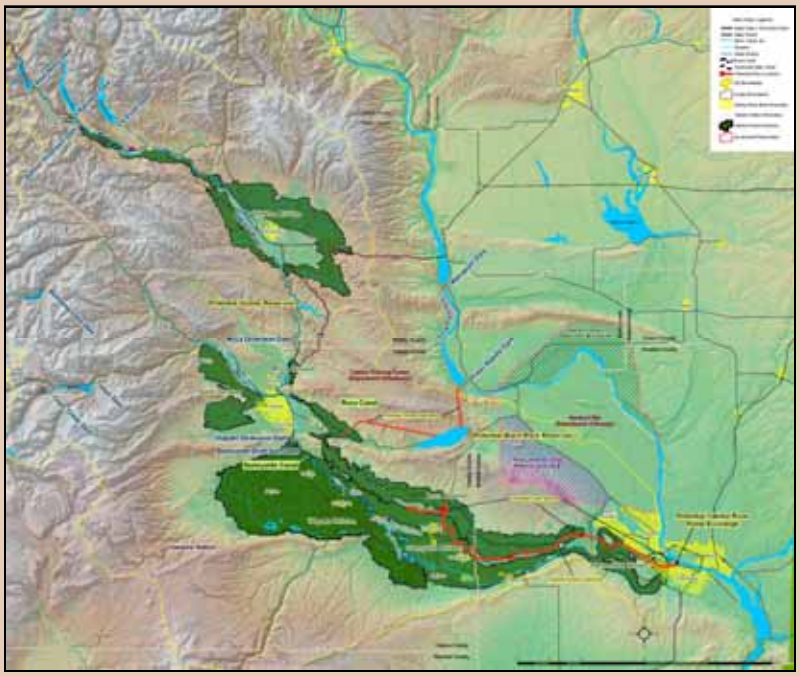
RECLAMATION

Managing Water in the West

Cost-Risk Analysis for the Black Rock and Wymer Dam and Reservoir Alternatives

A component of
Yakima River basin Water Storage Feasibility Study, Washington

Technical Series No. TS-YSS-26



U.S. Department of the Interior
Bureau of Reclamation
Technical Service Center
Denver, Colorado

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The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Cost-Risk Analysis for the Black Rock and Wymer Dam and Reservoir Alternatives

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Preface

The Congress directed the Secretary of the Interior, acting through the Bureau of Reclamation, to conduct a feasibility study of options for additional water storage in the Yakima River basin. Section 214 of the Act of February 20, 2003 (Public Law 108-7), contains this authorization and includes the provision "… with emphasis on the feasibility of storage of Columbia River water in the potential Black Rock Reservoir and the benefit of additional storage to endangered and threatened fish, irrigated agriculture, and municipal water supply."

Reclamation initiated the Yakima River basin Water Storage Feasibility Study (Storage Study) in May 2003. As guided by the authorization, the purpose of the Storage Study is to identify and examine the viability and acceptability of alternate projects by: (1) diversion of Columbia River water to a potential Black Rock reservoir for further water transfer to irrigation entities in the lower Yakima River basin as an exchange supply, thereby reducing irrigation demand on Yakima River water and improving Yakima Project stored water supplies; and (2) creation of additional water storage within the Yakima River basin. In considering the benefits to be achieved, study objectives are to modify Yakima Project flow management operations to improve the flow regime of the Yakima River system for fisheries, provide a more reliable supply for existing proratable water users, and provide water supply for future municipal demands.

State support for the Storage Study was provided in the 2003 Legislative session. The 2003 budget included appropriations for the Washington State Department of Ecology (Ecology) with the provision that the funds ". . . are provided solely for expenditure under a contract between the department of ecology and the United States bureau of reclamation for the development of plans, engineering, and financing reports and other preconstruction activities associated with the development of water storage projects in the Yakima River basin, consistent with the Yakima River basin water enhancement project, P.L. 103-434. The initial water storage feasibility study shall be for the Black Rock reservoir project." Since that initial legislation, the State of Washington has appropriated additional matching funds.

Storage Study alternatives were identified from previous studies by other entities and Reclamation, appraisal assessments by Reclamation in 2003 through 2006, and public input. Reclamation filed a Notice of Intent and Ecology filed a Determination of Significance to prepare a combined Planning Report and Environmental Impact Statement (PR/EIS) on December 29, 2006. A scoping process, including two public scoping meetings in January 2007, identified

several concepts to be considered in the Draft PR/EIS. Those concepts were developed into "Joint" and "State" Alternatives.

The Joint Alternatives fell under the congressional authorization and the analyses were cost-shared by Reclamation and Ecology. The State Alternatives fell outside the congressional authorization, but within the authority of State legislation, and were analyzed by Ecology only. Analysis of all alternatives was included in the Draft PR/EIS.

Some comments pointed out that Yakima River basin issues were not being adequately addressed in the Draft PR/EIS. Given those comments and the narrow focus of the congressional authorization, the State of Washington has decided to not participate further in the joint NEPA/SEPA process. The State will continue the SEPA process to look at a broader range of solutions to water resource problems that are not limited to storage solutions. As a consequence, the State Alternatives have been deleted from the Final PR/EIS and will be addressed in a separate SEPA process.

This technical document and others explain the analyses performed to determine how well the alternatives meet the goals of the Storage Study and the impacts of the alternatives on the environment. These documents will address such issues as hydrologic modeling, sediment modeling, temperature modeling, fish habitat modeling, and designs and costs. All technical documents were the basis for the Draft and Final Planning Reports/Environmental Impact Statements and are available for review.

List of Abbreviations and Acronyms

af	acre-feet
cfs	flow rate in cubic feet per second
cy	cubic yards
El.	Elevation
fps	velocity in feet per second
ft	foot or feet
ft^2	area in square feet
ft^3	volume in cubic feet
ft/s	velocity in feet per second
ft^3/s	flow rate in cubic feet per second
Hanford Site	Hanford Nuclear Reservation
hp	horsepower
H:V	ratio of horizontal to vertical slope
km	kilometers
kV	kilovolt
lbs	pounds
lf	linear feet
MP	mile post or Most Probable
MPH	Most Probable High
MPL	Most Probable Low
MW	Megawatt
NWS	normal water surface
PSHA	Probabilistic Seismic Hazard Assessment
psi	pressure in pounds per square inch
Q	flow rate
RM	River mile
SR	State Route
TDH	total design head

TSC	Technical Service Center
USGS	United States Geological Survey
WS	water surface
%	percent

Executive Summary

Background

Legislation authorizing the Yakima River basin Water Storage Feasibility Study (Storage Study) directs the Bureau of Reclamation to conduct a feasibility study of options for additional water storage in the Yakima River basin, Washington, with emphasis on the feasibility of storing Columbia River water in the potential offstream Black Rock reservoir. See Figure 1. In 2004, Reclamation completed an appraisal assessment of likely configurations, sizes, and costs of Black Rock Project facilities needed to pump, store, and deliver Columbia River water to willing exchange participants in the Yakima basin [1]. In 2007, Reclamation completed an appraisal assessment of likely configurations and costs of Wymer Project facilities needed to pump and store Yakima River water to increase storage capacity in the Yakima River basin [2]. The conclusions reached in these two appraisal assessments were that the Black Rock and Wymer Dam and Reservoir Alternatives should be included in the Plan Formulation Phase of the Storage Study. Both of these alternatives were presented in Reclamation's *Draft Planning Report/Environmental Impact Statement* (PR/EIS) (2008) [3].

Another alternative included in the Draft PR/EIS is the Wymer Dam Plus Yakima River Pump Exchange Alternative. This alternative included the Wymer Dam and Reservoir Alternative, along with a pipeline and pumping plants to deliver water to the lower Yakima River basin from the mouth of the Yakima River. This alternative was more expensive than the Wymer Dam and Reservoir Alternative, but had a very low benefit-cost ratio and minimal irrigation, fishery, and municipal benefits; therefore, it was not considered in this cost-risk analysis.

Purpose of this Report

The purpose of this report is to present findings of a cost-risk analysis of total project costs for the Black Rock and Wymer Dam and Reservoir Alternatives. This was accomplished by defining a range of probable field and total project costs associated with the two alternatives and performing a cost-risk analysis. Provisions to mitigate downstream seepage impacts at the Hanford Nuclear Reservation (Hanford Site) were also included in the revised cost estimates for the Black Rock Alternative.

The first step in the cost-risk analysis is development of the most probable low (MPL), most probable (MP), and most probable high (MPH) quantities and cost estimates that attempt to define the uncertainty of estimating costs of a project

with less-than-feasibility-level design data. The MPL field cost estimate was generally calculated by multiplying the lowest quantity value by the lowest cost value for all identified pay items and adding the lowest estimates for allowances (design contingencies and construction contingencies). The most probable field cost estimate was calculated by multiplying the most-likely-quantity value by the most-likely-cost value for each identified pay item and adding the most-likely estimates for allowances (design contingencies and construction contingencies) given our current understanding of local conditions. Similarly, the MPH field cost estimate was generally calculated by multiplying the highest quantity value by the highest cost value for all identified pay items and adding the highest estimates for allowances (design contingencies and construction contingencies). The variations of quantities and unit prices across the MPL, MP, and MPH cost estimates are based on engineering judgment, given the available design data and definition of project needs.

The second step is to perform a statistical analysis of the MPL, MP, and MPH cost estimates. Reclamation used the Crystal Ball software produced by the Oracle Corporation to develop risk-based models of the cost estimates. This software uses the "Monte Carlo" simulation techniques to model risk, based on the three cost estimates developed for each feature. The goal is to evaluate cost risk associated with each line item of the cost estimate including quantity and unit price ranges between the MPL, MP, and the MPH cost estimates.

Monte Carlo risk analysis is a statistical analysis which randomly generates total costs based on the sum of the distributions of quantities and unit prices generated from the MPL, MP, and MPH cost estimates. The resulting 0% field cost estimate has a zero-percent probability of not being exceeded, and the 100% field cost estimate has a 100-percent probability of not being exceeded. This cost-risk modeling allows the selection of a project budget associated with percent risk and likelihood that those funds would cover the costs associated with each feature.

Black Rock Alternative

The Black Rock Alternative involves a diversion and partial exchange of Columbia River water for Yakima Project water currently diverted by the Roza and Sunnyside Divisions (Roza and Sunnyside) of the Yakima Project for irrigation. Columbia River water pumped from Priest Rapids Reservoir would be stored in a Black Rock reservoir to be constructed in the Black Rock Valley. Stored water would be conveyed by an outflow conveyance system extending from the reservoir to the lower Yakima Valley and delivered to Roza Canal at MP 22.6 for Roza's downstream users and to Sunnyside Canal at MP 3.83 for Sunnyside upstream and downstream users. Most of the Yakima Project water currently diverted from the Yakima River by these two water exchange

participants would not be diverted, and the freed-up water would instead be applied to meet the Storage Study goals.

Table ES- 1 provides an overview of major features associated with the most probable configuration of the Black Rock Alternative, and Figure 2 shows the general location of the features.

Wymer Dam and Reservoir Alternative

The Wymer Dam and Reservoir Alternative involves construction of an off-channel storage facility on Lmuma Creek, approximately 8 miles upstream of Roza Diversion Dam. Wymer reservoir would be filled by a 400-cfs-capacity pumping plant located on the Yakima River and would release water back to the Yakima River by gravity. The addition of the Wymer Dam and Reservoir Alternative would increase the Yakima Project total active storage capacity from 1,070,700 acre-feet to 1,239,700 acre-feet.

Table ES- 2 provides an overview of major features associated with the most probable configuration of the Wymer Dam and Reservoir Alternative, and Figure 3 shows the general location of the features.

Findings

The cost-risk analysis shows considerable risk associated with these appraisal-level designs and cost estimates which are to be expected at this stage in the planning process. To substantially reduce this risk and narrow the range of probable cost estimates, sufficient design data would need to be collected and used in preparation of feasibility-level designs and cost estimates. This would involve considerable expense and time to accomplish.

Black Rock Alternative

Field cost estimate

1. The most probable field cost estimate for the Black Rock Alternative is $4.56 billion (April 2007). The most probable low and most probable high field cost estimates are $3.44 billion and $8.075 billion, respectively.
2. The MP field cost estimate for the Black Rock Alternative is $1.29 billion greater than the indexed appraisal-level field cost estimate used in the Draft PR/EIS. The three major components of this cost difference are: inclusion of seepage mitigation features ($605 million), design and cost estimating refinements ($250 million), and actual inflation over the previous indexing from 2004 to 2007 ($432 million).

Table ES- 1. Major Features of the Most Probable Black Rock Alternative

Priest Rapids Intake:	Located on Priest Rapids Lake Design Flow Capacity: 3,500 cfs Design Normal water Surface = El. 468.0 Approach velocity for fish screens = 0.4 fps
Pumping Plant:	Design pumped flow capacity at TDH_{max} of 1,400 feet: 3,500 cfs 5 Two-stage Spiral case Pumps Indoor plant with overhead crane
Inflow Conveyance:	All-tunnel option Design Flow Capacity: 3,500 cfs Tunnel Length = 34,850 ft, Finished Diameter = 17-feet Surge Shaft Depth = 1,506 ft, Finished Diameter = 22-feet
Reservoir:	Maximum WS = El. 1778.0 Normal WS (Top of Active Storage) = El. 1775.0 Bottom of Active Storage = El. 1,500.0 Active Storage: 1,300,000 af
Dam:	Type: Central core rockfill embankment Top of Dam: El. 1,785 Crest Length = 6,590 feet Maximum Structural Height = 755 feet
Spillway:	None.
Outlet Works:	Single-level, trashracked Intake Elevation = El. 1,360 20.0-ft ID upstream tunnel 32-ft ID downstream tunnel with 16-ft-diameter pipe. Discharge into Dry Creek.
Downstream Seepage Mitigation:	200-Foot Deep Cutoff Wall, 5,500 feet long 15-foot-high embankment Trashracked and gated intake with trash rake Ten dewatering wells downstream of embankment Pipeline Length = 19,200 feet; Pipeline Diameter = 4-feet Outlet structure on Yakima River.
Outflow Conveyance:	Trashracked Intake Elevation = El. 1,500 Tunnel on North side of valley. Design Flow Capacity: 2,500 cfs Tunnel Length = 90,000 ft, Finished Diameter = 17 feet Surge Shaft Depth = 530 ft, Finished Diameter = 40 feet
Black Rock Outlet Facility:	Located at MP 22.6 of Roza Canal Bypass flow capacity: 2,500 cfs (4 Sleeve valves) Powerplant design flow capacity: 900 cfs (1 Francis Turbine) Power output at design head of 338 feet: 23 MW Indoor facility with 2 overhead cranes
Project Roads:	Relocate 11.8 miles of SR-24
Sunnyside Powerplant:	Located at MP 3.83 of Sunnyside Canal Powerplant design-flow capacity: 900 cfs (1 Francis Turbine) Power output at design head of 435 feet: 29.5 MW Bypass flow capacity: 1,250 cfs (2 Sleeve valves) Indoor facility with overhead crane
Delivery System to Sunnyside:	Pipeline from MP22.6 of Roza Canal to MP 3.83 of Sunnyside Canal. Design-flow Capacity: 1,250 cfs
Delivery System to Roza:	No new features upstream of MP 22.6. Continue diversion of Yakima River at Roza Diversion Dam for deliveries upstream of MP 22.6. 800 cfs delivered via Black Rock outlet facility downstream of MP 22.6.

Table ES- 2 Major Features of the Most Probable Wymer Dam and Reservoir Alternative.

Yakima River Intake:	Design Flow Capacity: 480 cfs Min. Operating River WS = El. 1,275.0 Max. River WS = El. 1284.0 Approach velocity for fish screens = 0.4 fps
Pumping Plant:	Design pumped flow capacity at TDH_{max} of 475 feet: 400 cfs (w/o wear factor) 7 equal-sized, fixed-speed, horizontal centrifugal pumps Indoor plant with overhead crane
Discharge Pipe:	120-inch-diameter steel pipe Pipe length = 4,700 feet 46-foot-diameter steel air chamber Outlet elevation in reservoir: El. 1610
Reservoir:	Maximum WS = El. 1,741.7 (PMF) Normal WS (Top of Active Storage) = El. 1,730 Bottom of Active Storage = El. 1,375 Active Storage between El. 1,375 and El. 1,730: 169,000 af Active Storage between El. 1,456 and El. 1,730: 162,500 af
Main Dam:	Type: Concrete face rockfill embankment Top of Dam: El. 1,750 Crest Length = 3,200 feet Maximum Structural Height = 450 feet
Saddle Dike:	Type: Central cor,e rockfill embankment Top of Dike: El. 1750 Crest Length = 2,700 feet Maximum Structural Height = 180 feet
Spillway:	Type: Reinforced concrete uncontrolled ogee crest Top of Crest = El. 1,730, Crest Length = 60 feet Rectangular chute on right abutment with air slots Stilling Basin: Type II with slotted flip bucket Discharge into Lmuma Creek
Outlet Works:	Single-level intake at reservoir Intake Invert Elevation = El. 1,375 9.5-foot ID upstream tunnel 15-foot ID downstream tunnel with 102-inch-diameter pipe. Discharge into Lmuma Creek.
Lmuma Creek:	Channel modified for 100-year flood (1,600 cfs)
I-82 Bridge Protection:	Coat piers with waterproofing membrane Riprap embankments

3. Monte Carlo risk simulation of the calculated field cost estimates indicate that there is a 0% probability that the actual field cost will be less than $4.10 billion, and a 100% probability that the actual field cost will be less than $6.02 billion. The mean field cost estimate is $4.92 billion.

Total Project Cost Estimate

4. The MP total project cost estimate for the Black Rock Alternative is $5.69 billion (April 2007). The MPL and MPH total project cost estimates are $4.084 billion and $10.455 billion, respectively.

5. Monte Carlo risk simulation of the calculated total project cost estimates indicate that there is a 0% probability that the actual total project cost will be less than $4.95 billion, and a 100% probability that the actual total project cost will be less than $7.73 billion. The mean total project cost estimate is $6.18 billion.

Wymer Dam and Reservoir Alternative

Field cost estimate

1. The MP field cost estimate for the Wymer Dam and Reservoir Alternative is $786 million (April 2007). The MPL and MPH field cost estimates are $537 million and $1.285 billion, respectively.

2. The MP field cost estimate for the Wymer Dam and Reservoir Alternative is close to the appraisal-level field cost estimate used in the Draft PR/EIS.

3. Monte Carlo risk simulation of the calculated field cost estimates indicate that there is a 0% probability that the actual field cost will be less than $704 million, and a 100% probability that the actual field cost will be less than $1.01 billion. The mean field cost estimate is $831 million.

Total Project Cost Estimate

4. The MP total project cost estimate for the Wymer Dam and Reservoir Alternative is $1.024 billion (April 2007). The MPL and MPH total project cost estimates are $669 million and $1.715 billion, respectively.

5. Monte Carlo risk simulation of the calculated total project cost estimates indicate that there is a 0% probability that the actual total project cost will be less than $867 million, and a 100% probability that the actual total project cost will be less than $1.34 billion. The mean total project cost estimate is $1.08 billion.

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I. Introduction

Legislation authorizing the Yakima River basin Water Storage Feasibility Study (Storage Study) directs the Bureau of Reclamation to conduct a feasibility study of options for additional water storage in the Yakima River basin, Washington, with emphasis on the feasibility of storing Columbia River water in the potential offstream Black Rock reservoir. See Figure 1. As part of the feasibility study, Reclamation completed appraisal designs and cost estimates of alternatives to accomplish the goals of the study. Three of these designs and cost estimates were included in Reclamation's *Draft Planning Report/Environmental Impact Statement* (PR/EIS) (January 2008) [3]. To accurately portray the costs required to construct the alternatives in the Draft PR/EIS, a cost-risk analysis was prepared for two of the alternatives for the Final PR/EIS. A third alternative, the Wymer Dam Plus Yakima River Pump Exchange Alternative, was not subjected to the cost-risk analysis because of its high cost, very low benefit-cost ratio, and minimal irrigation, fishery, and municipal benefits identified in the Draft PR/EIS.

II. Purpose of this Report

The purpose of this report is to present the findings of a cost-risk analysis of total project costs for the Black Rock and Wymer Dam and Reservoir alternatives. This was accomplished by defining a range of probable field and construction costs associated with these alternatives and performing a cost-risk analysis. Provisions to mitigate downstream seepage impacts at the Hanford Site were also included in the revised cost estimates for the Black Rock Alternative.

III. Background

In 2004, Reclamation completed an appraisal assessment of likely configurations, sizes, and costs of Black Rock Project facilities needed to pump, store, and deliver Columbia River water to willing exchange participants in the Yakima Basin [1]. In 2007, Reclamation completed an appraisal assessment of likely configurations and costs of Wymer project facilities needed to pump and store Yakima River water to increase storage capacity in the Yakima River basin [2]. The conclusions reached in these two appraisal assessments were that the Black Rock and Wymer Dam and Reservoir Alternatives should be included in the Plan Formulation Phase of the Storage Study. Both of these alternatives were also presented in the January 2008 *Draft Planning Report/Environmental Impact Statement* (PR/EIS) [3]. The April 2007 Black Rock Alternative cost estimate was prepared by indexing the 2004 appraisal-level cost estimates, while the April 2007 Wymer

Dam and Reservoir cost estimate was prepared by applying April 2007 unit prices to estimated quantities.

The appraisal-level field cost estimates developed in support of the Storage Study are intended for use in comparing the various alternatives developed as part of the Study. The designs are based on limited design data that do not meet Reclamation's criteria for feasibility-level design. The field cost estimates were generated using industrywide accepted cost estimating methodology, standards, and practices with major features broken down into pay items and approximate quantities calculated for these items based on preliminary designs and drawings. Unit prices, adjusted for location and current construction cost trends, were determined for the identified pay items.

Reclamation Directives and Standards require a more refined estimate (feasibility) be used to request project authorization for construction by Congress. However, due to the low benefit-cost ratios (less than 0.30) identified for these alternatives in the Draft PR/EIS [3], it was decided that the large expense of additional data gathering and design work would not be warranted. However, to improve our understanding of costs and cost risks, the cost estimates for the Black Rock and Wymer Dam and Reservoir Alternatives were repriced to a common price level (April 2007) and the uncertainty due to limited design data and design calculation addressed with development of MPL, MP, and MPH quantities and cost estimates. This range of estimates attempts to account for possible deviations in quantities and costs due to lack of design data, level of design computation, and possible difficulties with construction due to local conditions.

IV. Cost-Risk Analysis Process

The first step in the cost-risk analysis is development of the most probable low (MPL), most probable (MP), and most probable high (MPH) quantities and cost estimates that attempt to define the uncertainty of estimating costs of a project with less-than-feasibility-level design data. The MPL field cost estimate was generally calculated by multiplying the lowest quantity value by the lowest cost value for all identified pay items and adding the lowest estimates for allowances (design contingencies and construction contingencies). The most probable field cost estimate was calculated by multiplying the most-likely-quantity value by the most-likely-cost value for each identified pay item and adding the most-likely estimates for allowances (design contingencies and construction contingencies) given our current understanding of local conditions. Similarly, the MPH field cost estimate was generally calculated by multiplying the highest quantity value by the highest cost value for all identified pay items and adding the highest estimates for allowances (design contingencies and construction contingencies).

The variations of quantities and unit prices across the MPL, MP, and MPH cost estimates are based on engineering judgment, given the available design data and definition of project needs.

The second step is to perform a statistical analysis of the MPL, MP, and MPH cost estimates. Reclamation used the Crystal Ball software produced by the Oracle Corporation to develop risk-based models of the cost estimates. Crystal Ball software is a spreadsheet-based software suite for predictive modeling, forecasting, Monte Carlo simulation and optimization used by over 4,000 customers worldwide, including customers from the aerospace, financial services, manufacturing, oil and gas, pharmaceutical, and utilities industries. Reclamation has been using Monte Carlo simulation techniques for many years to assess the risk of failure of its dam inventory and has recently adapted similar methodology to evaluate cost risk.

The Monte Carlo simulation capabilities of Crystal Ball were used to model cost risk based on the three estimates (MPL, MP, MPH) developed for each feature. Monte Carlo risk analysis is a statistical analysis randomly generating total costs based on the sum of the distributions of quantities and unit prices generated from the MPL, MP, and MPH cost estimates. The goal is to evaluate cost risk associated with each line item of the cost estimate including quantity and unit price ranges between the most probable low, most probable, and the most probable high cost estimates. The resulting 0% field cost estimate has a zero-percent probability of not being exceeded and the 100% field cost estimate has a 100-percent probability of not being exceeded. This cost risk modeling allows the selection of a project budget associated with percent risk and likelihood those funds would cover the costs associated with each feature.

V. Alternative Descriptions

The following sections describe the Design Team's efforts to develop the most probable low, most probable, and most probable high design concepts and cost risk for the Black Rock and Wymer Dam and Reservoir Alternatives.

Black Rock Alternative

The Black Rock Alternative involves a diversion and partial exchange of Columbia River water for Yakima Project water currently diverted by the Roza and Sunnyside Divisions (Roza and Sunnyside) of the Yakima Project for irrigation. See Figure 2.

Columbia River water pumped from Priest Rapids Reservoir would be stored in a Black Rock reservoir to be constructed in the Black Rock Valley. Stored water would be conveyed by an outflow conveyance system extending from the reservoir to the lower Yakima Valley and delivered to Roza Canal at MP 22.6 for Roza's downstream users and to Sunnyside Canal at MP 3.83 for Sunnyside upstream and downstream users. Most of the Yakima Project water currently diverted from the Yakima River by these two water exchange participants would not be diverted, and the freed-up water would instead be used to meet the Storage Study goals.

A 2,400-foot intake channel on Priest Rapids Lake with fish screens would carry water to the Priest Rapids pumping plant. The pumping plant would house three 500-cfs pump units and two 1,000-cfs pump units (total 3,500 cfs) that would withdraw water from Priest Rapids Lake at about elevation 488 feet and lift it to elevation 1,440 feet. Conveyance from the Priest Rapids pumping plant to the new Black Rock reservoir would be via a 6.5-mile, 17-foot-diameter tunnel with a capacity of 3,500 cfs. A 22-foot-diameter surge shaft would be located about ¾-mile up the tunnel from the pumping plant. A 6-mile-long, 500-kV transmission line would be constructed from the Midway Substation to a switchyard adjacent to the Priest Rapids pumping plant for power.

Black Rock reservoir would be impounded by a central core rockfill dam 550 feet high above original ground (structural height, 755 feet) and 6,695 feet long. The reservoir would have an active storage of 1,300,000 acre-feet. It would be 10 miles long at full pool (1,775 feet elevation) and a mile across at its widest point.

Stored water would be released through the reservoir's single-level screened intake at elevation 1,500 feet to a 17-foot-diameter tunnel with a capacity of 2,500 cfs on the northern side of the reservoir. The tunnel would parallel Yakima Ridge for about 14 miles to a 40-foot-diameter surge shaft. At that point, the tunnel would turn to the southwest and extend about 3 miles to the north side of SR-24. From there, water would be conveyed in a 3,000-foot-long, 17-foot-diameter buried steel pipeline that would cross under SR-24 to MP 22.6 of the Roza Canal. At this point, the pipeline would split, with 885 cfs carried to the 23-MW Black Rock powerplant and into the Roza Canal and up to 1,250 cfs carried in a 12-foot-diameter buried steel pipeline to the Sunnyside Canal.

The Sunnyside pipeline would extend from the vicinity of MP 22.6 of the Roza Canal about 6.5 miles over Konnowac Pass to the Sunnyside Canal at MP 3.83. At this point, most of the water would be discharged through a new Sunnyside powerplant into the Sunnyside Canal for downstream delivery. However, a small number of Sunnyside water users upstream of this point would receive delivery of

17 to 20 cfs by a pumping plant and a buried PVC pipeline about 3.2 miles long, located on the right embankment of the Sunnyside Canal.

The Roza Canal would continue to obtain some of its water supply from the Yakima River by diverting at the Roza Diversion Dam (RM 127.9). This diversion would continue to provide flows (up to 1,075 cfs) for the operation of the existing Roza Powerplant and the approximately 180-200 cfs required for irrigation of lands upstream of MP 22.6 on the Roza Canal.

The addition of the Black Rock Alternative would increase the Yakima Project total active storage capacity by 1,300,000 acre-feet from 1,070,700 acre-feet to 2,370,700 acre-feet. See Table 1 for an overview of major features associated with the most probable configuration of the Black Rock Alternative and Figure 2 for a general location of its features.

Wymer Dam and Reservoir Alternative

The Wymer Dam and Reservoir Alternative involves construction of an off-channel storage facility on Lmuma Creek, approximately 8 miles upstream of Roza Diversion Dam located at RM 127.9 on the Yakima River. Wymer reservoir would be filled by a 400-cfs-capacity pumping plant located on the Yakima River and would release water back to the Yakima River by gravity. See Figure 3.

A 200-foot-intake channel on the Yakima River with fish screens and a fish bypass system would carry water to an intake manifold to the Wymer pumping plant. The pumping plant would house seven 60-cfs pump units (total 420 cfs [with wear factor]) that would withdraw water from the Yakima River at about elevation 1,275 feet and lift it to elevation 1,610 feet. Conveyance from the Wymer pumping plant to the new reservoir would be via a 4,700-foot-long, 120-inch-diameter steel pipeline with a 46-foot-diameter air chamber for surge protection. The pumping plant and air chamber would be located partially underground to minimize visual impacts. A switchyard and 115 kilovolt (kV) transmission line (5 miles long) would be constructed to supply power to the pumping plant.

Wymer dam would be a concrete-faced rockfill embankment across Lmuma Creek approximately 450 feet high. It would create a 169,000-acre-foot active capacity reservoir extending 5 miles from about ¼ mile east of the Yakima River to I-82. A 180-foot-high central-core rockfill dike would also be constructed in a saddle on the north side of the reservoir. A reinforced concrete uncontrolled ogee crest spillway with slotted bucket stilling basin would be constructed to discharge water into Lmuma Creek. A single-level outlet works on the south dam abutment,

Table 1. Major Features of the Most Probable Black Rock Alternative

Priest Rapids Intake:	Located on Priest Rapids Reservoir Design Flow Capacity: 3,500 cfs Design Normal water Surface = El. 468.0 Approach velocity for fish screens = 0.4 fps
Pumping Plant:	Design pumped flow capacity at TDH_{max} of 1,400 feet: 3,500 cfs 5 Two-stage Spiral case Pumps Indoor plant with overhead crane
Inflow Conveyance:	All Tunnel Option Design Flow Capacity: 3,500 cfs Tunnel Length = 34,850 ft, Finished Diameter= 17-feet Surge Shaft Depth = 1,506 ft, Finished Diameter= 22-feet
Reservoir:	Maximum WS = El. 1,778.0 Normal WS (Top of Active Storage) = El. 1775.0 Bottom of Active Storage = El. 1,500.0 Active Storage: 1,300,000 af
Dam:	Type: Central core rockfill embankment Top of Dam: El. 1,785 Crest Length= 6,590 feet Maximum Structural Height= 755 feet
Spillway:	None.
Outlet Works:	Single-level, trashracked Intake Elevation = El. 1,360 20.0-ft ID upstream tunnel 32-ft ID downstream tunnel with 16-ft-diameter pipe. Discharge into Dry Creek.
Downstream Seepage Mitigation:	200-Foot Deep Cutoff Wall, 5,500 feet long 15-foot high embankment Trashracked and gated intake with trash rake Ten dewatering wells downstream of embankment Pipeline Length = 19,200 feet, Pipeline Diameter = 4-feet Outlet structure on Yakima River.
Outflow Conveyance:	Trashracked Intake Elevation= El. 1,500 Tunnel on North side of valley. Design Flow Capacity: 2,500 cfs Tunnel Length = 90,000 ft, Finished Diameter = 17-feet Surge Shaft Depth = 530 ft, Finished Diameter = 40-feet
Black Rock Outlet Facility:	Located at MP 22.6 of Roza Canal Bypass flow capacity: 2,500 cfs (4 Sleeve valves) Powerplant design flow capacity: 900 cfs (1 Francis Turbine) Power output at design head of 338 feet: 23 MW Indoor facility with 2 overhead cranes
Project Roads:	Relocate 11.8 miles of SH 24
Sunnyside Powerplant:	Located at MP 3.83 of Sunnyside Canal Powerplant design flow capacity: 900 cfs (1 Francis Turbine) Power output at design head of 435 feet: 29.5 MW Bypass flow capacity: 1,250 cfs (2 Sleeve valves) Indoor facility with overhead crane
Delivery System to Sunnyside:	Pipeline from MP22.6 of Roza Canal to MP 3.83 of Sunnyside Canal. Design Flow Capacity: 1,250 cfs
Delivery System to Roza:	No new features upstream of MP 22.6. Continue diversion of Yakima River at Roza Diversion Dam for deliveries upstream of MP 22.6. 800cfs delivered via Black Rock outlet facility downstream of MP22.6.

sized for evacuation, would return water to Lmuma Creek and the Yakima River. The Lmuma Creek channel would be modified with seven drop structures and then realigned (straightened) from after the SR-821 bridge to the Yakima River.

The addition of the Wymer Dam and Reservoir Alternative would increase the Yakima Project total active storage capacity by 162,500 acre-feet (reduced for sediment load) from 1,070,700 acre-feet to 1,233,200 acre-feet. See Table 2 for an overview of major features associated with the most probable configuration of the Wymer Dam and Reservoir Alternative and Figure 3 for a general location of its features.

Table 2. Major Features of the Most Probable Wymer Dam and Reservoir Alternative

Yakima River Intake:	Design Flow Capacity: 480 cfs Min. Operating River WS = El. 1,275.0 Max. River WS = El. 1,284.0 Approach velocity for fish screens = 0.4 fps
Pumping Plant:	Design pumped flow capacity at TDH_{max} of 475 feet: 400 cfs (w/o wear factor) 7 equal-sized, fixed-speed, horizontal centrifugal pumps Indoor plant with overhead crane
Discharge Pipe:	120-inch-diameter steel pipe Pipe length = 4,700 feet 46-foot-diameter steel air chamber Outlet elevation in reservoir: El. 1,610
Reservoir:	Maximum WS = El. 1,741.7 (PMF) Normal WS (Top of Active Storage) = El. 1,730 Bottom of Active Storage = El. 1375 Active Storage between El. 1375 and El. 1,730: 169,000 af Active Storage between El. 1456 and El. 1,730: 162,500 af
Main Dam:	Type: Concrete face rockfill embankment Top of Dam: El. 1,750 Crest Length = 3,200 feet Maximum Structural Height = 450 feet
Saddle Dike:	Type: Central core rockfill embankment Top of Dike: El. 1,750 Crest Length = 2,700 feet Maximum Structural Height = 180 feet
Spillway:	Type: Reinforced concrete uncontrolled ogee crest Top of Crest = El. 1,730, Crest Length = 60 feet Rectangular chute on right abutment with air slots Stilling Basin: Type II with slotted flip bucket Discharge into Lmuma Creek
Outlet Works:	Single level intake at reservoir Intake Invert Elevation = El. 1,375 9.5-foot ID upstream tunnel 15-foot ID downstream tunnel with 102-inch-diameter pipe. Discharge into Lmuma Creek.
Lmuma Creek:	Channel modified for 100-year flood (1,600 cfs)
I-82 Bridge Protection:	Coat piers with waterproofing membrane Riprap embankments

VI. Evaluation of Seismic Design Parameters

For the Black Rock Alternative, an initial probabilistic seismic hazard assessment (PSHA) was completed and included in Appendix B of the *Appraisal Assessment of the Black Rock Alternative Facilities and Field Cost Estimates* (Reclamation, 2004) (TS-YSS-2) [1]. For the Wymer Dam and Reservoir Alternative, the seismic hazard was based on the Black Rock PSHA. For both alternatives, it was assumed that an earthquake having a return period of 2,500 years had a total Peak Horizontal Ground Acceleration (PHA) of about 0.50 g, and at a return period of 10,000 years, the PHA would be about 0.95 g. The following is a recent evaluation of these seismic design parameters.

Black Rock Alternative

The 2004 PSHA for Black Rock Dam was based on readily available information, using a simplified source model and reasonable but possibly conservative assumptions regarding fault activity and slip rates for faults in the Yakima fold belt. To the best of our knowledge, there is no new data and no new investigations that have been carried out since the 2004 study that would significantly change the overall conclusions of that study. Only more detailed investigations that involved the collection of actual data on the activity, or inactivity of the faults near the Black Rock site, would change the 2004 results significantly.

As discussed in the 2004 report, more in-depth investigations would include evaluation and analysis of remotely sensed imagery, detailed geologic mapping, analysis of the potential for reservoir induced seismicity, assessment of the potential for surface fault rupture, and possible paleoseismic trenching. The large size of the Black Rock Alternative suggests that reservoir-induced seismicity could be also an issue. Thus, seismic monitoring of the site should be conducted which will require several years of pre-reservoir data collection as well as long-term monitoring after initial reservoir filling.

Appraisal-level studies to date also suggest the potential for surface fault rupture associated with faults at or near the proposed dam abutments. Studies to evaluate the age and activity of these faults would require extensive geophysical studies, drilling, detailed geologic mapping and geomorphic analyses, and paleoseismic trenching. To address all earthquake-related issues at the Black Rock site and produce feasibility-level earthquake ground-motion loadings and other necessary parameters for design would require collection and analysis of a substantial amount of design data at considerable additional expense and time.

Wymer Dam and Reservoir Alternative

A site-specific seismic hazard study has never been done for the Wymer dam site. Basically, the 2004 probabilistic seismic hazard assessment for Black Rock dam was used as a proxy for the Wymer dam site. While the two sites share many geologic and seismotectonic similarities, it is impossible to say at the present time whether the use of the results from the Black Rock study, a site approximately 60 km to the east-southeast of the Wymer site, are either conservative or unconservative as applied to Wymer dam. The Black Rock site is located adjacent to faults in Black Rock Valley that may be part of the Ahtanum Ridge-Rattlesnake Hills system of faults and folds. A moderate level of activity was assumed for these structures, but even with very low levels of activity, these faults appear to control the seismic hazard at the Black Rock site. Likewise, the Wymer site is located near the Umtanum Ridge-Gable Mountain system of faults and folds. In the 2004 Black Rock dam study, a lower rate of activity was assigned to these structures than was assigned to the Black Rock Valley faults, but the basis for this assessment is not clear. After a more detailed, site-specific study for the Wymer site, and especially if such a study included actual field study and data collection, the seismic hazard could be quite different from that currently portrayed.

Feasibility-level seismotectonic investigations for Wymer would entail aerial photograph interpretation, limited field studies involving geologic mapping, a revised seismic source characterization, and doing an updated probabilistic seismic hazard analysis specifically for the site. The goal of these studies would be to identify issues, such as the potential for surface fault rupture, requiring resolution before final designs. Given the current lack of knowledge of the Wymer site, these studies would require a substantial investment of time and money to obtain and analyze the data required to significantly reduce the uncertainty of the current seismic design parameters.

VII. Black Rock Alternative - Description of MPL, MP, and MPH Concepts

Columbia River Intake and Priest Rapids Pumping Plant

The original appraisal designs did not include specific pay items for handling groundwater in the excavations for the intake and pumping plant adjacent to Priest

Rapids Reservoir and protection of the existing Priest Rapids Dam. They also assumed excavated material could be wasted locally. No new geologic data was obtained for this study and the current level of knowledge is based on basic information obtained from the original construction of the dam. However, to account for this lack of data and the possibility that groundwater control during construction could lead to significant additional cost not previously identified in the appraisal-level estimate, the most probable estimate was revised to include installation and operation of dewatering wells on 20-foot centers around the excavation and operation of ten unwatering pumps for a 9-month period. For the MPL estimate, it was assumed that groundwater would not be a significant cost during construction, and for the MPH estimate, it was assumed that the spacing of the dewatering wells would be reduced to 10-foot centers, and 20 unwatering pumps would be required over the nine-month period. To protect Priest Rapids Dam from changes in pore pressure resulting from the operation of the dewatering system around the pumping plant excavation, the MPH estimate includes a sheet pile cutoff wall to isolate the dam from pumping plant construction operations.

A large amount of rock waste, on the order of 1.5 million cubic yards, will be generated at the Priest Rapids site from excavations for the intake, pumping plant, and inflow conveyance system tunnel. For the MPL estimate it is assumed that this material could be wasted locally but for the MP and MPH cost estimates, it was assumed that this waste material would have one-way haul distances of 2 miles and 5 miles, respectively. Although no specific waste sites have been identified, it is believed that this range of haul distances adequately portrays the local conditions at the site.

To account for possible changes in design caused by gathering additional data and performing a more rigorous analysis of the features during feasibility and final designs, the estimated weight of concrete reinforcing steel in the pumping plant was varied across the MPL, MP, and MPH estimates, from 110 lbs/cy to 130 lbs/cy. To account for possible future corrosion concerns, the steel support frames for the fishscreens were assumed to be mild steel in the MPL and MP estimates, but stainless steel for the MPH estimate. To improve the accuracy of the cost estimates, quantities and prices for the switchyard structures have been included in all estimates in lieu of having these costs covered by design contingencies (formerly unlisted items). For all other features, it was assumed that quantities generated for the original appraisal study [1] adequately describe their configuration and no variation was needed across the MPL, MP, and MPH cost estimates.

Inflow Conveyance System

To account for the current lack of design data and level of design, the quantities for the Inflow Conveyance System, All-Tunnel Alternative (Discharge 1) were varied across the MPL, MP, and MPH cost estimates. The principal assumptions for these three estimates are shown in Table 3:

Table 3. Principal Assumptions for Inflow Tunnel Estimates

	MPL	MP	MPH
Most economical tunnel velocity (ft/sec)	15	15	10
Finished diameter of tunnel (ft)	17	17	21
Rock quality of reaches of tunnel requiring steel supports	Fair to Good	Fair to Very Poor	Fair to Very Poor
Length of tunnel requiring steel liner (ft)	1,700	2,500	2,500
Length of tunnel requiring steel supports (ft)	2,000	3,500	3,500

The rock quality assumptions for the MPL estimate agree with the assumptions used to develop the estimate in the original appraisal study. Although the quantities developed for the MP and MPH estimates attempt to capture the range of possible geologic conditions that will be encountered during the tunnel excavation, it should be noted that lining requirements may change significantly if more rock of poor quality is encountered because of the high head of the tunnel.

No additional transient studies were performed for this study. For the MPL, MP, and MPH cost estimates, the size of the surge shaft was assumed the same as for the original appraisal study [1]. Costs for handling the tunnel muck brought to the Priest Rapids portal of the tunnel are discussed in the preceding *Columbia River Intake and Priest Rapids Pumping Plant* section of this report. For tunnel muck brought to the Black Rock Valley portal, the MPL estimate assumed the material could be wasted locally, but the MP and MPH cost estimates assumed that waste material would still be wasted within the reservoir area but have a one-way haul distance of 2 miles.

Black Rock Dam

The geotechnical aspects associated with the MPL, MP, and MPH options at Black Rock Dam are concentrated on two features – the embankment dam and the downstream seepage mitigation features. Considerations for these features are discussed below, along with descriptions of the design concepts and/or quantity assumptions for each.

At the appraisal-level of design, there are a number of key design/construction issues that contain uncertainty and could potentially influence costs. Many of these are a function of geologic or site conditions, and include such issues as the amount of foundation treatment and the location/availability of various construction materials. As more explorations and studies are conducted during higher levels of design, it would be expected that some of these assumptions would change. The following paragraphs identify these types of issues that are expected to contain sufficient uncertainties to impact project costs. In general, quantities and design features that are expected to comprise a very small percentage of the construction costs are not discussed below, and identical quantities were assumed for each of the three estimates for these items.

1. Foundation Excavation, Common

The top of rock surface beneath Black Rock Dam is defined by a very limited number of drill holes at this stage of design. Given the large size of the dam and limited exploration, there is considerable uncertainty about the actual configuration of the bedrock surface. This, in turn, affects the amount of foundation excavation. As was done for the original appraisal design [1], depths to bedrock from the existing drillhole logs were used to develop bedrock contours for the MP estimate. For the MPL quantities, the rock contours were assumed to be uniformly 20 feet higher than for the MP case. For the MPH quantities, the rock contours were assumed to be uniformly 30 feet lower than the MP case.

A large portion of the foundation excavation will encounter the Ringold Formation, which is a Tertiary age unit consisting of an apparent highly variable deposit of sediments. Ringold materials range from lacustrine clays to well graded sands, gravels, and cobbles; and are reported to be poorly to well consolidated, and poorly to partially indurated. Given the limited explorations to date, the properties of the Ringold (particularly its density and resistance to liquefaction) are not well understood. Thus it is uncertain whether it is necessary to remove all of this material, or whether a portion of the deposit is sufficiently dense to form a suitable foundation for part of the embankment. For all estimates, the upstream portion of the Ringold has been entirely removed so that the dam core can be founded on rock. For the MP quantities, it was assumed that approximately 75 percent of the Ringold materials beneath the downstream half of the dam would be removed. The MPL quantities assumed that approximately 50 percent of the downstream Ringold is removed, while the MPH assumes that all Ringold materials are removed from beneath the entire embankment.

For cost estimating purposes, estimates were also made regarding how much of the foundation excavation (particularly the Ringold) would need to be ripped as part of the excavation process. The MP estimate assumed 35 percent of the

excavation volume would require ripping. The MPL estimate assumed 25 percent, while the MPH estimate assumed 45 percent.

2. Foundation Excavation, Rock

Rock quality is expected to be variable, and there may be some additional rock excavation beneath the core of the dam. Rock excavation in the right abutment fault area is expected to be more extensive and is covered separately later. The MP estimate assumed that 5,000 cubic yards of rock excavation would be required, as was assumed during the original appraisal design. The MPL estimate assumed 2,000 cubic yards, while the MPH estimate assumed 10,000 cubic yards.

3. Foundation Filters

Foundation filters are included to blanket areas of the foundation downstream of the core to ensure that core or foundation materials are not eroded or "piped" into the coarse rockfill shell. (Additional treatments in the area of the right abutment fault are discussed separately later.) These filters include 3 feet of zone 2 filter sand overlain by 3 feet of zone 3 drain gravels. The original appraisal design had assumed that approximately 10 percent of the foundation downstream of the core would need treatment. To account for lack of design data this assumption was varied for the cost-risk analysis. For the MP estimate, it was assumed that approximately 25 percent of the foundation area between the downstream end of the core and the downstream toe would be blanketed with filters. The MPL estimate assumed that 10 percent of the area would be filtered, while the MPH estimate assumed that 50 percent of the area would be filtered.

4. Slush Grouting and Dental Concrete

To help ensure that core materials are not piped into the bedrock, areas of the rock surface beneath the core will be treated as necessary with slush grouting and dental concrete to seal joints/fractures and reduce foundation irregularities. (Additional treatments in the area of the right abutment fault are discussed separately later.) For the MP estimate, the amount of dental concrete was assumed to be 5,000 cubic yards, as assumed during the original appraisal study [1]. The MPL estimate assumed 2,000 cubic yards, while the MPH estimate assumed 10,000 cubic yards. Slush grouting was assumed to be needed over 10 percent of the core foundation surface for both the MP and MPL estimates, as assumed in the appraisal design. The MPH estimate assumed that slush grouting would be needed over 15 percent of the core foundation.

5. Foundation Treatment for Right Abutment Fault

Given the poor rock quality in the right abutment foundation due to the presence of the thrust fault in that area, additional foundation treatment will be required. Such treatment is expected to include additional rock excavation (and replacement), additional foundation filters, and additional dental concrete. Essentially, the quantities for each of these features were based on three different assumptions of the areas to be treated. For rock excavation, all three estimates assumed 2,000 feet of treatment (in an upstream to downstream orientation). The depths of excavation varied from 10 feet for the MPL, 15 feet for the MP, and 20 feet for the MPH; resulting in rock excavation quantities of 150,000; 220,000; and 300,000 cubic yards, respectively. In addition, earthfill was assumed as the replacement for the MPL estimate, while roller-compacted concrete (RCC) was assumed for the MP and MPH estimates.

For the quantity of foundation filters (zone 2 and zone 3 blankets) over poor-quality rock, different treatment dimensions were assumed. Constant lengths of 1,000 feet were assumed, but the widths varied from 500 to 1,400 feet. Resulting quantities of both zone 2 and zone 3 were 56,000 cubic yards each for the MPL; 100,000 cubic yards for the MP; and 156,000 cubic yards for the MPH estimate.

Similarly, dental concrete quantities varied from 2,000 cubic yards for the MPL; 5,000 cubic yards for the MP; and 10,000 cubic yards for the MPH estimate.

6. Blanket and Curtain Grouting

Considering the potential uncertainties in rock quality, foundation grouting is certainly an area subject to a wide range of potential costs. To estimate this variability in both blanket and curtain grouting quantities, different assumptions were made for the number of grouting rows, spacings between holes, average depth of hole, and average grout take.

For blanket (consolidation) grouting, the MP estimate assumed that there would be 9 rows of holes set on an average spacing of 8.75 feet (average of 7.5- and 10-foot spacing); the holes would have an average depth of 45 feet; and the grout take would average 2 sacks of cement per lineal foot of hole. The MPL estimate reduced these assumptions to 9 rows, an average spacing of 10 feet, an average hole depth of 30 feet, and an average grout take of 1.5 sacks per lineal foot of hole. The MPH estimate assumed 22 rows (in large part due to a wider core which is discussed later), an average spacing of 7.5 feet, an average hole depth of 60 feet, and an average grout take of 2.5 sacks per lineal foot of hole.

For curtain grouting, the MP estimate assumed that there would be 2 to 3 rows of holes set on 10-foot spacing; the holes would have an average depth of 200 feet;

and the grout take would average 2.5 sacks of cement per lineal foot of hole. The MPL estimate reduced these assumptions to 2 rows, an average spacing of 10 feet, an average hole depth of 150 feet, and an average grout take of 2 sacks per lineal foot of hole. The MPH estimate assumed 3 rows, an average spacing of 10 feet, an average hole depth of 250 feet, and an average grout take of 3 sacks per lineal foot of hole.

7. Dam Crest Elevation and Outer Slopes

The dam crest elevation was set at 1,785 during the original appraisal designs, based largely on ensuring adequate freeboard during an extreme flood event. Since a Probable Maximum Flood (PMF) study was conducted for the appraisal, there is reasonable confidence that the maximum water surface is well established. However, there is always some possibility that the flood loading will increase, or that a higher freeboard is deemed necessary for security or seismic stability reasons. For both the MPL and MP estimates, the elevation of the dam crest was assumed to be 1,785. However, for the MPH estimate, the crest elevation was assumed to be 1,790, which results in somewhat larger embankment quantities.

Upstream and downstream embankment slopes for the appraisal design were 1.75:1 and 1.5:1, respectively. These slopes were kept for both the MPL and MP estimates. However, since the upstream sloping core was widened (as discussed later) in the MPH estimate, the upstream slope had to be flattened slightly. Thus, the upstream slope in the MPH estimate was set at 2:1, increasing excavation and embankment quantities somewhat.

8. Zone 1 Core

The appraisal design established the core thickness to vary, given its downstream slope of 0.5:1 and upstream slope of 0.75:1. In general, this results in a ratio of reservoir head to core width of roughly 4. It is believed that this core width is not particularly thin and is well within the precedent used on large rockfill dams. Thus, for the MPL and MP estimates, the core thickness was kept the same as developed in the original appraisal design. However, for the MPH estimate, the upstream slope of the core was flattened to a 1:1 slope, which approximately doubles the width of the core.

In addition, since specific borrow areas have not been finalized at this stage of the design, haul distances could vary, impacting the costs of these materials. Thus, one-way haul distances were varied from 3 miles in the MPL estimate, 6 miles in the MP estimate (same as assumed in the appraisal design), and 10 miles in the MPH estimate to account for the possible range of source locations identified during future studies.

9. Zone 2 Filter and Zone 3 Drain

The appraisal design set the horizontal thickness of the zone 2 and zone 3 chimney filter/drain at 15 feet, which is considered more than adequate to provide sufficient filtering and sufficient widths to accommodate any seismic movements at the Black Rock site. It is also noted that the expected movement from the thrust fault would not be in an upstream-downstream direction, thus not comprising the effective width of the filter. Given these considerations and to account for possible revisions during later designs, the horizontal widths of each zone were set at 12 feet for the MPL, 15 feet for the MP, and 20 feet for the MPH. In addition, an upstream "crackstopper" zone of zone 2 was added to each estimate.

Since the actual locations of these materials, whether from borrow or commercial source, has not been finalized, one-way haul distances were varied. Assumed one-way hauls were 17 miles for the MPL and MP estimates (same as used in appraisal design), and 23 miles for the MPH estimate.

10. Zone 5 and Zone 6 Random Fill Zones

The size of the random fill zones is a function of the quantity of foundation excavation, since these materials are simply reused material from the foundation excavation. Therefore, the quantities will vary between estimates based upon the assumptions regarding foundation excavation. However, during the estimation of quantities, it was determined that the size of the random fill zone was also limited by embankment geometry and embankment stability concerns to about 20 million cubic yards. Thus, there is no difference between the MP and MPH quantities for these zones, while the MPL estimate reflects less available materials from required excavation.

11. Zone 4 Rockfill

The quantity of zone 4 rockfill is essentially governed by the size of the other embankment zones and the overall dimensions of the dam. Thus, this quantity is impacted by crest elevation, outer slopes, changes to the other zone widths, and the amount of foundation excavation. These are the only factors that cause this quantity estimate to vary; there are no differing design assumptions regarding zone 4.

There is some possibility that the location of quarries along the reservoir rim could impact the haul distance and costs of this material. However, it is likely that this rockfill can be obtained close to the dam. For the MPL and MP estimates, a 1-mile, one-way haul was assumed (same as original appraisal design). For the MPH estimate, the haul distance was increased to 2 miles.

12. Right Abutment Seepage Mitigation Features

Geologic investigations conducted during the original appraisal designs have shown that the right abutment of the dam contains poor quality rock, thought to be largely the result of faulting at the base of the abutment. Therefore, the poor-quality rock is expected to lead to significant seepage through the abutment, which could have negative consequences to the downstream Hanford Site. Appraisal designs did not include estimates for seepage mitigation features, assuming that those features would be included in later designs. Mitigation features that could be included within the right abutment area of the embankment include drainage tunnels, a cutoff wall, and partial upstream blanketing.

The minimum level of treatment, corresponding to the MPL estimate, was assumed to consist of a cutoff wall. The most probable, or MP, treatment was assumed to consist of drainage tunnels in addition to a cutoff wall. The maximum probable level of treatment, or MPH option, consists of drainage tunnels, a cutoff wall, plus partial upstream blanketing of the right abutment reservoir rim.

The concrete cutoff wall was assumed to have the same configuration for all three estimates, as it is expected to be a key feature, plus it has a rather defined extent due to site conditions and construction limitations. For all three estimates, the wall was assumed to be 400-feet deep (generally the limit of excavation equipment), 3- to 5-feet wide, and traverses the entire height of the right abutment from the base to the dam crest elevation. It is expected that the wall will be constructed using a Hydrofraise machine to excavate the bedrock, with the excavation filled with bentonite slurry to keep the side walls intact during construction. In order to provide level working surfaces, a series of benches or steps will be constructed in the abutment. It is assumed that minimal rock excavation will be needed, and the benches will be constructed with RCC.

Drainage tunnels have been included in the MP and MPH estimates. The MP option assumes 2 tunnels, while the MPH option assumes 3 tunnels. The tunnels are assumed to be 1,500 feet long and about 10 feet in diameter, constructed by drill and blast methods. Given the poor rock quality, extensive tunnel support is expected. The finished tunnels will be concrete-lined. Drain holes will be installed on 10-foot centers on each wall of the tunnels to an average depth of 200 feet.

For the MPH estimate, an additional feature consists of a geomembrane blanket placed upstream of the dam core and covering the right abutment. This feature is assumed to extend the full height of the abutment from the base to the dam crest and to an upstream distance of 1,000 feet from the upstream toe of the dam. The blanket will be constructed by first excavating a uniform slope in the abutment,

providing a shotcrete surface, installing a geomembrane sandwiched by protective geotextile layers, and covering the membrane by a thickness of soil and overlying rockfill. Given the expected cost of this feature and modeling results, which indicate its marginal effectiveness in reducing seepage, this option is only included in the MPH estimate.

Black Rock Dam - Appurtenant Structures

To account for the current lack of design data and level of design, the quantities for the outlet works were varied across the MPL, MP, and MPH cost estimates. For the MP estimate, original appraisal quantities were assumed to be appropriate. For the MPL estimate, better rock quality was assumed which reduced excavation and concrete and increased ring grout spacing to 30-foot centers. For the MPH estimate, poorer rock quality was assumed from the MP estimate requiring additional excavation and concrete and a tighter ring grout spacing of 10-foot centers.

Downstream Seepage Mitigation Features

There are concerns about the possibility of increased contaminant movement and higher groundwater levels on the Hanford Site resulting from seepage from the proposed Black Rock dam and reservoir. This section describes mitigation measures intended to reduce reservoir seepage and/or intercept seepage water before it reaches the Hanford Site so that impacts are minimized. The mitigation measures selected were those considered most likely to reduce both reservoir seepage and hydrologic impacts on the Hanford Site. Key attributes include preventing or intercepting reservoir seepage as close to the reservoir as possible and minimizing operational costs of mitigation (such as by pumping wells).

Reclamation developed a groundwater flow model to evaluate the effectiveness of proposed mitigation measures [4]. To reduce total seepage from the reservoir, sediments under the dam would be replaced with zone 1 core material; a grout curtain would be installed under the dam; a geomembrane liner would be installed over a Wanapum outcrop; and a cutoff wall would be constructed beneath the right dam abutment. Model results show that a combination of these mitigation measures would reduce total *maximum* modeled reservoir seepage by approximately 30 percent (from 74.3 to 51.9 cfs). However, most of the seepage (46.5 cfs) would bypass these mitigation features and surface in the Dry Creek drainage downstream from the dam. The remaining total reservoir seepage (about 5.4 cfs) would continue deeper into the basalts. The minimal deep basalt flow is expected to have negligible effect on the Hanford Site.

Without further mitigation, the water that surfaces in Dry Creek would flow downstream (with some loss to evaporation, assumed to be 25 percent) until it reached thick sediments near the interception with Cold Creek, where it would re-infiltrate and continue flowing in the subsurface toward the Hanford Site. To capture surface water and groundwater flows in Dry Creek, a concrete cutoff wall to bedrock, approximately 200 feet deep and 5,500 feet long, would be constructed about 6.6 miles downstream from the dam in the Dry Creek drainage. (See Figure 4.) At this location impounded water in Dry Creek between Black Rock dam and the cutoff wall should not impact the existing substation shown on Figure 4. A 15-foot-high embankment on top of the cutoff wall would prevent surface water from proceeding down Dry Creek and would direct the surface flow into a 48-inch-diameter pipeline that would convey the water away from the site. Mitigation model results indicate these measures could reduce total reservoir seepage across the Cold Creek boundary by 99 percent.

The pipeline would extend 20.6 miles to the Yakima River along existing roadways. An inlet structure would be constructed behind the 15-foot-high embankment to direct water to the pipeline. The inlet would have a trashrack to catch large debris, a trash rake for cleaning, and a steel slide gate to close off flow to the pipeline for maintenance. A baffled outlet structure (see Figure 5) would transition water from the pipeline outlet to the Yakima River near Horn Rapids. A 150-foot-wide construction right-of-way along existing trails or roadways would be needed for the pipeline construction, and a 100-foot right-of-way would be needed for permanent easement.

Additionally, ten wells (each about 300 feet deep) would be drilled downstream from the cutoff wall, as needed, to capture seepage in the deeper basalt layers and to prevent any groundwater from flowing east to the Hanford Site. One or two of these wells could be placed upstream of the cutoff wall/embankment to pump groundwater into the pipeline upstream of the cutoff wall. These refinements would be made in the final design if construction were authorized. For the MPL, MP, and MPH estimates, three different configurations of the cutoff wall, embankment, and deep wells were developed, as discussed below.

1. Cutoff Wall

The concrete cutoff wall is assumed to cut off both overlying sediments and the upper portion of the basalt bedrock. It will extend the length of the valley, and is assumed to be constructed by slurry trench methods utilizing a Hydrofraise machine. Given the lack of data at the site, depth to rock is uncertain. In addition, the exact location of the feature, and thus the valley width, is uncertain. For the MP estimate, the cutoff wall was assumed to be 200 feet deep and 5,500 feet long. For the MPL estimate, the cutoff wall was reduced in size to

100 feet deep and 5,000 feet long. For the MPH estimate, the cutoff wall was assumed to be 300 feet deep and 6,000 feet long.

2. Embankment

A small embankment will be required to develop a pool and force collected seepage into an outlet works for safe conveyance from the site. Depending on the location and topography of the remediation site, the embankment configuration may vary. For all three estimates, the embankment was assumed to consist of rockfill on 1.5:1 slopes, with a 20-foot-wide crest and the cutoff wall serving as the diaphragm. The MP estimate assumed the embankment would be 15 feet high and 5,500 feet long. The MPL and MPH estimates assumed heights of 10 and 20 feet, respectively; and lengths of 5,000 and 6,000 feet, respectively.

3. Deep Wells

Although the cutoff wall is expected to retain seepage through the overlying sediments, there may still be some seepage traveling downstream through the upper portions of the basalt bedrock. Thus, deep wells are needed in conjunction with the wall to help ensure most seepage is collected. These wells are assumed to extend about 100 feet below the bottom of the cutoff wall. For the MP estimate, a total of 10 wells are assumed, each with a depth of 300 feet. For the MPL estimate, 5 wells each with a depth of 200 feet were assumed. For the MPH estimate, 15 wells each with a depth of 400 feet were assumed.

4. Additional Mitigation Feature for MPH Option

For the MPH option only, an assumption was made that an additional, nearly identical, mitigation feature would be located at a second location along Dry Creek or Cold Creek downstream from the dam. Therefore, for the MPH estimate, a second cutoff wall, embankment, and set of deep wells were assumed, matching the above features listed for the MPH option.

Highway and Utility Relocations

Although relocation of SR-24 to the north side of the valley is preferred by the local stakeholders, logistical concerns with this location, including topography and land ownership, led the Design Team to keep the road relocation the same as the original appraisal design [1]. For the highway and utility relocations it was assumed that quantities generated for the original appraisal study adequately describe the preferred configuration and no variation was needed across the MPL, MP, and MPH cost estimates.

Outflow Conveyance System and Black Rock Outlet Facility

The original appraisal designs assumed excavated material could be wasted locally. To account for the possibility that the local area may not be able to accommodate the large volume of waste from the outflow conveyance tunnel and Black Rock outlet facility, the cost estimates were revised to account for hauling the excavated material. Approximately 575,000 cubic yards of rock waste and 90,000 cubic yards of common waste material are expected to be generated near MP 22.6 of the Roza Canal. For the MPL estimate it was assumed that this material could be wasted locally, but for the MP and MPH cost estimates, it was assumed that this waste material would have one-way haul distances of 2 miles and 5 miles, respectively. For tunnel muck brought to the Black Rock Valley portal, the MPL estimate assumed the material could be wasted locally, but the MP and MPH cost estimates assumed that waste material would have a one-way haul distance of 2 miles. Although no specific waste sites have been identified, it is believed that this range of haul distances adequately portrays the local conditions at the site.

To account for the current lack of geologic design data and level of design for the outlet facility, the assumed top of rock elevation, estimated concrete volumes, and estimated weight of concrete reinforcing steel were varied across the MPL, MP, and MPH estimates. For the MPL estimate, top of rock was assumed to be 5 feet lower than the MP estimate of El. 1,150.0, and the MPH estimate assumed top of rock was 10 feet higher than the MP estimate. For all other features associated with the Black Rock outlet facility, it was assumed that quantities generated for the original appraisal study [1] adequately represent the concept, and no variation was needed across the MPL, MP, and MPH cost estimates.

Delivery Systems

1. Roza Division Delivery System

The preferred alternative for making deliveries to the Roza Division incurs no cost as Roza would continue to obtain its water supply from the Yakima River by diverting at the Roza Diversion Dam (RM 127.9). This diversion would continue to provide flows (up to 1,075 cfs) for the operation of the existing Roza Powerplant and the approximately 180-200 cfs required for irrigation by Roza of lands upstream of MP 22.6.

2. Sunnyside Division Delivery System

To account for the current lack of geologic design data and level of design for the Sunnyside pipeline delivery system, the amount of rock and common excavation was varied across the MPL, MP, and MPH estimates.

Sunnyside Powerplant

To account for the current lack of geologic design data and level of design, the assumed top of rock elevation, estimated concrete volumes, and estimated weight of concrete reinforcing steel were varied across the MPL, MP, and MPH estimates. For the MPL estimate, top of rock was assumed to be 5 feet lower than the MP estimate of El. 880.0, and the MPH estimate assumed top of rock was 10 feet higher than the MP estimate. For all other features associated with the Sunnyside Powerplant, it was assumed that quantities generated for the original appraisal study [1] adequately describe its configuration and no variation was needed across the MPL, MP, and MPH cost estimates.

VIII. Wymer Dam and Reservoir Alternative - Description of MPL, MP, and MPH Concepts

Yakima River Intake and Wymer Pumping Plant

The original appraisal designs assumed that material excavated from the intake and pumping plant site on the Yakima River could be wasted locally. To account for the possibility that the local area may not be able to accommodate the waste, the cost estimates were revised to account for the handling of the approximately 72,000 cubic yards of waste rock and 115,000 cubic yards of waste common material expected to be generated at the site. For the MPL and MP estimates, it was assumed that this material could be wasted within 1 mile of the excavation, but for the MPH cost estimate, it was assumed that this waste material would have a one-way haul distance of 2 miles. Although no specific waste sites have been identified, it is believed that this range of haul distances adequately portrays the local conditions at the site.

To account for the current level of design for the pumping plant, estimated concrete volumes and weight of concrete reinforcing steel were varied across the MPL, MP, and MPH estimates. Also, the aluminum cover over the 46-foot-diameter air chamber that was included in the original appraisal study [2] was

removed for the MPL and MP estimates. For all other features associated with the Yakima River intake and Wymer Pumping Plant, it was assumed that quantities generated for the original appraisal study [2] adequately represent the concept and no variation was needed across the MPL, MP, and MPH cost estimates.

Discharge Pipeline

To optimize the design of the discharge pipeline, the discharge line velocities were revisited. Reclamation design standards recommend the velocity in conduits range between 5 ft/s and 10 ft/s. The pipe velocity for a 96-inch-diameter pipe at design flow 400 cfs is approximately 8 ft/s. The velocity for a 120-inch-diameter pipe at design flow 400 cfs is approximately 5 ft/s. The MPL estimate assumes that the 96-inch-diameter pipe with higher conduit velocities would be adequate. The MP and MPH assume that a 120-inch-diameter pipe with lower velocities would be more appropriate. In order to determine the most appropriate pipe size for this system, a transient analysis would need to be done using the 120-inch pipeline and air chamber capacity revisited. The determination of an optimum pipe size for this system during future studies should require:

- A transient analysis for the 120-inch-diameter pipeline
- An air chamber capacity analysis for the 120-inch-diameter pipeline
- Pumping cost comparisons
- Air chamber cost comparisons
- Pipeline construction cost comparisons

The original appraisal design assumed cut-and-cover construction for the access conduit under the dam. To address concerns regarding possible rockfill settlement and complications that a cut-and-cover section below the dam could create, the MPL, MP, MPH estimates assume that mass concrete backfill will be used in lieu of rockfill backfill for the cut-and-cover section.

For the MPL quantities, the appraisal-level alignment was altered to reduce pipe excavation under the dam and utilize benched excavation for the concrete conduit. The 96-inch pipe and concrete conduit trench quantities were calculated based on this altered alignment.

For the MP quantities, the appraisal-level alignment was altered to reduce pipe excavation under the dam and to utilize a benched excavation for the concrete conduit. The 120-inch-diameter pipe and concrete conduit trench quantities were calculated based on this altered alignment.

For the MPH quantities, the pipeline alignment matched the original appraisal study alignment, but the pipe diameter was increased to 120-inch diameter. Pipe and concrete conduit trench quantities were calculated based on this larger pipe diameter.

Wymer Dam and Dike

The two key geotechnical features comprising the Wymer reservoir project include a concrete face rockfill main dam and a central core rockfill dike. Considerations that would impact ultimate costs for each of these two features are discussed below, along with a detailed description of the design concepts and/or quantity assumptions for each.

1. Concrete Face Rockfill Main Dam Embankment

Like Black Rock dam, given the early level of design effort, there are a number of key design/construction issues that contain potential uncertainty and could influence costs at Wymer dam. The following paragraphs identify those issues that are expected to contain sufficient uncertainties to impact project costs. In general, quantities and design features that are expected to comprise a very small percentage of the design costs are not discussed below, and identical quantities were assumed for each of the three estimates.

a. Foundation Excavation, Common

As with Black Rock dam, there is considerable uncertainty in the foundation conditions beneath Wymer dam, given the limited amount of explorations to date. As was done for the appraisal design, depths to bedrock from the existing drillhole logs were used to develop bedrock contours for the MP estimate. For the MPL quantities, the rock contours were assumed to be uniformly 5 feet higher than for the MP case. For the MPH quantities, the rock contours were assumed to be uniformly 15 feet lower than the MP case. For cost estimating purposes, estimates were also made regarding how much of the foundation excavation would need to be ripped as part of the excavation process. The MP estimate assumed 35 percent of the excavation volume would require ripping. The MPL estimate assumed 25 percent, while the MPH estimate assumed 45 percent.

b. Foundation Excavation, Rock

Rock quality is expected to be variable, and there may be some additional rock excavation beneath the plinth. Not only will the rock quality vary, but different assumptions for the plinth dimensions have been made, which in turn impacts estimates of rock excavation. The MP alternative estimated 35,000 cubic yards of rock excavation would be required, assuming a 10-foot excavation depth over an

average 20-foot-wide plinth. The MPL option estimated 16,000 cubic yards, assuming a 5-foot excavation depth over an average 15-foot-wide plinth. The MPH option estimated 75,000 cubic yards, assuming a 15-foot excavation depth over an average 30-foot-wide plinth.

c. Foundation Filters

Foundation filters are included to blanket areas of the foundation downstream of the plinth to ensure that foundation materials are not eroded or "piped" into the coarse rockfill embankment. These filters include 3 feet of zone 2 filter sand overlain by 3 feet of zone 3 drain gravels. The original appraisal design had assumed that 10 percent or less of the foundation between the plinth and dam centerline would need treatment. For the MP estimate, it was assumed that approximately 15 percent of the foundation area between the plinth and the dam centerline would be blanketed with filters. The MPL estimate assumed that 10 percent of that area would be filtered, while the MPH estimate assumed that 20 percent of that area would be filtered.

d. Slush Grouting and Dental Concrete

To help minimize the potential for seepage at the embankment/foundation contact, areas of the rock surface will be treated as necessary with slush grouting. In addition, where needed, dental concrete will be used to seal joints/fractures and reduce foundation irregularities. For the MPL and MP estimates, the amount of dental concrete was assumed to be 2,000 cubic yards, as assumed during the original appraisal study [2]. The MPH estimate assumed 5,000 cubic yards. In the appraisal design, slush grouting was assumed to be needed over 40 percent of the plinth area. Both the MP and MPH estimates assumed this same 40-percent quantity. The MPL estimate assumed that slush grouting would be needed over 25 percent of the plinth foundation.

e. Blanket and Curtain Grouting

Considering the uncertainties in rock quality, foundation grouting is an area that is subject to a wide range of potential costs. To estimate this variability in both blanket and curtain grouting quantities, different assumptions were made for number of grouting rows, spacing between holes, average depth of hole, and average grout take.

For blanket (consolidation) grouting, the MP estimate assumed that there would be an average of 3-1/2 rows of holes set on an average spacing of 8.75 feet (average of 7.5- and 10-ft spacing), the holes would have an average depth of 45 feet, and the grout take would average 2.5 sacks of cement per lineal foot of hole. The MPL estimate reduced these assumptions to 3 rows, an average spacing

of 10 feet, an average hole depth of 30 feet, and an average grout take of 2 sacks per lineal foot of hole. The MPH estimate assumed 5 rows, an average spacing of 7.5 feet, an average hole depth of 60 feet, and an average grout take of 3 sacks per lineal foot of hole.

For curtain grouting, the MP estimate assumed that there would be 3 rows of holes set on 10-ft spacing, the holes would have an average depth of 200 feet, and the grout take would average 2.5 sacks of cement per lineal foot of hole. The MPL estimate assumed 3 rows, an average spacing of 10 feet, an average hole depth of 150 feet, and an average grout take of 2 sacks per lineal foot of hole. The MPH estimate assumed 3 rows, an average spacing of 10 feet, an average hole depth of 250 feet, and an average grout take of 3 sacks per lineal foot of hole.

f. Dam Crest Elevation and Outer Slopes

The dam crest elevation was set at 1,750 during the original appraisal design based largely on ensuring adequate freeboard during an extreme flood event. Since a PMF study was conducted for the appraisal study, there is reasonable confidence that the maximum water surface is well established. However, the appraisal design did allow some conservatism in setting the crest elevation. Further designs could end up optimizing spillway capacity and dam height, as well as revisiting necessary freeboard, with the end result possibly being a slightly lower crest elevation. For both the MP and MPH estimates, the elevation of the dam crest was assumed to be 1,750. However, for the MPL estimate, the crest elevation was assumed to be 1,745, which results in somewhat smaller embankment quantities.

Upstream and downstream embankment slopes for the appraisal design were both 1.5:1. These slopes are rather typical for this type of dam, particularly in a potentially high seismic area, and thus no slope changes from the original appraisal design were deemed necessary for the three estimates.

g. Concrete Face and Plinth

The width (upstream to downstream) of the plinth (footing) for a concrete face rockfill dam is typically a function of foundation rock quality. With poorer quality rock, the width of the plinth increases. Given the uncertainties in rock quality at the Wymer site, it appears appropriate to assume different plinth widths. For the MP estimate, the plinth width was assumed to be 20 feet, as was assumed in the appraisal design. The assumed widths for the MPL and MPH estimates were 15 and 30 feet, respectively. The average (vertical) thickness of the plinth was assumed to be 1.5 feet for the MP and MPL estimates, which is typical. The thickness for the MPH was assumed to average 2 feet.

The average thickness of the concrete face was assumed to be 2 feet in the original appraisal design. This same thickness was assumed for the MP estimate. The thicknesses of the concrete face for the MPL and MPH estimates were assumed to be 1.5 and 2.5 feet, respectively.

h. Zone 2 Filter and Zone 3 Drain

The original appraisal design set the horizontal thickness of the zone 2 and zone 3 chimney filter/drain at 15 feet. Depending on seismic analyses during final designs, different chimney widths may be necessary. Similar to the estimates for Black Rock dam, the horizontal widths of each zone were set at 12 feet for the MPL, 15 feet for the MP, and 20 feet for the MPH.

Since the actual locations of these materials, whether from borrow or commercial source, has not been finalized, one-way haul distances were varied. Assumed one-way hauls were 17 miles for the MPL and MP estimates (same as used in appraisal design), and 23 miles for the MPH estimate.

i. Miscellaneous Fill Zone

The size of the miscellaneous fill zone is a function of the quantity of foundation excavation, since these materials are simply reused material from the foundation excavation. Therefore, the quantities will vary between estimates based upon the assumptions regarding foundation excavation. For the MP estimate, the volume of miscellaneous fill was estimated to be 2,100,000 cubic yards. The estimated volumes for the MPL and MPH options were 1,600,000 and 3,650,000 cubic yards, respectively.

j. Zone 4 Rockfill

The quantity of zone 4 rockfill is essentially governed by the size of the other embankment zones and the overall dimensions of the dam. Thus, this quantity is impacted by crest elevation, changes to the other zone widths, and the amount of foundation excavation. These are the only factors that cause this quantity to vary; there are no differing design assumptions regarding zone 4.

There is some possibility that the location of quarries along the reservoir rim could impact the haul distance and costs of this material. However, it is likely that this rockfill can be obtained close to the dam. For the MPL and MP estimates, a 2-mile, one-way haul was assumed (same as appraisal design). For the MPH estimate, the haul distance was increased to 3 miles.

2. Central Core Rockfill Dike Embankment

The central core rockfill dike has a set of issues potentially affecting cost similar to those found at the main dam. The following paragraphs identify the issues that are expected to contain sufficient uncertainties to impact project costs. In general, quantities and design features that are expected to comprise a very small percentage of the design costs are not discussed below, and identical quantities were assumed for each of the three estimates.

a. Foundation Excavation, Common

As with the main dam, there is considerable uncertainty in the foundation conditions beneath the dike, given the limited amount of explorations to date. As was done for the original appraisal design, depths to bedrock from the existing drillhole logs were used to develop bedrock contours for the MP estimate. For the MPL quantities, the rock contours were assumed to be uniformly 5 feet higher than for the MP case. For the MPH quantities, the rock contours were assumed to be uniformly 15 feet lower than the MP case. For cost-estimating purposes, estimates were also made regarding how much of the foundation excavation would need to be ripped as part of the excavation process. The MP estimate assumed 35 percent of the excavation volume would require ripping. The MPL estimate assumed 25 percent, while the MPH estimate assumed 45 percent.

b. Foundation Excavation, Rock

Rock quality is expected to be variable, and there may be some additional rock excavation beneath the dike core. Not only will the rock quality vary, but different assumptions for the core width have been made, which in turn could impact the amount of rock excavation. The MP and MPL alternatives estimated that 2,000 cubic yards of rock excavation would be required. The MPH option estimated 5,000 cubic yards.

c. Foundation Filters

Foundation filters are included to blanket areas of the foundation downstream of the dike core to ensure that core or foundation materials are not eroded or "piped" into the coarse rockfill shell. These filters include 3 feet of zone 2 filter sand overlain by 3 feet of zone 3 drain gravels. The original appraisal design had assumed that approximately 10 percent of the foundation downstream of the core would need treatment. To account for lack of design data, this assumption was varied for the cost-risk analysis. For the MP estimate, it was assumed that approximately 25 percent of the foundation area between the downstream end of the core and the downstream toe would be blanketed with filters. The MPL

estimate assumed that 10 percent of the area would be filtered, while the MPH estimate assumed that 50 percent of the area would be filtered.

d. Slush Grouting and Dental Concrete

To help ensure that core materials are not piped into the bedrock, areas of the rock surface beneath the core will be treated as necessary with slush grouting and dental concrete to seal joints/fractures and reduce foundation irregularities. For the MP and MPL estimates, the amount of dental concrete was assumed to be 2,000 cubic yards, as assumed during appraisal studies. The MPH estimate assumed 5,000 cubic yards. Slush grouting was assumed to be needed over 30 percent of the core foundation surface for the MP estimate, as assumed in appraisal design. The MPL and MPH estimates assumed that slush grouting would be needed over 20 and 40 percent of the core foundation, respectively.

e. Blanket and Curtain Grouting

As with the main dam, the potential uncertainties in rock quality make foundation grouting an area subject to a wide range of potential costs. To estimate this variability in both blanket and curtain grouting quantities, different assumptions were made for number of grouting rows, spacing between holes, average depth of hole, and average grout take.

For blanket (consolidation) grouting, the MP estimate assumed that there would be 7 rows of holes set on an average spacing of 8.75 feet (average of 7.5- and 10-ft spacing); the holes would have an average depth of 40 feet; and the grout take would average 2.5 sacks of cement per lineal foot of hole. The MPL estimate reduced these assumptions to 6 rows, an average spacing of 10 feet, an average hole depth of 30 feet, and an average grout take of 2 sacks per lineal foot of hole. The MPH estimate assumed 8 rows (in part due to a wider core which is discussed later), an average spacing of 7.5 feet, an average hole depth of 50 feet, and an average grout take of 3 sacks per lineal foot of hole.

For curtain grouting, the MP estimate assumed that there would be 2 to 3 rows of holes set on 10-foot spacing; the holes would have an average depth of 120 feet; and the grout take would average 2.5 sacks of cement per lineal foot of hole. The MPL estimate reduced these assumptions to 2 rows, an average spacing of 10 feet, an average hole depth of 90 feet, and an average grout take of 2 sacks per lineal foot of hole. The MPH estimate assumed 3 rows, an average spacing of 10 feet, an average hole depth of 150 feet, and an average grout take of 3 sacks per lineal foot of hole.

f. Dike Crest Elevation and Outer Slopes

The dike crest elevation was set at 1,750 during the appraisal designs, based largely on ensuring adequate freeboard during an extreme flood loading. A rationale has been offered for assuming different crest heights for the main dam. That same rationale applies to the dike. Thus, for both the MP and MPH estimates, the elevation of the dike crest was assumed to be 1,750. However, for the MPL estimate, the crest elevation was assumed to be 1,745, which results in somewhat smaller embankment quantities.

Upstream and downstream embankment slopes for the original appraisal design were 2:1 and 1.5:1, respectively. These slopes are rather typical for this type of dam, particularly in a potentially high seismic area and, thus, no slope changes from the appraisal design were deemed necessary for the three estimates.

g. Zone 1 Core

The original appraisal design established the core thickness to vary, given its downstream slope of 0.5:1 and upstream slope of 0.8:1. In general, this results in a ratio of reservoir head to core width of slightly more than 3. It is believed that the core is not particularly thin and is well within the precedent used on large rockfill dams. Thus, for the MPL and MP estimates, the core thickness was kept the same as developed in the appraisal design. However, for the MPH estimate, the upstream slope of the core was flattened to a 1:1 slope, which nearly doubles the width of the core.

In addition, since specific borrow areas have not been finalized at this stage of the design, haul distances could vary, impacting the costs of these materials. Thus, one-way haul distances were varied from 3 miles in the MPL estimate, 5 miles in the MP estimate (same as assumed in the appraisal design), and 10 miles in the MPH estimate.

h. Zone 2 Filter and Zone 3 Drain

The appraisal design set the horizontal thickness of the zone 2 and zone 3 chimney filter/drain at 15 feet. Depending on seismic analyses during final designs, different chimney widths may be suggested. Similar to the estimates for Black Rock Dam, the horizontal widths of each zone were set at 12 feet for the MPL, 15 feet for the MP, and 20 feet for the MPH. In addition, an upstream "crackstopper" zone of zone 2 material was added to each estimate.

i. Miscellaneous Fill Zone

The size of the miscellaneous fill zone is a function of the quantity of foundation excavation, since these materials are simply re-used material from the foundation

excavation. Therefore, the quantities will vary between estimates based upon the assumptions regarding foundation excavation. However, during the estimation of quantities, it was determined that size of the random fill zone was limited by embankment geometry and embankment stability concerns to about 500,000 cubic yards. Thus, there is no difference between the MP and MPH quantities for these zones, while the MPL estimate reflects just slightly less available materials from required excavation.

j. Zone 4 Rockfill

The quantity of zone 4 rockfill is essentially governed by the size of the other embankment zones and the overall dimensions of the dike. Thus, this quantity is impacted by crest elevation, outer slopes, changes to the other zone widths, and the amount of foundation excavation. These are the only factors that cause the zone 4 quantity estimate to vary and there are no differing design assumptions regarding zone 4.

There is some possibility that the location of quarries along the reservoir rim could impact the haul distance and costs of this material. However, it is likely that this rockfill can be obtained close to the dike. For the MP and MPH estimates, a 3-mile, one-way haul was assumed. For the MPL estimate, the haul distance was decreased to 2 miles (same as appraisal design).

Wymer Dam - Appurtenant Structures

As developed in the original appraisal study, the spillway and outlet works discharges are directed toward the pumping plant site [2]. To address concerns that discharges could compromise the safety of the pumping plant site, the spillway was moved to the left abutment for the MPL and MP designs and estimates. See Figure 6. The MPH design kept the spillway on the right abutment but changed its orientation so that discharges were directed away from the pumping plant service yard. Additionally, the MPL and MP outlet works were modified for a single-level intake at El. 1,375.0. The MPH cost estimate still includes the two-level intake at Els. 1,375 and 1,456, as was proposed in the original appraisal study.

1. Outlet Channel Modifications

To address potential damage from large flood events, the channel design flows were revisited during this cost-risk analysis. The channel is designed to convey only outlet works flows since it is unlikely that the spillway would operate. For the MPL it was assumed that the appraisal report peak inflow for the 100-year flood (1600 cfs) would be adequate as the maximum planned outlet works release.

For the MP and MPH estimates the Lmuma Creek outlet channel was evaluated for the maximum outlet works release of 3600 cfs. The channel riprap size was increased to handle the higher velocities that would occur in the channel. For the MPL, MP, and MPH quantities, two additional drop structures were added. These drop structures are to be located at the upstream and downstream ends of the channel. For the MPH estimate, an additional outlet channel was included to accommodate the realigned left abutment spillway and stilling basin. The new outlet channel connects the stilling basin to the Yakima River and passes under a new SR-821 bridge. This channel is designed to convey flows up to 12,000 cfs.

The following data summarize the MPL Lmuma Creek channel design:

- Design Q = 1,600 cfs
- Channel Base = 60 feet
- Water Depth = 4 feet
- Side Slopes = 2:1
- Mannings n = 0.045
- Channel Velocity =5.9 ft/s
- Channel Slope = 0.006
- Froude Number = 0.55

The following data summarize the MP and MPH Lmuma Creek channel design:

- Design Q = 3,600 cfs
- Channel Base = 60 feet
- Maximum Water Depth = 6 feet
- Side Slopes = 2:1
- Mannings n = 0.045
- Maximum Channel Velocity = 10 ft/s
- Channel Slope = 0.006
- Maximum Froude Number = 1.6

The following data summarize the MPH new channel design:

- Design Q = 12,000 cfs
- Channel Base = 60 feet
- Water Depth = 7 feet
- Side Slopes = 2:1
- Mannings n = 0.045
- Channel Velocity =23.5 ft/s
- Channel Slope = 0.05
- Froude Number = 1.7

Roadwork

1. Road from SR-821 to Left Abutment

This road name was mislabeled in the original appraisal report [2] as "SH-821 to the northwest side of Wymer Dam." Correcting the road name to “Road from SR-821 to Left Abutment” addresses concerns regarding access to the dam after operation of the spillway since this access road would not be affected if the spillway were to operate. For the MPL and MP estimates, the quantities match the values from the original appraisal report. For the MPH estimate, the access road alignment was modified to accommodate the relocated left abutment spillway.

2. Spillway Bridges

The spillway bridge consists of a single span supported on the spillway walls. The bridge, which is designed for HL-93 live loads, has a clear width of 24 feet (two 12-foot lanes) and an overall length of 65 feet. The bridge will be supported on bearing seats formed onto the spillway walls and, therefore, this design does not include abutment design. The bridge superstructure consists of five WSDOT W42G precast prestressed concrete girders with a cast-in-place concrete deck. The bridge rail consists of 32-inch F Shape barrier.

The MPL, MP, and MPH quantity estimates are identical for the upstream spillway bridge that provides access to the dam crest. For the MPL and MP estimates, the spillway is located at the right abutment. For these estimates, a second spillway bridge is necessary to provide access to the outlet works control house.

3. Road from Discharge Line Access House to Northeast Side of Dike

For the road from the discharge line access house to the northeast side of the dike, it was assumed that quantities generated for the original appraisal study [2] adequately represent the concept and no variation was needed across the MPL, MP, and MPH cost estimates.

4. Road from SR-821 to Outlet Works

For the road from SR-821 to the outlet works, it was assumed that quantities generated for the original appraisal study [2] adequately represent the concept and no variation was needed across the MPL, MP, and MPH cost estimates

Existing Interstate-82 Bridges

The proposed Wymer reservoir will inundate the piers of two existing Interstate-82 bridges located between Yakima and Ellensburg near MP 15. These bridges provide east- and westbound access over Lmuma Creek.

For the MPL and MP options, the estimated quantities are based on the assumption that the existing conditions of the bridge are adequate and mitigation measures are only required to address submergence of bridge features. For the piers, a liquid-applied waterproofing membrane is included to increase protection of the reinforcement in the existing concrete columns. The columns would be cleaned, sand blasted, and coated with a liquid applied urethane coating.

For the MPH option, the concrete cover of the bridge piers is to be removed to expose the vertical reinforcement and lateral ties. All of the reinforcement is to be sandblasted clean and a 3-inch concrete jacket placed around the exposed column. It should be noted that for any structure, if the existing concrete is sound, there is no need to mitigate for submergence. Access to facilitate this work has not been included in the estimated quantities. In addition, eastbound highway traffic would be detoured onto the westbound bridge, while repairs are made on the eastbound bridge. Once repairs are made on the eastbound bridge, the westbound traffic would be detoured onto the eastbound bridge for repairing the westbound bridge. Detour quantities are not included in the attached cost estimates.

Protection of the bridge/road embankments is provided by a 3-foot layer of 24-inch-diameter riprap on top of a 15-inch layer of sand and gravel bedding. The embankments are prepared for the riprap and bedding by excavating an 18-inch layer of existing embankment. The slope stability of the submerged embankments is assumed to withstand normal water surface elevation fluctuations due to operations of the reservoir and that there will be no rapid drawdown.

1. SR-821 Bridge

For the MPL and MP options, the spillway is located on the right abutment and discharges into the modified Lmuma Creek channel which directs flows towards the existing SR-821 bridge. For the MPH option, the spillway is located on the left abutment and discharges into a new outlet channel which directs flows towards a new SR-821 bridge. The new bridge is a single span structure, 96-feet long, to span the 60-foot-wide outlet channel. The bridge clear width is 40 feet as required for rural two-lane highways, per the Washington State Department of Transportation Design Manual. The bridge superstructure is supported on spread footing abutments.

The bridge superstructure consists of seven WSDOT W53DG precast prestressed concrete bulb tee girders with a 3-inch concrete overlay. The bridge rail consists of 32-inch F Shape barrier. Approach slabs are required at both approach spans. The attached cost estimates do not include a detour that will be required for bridge construction.

IX. Cost Estimates

Standard estimating methods were used for preparing the attached appraisal-level cost estimates for the Black Rock and Wymer Dam and Reservoir Alternatives. Each feature was estimated three times, generating three (3) different field and total project cost totals, referred to as MPL, MP, and MPH cost estimates. Development of the MPL, MP, and MPH cost estimates was done to help define the uncertainty associated with this stage of the planning process; particularly the risks associated with lack of feasibility-level design data and the current level of design computation. The MPL field cost estimate was generally calculated by multiplying the lowest quantity value times the lowest cost value for all identified pay items and adding the lowest estimates for allowances (design contingencies and construction contingencies). The most probable field cost estimate was calculated by multiplying the most-likely-quantity value by the most-likely-cost value for each identified pay item and adding the most-likely estimates for allowances (design contingencies and construction contingencies) given our current understanding of local conditions. Similarly, the MPH field cost estimate was generally calculated by multiplying the highest quantity value times the highest cost value for all identified pay items and adding the highest estimates for allowances (design contingencies and construction contingencies). The variations of quantities and unit prices across the MPL, MP, and MPH cost estimates are based on engineering judgment, given the available design data and definition of project needs

Field Cost Estimates

Field cost estimates include construction contract costs and construction contingencies. Construction contract costs include itemized pay items, mobilization, and an allowance for design contingencies. Field cost estimates do not include noncontract costs (environmental studies, site investigations, design, construction management, etc.). Field cost estimates also do not include land acquisition, relocation, or right-of-way costs that may be required for construction of the project features. Operation, maintenance, and replacement costs are also not included in field cost estimates.

The appraisal-level field cost estimates in this report are at the April 2007 price level and include mobilization, design contingencies, and construction contingencies as explained below:

- Mobilization - Mobilization costs include mobilizing contractor personnel and equipment to the project site during initial project startup. The assumed 5 (+/-) percent of the subtotal cost used in the MPL, MP, and MPH cost estimates is based on past experience.

- Design Contingencies (formerly Unlisted Items) - Design contingencies are a means to recognize the confidence level in the estimates and the level of detail and knowledge that was used to develop the estimated cost. This line item may be considered as a contingency for minor design changes and also as an allowance to cover minor pay items that have not been itemized but will have some influence on the total cost. The design contingency line item is a percentage of the subtotal cost plus mobilization. This percentage was varied between 10 and 20 percent across the MPL, MP, and MPH cost estimates to account for the level of detail and anticipated cost risk.

- Construction Contingencies (formerly Contingencies) - Construction contingencies are considered funds to be used after construction starts and not for design changes during project planning and design stage. The purpose of construction contingencies is to identify funds to pay contractors for overruns on quantities, changed site conditions, change orders, etc. This percentage was varied between 15 and 30 percent across the MPL, MP, and MPH cost estimates to account for the anticipated cost risk.

Table 4 shows the mobilization (Mob), design contingencies (DC), and construction contingencies (CC) percentages used to develop the MPL, MP, and MPH field cost estimates. The actual line item is a rounded value per Reclamation guidelines, which may cause the dollar value to deviate from the percentages shown. Varying percentages for design contingencies were used to account for the level of detail in the cost estimate, possibility of additional items of work, and the possibility that items sized at the appraisal level could vary in future studies. Varying percentages for construction contingencies were used to account for the lack of geologic data and its influence on the features contained in the estimate; i.e. lack of geologic data would typically have a greater impact on tunnel and dam construction than for pipeline and pumping plant construction.

Table 4. Black Rock and Wymer Dam and Reservoir Alternatives – Percentages

Features	Most Probable Low (MPL)	Most Probable (MP)	MPH
Black Rock Alternative	**Mob/DC/CC**	**Mob/DC/CC**	**Mob/DC/CC**
Columbia River Intake, Pumping Plant, and Inflow Conveyance	5/10/20	5/10/25	5/15/30
Dam, Seepage Mitigation, Outlet Works, and Roads	5/10/20	5/10/25	5/15/30
Outflow Conveyance and Black Rock Outlet Facility	5/10/20	5/10/25	5/15/30
Delivery Systems	5/15/15	5/15/20	5/20/25
Sunnyside Powerplant	5/10/15	5/10/20	5/15/25
Wymer Dam and Reservoir Alternative	**Mob/DC/CC**	**Mob/DC/CC**	**Mob/DC/CC**
Yakima River Intake and Pumping Plant	5/10/15	5/15/20	5/20/25
Discharge Line	5/10/15	5/10/20	5/15/25
Dam, Dike, Spillway, Outlet Works, and Roads	5/10/20	5/10/25	5/15/30

The designs are based mostly on available design data from past Reclamation work. The amount of data collected to adequately define major cost drivers and technical adequacy is not considered to be at the level required for a feasibility-level assessment of project features.

The major cost items for the Black Rock estimates were developed using Hard Dollar commercial estimating software, produced by Hard Dollar Corporation of Scottsdale, Arizona. Reclamation typically uses Hard Dollar to develop their detailed cost estimates. Current labor-equipment-materials resources were input, production rates were applied, and totals extended for each item within each feature, to produce direct costs for each pay item. Additionally, project overhead costs were estimated and applied to each feature for this project, generating unit prices and construction cost totals for each feature. Somewhat similar methods were used to develop major cost items in the Wymer Dam and Reservoir Alternative; however, the Wymer cost estimates were not input directly into the Hard Dollar program. Minor cost items for both Black Rock and Wymer Dam and Reservoir Alternatives were developed using historical unit prices, standard industry reference sources, and other methods.

Typical percentages for general and administrative costs, as well as profit for each feature were applied. The final unit prices were then entered into the estimate worksheets and totals were extended. The costs and unit prices for these cost estimates were developed at a price level of April 2007. Labor rates were

generated based on the historical Davis Bacon Wage Decision available in April 2007. The appraisal-level cost estimates contained in this report do not include an adjustment for escalation. They were prepared and presented as cost estimates in present-worth dollars with unit-price levels set at April 2007 values.

Table 5 shows a comparison of the Most Probable field cost estimate for the Black Rock Alternative to the original appraisal-level estimate (in April 2004 dollars), and the indexed appraisal-level estimate that was used in the Draft PR/EIS (in April 2007 dollars).

Table 5. Comparison of Black Rock Appraisal-Level Field Cost Estimates

Feature	Original Appraisal Estimate	Indexed Appraisal Estimate	Most Probable Estimate
Price Level	**April 2004**	**April 2007**	**April 2007**
Columbia River Intake	$58,035,920	$71,704,600	$91,507,896
Pumping Plant and Switchyard	$182,919,070	$214,141,700	$271,219,900
Inflow Conveyance	$186,471,700	$219,019,500	$348,257,760
Dam*	$733,280,000	$890,935,200	$1,193,825,400
Downstream Seepage Mitigation**	$0	$0	$246,940,609
Outlet Works	$83,494,115	$103,158,800	$125,537,315
Highway and Utility Relocations	$57,320,000	$71,881,100	$102,891,000
Outflow Conveyance	$306,402,600	$359,883,800	$415,741,270
Black Rock Outlet Facility	$102,165,985	$120,704,500	$126,833,699
Sunnyside Delivery System	$138,203,920	$164,880,000	$171,873,870
Sunnyside Powerplant	$32,302,450	$37,100,000	$57,756,137
Subtotal	**$1,880,595,760**	**$2,253,409,200**	**$3,152,384,856**
Mobilization	$93,500,000	$112,050,000	$157,500,000
Design Contingencies	$187,904,240	$267,540,800	$367,115,144
Construction Contingencies	$555,000,000	$641,000,000	$883,000,000
Total Field Cost	**$2,717,000,000**	**$3,274,000,000**	**$4,560,000,000**

* Original and indexed appraisal estimates did not include seepage mitigation features at the dam.
** Downstream seepage mitigation costs do not include seepage mitigation features at the dam.

As shown in Table 5, the MP field cost estimate for the Black Rock Alternative is approximately $1.29 billion greater than the indexed appraisal-level estimate presented in the Draft PR/EIS [3]. Analyzing this cost difference reveals three major components impacting the field cost:

- Seepage mitigation features, both at the dam and downstream from the dam, account for approximately $605 million of the increase. The original appraisal design concept had no extra features to prevent

downstream seepage impacts at the Hanford Site, as the scope of these features were not known at the time.

- Design and estimating refinements account for approximately $250 million of the increase, with the bulk of these costs associated with tunnel construction and dam foundation treatment. Refinements to the design also resulted in some new items of work.

- Actual inflation over the previous indexing from 2004 to 2007 accounts for approximately $432 million of the total increase in field cost dollars. This increase represents an additional 15.9 percent (5 percent per annum) of measured inflation over the 3 years on top of the previously indexed (20.5 percent increase) total. Cost indices representing the seventeen Western states as a whole are developed for various typical features but do not appear to have adequately captured the changing market conditions since 2004, especially with respect to material price increases such as diesel fuel, steel, and concrete. Compounding the difficulties with indexing previously prepared cost estimates, the construction industry experienced a high inflationary period for those 3 years, especially in the Western part of the United States. During periods of high inflation, cost indices will often lag actual costs and, thus, to obtain the most accurate cost estimate, re-pricing is the preferred method.

Table 6 shows a comparison of the Most Probable field cost estimate for the Wymer Dam and Reservoir Alternative to the original appraisal-level estimate (in April 2007 dollars).

As shown in Table 6, the MP field cost estimate for the Wymer Dam and Reservoir Alternative is close to the appraisal-level estimate prepared in 2007 [2], even though some variations of individual features were significant.

Table 7 and Table 8 show the distribution of MPL, MP, and MPH costs relative to major features for the Black Rock and Wymer Dam and Reservoir Alternatives, respectively. Estimate worksheets showing a detailed breakdown of the Black Rock Alternative field cost estimates are provided in Appendix A. Estimate worksheets showing a detailed breakdown of the Wymer Dam and Reservoir Alternative field cost estimates are provided in Appendix B.

Table 6. Comparison of Wymer Appraisal-Level Field Cost Estimates

Feature	Original Appraisal Estimate	Most Probable Estimate
Price Level	**April 2007**	**April 2007**
Yakima River Intake	$18,352,464	$16,991,032
Pumping Plant and Switchyard	$60,316,445	$54,756,856
Discharge Line	$24,306,490	$44,158,980
Dam	$306,452,950	$310,147,160
Dike	$63,553,000	$64,527,800
Spillway	$29,150,727	$20,940,630
Outlet Works	$33,125,567	$28,765,790
Roadwork	$3,402,070	$4,442,570
Subtotal	**$538,659,713**	**$544,730,818**
Mobilization	$27,000,000	$26,800,000
Design Contingencies	$54,340,287	$56,469,182
Construction Contingencies	$160,000,000	$158,000,000
Total Field Cost	**$780,000,000**	**$786,000,000**

Table 7. Breakdown of Black Rock Appraisal-Level Field Cost Estimates

Feature	Most Probable Low (MPL)	Most Probable (MP)	MPH
Columbia River Intake	$77,172,789	$91,507,896	$115,212,650
Pumping Plant and Switchyard	$251,281,692	$271,219,900	$315,373,895
Inflow Conveyance	$230,426,665	$348,257,760	$524,329,820
Dam	$882,621,500	$1,193,825,400	$2,114,941,800
Downstream Seepage Mitigation	$136,802,193	$246,940,609	$832,612,392
Outlet Works	$106,924,188	$125,537,315	$158,063,250
Highway and Utility Relocations	$92,584,000	$102,891,000	$139,004,000
Outflow Conveyance	$381,512,900	$415,741,270	$500,448,695
Black Rock Outlet Facility	$115,716,832	$126,833,699	$157,166,950
Sunnyside Delivery System	$150,102,600	$171,873,870	$202,784,260
Sunnyside Powerplant	$52,561,861	$57,756,137	$69,396,346
Subtotal	**$2,477,707,220**	**$3,152,384,856**	**$5,129,334,058**
Mobilization	$124,100,000	$157,500,000	$254,500,000
Design Contingencies	$259,192,781	$367,115,144	$800,165,942
Construction Contingencies	$579,000,000	$883,000,000	$1,891,000,000
Total Field Cost	**$3,440,000,000**	**$4,560,000,000**	**$8,075,000,000**

Table 8. Breakdown of Wymer Appraisal-Level Field Cost Estimates

Feature	Most Probable Low (MPL)	Most Probable (MP)	MPH
Yakima River Intake	$14,734,796	$16,991,032	$19,478,499
Pumping Plant and Switchyard	$45,865,127	$54,756,856	$65,079,250
Discharge Line	$35,525,490	$44,158,980	$66,532,900
Dam	$209,922,120	$310,147,160	$456,929,050
Dike	$41,235,440	$64,527,800	$115,332,850
Spillway	$17,968,090	$20,940,630	$37,204,760
Outlet Works	$24,590,545	$28,765,790	$39,971,240
Roadwork	$3,842,035	$4,442,570	$5,635,260
Subtotal	**$393,683,643**	**$544,730,818**	**$806,163,809**
Mobilization	$19,800,000	$26,800,000	$40,500,000
Design Contingencies	$37,516,357	$56,469,182	$128,336,191
Construction Contingencies	$86,000,000	$158,000,000	$310,000,000
Total Field Cost	**$537,000,000**	**$786,000,000**	**$1,285,000,000**

Total Project Cost Estimates

Construction cost estimates include both field costs and noncontract costs. Summing the construction costs for all features required for a project yields the total project cost. Noncontract costs are for environmental studies, site investigations, design, construction management, etc., and costs associated with land acquisition, relocation, or right-of-way costs that may be required for construction of the project features. Operation, maintenance, and replacement costs are not included in construction cost estimates. At the appraisal-level, a percentage of the field cost ranging from 25 to 35 percent is typically used to identify funds for noncontract items. For development of the Black Rock and Wymer Dam and Reservoir Alternatives MPL, MP, and MPH construction cost estimates, 20, 25, 30 and 25, 30, 35 percent were used to estimate noncontract costs, respectively. The lower percentages used for Black Rock are to account for the fact that not all contract costs vary linearly with size of features i.e., design costs for a 500-foot dam will be similar to a 600-foot dam even though the construction cost will be significantly greater.

Typically, land-acquisition costs, being site-specific, are not adequately addressed by factoring field cost estimates. For this study, land-acquisition costs were developed by the Upper Columbia Area Office. The rights-of-way estimates for the proposed Black Rock and Wymer Dam and Reservoir Alternatives were developed from USGS quadrangle maps and design drawings. Reservoir rights-of-way were estimated by determining the high water contour on the quadrangle

maps and then determining the parcels of land which contained that contour. The minimum land parcel was 40 acres, except in some cases, where the terrain is steep or other issues were apparent, larger parcels were chosen. Pipeline and powerline rights-of-way were determined by estimating how wide a strip of land would be needed to construct, operate, and maintain the pipeline or powerline, and multiplying that width by the length of pipeline.

Rights-of-way (ROW) for specific facilities, such as powerplants, were estimated from the design drawings for that facility. Rights-of-way costs were determined by using Yakima and Kittitas County databases on land values and computing average price per acre from that information. Tax databases and geographic information system information was supplied by Yakima County and Kittitas County. These average prices were then applied to the ROW required for that facility or feature. Noncontract costs to acquire the ROW were estimated as 35 percent of the land costs. The land acquisition noncontract costs include:

- Land appraisals
- Environmental, Cultural, and Hazardous material clearances
- Title fees
- Relocation expenses
- Legal costs

Recreation cost estimates for minimum basic recreation facilities were also developed by the Upper Columbia Area Office. The rights-of-way for the recreation facilities are included in the above estimate for ROW. Land-acquisition and recreation costs for the Black Rock and Wymer Dam and Reservoir Alternatives MPL, MP, and MPH construction cost estimates are shown in Table 9. Because of their relative low cost compared to the noncontract cost calculated as a percentage of field cost, these costs were assumed to be adequately covered by the noncontract cost estimates.

Table 9. Black Rock and Wymer Dam and Reservoir Alternatives - Land and Recreation Costs

	Most Probable Low (MPL)	Most Probable (MP)	MPH
Black Rock Alternative			
Land Acquisition	$6,362,000	$6,628,000	$6,893,000
Recreation	$2,820,000	$2,938,000	$3,055,000
Wymer Dam and Reservoir Alternative			
Land Acquisition	$1,697,000	$1,768,000	$1,838,000
Recreation	$1,704,000	$1,775,000	$1,846,000

Table 10 and Table 11 show the distribution of MPL, MP, and MPH project costs.

Table 10. Black Rock Appraisal-Level Project Cost Estimates

Cost Component	Most Probable Low (MPL)	Most Probable (MP)	MPH
Field cost estimate	$3,440,000,000	$4,560,000,000	$8,075,000,000
Noncontract costs*	$644,000,000	$1,130,000,000	$2,380,000,000
Total Project Cost	**$4,084,000,000**	**$5,690,000,000**	**$10,455,000,000**

* Includes land acquisition and recreation costs.

Table 11. Wymer Appraisal-Level Project Cost Estimates

Cost Component	Most Probable Low (MPL)	Most Probable (MP)	MPH
Field cost estimate	$537,000,000	$786,000,000	$1,285,000,000
Noncontract costs*	$132,000,000	$238,000,000	$430,000,000
Total Project Cost	**$669,000,000**	**$1,024,000,000**	**$1,715,000,000**

* Includes land acquisition and recreation costs.

X. Cost-Risk Analysis Results

Crystal Ball software produced by the Oracle Corporation was utilized for developing risk-based models of the cost estimates. This software uses Monte Carlo simulation techniques to model risk, based on the three (MPL, MP, MPH) cost estimates developed for each feature. The goal is to evaluate cost uncertainty associated with each line item of the cost estimate including quantity and unit price ranges between the most probable low, most probable, and the most probable high cost estimates. The cost-risk models were set up by assigning appropriate distribution assumptions (generally a normal, triangular, or BetaPERT) to each quantity range and unit price range. A forecast assumption was generated for the field cost total and project cost total, establishing a cost-probability curve for each. This cost-risk modeling allows the selection of a project cost estimate associated with percent risk and the likelihood that those funds would cover the costs associated with each feature.

The Monte Carlo risk analysis is a statistical analysis randomly generating total costs based on the sum of the distributions of quantities and unit prices generated from the MPL, MP, and MPH cost estimates. The resulting 0% field cost estimate has a zero-percent probability of not being exceeded, and the 100% field cost estimate has a 100-percent probability of not being exceeded. These values

are typically between the MPL and MPH values, because the probability that all pay items and allowances will be at their minimums (or maximums) is highly unlikely. By using the Monte Carlo approach, we can more accurately predict the range of likely possibilities rather than using very unlikely events such as MPL and MPH cost estimates.

Crystal Ball output for the Black Rock Alternative is shown in Appendix C.

Crystal Ball output for the Wymer Dam and Reservoir Alternative is shown in Appendix D. Table 12 and

Table 13 show the 0%, mean, and 100% field cost estimates. The mean cost estimate is the average of the calculated cost estimates and in general is close to, but not necessarily equal to, the 50% field cost estimate. Other levels of cost risk are shown in the appendices.

Table 12. Black Rock Alternative – Appraisal-Level Field Costs

Feature	0%	Mean	100%
Columbia River Intake, Pumping Plant, and Inflow Conveyance	$919,355,956	$1,071,903,115	$1,240,334,120
Dam, Seepage Mitigation, Outlet Works and Roads	$2,144,990,381	$2,705,168,787	$3,457,412,297
Outflow Conveyance and Black Rock Outlet Facility	$738,296,965	$809,442,129	$929,570,114
Sunnyside Delivery System	$222,470,610	$254,905,296	$298,587,149
Sunnyside Powerplant	$75,628,684	$82,503,627	$93,025,716
Total Field Cost	**$4,100,742,596**	**$4,923,922,954**	**$6,018,929,396**

Table 13. Wymer Dam and Reservoir Alternative – Appraisal-Level Field Costs

Feature	0%	Mean	100%
Yakima River Intake and Pumping Plant	$92,724,487	$105,611,099	$120,091,610
Discharge Line	$55,468,383	$66,974,678	$82,900,530
Dam, Dike, Spillway, Outlet Works, and Roads	$555,986,306	$658,435,450	$808,954,167
Total Field Cost	**$704,179,176**	**$831,021,227**	**$1,011,946,307**

Table 14 and Table 15 show the 0%, mean, and 100% construction costs. Other levels of cost risk are shown in the appendices.

Table 14. Black Rock Alternative – Appraisal-Level Construction Costs

Feature	0%	Mean	100%
Columbia River Intake, Pumping Plant, and Inflow Conveyance	$1,105,669,132	$1,337,988,875	$1,597,575,093
Dam, Seepage Mitigation, Outlet Works, and Roads	$2,587,033,931	$3,406,734,101	$4,474,262,049
Outflow Conveyance and Black Rock Outlet Facility	$897,162,441	$1,015,722,182	$1,169,255,199
Sunnyside Delivery System	$272,723,622	$318,264,499	$373,969,013
Sunnyside Powerplant	$91,473,090	$103,251,559	$117,503,798
Total Project Cost	**$4,954,062,216**	**$6,181,961,216**	**$7,732,565,152**

Table 15. Wymer Dam and Reservoir Alternative - Appraisal-Level Construction Costs

Feature	0%	Mean	100%
Yakima River Intake and Pumping Plant	$117,822,553	$136,517,972	$159,467,087
Discharge Line	$70,155,197	$86,800,217	$109,991,044
Dam, Dike, Spillway, Outlet Works, and Roads	$679,822,181	$859,623,693	$1,067,949,200
Total Project Cost	**$867,799,931**	**$1,082,941,882**	**$1,337,407,331**

The Crystal Ball output also identifies the cost components exhibiting the greatest amount of risk to the cost estimates. Excluding allowances and noncontract costs, the following pay items have a significant impact on cost risk:

Black Rock Alternative

- Tunnel support for the inflow and outflow conveyances.
- Limits of downstream concrete cutoff wall.
- Furnishing and placing zone 1 and zone 4 embankment materials.
- Limits of dam excavation.

Wymer Dam and Reservoir Alternative

- Pipe backfill requirements for discharge line under the dam.
- Furnishing and placing zone 4 embankment materials in the concrete face rockfill dam.

- Furnishing and placing reinforced concrete on the concrete face rockfill dam.

To reduce cost risk, future work activities should be focused on refining these items. More refined levels of design will reduce risks associated with allowances and noncontract costs.

XI. Conclusions

The cost-risk analysis shows considerable risk associated with these appraisal-level designs and cost estimates which are to be expected at this stage in the planning process. To substantially reduce this risk and narrow the range of probable cost estimates, sufficient design data would need to be collected and used in preparation of feasibility-level designs and cost estimates. This would involve considerable expense and time to accomplish.

Black Rock Alternative

Field Cost Estimate

1. The MP field cost estimate for the Black Rock Alternative is $4.56 billion (April 2007). The most probable low and most probable high field cost estimates are $3.44 billion and $8.075 billion, respectively.

2. The MP field cost estimate for the Black Rock Alternative is $1.29 billion greater than the indexed appraisal-level field cost estimate used in the Draft PR/EIS. The three major components of this cost difference are: inclusion of seepage mitigation features ($605 million), design and cost estimating refinements ($250 million), and actual inflation over the previous indexing from 2004 to 2007 ($432 million).

3. Monte Carlo risk simulation of the calculated field cost estimates indicate that there is a 0% probability that the actual field cost will be less than $4.10 billion, and a 100% probability that the actual field cost will be less than $6.02 billion. The mean field cost estimate is $4.92 billion.

Total Project Cost Estimate

4. The MP total project cost estimate for the Black Rock Alternative is $5.69 billion (April 2007). The MPL and MPH total project cost estimates are $4.084 billion and $10.455 billion, respectively.

5. Monte Carlo risk simulation of the calculated total project cost estimates indicate that there is a 0% probability that the actual total project cost will be less than $4.95 billion, and a 100% probability that the actual total project cost will be less than $7.73 billion. The mean total project cost estimate is $6.18 billion.

Wymer Dam and Reservoir Alternative

Field Cost Estimate

1. The MP field cost estimate for the Wymer Dam and Reservoir Alternative is $786 million (April 2007). The MPL and MPH field cost estimates are $537 million and $1.285 billion, respectively.

2. The MP field cost estimate for the Wymer Dam and Reservoir Alternative is close to the appraisal-level field cost estimate used in the Draft PR/EIS.

3. Monte Carlo risk simulation of the calculated field cost estimates indicate that there is a 0% probability that the actual field cost will be less than $704 million, and a 100% probability that the actual field cost will be less than $1.01 billion. The mean field cost estimate is $831 million.

Total Project Cost Estimate

4. The MP total project cost estimate for the Wymer Dam and Reservoir Alternative is $1.024 billion (April 2007). The MPL and MPH total project cost estimates are $669 million and $1.715 billion, respectively.

5. Monte Carlo risk simulation of the calculated total project cost estimates indicate that there is a 0% probability that the actual total project cost will be less than $867 million, and a 100% probability that the actual total project cost will be less than $1.34 billion. The mean total project cost estimate is $1.08 billion.

XII. References

[1] *Appraisal Assessment of the Black Rock Alternative Facilities and Field Cost Estimates*, Technical Series No. TS-YSS-2. 2004. U.S. Department of the Interior, Bureau of Reclamation, Technical Service Center. December 2004. Denver, Colorado.

[2] *Wymer Dam and Reservoir Appraisal Report*, Technical Series No. TS-YSS-16. 2007. U.S. Department of the Interior, Bureau of Reclamation, Technical Service Center. September 2007. Denver, Colorado.

[3] *Draft Planning Report/Environmental Impact Statement, Yakima RiverBasin Water Storage Feasibility Study*. 2008. U.S. Department of the Interior, Bureau of Reclamation, Pacific Northwest Region, Upper Columbia Area Office. January 2008. Yakima, Washington.

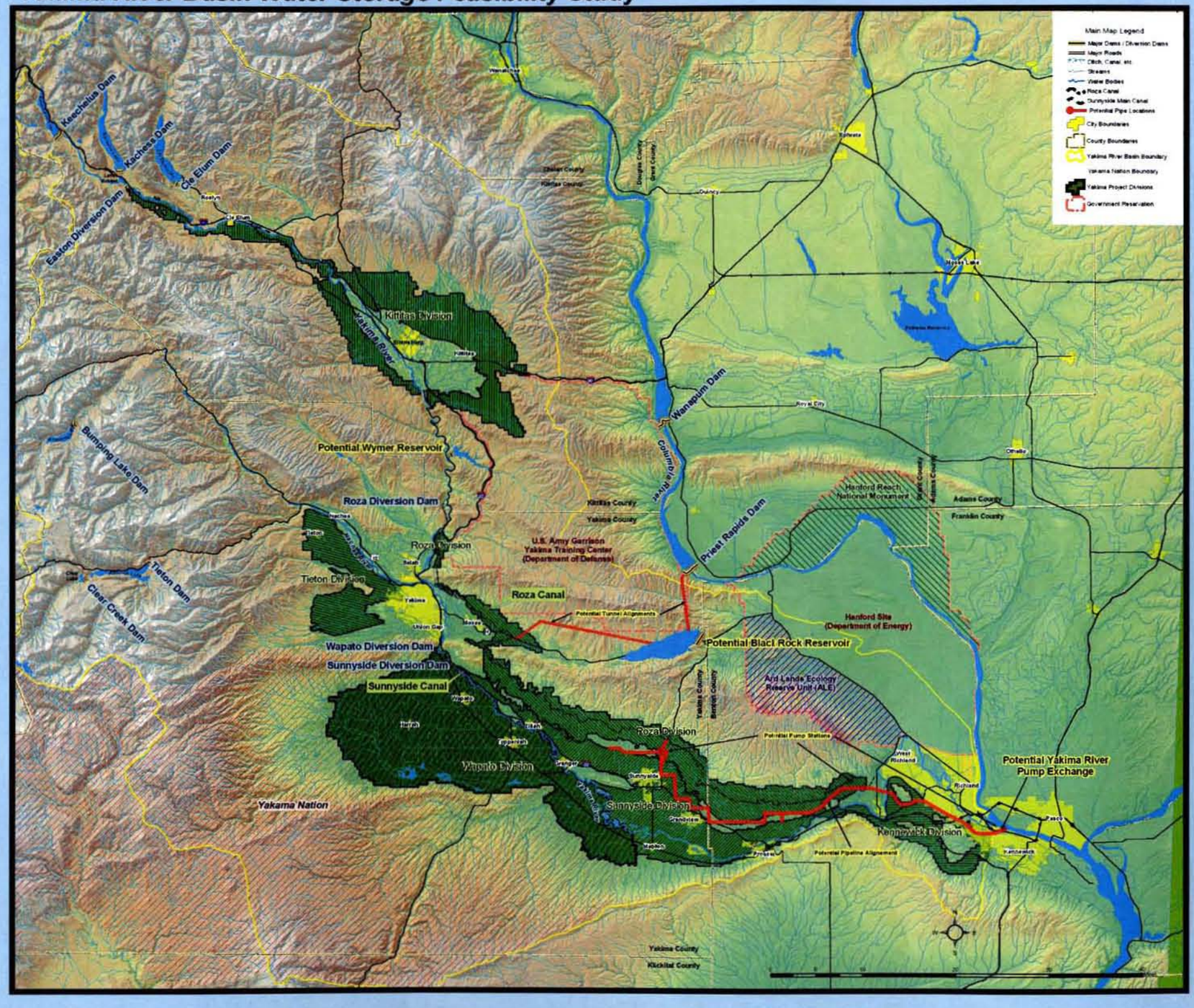
[4] *Modeling Mitigation of Seepage from the Potential Black Rock Reservoir*, Technical Series No. TS-YSS-25. 2008. U.S. Department of the Interior, Bureau of Reclamation, Pacific Northwest Region. December 2008.

FIGURES

Figure

1. Yakima River Basin Water Storage Feasibility Study - Reference Graphic
2. Black Rock Alternative - Reference Graphic
3. Wymer Dam and Reservoir Alternative - Reference Graphic
4. Black Rock Assessment Study - Downstream Seepage Mitigation Features - Sheet 1 of 2
5. Black Rock Assessment Study - Downstream Seepage Mitigation Features - Sheet 2 of 2
6. Wymer Dam and Reservoir - Most Probable Alternative - General Plan

Yakima River Basin Water Storage Feasibility Study





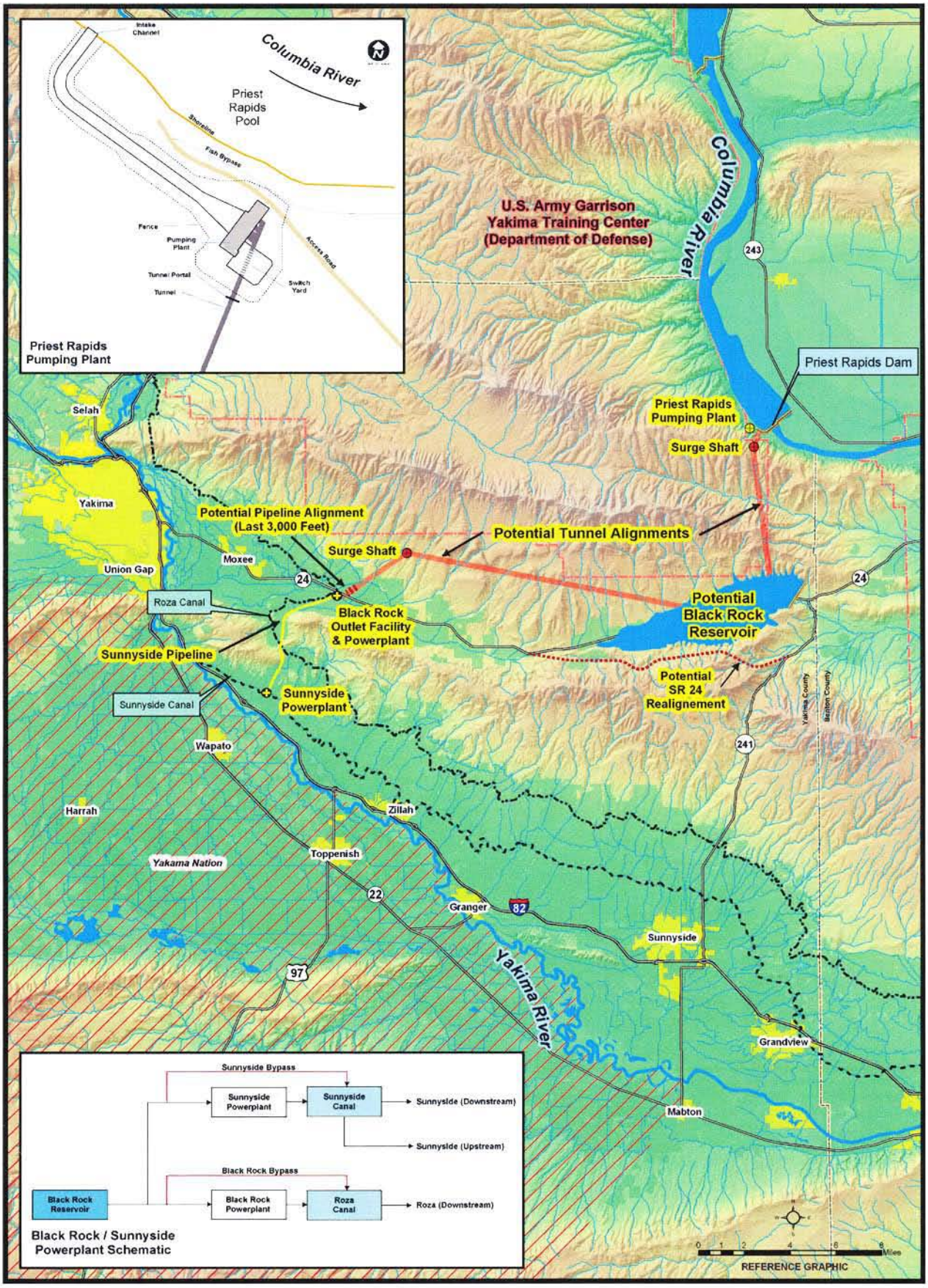


This reference graphic is intended for informational purposes only. It is meant to assist in feature location relative to other landmarks. Geographic features have been intentionally simplified in an attempt to provide a more readable product. No representation is made as to accuracy of this document. Current as of January 2008.

RECLAMATION
Managing Water in the West

REFERENCE GRAPHIC

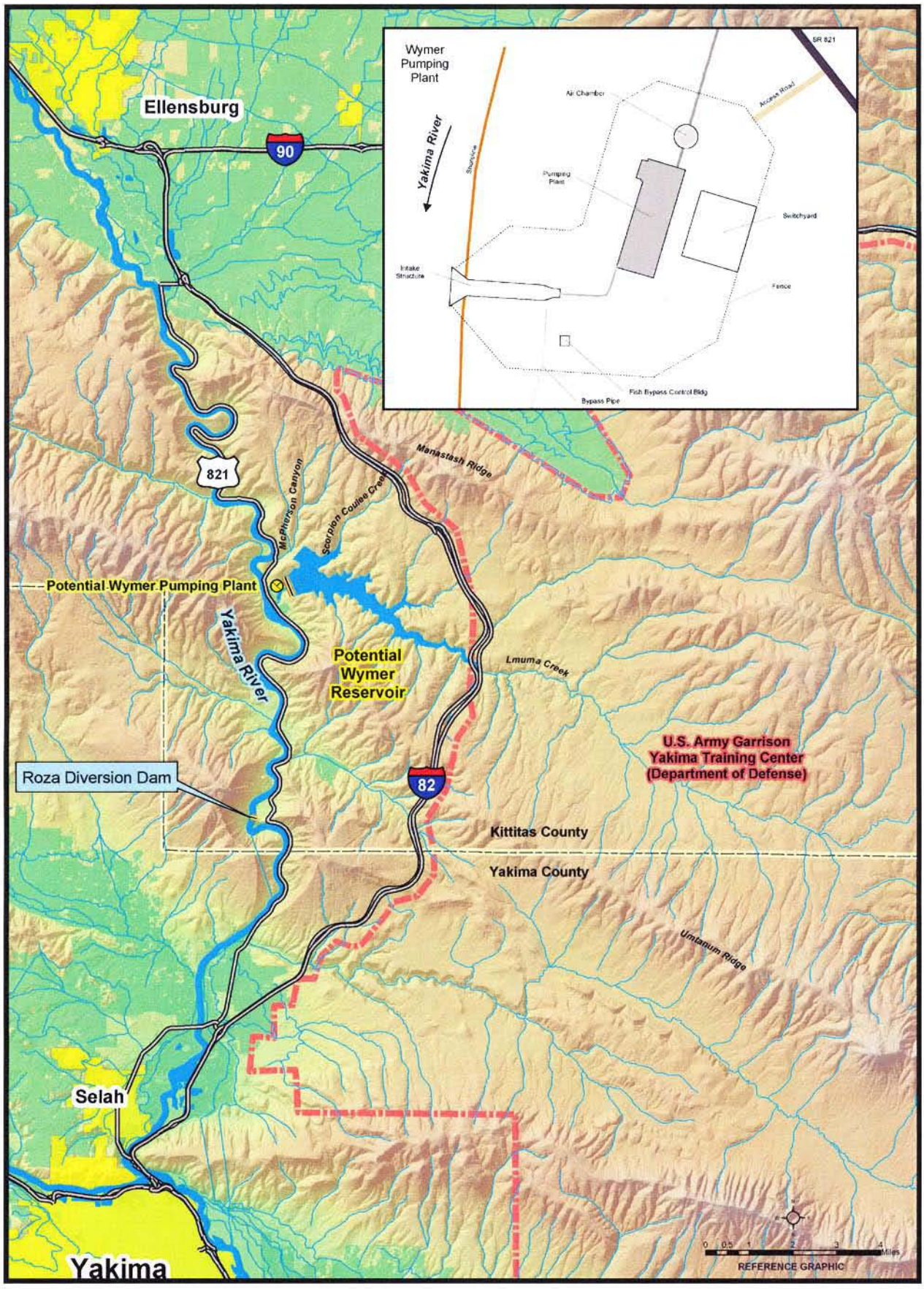
Figure 1



This reference graphic is intended for informational purposes only. It is meant to assist in feature location relative to other landmarks. Geographic features have been intentionally simplified in an attempt to provide a more readable product. No representation is made as to accuracy of this document. Current as of January 2008

Figure 2

Black Rock Alternative



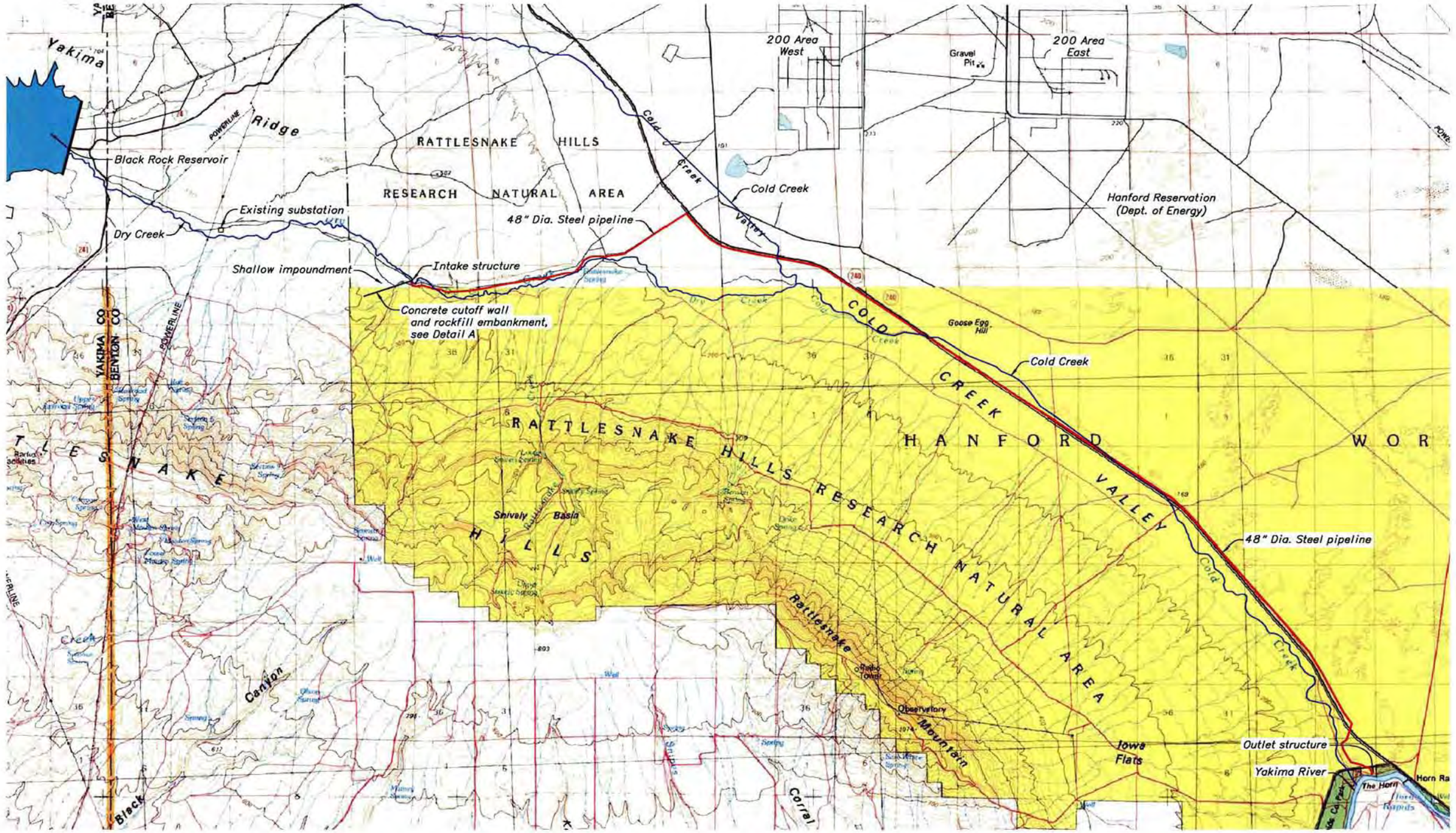
This reference graphic is intended for informational purposes only. It is meant to assist in feature location relative to other landmarks. Geographic features have been intentionally simplified in an attempt to provide a more readable product. No representation is made as to accuracy of this document. Current as of January 2008

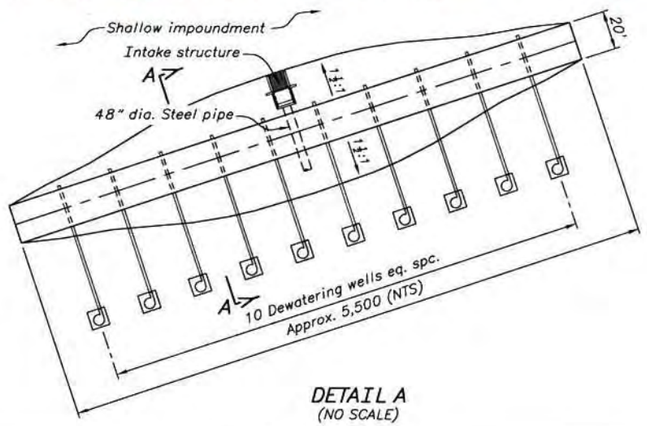
Wymer Dam and Reservoir Alternative

Figure 3

FIGURE 4

RECLAMATION
Managing Water in the West

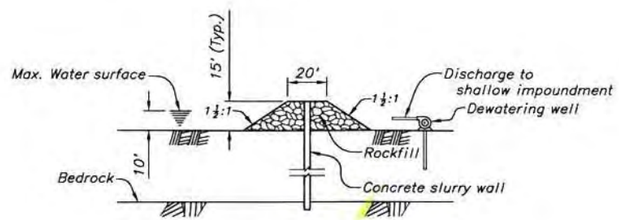




DETAIL A
(NO SCALE)

GENERAL MAP

1 0 1 2 3
SCALE OF MILES



SECTION A–A
(NO SCALE)

NOTES
1. For intake structure details, typical pipe section, and outlet structure details, see Figure 5.
2. Scale and accuracy of topography is not adequate to delineate extents of shallow impoundment.

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

YAKIMA RIVER BASIN WATER SUPPLY STUDY

BLACK ROCK ASSESSMENT STUDY

DOWNSTREAM SEEPAGE MITIGATION FEATURES

GENERAL MAP, DETAIL, AND SECTION

DESIGNED BY
REVIEWED BY
FOR STRUCTURES GROUP

DENVER, COLORADO 2008-12-09
SHEET 1 OF 2

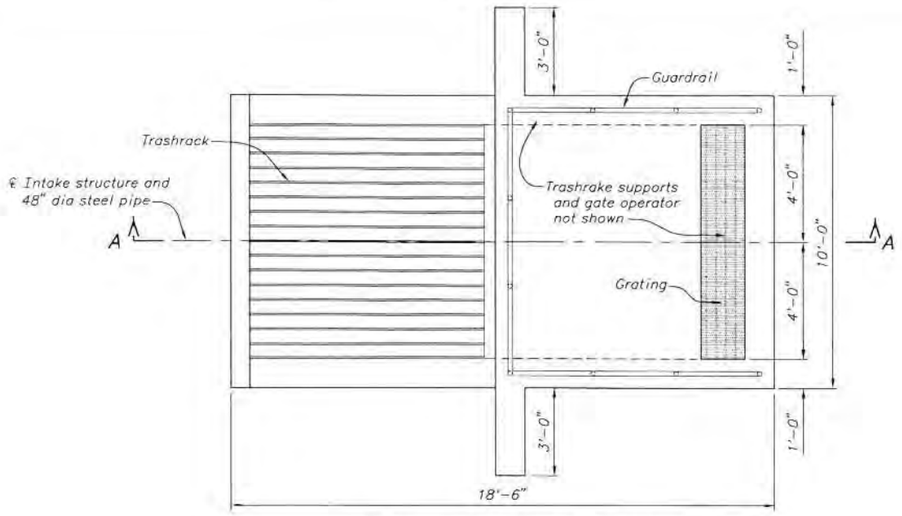
FIGURE 4

DATE AND TIME PLOTTED
DECEMBER 9, 2008 08:54
PLOTTED BY
RMORRISEZ

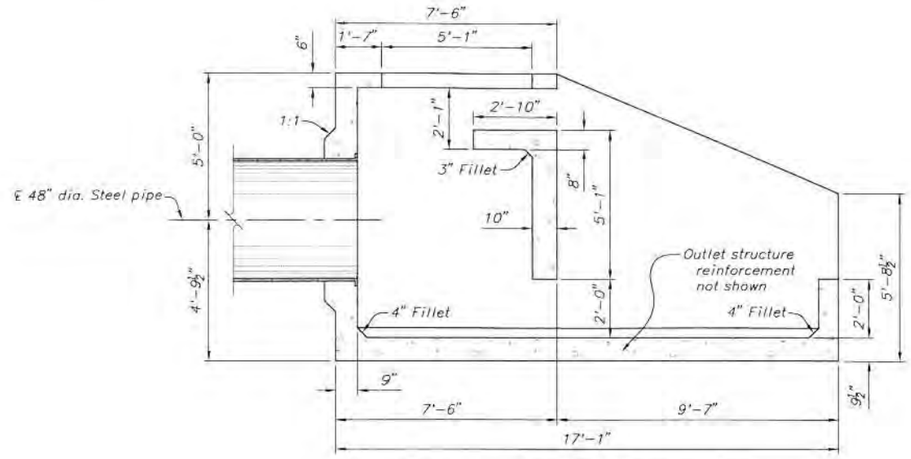
CAD SYSTEM
AutoCAD Rel. 17.1s
DRAWING NAME
FIGURE 4.DWG

FIGURE 5

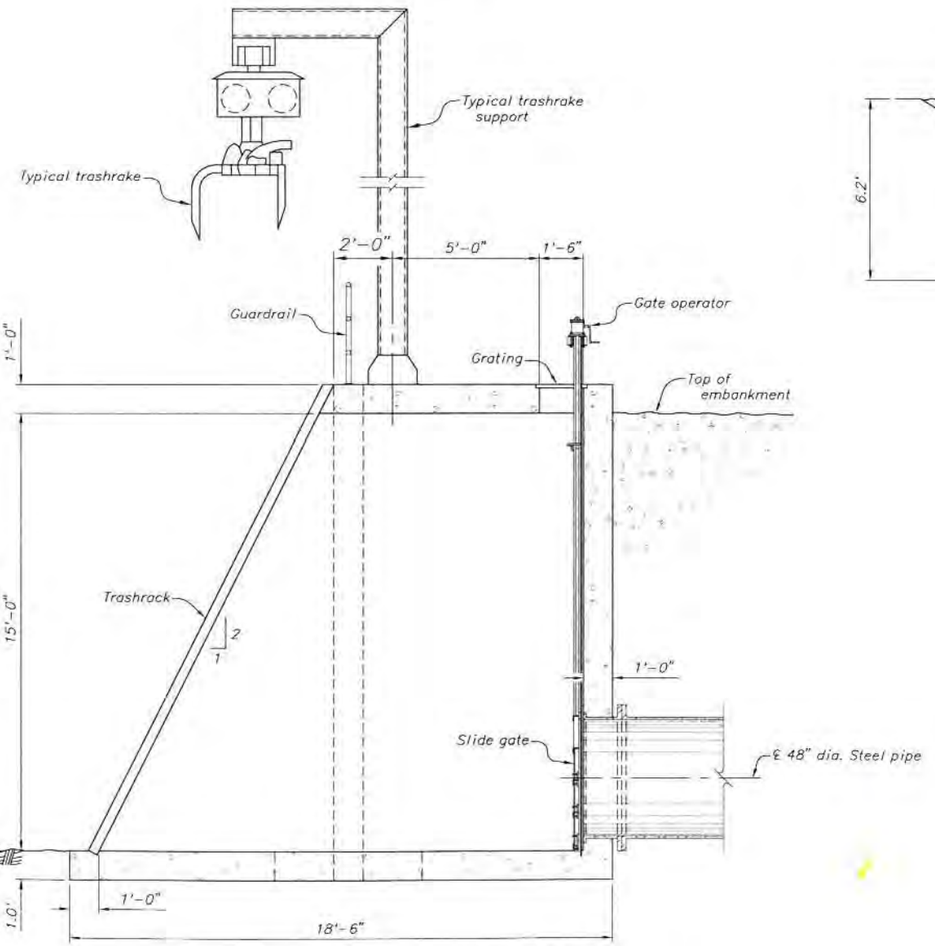
RECLAMATION
Managing Water in the West



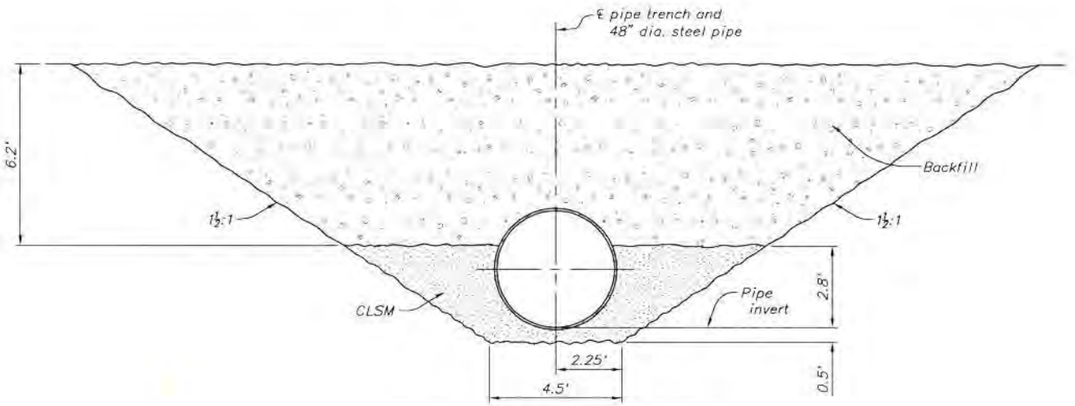
PLAN – INTAKE STRUCTURE



SECTION THRU OUTLET STRUCTURE
BAFFLED OUTLET TYPE 8
13'-3" WIDE



SECTION A–A



TYPICAL PIPE TRENCH SECTION

NOTES
1. For locations, see FIGURE 4.
2. CLSM Denotes Cementitious Low Strength Material.

SCALE OF FEET
1 0 1 2 3 4 5

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BUREAU OF RECLAMATION

YAKIMA RIVER BASIN WATER SUPPLY STUDY

BLACK ROCK ASSESSMENT STUDY

DOWNSTREAM SEEPAGE MITIGATION FEATURES

PLAN AND SECTIONS

DESIGNED BY
REVIEWED BY
PLANS-STRUCTURES GROUP

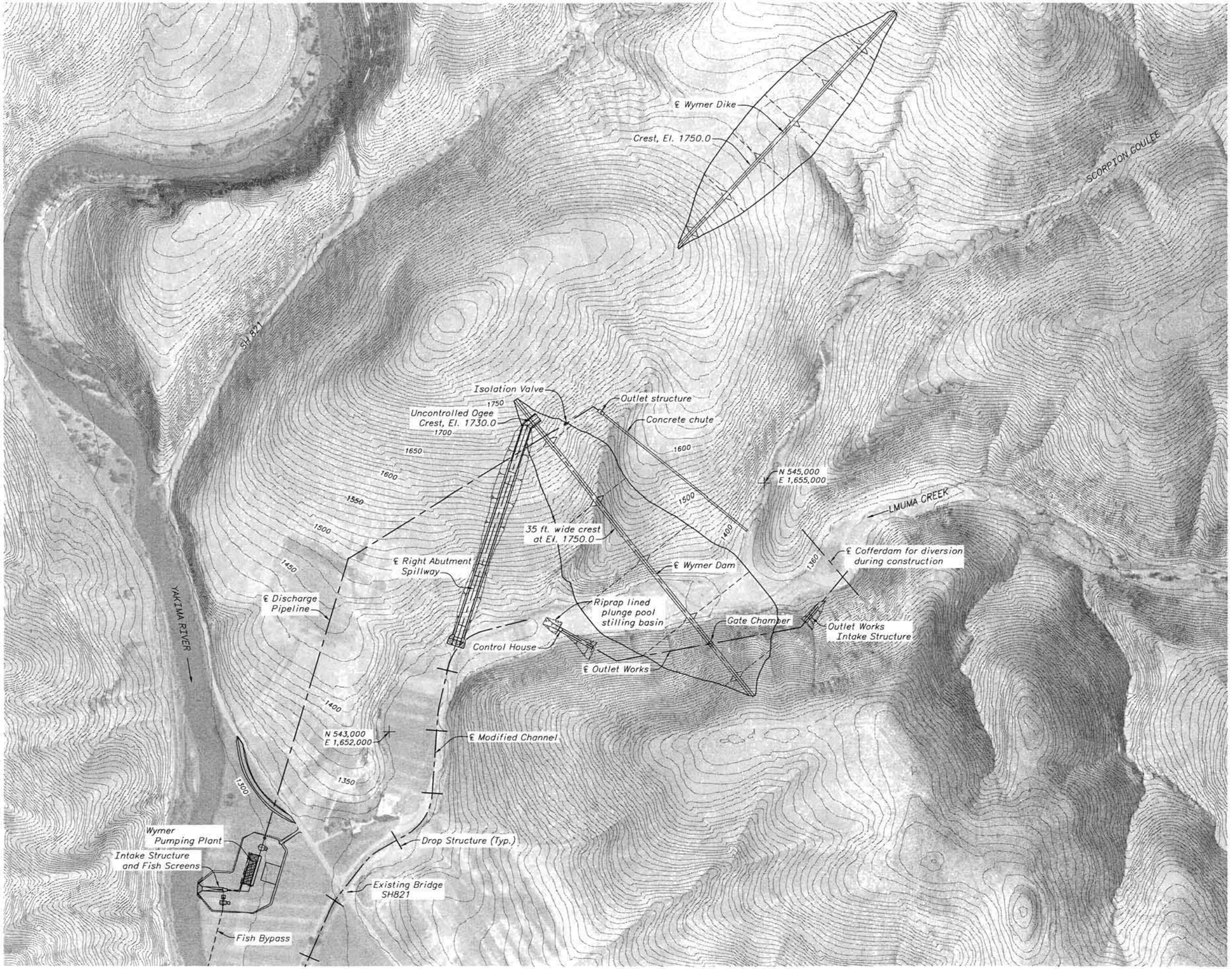
DENVER, COLORADO
SHEET 2 OF 2
2008-06-10

FIGURE 5

DATE AND TIME PLOTTED
DECEMBER 8, 2008 09:29
PLOTTED BY
RRODRIGUEZ

CAD SYSTEM
AutoCAD Rel. 17.1s
CAD FILENAME
FIGURE 5.DWG

FIGURE 6



GENERAL PLAN

400 0 400 800 1200
SCALE OF FEET

NOTE
1. Vertical datum referenced to NGVD29.

ALWAYS THINK SAFETY

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YAKIMA RIVER BASIN STORAGE STUDY

WYMER DAM AND RESERVOIR

COST RISK ANALYSIS

MOST PROBABLE ALTERNATIVE

GENERAL PLAN

DESIGNED BY
REVIEWED BY
PLANT STRUCTURES GROUP
P.E.

DENVER, CO
SHEET 1 OF 1
2008-12-09

FIGURE 6

DATE AND TIME PLOTTED
DECEMBER 9, 2008 08:52
PLOTTED BY
RRODRIGUEZ

CAD SYSTEM
AutoCAD Rel. 17.1s
CAD FILENAME
FIGURE 6.DWG

APPENDIX A

Black Rock Alternative

Field Cost Estimates

Black Rock Alternative

Most Probable Low (MPL) Field Cost Estimate

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

SHEET 1 OF 22

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Low Cost Estimate
Summary

Summary Sheet 1 of 1

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Inflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Intake and Pumping Plant on Priest Rapids Reservoir					
		Design Flow capacity: 3,500 cfs					
		All Tunnel Option to Black Rock Reservoir					
		Intake - Civil/Structural Subtotal					$63,661,445.00
		Intake - Mechanical/Electrical Subtotal					$13,511,344.00
		Plant - Civil/Structural Subtotal					$94,501,312.00
		Plant - Mechanical Subtotal					$121,763,300.00
		Plant - Electrical Subtotal					$7,114,480.00
		Switchyard & Transmission Line Subtotal					$27,902,600.00
		Discharge (All Tunnel) - Subtotal					$230,426,665.00
		Subtotal					**$558,881,146.00**
		Mobilization		5%	(+/-)		$28,000,000.00
		Subtotal with mobilization					**$586,881,146.00**
		Escalation During Construction		0%	(+/-)		$0.00
		Subtotal with mobilization and escalation					**$ 586,881,146.00**
		Design Contingencies		10%	(+/-)		$63,118,854.00
		CONTRACT COST					**$650,000,000.00**
		Construction Contingencies		20%	(+/-)		$ 120,000,000.00
		FIELD COST					**$770,000,000.00**
		Non-Contract Costs **		20%	(+/-)		$150,000,000.00
		CONSTRUCTION COST					**$920,000,000.00**

Escalation to notice to proceed, allowance for procurement strategies, and utility relocations are not included.

** Land Acquisition Costs of $21,000 associated with these features are included in the Non-Contract Costs.

QUANTITIES		PRICES	
BY Design Team	**CHECKED**	**BY** G. Akins, J. Morris & L. Zlomke (8170)	**CHECKED**
DATE PREPARED 6/2/08	**PEER REVIEW**	**DATE PREPARED** 8/20/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Low Cost Estimate

Intake - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Inflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		CIVIL					
		Construct/Remove Cellular Cofferdam around Reservoir Intake					
		Assume construct from shore without barge.					
		Assume circular cellular cofferdam.					
		Length= 380 feet, 32-ft dia. cells, 28 ft high					
		Top of cofferdam - El. 488, Bottom of cofferdam - El. 460					
		Assume top of rock at reservoir bottom..					
	1	Furnish and install sheet pile walls	D8120	555	TONS	$2,900.00	$1,609,500.00
		Arbed AS 500-12, 30 psf					
	2	Backfill cells with free-draining granular material	D8120	11,700	CY	$33.00	$386,100.00
	3	Unwater behind cofferdam	D8120	6	MOS	$61,000.00	$366,000.00
		Assume sumps and surface pumps					
		Remove Cofferdam					
	4	Remove and stockpile granular material	D8120	11,700	CY	$27.00	$315,900.00
	5	Extract and salvage sheet pile cutoff wall	D8120	555	TONS	$440.00	$244,200.00
		Dewatering Intake and Pumping Plant					
		Assume minimal seepage into excavation.					
		No dewatering wells.					
		Sheet Subtotal					**$2,921,700.00**

QUANTITIES		PRICES	
BY Brad VanOtterloo (8120)	CHECKED Dick LaFond (8120)	BY Jeff Morris (8170)	CHECKED
DATE PREPARED 06/02/08	PEER REVIEW	DATE PREPARED 8/14/08	PEER REVIEW

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE: Black Rock Preferred Alternative Inflow Conveyance System Most Probable Low Cost Estimate Intake - Civil/Structural	**PROJECT:** Yakima River Basin Water Storage Study
WOID: YAKAP	**ESTIMATE LEVEL:** Appraisal
REGION PN	**PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\[Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Inflow_Most Probable Low_060608.xls]Summary	

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Unwatering Intake and Pumping Plant Assume minimal seepage into excavation. No unwatering pumps.					
		Sheet Subtotal					**$0.00**

QUANTITIES		PRICES	
BY Brad VanOtterloo (8120)	CHECKED Dick LaFond (8120)	BY Jeff Morris (8170)	CHECKED
DATE PREPARED 06/02/08	PEER REVIEW	DATE PREPARED 8/14/08	PEER REVIEW

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Low Cost Estimate

Intake - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Inflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Structural Excavation and Backfill					
		Assume dam excavation is all common.					
		Assume top 5 feet of excavation is common and the remainder is rock					
		Assume stockpile some common material and use for backfill or embankment.					
		Assume local wasting of excess material.					
	8	Excavation of common materials for structures	D8140	388,500	CY	$6.00	$2,331,000.00
	9	Excavation of rock for structures (drill & shoot)	D8140	671,700	CY	$17.00	$11,418,900.00
	10	Furnish & place backfill for structures (assume local borrow	D8140	35,800	CY	$4.20	$150,360.00
	11	Place backfill around structures	D8140	35,800	CY	$0.00	$0.00
	12	Compact backfill around structures	D8140	35,800	CY	$7.10	$254,180.00
		Roads and Fencing					
	13	Gravel surfacing		2,270	TONS	$49.00	$111,230.00
		20 ft wide road right side of channel					
		12 ft wide road left side of channel					
	14	Safety fencing		4,750	LF	$30.00	$142,500.00
		8' chainlink fence					
		STRUCTURAL					
		Construct Gated Intake and Fishscreen Structure					
	15	Furnish, form, and place reinforced concrete (f'c=4ksi)	D8140	40,150	CY	$510.00	$20,476,500.00
	16	Furnish and place concrete reinforcement.	D8140	6,424,000	LBS	$1.50	$9,636,000.00
	17	Furnish and handle cement	D8140	11,325	TONS	$150.00	$1,698,750.00
		Construct Lined Intake Canal					
	18	Furnish, form, and place unreinforced concrete	D8140	2,350	CY	$460.00	$1,081,000.00
		lining in excavated channel (f'c= 3 ksi)					
	19	Furnish and handle cement	D8140	665	TONS	$165.00	$109,725.00
		Construct Bypass Pipe					
	20	3 - 54" Dia. steel pipe for fish bypass.		15,840	LF	$340.00	$5,385,600.00
		Mortar line pipe					
	21	Bypass pipe common excavation		270,000	CY	$3.40	$918,000.00
	22	Bypass pipe rock excavation		130,000	CY	$22.00	$2,860,000.00
	23	Bypass pipe backfill		380,000	CY	$6.70	$2,546,000.00
	24	Bypass pipe soil cement bedding (100 psi)		12,000	CY	$135.00	$1,620,000.00
		Miscellaneous Metalwork					
		Listed under Intake - Mechanical Items					
		Intake - Civil/Structural Subtotal					**$63,661,445.00**

QUANTITIES		PRICES	
BY Chou Cha (8140)	CHECKED David Gesundheit/Anne Pavol (8140)	BY Jeff Morris (8170)	CHECKED
DATE PREPARED 04/19/04	PEER REVIEW	DATE PREPARED 8/14/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Low Cost Estimate

Intake - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Inflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
	1	Furnish and install steel stoplog guides and seats (upstream of radial gates)	D8410	13,500	LBS	$10.00	$135,000.00
	2	Furnish and install steel trashracks	D8410	102,000	LBS	$7.40	$754,800.00
	3	Furnish and install one trash rake, rails, supports (assume Atlas Polar DT8300 rake)	D8410	21,000	LBS	$9.30	$195,300.00
	4	Furnish and install one conveyor, steel	D8410	13,000	LBS	$9.70	$126,100.00
	5	Furnish and install steel fish screen guides, supports, embedded seats, and bypass walls	D8410	360,000	LBS	$7.40	$2,664,000.00
	6	Furnish and install fish screens, 10' W x14' H panel 70 panels + 6 spares	D8410				
		Structural steel		106,400	LBS	$7.40	$787,360.00
		Stainless steel		106,400	LBS	$23.00	$2,447,200.00
	7	Furnish and install barrier panels above fish screens 10' W x 11' H panels, 70 panels + 6 spares	D8410				
		Structural steel		209,000	LBS	$4.60	$961,400.00
	8	Furnish and install adjustable baffle panels 10' W x 25' H panels, 70 panels + 6 spares	D8410				
		Structural steel		570,000	LBS	$4.60	$2,622,000.00
	9	Furnish and install fish screen cleaners with travel rail, 5 systems with 2 brush cleaner arms per system	D8410				
		a. Structural steel		40,000	LBS	$5.60	$224,000.00
		b. Stainless steel		2,500	LBS	$23.00	$57,500.00
		c. 2 Hp motors/gear reducers, with adj. speed controllers, and limit switches		5	UNITS	$9,300.00	$46,500.00
	10	Furnish and install water level measuring systems	D8410	12	UNITS	$14,000.00	$168,000.00
		Sheet Subtotal					**$11,189,160.00**

QUANTITIES		PRICES	
BY	CHECKED	BY	CHECKED
R Christensen/B Sund (8410)	Alex Ritt (8410)	Lonnie Zlomke (8170)	
DATE PREPARED	PEER REVIEW	DATE PREPARED	PEER REVIEW
4/21/04, 6/03/08		8/14/08	

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Low Cost Estimate

Intake - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Inflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont)					
	11	Furnish and install steel stoplog guides and seats (downstream of fish screens)	D8410	13,500	LBS	$9.60	$129,600.00
	12	Furnish and install one set of steel stoplogs for the two different size bays with lifting beam	D8410	101,000	LBS	$3.90	$393,900.00
	13	3' wide walkway, steel, safety grating along fish screens	D8410	19,500	LBS	$8.60	$167,700.00
	14	Handrail along each side of fish screen walkway	D8410	1,520	LF	$56.00	$85,120.00
		Radial Gates in Intake Structure					
		Furnish and install two 36.5-ft x 8.5-ft top seal radial gates and hoist equipment:	D8420				
	15	Gate (Weight/gate= 34,650 lbs)		69,120	LBS	$8.40	$580,608.00
	16	Embedded metalwork (Weight/bay= 5,000 lbs)		10,000	LBS	$6.90	$69,000.00
	17	Hoist operator (Weight/gate operator= 11,300 lbs)		22,600	LBS	$22.00	$497,200.00
	18	Motor - 5 hp (One per gate)		2	EA	$810.00	$1,620.00
		Furnish and install one 15.0-ft x 8.5-ft top seal radial gate and hoist equipment:	D8420				
	19	Gate (Weight/gate= 20,790 lbs)		20,790	LBS	$8.40	$174,636.00
	20	Embedded metalwork (Weight/bay= 3,000 lbs)		3,000	LBS	$6.90	$20,700.00
	21	Hoist operator (Weight/gate operator= 6,150 lbs)		6,150	LBS	$22.00	$135,300.00
	22	Motor - 3 hp		1	EA	$790.00	$790.00
		Sheet Subtotal					**$2,256,174.00**

QUANTITIES		PRICES	
BY Rick Christensen/B Sund (8410) Pete Hoffman (8420)	CHECKED Alex Ritt (8410)	BY Lonnie Ziomke (8170)	CHECKED
DATE PREPARED 4/21/04, 6/03/08	PEER REVIEW	DATE PREPARED 8/14/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Low Cost Estimate

Intake - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Inflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		ELECTRICAL					
		Service Equipment (F&I)	D8430				
	23	Distribution panelboard, outdoor type 480 volts, 3-phase with 225 ampere bus		1	EA	$11,000.00	$11,000.00
	24	Outdoor transformer load center 15 kVA, 1-phase, 480-240/120 volt		1	EA	$7,900.00	$7,900.00
		Combination Motor Starters	D8430				
	25	NEMA size 2 non-reversing contactor, 480-120 volt control transformer NEMA type 4 enclosure		6	EA	$4,200.00	$25,200.00
		Insulated Conductors (F&I)					
		600-volt, single-conductor, stranded copper					
	26	12 AWG		500	LF	$1.05	$525.00
	27	10 AWG		200	LF	$1.45	$290.00
	28	8 AWG		100	LF	$1.70	$170.00
		Conduit System (F&I)					
		Rigid steel conduit					
	29	1 inch		150	LF	$19.50	$2,925.00
		Lighting System (F&I)	D8430				
	30	High-pressure sodium, pole mounted, outdoor 70 watt, 120 volt		6	EA	$3,000.00	$18,000.00
		Intake - Mechanical/Electrical Subtotal					**$13,511,344.00**

QUANTITIES		PRICES	
BY Mike Schuh (8430)	CHECKED Cory Maurer (8430)	BY Lonnie Zlomke (8170)	CHECKED
DATE PREPARED 05/22/08	PEER REVIEW George Girgis (8430)	DATE PREPARED 8/14/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Low Cost Estimate

Plant - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Inflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Access Road (9.75 miles of 2-lane access road):					
		Assume construct access road from SH24 to PP.					
		Assume place road along abandoned railroad alignment					
		Assume no major excavation or embankment sections.					
	1	Clear roadway alignment	D8140	45	AC	$4,400.00	$198,000.00
	2	Furnish and place base course material (9-inch depth)	D8140	96,000	TONS	$37.00	$3,552,000.00
	3	Furnish and place asphalt concrete (6-inch depth)	D8140	70,000	TONS	$87.00	$6,090,000.00
	4	Furnish and install W-beam type guardrail	D8140	10,000	LF	$88.00	$880,000.00
	5	Furnish and install miscellaneous pipe culverts	D8140	1,000	LF	$165.00	$165,000.00
		Assume 36-inch-diameter, wt/ft= 35#/ft)					
		Service Yard (6" asphalt concrete surface)					
	6	Strip and clear pumping plant site to 1 foot depth	D8120	15,300	CY	$5.50	$84,150.00
	7	Common excavation to Service Yard El. 505.0	D8120	164,000	CY	$4.20	$688,800.00
	8	Rock excavation to Service Yard El. 505.0	D8120	208,000	CY	$22.00	$4,576,000.00
	9	Place and compact embankment for service yard	D8120	19,200	CY	$8.50	$163,200.00
	10	Furnish and place base course material (6-inch)	D8120	10,000	TONS	$39.00	$390,000.00
	11	Furnish and place asphalt concrete (6-inch)	D8120	11,000	TONS	$92.00	$1,012,000.00
	12	Furnish and install 7-foot chain link fence for PP Yard	D8120	3,100	LF	$28.00	$86,800.00
	13	Furnish and install 7-foot x 24-foot access gate	D8120	3	EA	$4,400.00	$13,200.00
		Unwatering/Dewatering During Construction:					
		Minimal seepage. No dewatering/unwatering features required.					
		Structural Excavation and Backfill					
		Assume all common material excavated under site excavation for yard.					
	14	Excavation of rock for structures (drill & shoot)	D8120	200,000	CY	$27.00	$5,400,000.00
	15	Furnish backfill for structures (assume local borrow)	D8120	40,000	CY	$5.40	$216,000.00
	16	Place backfill around structures	D8120	40,000	CY	$0.00	$0.00
	17	Compact backfill around structures	D8120	40,000	CY	$8.20	$328,000.00
	18	Rock Exc. for manifold pipe to edge of Service Yard	D8120	78,000	CY	$20.00	$1,560,000.00
	19	Furnish, place, & compact backfill for manifold pipe trench(a	D8120	63,480	CY	$9.40	$596,712.00
	20	Furnish & place soil cement for manifold pipe trench	D8120	8,160	CY	$125.00	$1,020,000.00
		Sheet Subtotal					**$27,019,862.00**

QUANTITIES		PRICES	
BY Dick LaFond (8120) Mike O'Shea (812	**CHECKED** Mike O'Shea/Dick LaFond (8120)	**BY** Greg Akins Greg Akins (8170)	**CHECKED**
DATE PREPARED 4/19/04	**PEER REVIEW**	**DATE PREPARED** 8/14/08	**PEER REVIEW**

FEATURE:	PROJECT:	
Black Rock Preferred Alternative Inflow Conveyance System Most Probable Low Cost Estimate	Yakima River Basin Water Storage Study	
	WOID: YAKAP	ESTIMATE LEVEL: Appraisal
	REGION PN	PRICE LEVEL: Apr-07
Plant - Civil/Structural	FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Inflow_Most Probable Low_060608.xls]Summary	

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Waste Excess Excavated Material at Priest Rapids					
		Assume local wasting of material.					
		Quantities include intake, plant, and 1/2 tunnel.					
		Waste rock excavation	D8120	1,523,000	CY	Included in Item 8 of Intake (C/S) and Item 7 of Plant (C/S)	
		Waste common material	D8120	296,000	CY	Included in Item 9 of Intake (C/S) and Items 8,14,18 of Plant (C/S)	
		STRUCTURAL					
		Construct Building Structure					
	21	Furnish, form, and place reinforced concrete	D8120	91,300	CY	$500.00	$45,650,000.00
	22	Furnish and place concrete reinforcement.	D8120	10,043,000	LBS	$1.40	$14,060,200.00
		Assume 110 #/CY					
	23	Furnish and handle cement (.282T/CY)	D8120	25,750	TONS	$135.00	$3,476,250.00
		Furnish & install precast, prestressed double tees for roof					
	24	10LDT 32+2 = 10' wide & 32" deep - 80' Span	D8120	36	EA.	$55,000.00	$1,980,000.00
		Structural Steel					
	25	Furnish and install structural steel (painted):	D8120	60,000	LBS	$4.00	$240,000.00
		crane rails, baseplates					
		Miscellaneous Metalwork					
	26	Furnish and install miscellaneous metalwork	D8120	250,000	LBS	$8.30	$2,075,000.00
		Includes gratings, hatches, ladders, guardrails, catwalk, and cable trays and supports					
		Plant - Civil/Structural Subtotal					**$94,501,312.00**

QUANTITIES		PRICES	
BY Mike O'Shea (8120)	CHECKED Dick LaFond (8120)	BY Greg Atkins (8170)	CHECKED
DATE PREPARED 4/19/04 and 6/2/08	PEER REVIEW	DATE PREPARED 8/14/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Low Cost Estimate

Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Major Mechanical Equipment					
		Prices below telephone quote from Bob Rittase, Voith Hydro, 717-792-7206					
		500 cfs two-stage spiral case pump, rated 500cfs at 1430 ft total dynamic head, overall efficiency more than 83% operating range from 1030 to 1430 feet					
	1	Pumps		3	EA	$5,700,000.00	$17,100,000.00
	2	Motors		3	EA	$2,800,000.00	$8,400,000.00
	3	Spherical discharge valves, with operators, rated at 1500 ft working pressure and 2000 ft surge pressure, with operators		3	EA	$3,400,000.00	$10,200,000.00
	4	Installation supervision of 500 cfs pumping unit		3	EA	$1,150,000.00	$3,450,000.00
		1000 cfs two-stage spiral case pump, rated 1000 cfs at 1430 ft total dynamic head, overall efficiency more than 83% operating range 1030 to 1430 ft					
	5	Pumps		2	EA	$10,000,000.00	$20,000,000.00
	6	Motors		2	EA	$5,100,000.00	$10,200,000.00
	7	Spherical discharge valves, with operators, rated at 1500 ft working pressure and 2000 ft surge pressure, with operators		2	EA	$5,100,000.00	$10,200,000.00
	8	Installation supervision of 1000 cfs pumping unit		2	EA	$1,700,000.00	$3,400,000.00
		Sheet Subtotal					**$82,950,000.00**

QUANTITIES		PRICES	
BY Richard Fehr (8420)	CHECKED Robert Zelenka (8420)	BY Lonnie Zlomke (8170)	CHECKED
DATE PREPARED 4/16/04; 6/02/08		DATE PREPARED 8/14/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Low Cost Estimate

Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Inflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		FURNISH-AND-INSTALL THE FOLLOWING:					
		Steel Manifold and Suction Tubes Steel plate used for pipe fabrication: ASTM A572 Gr. 50: Sy = 50 kpsi St = 65 kpsi (All pipe sizes are inside diameters)	D8420				
	9	192" Inside Dia., 3 5/8" wall, L= 340 ft.	D-8420	2,600,000	LBS	$5.20	$13,520,000.00
	10	192" Dia., 3 3/4" wall, L= 152 ft.		1,200,000	LBS	$5.20	$6,240,000.00
	11	175" Dia., 3 3/8" wall, L= 58 ft.		375,000	LBS	$5.20	$1,950,000.00
	12	170" Dia., 1" wall, L= 134 ft.		260,000	LBS	$2.80	$728,000.00
	13	135" Dia., 2 5/8" wall, L= 54 ft.		210,000	LBS	$5.30	$1,113,000.00
	14	120" Dia., 1/8" wall, L= 122 ft.		150,000	LBS	$2.70	$405,000.00
	15	110" Dia., 2 1/8" wall, L= 261 ft.		670,000	LBS	$5.30	$3,551,000.00
	16	78" Dia., 1 1/2" wall, L= 260 ft.		340,000	LBS	$2.70	$918,000.00
		Sheet Subtotal					**$28,425,000.00**

QUANTITIES		**PRICES**	
BY Nathan Nakamoto (8420)	**CHECKED** Rick Frisz (8420)	**BY** Lonnie Zlomke (8170)	**CHECKED**
DATE PREPARED 4/16/04		**DATE PREPARED** 8/14/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Low Cost Estimate

Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont)					
	17	CO2 High Pressure Fire Extinguishing System: 16 - 100# Storage Cylinders w/ control panel and appurtenances and 2,000 lbs. of sch. 80 carbon steel pipe, valves & fittings	D8410	2	each	$114,000.00	$228,000.00
	18	Fire Suppression System: 10 Fire hose reels w/ 100 feet of hose 20 - Portable hand-held 20# extinguishers 12,000 lbs. of sch. 40 carbon steel pipe, valves & fittings 1 - Fire pump, split-case, 500 gpm @ 300 ft of head	D8410	1	L.S.	$200,000.00	$200,000.00
	19	Unit Cooling Water System: 6 - Cooling water pumps, end-suction type, 150 gpm 2 - 8-inch automatic, self-cleaning strainers 4,000 lbs. of type K copper tubing, valves & fittings 5,000 lbs. of ductile iron, mechanical joint pipe & fittings	D8410	1	L.S.	$290,000.00	$290,000.00
	20	Lubricating Oil System: 2- 500 gal carbon steel storage tanks 1 - 10 gpm @ 100 psi oil pump 1 - lube oil filter 3,000 lbs. of sch. 40 carbon steel pipe, valves & fittings	D8410	1	L.S.	$57,000.00	$57,000.00
	21	Compressed Air System: 2 - 100 cfm @ 125 psi rotary screw air compressors 1 - 250 gal. carbon steel air receiver 1 - 200 cfm air dryer 3,000 lbs. of sch. 40 carbon steel pipe, valves & fittings	D8410	1	L.S.	$114,000.00	$114,000.00
	22	Service Water System: 1 - Service water pump, 75 gpm @ 200 ft. of head 1 - Hydropneumatic Tank, 300 gal. 1,500 lbs. of type K copper tubing, valves & fittings	D8410	1	L.S.	$115,000.00	$115,000.00
	23	Gravity Drainage System: 50 - Floor drains, cast iron 25,000 lbs. of cast iron hub & spigot, service weight soil pipe	D8410	1	L.S.	$340,000.00	$340,000.00
		Sheet Subtotal					**$1,344,000.00**

QUANTITIES		PRICES	
BY John Grass, Randy Egan (8410)	CHECKED Alex Ritt (8410)	BY Lonnie Zlomke (8170)	CHECKED
DATE PREPARED 4/16/04, 6/03/08	PEER REVIEW	DATE PREPARED 6/14/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Low Cost Estimate

Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont)					
	24	Plant Unwatering System: 2 - Vertical turbine type sump pump, 1000 gpm @ 50 ft hd 1 - Drainage jet type drainage pump 1,500 lbs. of type K copper tube, valves & fittings 4,000 lbs. of ductile iron, mechanical joint pipe & fittings	D8410	1	L.S.	$200,000.00	$200,000.00
	25	Domestic Water and Sanitary Waste System: 4 - Water Closets 2 - Urinal 4 - Lavatories & accessories 1 - Duplex Sewage Ejector 2,000 lbs. of cast iron hub & spigot service weight sewer pipe 800 lbs. of type K copper tubing, valves & fittings	D8410	1	L.S.	$114,000.00	$114,000.00
	26	100-Ton overhead crane, 72'-6" span	D8410	153,000	LBS	$6.90	$1,055,700.00
	27	200-Ton overhead crane, 72'-6" span, two required	D8410	520,000	LBS	$6.90	$3,588,000.00
	28	Electric traction elevator overhead, geared, capacity = 3500 pounds, travel = 100 feet, landings = 6, speed = 200 ft/min.	D8410	1	unit	$570,000.00	$570,000.00
	29	Ultrasonic flowmeter, 4-path	D8410	1	meter	$40,000.00	$40,000.00
	30	Trashracks (steel) at pumping plant	D8410	77,000	LBS	$6.30	$485,100.00
	31	Stoplogs, lifting beams and guides (steel) (assumes one set of stoplogs for each size bay)	D8410	45,000	LBS	$8.70	$391,500.00
		Sheet Subtotal					**$6,444,300.00**

QUANTITIES		PRICES	
BY Rich Christensen, B Sund, Randy Egan Alex Ritt, C. Berte, P. Schlien, J. Grass (8410)	**CHECKED** Alex Ritt (8410)	**BY** Lonnie Zlomke (8170)	**CHECKED**
DATE PREPARED 4/16/04, 6/03/08	**PEER REVIEW**	**DATE PREPARED** 6/14/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Low Cost Estimate

Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont)					
		Heating, Ventilating, and Air Conditioning HVAC for bulding except bus & switchgear 372-ft long by 77'-ft wide by 70-ft high unit/service bay 54-ft long by 77-ft wide by 20-ft high control bay Two each 54-ft long by 77-ft wide by 17-ft equipment rooms 308-ft long by 56'-ft wide by 20-ft high Electrical Gallery Pump/Motor/Valve Galleries= 756,000 ft^3	D8410	1	L.S.	$2,600,000.00	$2,600,000.00
		Plant - Mechanical Subtotal					**$121,763,300.00**

QUANTITIES		PRICES	
BY Paul Schlein, Mike Weems (8410)	**CHECKED** Alex Ritt (8410)	**BY** Lonnie Zlomke (8170)	**CHECKED**
DATE PREPARED 4/16/04, 6/03/08	**PEER REVIEW**	**DATE PREPARED** 8/14/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Low Cost Estimate

Plant - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Plant Grounding System (F&I)	D8430				
	1	Ground rods, 10 ft, 3/4" dia., copper-clad		50	EA	$230.00	$11,500.00
		Stranded bare-copper conductor					
	2	250 MCM		1,500	LF	$11.50	$17,250.00
	3	4/0 AWG		1,000	LF	$11.00	$11,000.00
	4	2/0 AWG		1,000	LF	$7.50	$7,500.00
	5	4 AWG		700	LF	$3.00	$2,100.00
		Motor Bus & Switchgear (F&I)	D8430				
	6	Main motor isolated-phase bus:		400	LF	$3,600.00	$1,440,000.00
		15 kV; 24,000 amperes; 3-phase; 60 hz.					
		Self-cooled					
	7	Individual motor isolated-phase bus:					
		15 kV; 3,500 amperes; 3-phase; 60 hz.		150	LF	$1,600.00	$240,000.00
		Self-cooled					
	8	15 kV; 7,000 amperes; 3-phase; 60 hz.		100	LF	$1,350.00	$135,000.00
		Self-cooled					
		Motor reduced-voltage, static starting system with 15 kV, SF6 type unit circuit-breakers					
	9	3,500 amperes continous current		3	EA	$300,000.00	$900,000.00
	10	7,000 amperes continuous current		2	EA	$340,000.00	$680,000.00
		Synchronous motor static excitation system					
	10A	65,000 HP motor		3	EA	$410,000.00	$1,230,000.00
	10B	125,000 HP motor		2	EA	$410,000.00	$820,000.00
		Motor Control Equipment (F&I)	D8430				
	11	Duplex control switchboard for operation of 5 main pumping motors.		1	EA	$210,000.00	$210,000.00
		Motors					
		Listed under Plant-Mechanical					
		Sheet Subtotal					**$5,704,350.00**

QUANTITIES		PRICES	
BY Mike Schuh (8430)	**CHECKED** Cory Maurer (8430)	**BY** Lonnie Zlomke (8170)	**CHECKED**
DATE PREPARED 5/22/08	**PEER REVIEW** George Girgis (8430)	**DATE PREPARED** 8/14/08	**PEER REVIEW**

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Low Cost Estimate

Plant - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		15 kV Metal-Clad Switchgear (F&I)	D8430				
	12	15 kV metal-clad switchgear rated 1200 amperes with two 1200 ampere vacuum type power circuit breakers		1	EA	$360,000.00	$360,000.00
		15 kV Non-Segregated-Phasae Bus (F&I)	D8430				
	13	15 kV, 1200 amperes		200	FT	$830.00	$166,000.00
		Plant Station-Service Equipment (F&I)	D8430				
		Indoor double-ended secondary unit substation with following features:					
	14	Dry-type transformer 13.8 kV-480Y277 V, 2,500 KVA		2	EA	$93,000.00	$186,000.00
	15	480 V power-circuit breakers, 600 amperes		10	EA	$4,700.00	$47,000.00
		Building Lighting System (F&I)	D8430				
		Interior luminaires					
	16	High bay, high-pressure sodium, 400 W, 480 V		30	EA	$730.00	$21,900.00
	17	Emergency lighting system		1	LS	$12,500.00	$12,500.00
	18	Exterior luminaires High-pressure sodium, wall mounted, outdoor 70 watt, 120 volt		10	EA	$420.00	$4,200.00
		Sheet Subtotal					**$797,600.00**

QUANTITIES		PRICES	
BY Mike Schuh (8430)	CHECKED Cory Maurer (8430)	BY Lonnie Zlomke (8170)	CHECKED
DATE PREPARED 5/22/08	PEER REVIEW George Girgis (8430)	DATE PREPARED 6/14/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Low Cost Estimate

Plant - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	19	**Building Fire Detection and Alarm System (F&I)**	D8430	1	LS	$155,000.00	$155,000.00
	20	**Distribution Panelboards (F&I)**	D8430	3	EA	$10,500.00	$31,500.00
		480 volts, 3-phase with 400 ampere bus					
	21	**Motor Control Centers (F&I)**	D8430	2	EA	$125,000.00	$250,000.00
		480 volts, 3-phase with1200 ampere bus					
		Five 20 inch wide sections					
		Insulated Conductors (F&I)	D8430				
		600-volt, single-conductor, stranded copper					
	22	14 AWG		12,000	LF	$0.94	$11,280.00
	23	12 AWG		15,000	LF	$0.96	$14,400.00
	24	10 AWG		15,000	LF	$1.25	$18,750.00
	25	6 AWG		3,000	LF	$2.60	$7,800.00
	26	4 AWG		3,000	LF	$3.60	$10,800.00
	27	1/0 AWG		2,000	LF	$5.70	$11,400.00
		600-volt multi-conductor control cable					
	28	9 conductor 16 AWG		2,000	LF	$3.00	$6,000.00
	29	12 conductor 16 AWG		3,000	LF	$3.10	$9,300.00
	30	5 conductor 10 AWG		3,000	LF	$3.60	$10,800.00
		Conduit System (F&I)	D8430				
		Rigid steel conduit					
	31	1 inch		800	LF	$20.00	$16,000.00
	32	2 inch		500	LF	$33.00	$16,500.00
	33	2 1/2 inch		250	LF	$50.00	$12,500.00
	34	3 inch		250	LF	$62.00	$15,500.00
		Plastic-coated rigid steel					
	35	2 inch		300	LF	$50.00	$15,000.00
		Plant - Electrical Subtotal					**$7,114,480.00**

QUANTITIES		PRICES	
BY Mike Schuh (8430)	CHECKED Cory Maurer (8430)	BY Lonnie Zlomke (8170)	CHECKED
DATE PREPARED 5/22/08	PEER REVIEW George Girgis (8430)	DATE PREPARED 8/14/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Low Cost Estimate

Switchyard - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Inflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		CIVIL/STRUCTURAL	D8120				
		Switchyard					
	1	Excavation (Common)		1,200	CY	$18.50	$22,200.00
	2	Structural Concrete (Switchyard foundations and pullboxes)		150	CY	$1,300.00	$195,000.00
	3	Concrete Reinforcement (130lbs/CY)		19,500	LBS	$1.85	$36,075.00
	4	Compacting Backfill about Structures		1,000	CY	$13.00	$13,000.00
	5	Switchyard Steel Structures		80,000	LBS	$5.10	$408,000.00
	6	Gravel Surfacing - 6-inch thick		4,000	SY	$12.00	$48,000.00
	7	Oil-Spill Containment System Geotextile fabric 4,500 SF (12 oz per sq yard, 110 mils non-woven) Geomembrane liner: 2,500 SF (30 Mils XR-5 Seaman Corporation) Geocel: 1,700 SF (8" deep "enviro grid" polymeric cellular confinement system) Piping: 150 LF (6" Dia. Schedule 80 PVC pipe perforated) Preservative-Treated Lumber: 100 LF (2"x4") Excavation: Included in excavation for structures Uncompacted crushed aggregate: 150 CY (ASTM C33 Size No 4, 1 1/2" to 3/4")		1	LS	$36,000.00	$36,000.00
	8	Gravelfill for Switchyard Foundations (Compacted)		75	CY	$51.00	$3,825.00
	9	5-Inch PVC Schedule 80 Conduit (CIP Power Duct Bank) Includes: 115 LF of 1.5' tall x 2.33' wide concrete CIP 15 CY of concrete 1970 lbs of reinforcement		150	LF	$250.00	$37,500.00
	10	7-foot Chain link fence		1,000	LF	$33.00	$33,000.00
		Sheet Subtotal					**$832,600.00**

QUANTITIES		PRICES	
BY Dick LaFond (8120)	CHECKED	BY Greg Akins/Lonnie Zlomke (8170)	CHECKED
DATE PREPARED 6/2/2008	PEER REVIEW	DATE PREPARED 8/14/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Low Cost Estimate

Switchyard - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Inflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		ELECTRICAL					
		Switchyard					
		Furnish and Install:					
	11	Oil-filled, conservator-type power transformer 600 MVA; 500-13.8kV, 1-phase	D8430	3	EA	$ 6,400,000	$19,200,000.00
	12	500-kV disconnect switches, 1200 amp, 3-phase	D8430	2	EA	$ 210,000	$420,000.00
	13	500-kV circuit breakers, 1200 amp, 3-phase	D8430	1	EA	$ 1,150,000	$1,150,000.00
	14	**Construct Transmission Line (by others)** Assume 6 miles of transmission line from Midway substation to the east 500-kV, steel towers, 2167 AWG conductor	D8430	6	MILES	$ 1,050,000	$6,300,000.00
		Switchyard & Transmission Line Subtotal					**$27,902,600.00**

QUANTITIES		PRICES	
BY	CHECKED	BY	CHECKED
Lisa Gamuciello (8430)	Cory Maurer	Lonnie Zlomke (8170)	
DATE PREPARED	PEER REVIEW	DATE PREPARED	PEER REVIEW
5/14/2008	George Girgis (8430)	8/14/08	

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Low Cost Estimate
All Tunnel Alternative (Discharge 1)

Tunnel - Civil/Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Inflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Tunnel					
		Construct 34,850-ft long, 17.00-ft finished diameter, 20.00-ft minimum bore diameter, tunnel in rock. Tunnel will be excavated with TBM and driven uphill. Water problems will be minimal. Tunnel has three final support reaches.					
		32,150-ft long unreinforced concrete lined reach					
	1	Excavation (appr 12 cy/lf)	D8140	32,150	lf	$1,950.00	$62,692,500.00
	2	Furnish and place unreinforced concrete tunnel lining	D8140	104,000	cy	$440.00	$45,760,000.00
	3	Cementitious materials for concrete tunnel lining	D8140	29,300	tons	$135.00	$3,955,500.00
	4	Furnish & install 7/8-in dia, 10-ft long rock bolts	D8140	228,000	lin ft	$71.00	$16,188,000.00
		1,000-ft long reinforced concrete lined reach					
	5	Excavation (appr 12 cy/lf)	D8140	1,000	lf	$1,950.00	$1,950,000.00
	6	Furnish and place reinforced concrete tunnel lining	D8140	3,230	cy	$500.00	$1,615,000.00
	7	Cementitious materials for concrete tunnel lining	D8140	910	tons	$150.00	$136,500.00
	8	Furnish and install concrete reinforcement	D8140	50,400	lbs	$1.65	$83,160.00
	9	Furnish and install structural steel tunnel supports	D8140	422,000	lbs	$5.65	$2,384,300.00
		1,700-ft long steel lined portal reach					
	10	Excavation (appr 12 cy/lf)	D8140	1,700	lf	$1,950.00	$3,315,000.00
		Steel Tunnel Liner:					
		ASTM A572 Gr. 50: Sy = 50 kpsi St = 65 kpsi					
	10a	204" Inside Dia., 3 7/8" wall, L= 1700 ft.	D8420	14,639,000	LBS	$3.20	$46,844,800.00
	11	Furnish and place backfill concrete	D8140	5,490	cy	$460.00	$2,525,400.00
	12	Cementitious materials for backfill concrete	D8140	1,550	tons	$135.00	$209,250.00
	13	Furnish & install 7/8-in dia, 10-ft long rock bolts	D8140	8,400	lin ft	$71.00	$596,400.00
	14	Furnish and install structural steel tunnel supports	D8140	422,000	lbs	$5.65	$2,384,300.00
		Sheet Subtotal					**$190,640,110.00**

QUANTITIES		PRICES	
BY Bill Thompson (8140) Rick Frisz (8420)	**CHECKED**	**BY** Greg Alkins (8170)	**CHECKED**
DATE PREPARED 4/19/04	**PEER REVIEW**	**DATE PREPARED** 8/14/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE: Black Rock Preferred Alternative Inflow Conveyance System Most Probable Low Cost Estimate All Tunnel Alternative (Discharge 1) Tunnel - Civil/Mechanical	**PROJECT:** Yakima River Basin Water Storage Study **WOID:** YAKAP **ESTIMATE LEVEL:** Appraisal **REGION** PN **PRICE LEVEL:** Apr-07 **FILE:** H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Inflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Surge Shaft					
		Construct 1506-ft deep, 22.0-ft finished diameter, 24.34-ft minimum bore diameter, shaft in rock. Shaft will be excavated by raise bore and drill down method. Water problems will be minimal. Shaft has two final support reaches.					
		1,200-ft deep unreinforced concrete lined reach					
	15	Excavation (appr 17 cy/lf)	D8140	1,200	lf	$7,100.00	$8,520,000.00
	16	Furnish and place unreinforced concrete shaft lining	D8140	3,800	cy	$460.00	$1,748,000.00
	17	Cementitious materials for concrete shaft lining	D8140	1,070	tons	$140.00	$149,800.00
	18	Furnish & install 5/8-in dia, 6-ft long rock bolts	D8140	63,100	lin ft	$69.00	$4,353,900.00
		300-ft long reinforced concrete lined shaft top reach					
	19	Excavation (appr 17 cy/lf)	D8140	300	lf	$7,100.00	$2,130,000.00
	20	Furnish and place reinforced concrete shaft lining	D8140	945	cy	$460.00	$434,700.00
	21	Cementitious materials for concrete shaft lining	D8140	265	tons	$140.00	$37,100.00
	22	Furnish and install concrete reinforcement	D8140	15,700	lbs	$1.65	$25,905.00
	23	Furnish & install 5/8-in dia, 6-ft long rock bolts	D8140	15,600	lin ft	$69.00	$1,076,400.00
	24	Furnish and install chain link protection	D8140	13,000	sq yd	$30.00	$390,000.00
		Sheet Subtotal					**$18,865,805.00**

QUANTITIES		PRICES	
BY Bill Thompson (8140)	CHECKED	BY Greg Akins (8170)	CHECKED
DATE PREPARED 4/19/04	PEER REVIEW	DATE PREPARED 8/14/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Low Cost Estimate
All Tunnel Alternative (Discharge 1)

Tunnel - Civil/Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE:

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Tunnel Outlet Features					
		Assume ~100' head to valley invert and L~ 4000'					
		Assume need to control flow from tunnel portal to bottom of reservoir during initial fill.					
		Earthwork					
	25	Excavation at outlet area for portal and channel	D8130	40,000	CY	$12.50	$500,000.00
	26	Excavation for pipe trench	D8130	246,000	CY	$4.60	$1,131,600.00
	27	Excavation for thrust block	D8130	1,500	CY	$16.50	$24,750.00
	28	Concrete for open channel	D8130	450	CY	$500.00	$225,000.00
	29	F & P reinforcement (150 lbs/CY)	D8130	68,000	LBS	$1.65	$112,200.00
	30	Furnish and handle cement (.282T/CY)	D8130	130	TONS	$150.00	$19,500.00
	31	Concrete for thrust block	D8130	900	CY	$510.00	$459,000.00
	32	F & P reinforcement (60 lbs/CY)	D8130	54,000	LBS	$1.65	$89,100.00
	33	Furnish and handle cement (.20T/CY)	D8130	180	TONS	$150.00	$27,000.00
	34	Furnish and place Zone 3 bedding for pipe	D8130	22,000	CY	$38.00	$836,000.00
	35	Backfill pipe with excavated material	D8130	213,000	CY	$6.20	$1,320,600.00
	36	Furnish and place zone 3 bedding for riprap	D8130	3,000	CY	$38.00	$114,000.00
	37	Furnish and place riprap	D8130	6,000	CY	$57.00	$342,000.00
	38	20 ' dia. Steel pipe L = 2000' t= 1/2 inches assume 12' dia. For L=2000 ft t=1/2 inches Wt/ft + 10% for couplings and connections	D8130	5,100,000	LBS	$2.80	$14,280,000.00
	39	Steel safety trashracks	D8410	80,000	LBS	$7.20	$576,000.00
	40	Steel Bulkhead	D8410	120,000	LBS	$7.20	$864,000.00
	41	Remove and salvage 20' dia. Steel pipe Assume diver-assisted removal in wet at a max depth = 100'. Assume removal of 90% of the pipe. Assume lift bags to raise pipe and barge-mounted crane to handle pipe at surface. Salvage at $50/ton (quote), but salvage value is much less than the cost to remove and cut up pipe.	D8410	7,650,000	LBS	$0.00	$0.00
		Discharge 1 - Subtotal					**$230,426,665.00**

QUANTITIES		PRICES	
BY Doug Stanton (8130) Rick Christensen (8410)	**CHECKED** Alex Ritt (8410)	**BY** Greg Atkins (8170)	**CHECKED**
DATE PREPARED 4/27/04, 6/03/08	**PEER REVIEW**	**DATE PREPARED** 8/14/08	**PEER REVIEW**

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Low Cost Estimate
Summary

Summary Sheet

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Dam_Most Probable Low_060608_1.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Central Core Rockfill Dam					
		Large Reservoir - 1.3 MAF					
		Includes foundation treatment, dam structure, river outlet works, relocation of State Highway 24, and seepage mitigation features.					
		Dam Subtotal					$882,621,500.00
		River Outlet Works Subtotal					$106,924,188.00
		Roads and Utility Relocations					$92,584,000.00
		Downstream Seepage Mitigation Features					$136,802,192.50
		Subtotal					**$1,218,931,880.50**
		Mobilization		5%	(+/-)		$61,000,000.00
		Subtotal with mobilization					**$1,279,931,880.50**
		Escalation During Construction		0%	(+/-)		$0.00
		Subtotal with mobilization and escalation					**$1,279,931,880.50**
		Design Contingencies		10%	(+/-)		$120,068,119.50
		CONTRACT COST					**$1,400,000,000.00**
		Construction Contingencies		20%	(+/-)		$ 300,000,000.00
		FIELD COST					**$1,700,000,000.00**
		Non-Contract Costs **		20%	(+/-)		$300,000,000.00
		CONSTRUCTION COST					**$2,000,000,000.00**

Escalation to notice to proceed, allowance for procurement strategies, and utility relocations are not included.

** Land Acquisition Costs of $5,666,400 associated with these features are included in the Non-Contract Costs.

QUANTITIES		PRICES	
BY	CHECKED	BY J. Zander, J. Morris & L. Zlomke (8170)	CHECKED 8/20/2008
Design Team	Design Team		
DATE PREPARED	PEER REVIEW	DATE PREPARED	PEER REVIEW
6/02/08	Design Team	8/20/08	

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Low Cost Estimate

Dam - Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Dam_Most Probable Low_060608_1.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		GENERAL SITEWORK					
		Assume no clearing and grubbing required					
		Assume road improvements and haul roads are part of unlisted items					
		DIVERSION & DEWATERING					
		Assume groundwater is below excavation					
		Assume natural stream beds in area are dry					
		FOUNDATION EXCAVATION					
		Assume common material stockpiled for reuse					
		Assume rock material stockpiled for reuse					
		Stockpiles will be upstream, within 1/2 mile of dam					
	1	Excavation, stripping, of dam foundation	D8312	370,000	CY	$2.10	$777,000.00
		Assume depth of stripping 12 inches or less					
		Assume stripping will be stockpiled for topsoil use					
	2	Excavation, common, for dam foundation	D8312	18,040,000	CY	$3.20	$57,728,000.00
		Assume about 35% of volume requires ripping					
		Assume fine-grained and coarse-grained materials (3.C will be separately stockpiled					
	3	Excavation, rock, for dam foundation	D8312	2,000	CY	$28.00	$56,000.00
		Assume drill and blast in random locations					
		FOUNDATION TREATMENT					
		Includes misc. foundation treatment, fault zone treatment, consolidation grouting, and curtain grouting					
		Miscellaneous Foundation Areas					
		Applied in areas of poor quality rock					
	4	Slush grouting of foundation surface	D8312	62,000	SF	$4.80	$297,600.00
		Over assumed 10% of area beneath zone 1					
	5	Dental concrete	D8312	2,000	CY	$180.00	$360,000.00
	6	Furnish/place zone 2 sand filter on foundation	D8312	56,000	CY	$36.00	$2,016,000.00
		Over 10% of area between zone 1 and d/s toe					
		Assume a 3-ft thickness					
	7	Furnish/place zone 3 gravel drain on foundation	D8312	56,000	CY	$29.00	$1,624,000.00
		Over the zone 2 filter in a 3-ft thickness					
		Sheet Subtotal					**$62,858,600.00**

QUANTITIES		**PRICES**	
BY Chris Strickland (8361)	**CHECKED** Bill Engemoen (8312)	**BY** Jerry Zander/Jeff Morris (8170) J.M.	**CHECKED** 8/12/2008
DATE PREPARED 5/30/08	**PEER REVIEW** Bill Engemoen (8312)	**DATE PREPARED** 8/4/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Low Cost Estimate

Dam - Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Dam_Most Probable Low_060608_1.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		FOUNDATION TREATMENT (continued)					
		Treatment of south abutment fault area					
	8	Extra rock excavation for fault treatment	D8312	150,000	CY	$19.00	$2,850,000.00
		Assume south abutment is fractured					
		Assume excavate with hydraulic excavator					
	9	Dental concrete for fault treatment	D8312	2,000	CY	$180.00	$360,000.00
	10	Furnish/place zone 2 sand filter downstream of zone 1	D8312	56,000	CY	$36.00	$2,016,000.00
		Assume a 3-ft thickness, 500' by 1000' area					
		Assume same source as listed under emb.					
	11	Furnish/place zone 3 gravel drain d/s of zone 1	D8312	56,000	CY	$26.00	$1,456,000.00
		Assume 3-ft thickness, over zone 2 filter					
		Consolidation Grouting of Foundation					
		Generally limited to area beneath zone 1					
	12	Setups for drilling grout holes	D8312	6,000	EA	$89.00	$534,000.00
		Assume 2-inch dia. drilled on 10-foot centers					
	13	Drill grout holes	D8312	180,000	LF	$26.00	$4,680,000.00
		Assume 2-inch dia. w/length= 30 feet					
	14	Hookups to grout holes	D8312	6,000	EA	$53.00	$318,000.00
	15	Pressure grout	D8312	270,000	CF	$8.90	$2,403,000.00
		Assume grouting process only minus cement					
		Assume 1.5 CF per 1 LF of hole					
	16	Furnish and handle cement for pressure grouting	D8312	270,000	BAGS	$8.90	$2,403,000.00
		Assume 1 bag per CF					
		Curtain Grouting of Foundation					
		Two-row curtain beneath zone 1					
	17	Setups for drilling grout holes	D8312	1,300	EA	$94.00	$122,200.00
		Assume 2-rows of 2-inch dia.on 10-ft centers					
	18	Drill grout holes	D8312	200,000	LF	$26.00	$5,200,000.00
		Assume 2-inch dia. w/length from 60 to 250 feet					
	19	Hookups to grout holes	D8312	1,300	EA	$59.00	$76,700.00
	20	Pressure grout	D8312	400,000	CF	$8.90	$3,560,000.00
		Assume grouting process only minus cement					
		Assume 2 CF per 1 LF of hole					
	21	Furnish and handle cement for pressure grouting	D8312	400,000	BAGS	$8.90	$3,560,000.00
		Assume 1 bag per CF					
		Sheet Subtotal					**$29,538,900.00**

QUANTITIES		PRICES	
BY Chris Strickland (8361)	**CHECKED** Bill Engemoen (8312)	**BY** Jerry Zander/Jeff Morris (8170)	**CHECKED** 8/12/2008
DATE PREPARED 5/30/08	**PEER REVIEW** Bill Engemoen (8312)	**DATE PREPARED** 5/6/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Low Cost Estimate

Dam - Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Dam_Most Probable Low_060608_1.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		EMBANKMENT CONSTRUCTION *Items are set up as furnish and place, which would include purchasing from commercial sites, processing onsite, development of quarry, or transporting from stockpiles of required excavation*					
	22	Furnish and place zone 1 core *Acquired from source 6 miles from dam* *Compacted to 6-inch lifts by tamping roller*	D8312	7,950,000	CY	$12.50	$99,375,000.00
	23	Furnish and place zone 2 filter *Sand/gravel material processed commercially or developed onsite* *If commercial, assume 17 mile one-way haul* *Compacted to 12-inch layers by vibratory steel drum* *Zones have 12-ft horizontal width*	D8312	2,250,000	CY	$31.00	$69,750,000.00
	24	Furnish and place zone 3 drain *Gravel/cobble material processed commercially or developed onsite* *If commercial, assume 17 mile one-way haul* *Compacted to 12-inch layers by vibratory steel drum* *Zone has 12-ft horizontal width*	D8312	1,125,000	CY	$30.00	$33,750,000.00
	25	Furnish and place zone 4 rockfill *Developed from basalt ridges surrounding reservoir* *Assume average 1-mile haul to dam* *Rock sizes up to 3-foot* *Compacted in 3-ft layers by vibratory steel drum*	D8312	55,650,000	CY	$6.80	$378,420,000.00
	26	Furnish and place zone 5 coarse grained random fill *Comes from stockpiles of required excavation within 1/2 mile of dam* *Generally consists of gravelly soils* *Compacted in 2-ft layers by vibratory steel drum*	D8312	9,970,000	CY	$4.10	$40,877,000.00
	27	Furnish and place zone 6 fine grained random fill *Comes from stockpiles of required excavation within 1/2 mile of dam* *Generally consists of sands/silts/clays* *Compacted to 9-inch layers by tamping rollers*	D8312	5,370,000	CY	$4.60	$24,702,000.00
		Sheet Subtotal					**$646,874,000.00**

QUANTITIES		PRICES	
BY Chris Strickland (8361)	**CHECKED** Bill Engemoen (8312)	**BY** Jerry Zander/Jeff Morris (8170) JM.	**CHECKED** 8/12/2008
DATE PREPARED 5/30/08	**PEER REVIEW** Bill Engemoen (8312)	**DATE PREPARED** 8/12/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Low Cost Estimate

Dam - Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Dam_Most Probable Low_060608_1.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		RIGHT ABUTMENT SEEPAGE MITIGATION FEATURES *These are features incorporated into the right abutment of the dam, designed to reduce or collect seepage through the pervious abutment bedrock*					
	28	Construct concrete diaphragm wall *Assume slurry trench construction, using a hydrofraise machine to 400-ft depth (1000 ft long)* *Assume concrete backfill*	D8312	650,000	SF	$195.00	$126,750,000.00
	20	Construct RCC working surface *Assume around 25 benches on abutment* *Assume benches constructed of RCC* *Benches about 100 ft wide by maximum 33 ft high*	D8312	200,000	CY	$83.00	$16,600,000.00
		MISCELLANEOUS					
		Instrumentation *Assume part of unlisted items*					
		Toe Drains *Assume part of unlisted items*					
		Site cleanup and relandscaping *Assume part of unlisted items*					
		Dam Subtotal					**$882,621,500.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Chris Strickland (8361)	Bill Engemoen (8312)	Jerry Zander/Jeff Morris (8170)	8/12/2008
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
6/6/2008	Bill Engemoen (8312)	8/12/08	

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Low Cost Estimate

River Outlet Works - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
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FILE:			

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Establish Upstream Portal	D8130				
	1	Common excavation to establish tunnel portal		69,070	CY	$8.50	$587,095.00
	2	Rock excavation to establish tunnel portal		6,230	CY	$25.00	$155,750.00
	3	Furnish and install chain link fabric around portal		240	SY	$24.00	$5,760.00
	4	F&I 18-inch x 1/2 in. dia resin anchors for fabric support		28	EA	$63.00	$1,764.00
		Establish Downstream Portal	D8130				
	5	Common excavation to establish tunnel portal		64,900	CY	$8.50	$551,650.00
	6	Rock excavation to establish tunnel portal		6,230	CY	$25.00	$155,750.00
	7	Furnish and install chain link fabric around portal		240	SY	$24.00	$5,760.00
	8	F&I 18-inch x 1/2 in. dia resin anchors for fabric		28	EA	$63.00	$1,764.00
		Construct ROW tunnel u/s of gate chamber	D8130				
	9	Drill and shoot 28-ft Dia.circular shaped u/s tunnel (17,500 CY)		700	LF	$4,000.00	$2,800,000.00
	10	Remove and stockpile rock (assume local stockpile)		17,500	CY	$17.50	$306,250.00
	11	Furnish and install 790-10-ft long x 1-inch dia. A307, 20K rockbolts		6,320	LF	$65.00	$410,800.00
	12	Furnish and install 9 steel sets (W8 x 48) in crown		30,000	LBS	$5.40	$162,000.00
		Construct ROW tunnel d/s of gate chamber	D8130				
	13	Drill and shoot 32-ft OD mod.HS shaped d/s tunnel (23,000 CY)		600	LF	$5,300.00	$3,180,000.00
	14	Rer (3.0% per year to 24 month midpoint of construction period)		21,900	CY	$17.50	$383,250.00
	15	Furnish and install 740-10-ft long x 1-inch dia. A307, 20K rockbolts		5,920	LF	$65.00	$384,800.00
	16	Furnish and install 9 steel sets (W10 x 54) in crown		31,300	LBS	$5.40	$169,020.00
		Construct ROW Gate Chamber and Shaft	D8130				
	17	Drill and shoot 24-ft diameter shaft (800 CY)		40	LF	$6,800.00	$272,000.00
	18	Remove and stockpile rock (assume local stockpile)		760	CY	$17.50	$13,300.00
	19	Furnish and install 64 - 10-ft long x 1-inch dia. A307, 20K rockbolts		500	LF	$65.00	$32,500.00
	20	Furnish and install 4 circular steel sets (W8 x 48)		12,800	LBS	$5.40	$69,120.00
		Place Conc. Lining In Tunnel, Shaft & Gate Chamber	D8130				
	21	FF&P reinf. Concrete in u/s steel-lined tunnel		9,700	CY	$380.00	$3,686,000.00
	22	FF&P reinf. concrete gate chamber		570	CY	$850.00	$484,500.00
	23	FF&P reinf. Concrete in d/s tunnel		10,800	CY	$490.00	$5,292,000.00
	24	Furnish and place reinforcement (160 lbs/CY)		3,161,000	LBS	$1.50	$4,741,500.00
	25	Furnish and handle cement (.282T/CY)		5,900	TONS	$145.00	$855,500.00
		Sheet Subtotal					**$24,707,833.00**

QUANTITIES		PRICES	
BY: Doug Stanton (8130)	CHECKED: Dave Godaire (8130)	BY: Jeff Morris (8170) J. M.	CHECKED: 8/12/2008
DATE PREPARED	PEER REVIEW	DATE PREPARED: 8/12/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
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River Outlet Works - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Ring Grout Upstream Conduit	D8130				
	26	Setups for drilling grout holes (2-in dia holes, 30 ft ctrs, and 8 holes per ring)(L=700 ft)		24	EA	$230.00	$5,520.00
	27	Drill grout holes (2-in dia and L=30 ft)		5,760	LF	$24.00	$138,240.00
	28	Hookups to grout holes		192	EA	$135.00	$25,920.00
	29	Pressure grout (grouting process only minus cement) Assume 2 CF per 1 LF of hole		11,500	CF	$14.50	$166,750.00
	30	Furnish and handle cement for pressure grouting Assume 1 bag per CF		11,500	BAGS	$14.50	$166,750.00
		Ring Grout Shaft and Gate Chamber	D8130				
	31	Setups for drilling grout holes (2-in dia holes, 30 ft ctrs, and 8 holes per ring)(L=80 ft)		4	EA	$310.00	$1,240.00
	32	Drill grout holes (2-in dia and L=30 ft)		960	LF	$33.00	$31,680.00
	33	Hookups to grout holes		32	EA	$180.00	$5,760.00
	34	Pressure grout (grouting process only minus cement) Assume 2 CF per 1 LF of hole		1,920	CF	$17.50	$33,600.00
	35	Furnish and handle cement for pressure grouting Assume 1 bag per CF		1,920	BAGS	$17.00	$32,640.00
		Ring Grout Downstream Conduit	D8130				
	36	Setups for drilling grout holes (2-in dia holes, 30 ft ctrs, and 8 holes per ring)(L=100 ft)		4	EA	$310.00	$1,240.00
	37	Drill grout holes (2-in dia and L=30 ft)		960	LF	$32.00	$30,720.00
	38	Hookups to grout holes		32	EA	$180.00	$5,760.00
	39	Pressure grout (grouting process only minus cement) Assume 2 CF per 1 LF of hole		1,920	CF	$17.50	$33,600.00
	40	Furnish and handle cement for pressure grouting Assume 1 bag per CF		1,920	BAGS	$17.00	$32,640.00
		Earthwork - intake, u/s conduit, d/s pipe, stilling basin and discharge channel	D8130				
	41	Excavation of common materials for basin and channel		320,000	CY	$4.40	$1,408,000.00
	42	F & P impervious material (Zone 6 Ringold - local)		16,000	CY	$11.00	$176,000.00
	43	F & P bedding for riprap (zone 3 gravel)		8,000	CY	$35.00	$280,000.00
	44	F & P rockfill from dam excavation (riprap)		24,000	CY	$13.50	$324,000.00
	45	F & P backfill for intake and u/s conduit (Ringold - local)		13,000	CY	$11.00	$143,000.00
	46	Excavation of common materials for burying 16' pipe		281,000	CY	$3.50	$983,500.00
	47	Backfill for burying 16' dia. Pipe - zone 3 bedding		18,000	CY	$36.00	$648,000.00
	48	Backfill for burying 16' dia. Pipe - From common exc.		177,000	CY	$5.30	$938,100.00
		Sheet Subtotal					**$5,612,660.00**

QUANTITIES		PRICES	
BY	CHECKED	BY	CHECKED
Doug Stanton (8130)	Dave Godaire (8130)	Jeff Morris (8170)	8/12/2008
DATE PREPARED	PEER REVIEW	DATE PREPARED 8/12/08	PEER REVIEW

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct ROW cast in place (CIP) concrete	D8130				
	49	Furnish, form, and place reinf. Conc - Intake structure		11,000	CY	$580.00	$6,380,000.00
	50	Furnish and place reinforcement (est 180#/CY)		1,980,000	LBS	$1.50	$2,970,000.00
	51	Furnish and handle cement (.282T/CY)		3,100	TONS	$145.00	$449,500.00
	52	FFP Reinf. Conc - Steel lined U/S Conduit (L=400')		10,500	CY	$580.00	$6,090,000.00
	53	Furnish and place reinforcement (est 160#/CY)		1,680,000	LBS	$1.50	$2,520,000.00
	54	Furnish and handle cement (.282T/CY)		2,960	TONS	$145.00	$429,200.00
	55	FFP reinf. concrete - CIP shaft (L=375)		6,100	CY	$460.00	$2,806,000.00
	56	Furnish and place reinforcement (est 160#/CY)		976,000	LBS	$1.50	$1,464,000.00
	57	Furnish and handle cement (.282T/CY)		1,720	TONS	$145.00	$249,400.00
	58	FFP reinf. concrete - shaft control house		400	CY	$830.00	$332,000.00
	59	Furnish and place reinforcement (160#/CY)		64,000	LBS	$1.65	$105,600.00
	60	Furnish and handle cement (.282T/CY)		110	TONS	$145.00	$15,950.00
	61	FFP reinf. Concrete in gate chamber		410	CY	$830.00	$340,300.00
	62	Furnish and place reinforcement (160#/CY)		66,000	LBS	$1.65	$108,900.00
	63	Furnish and handle cement (.282T/CY)		120	TONS	$145.00	$17,400.00
	64	FFP reinf. concrete - D/S access house		450	CY	$830.00	$373,500.00
	65	Furnish and place reinforcement (160#/CY)		72,000	LBS	$1.65	$118,800.00
	66	Furnish and handle cement (.282T/CY)		130	TONS	$145.00	$18,850.00
	67	FFP reinf. concrete for thrust block @ 80 deg bend		4,600	CY	$490.00	$2,254,000.00
	68	Furnish and place reinforcement (60#/cy wire mesh)		276,000	LBS	$1.60	$441,600.00
	69	Furnish and handle cement (.20T/CY)		920	TONS	$145.00	$133,400.00
	70	FFP reinf. concrete - jet flow gate control house		630	CY	$850.00	$535,500.00
	71	Furnish and place reinforcement (160#/CY)		100,800	LBS	$1.65	$166,320.00
	72	Furnish and handle cement (.282T/CY)		180	TONS	$145.00	$26,100.00
	73	FFP reinf. concrete for thrust block @ jet gate house		3,700	CY	$490.00	$1,813,000.00
	74	Furnish and place reinforcement (60 #/cy wire mesh)		222,000	LBS	$1.60	$355,200.00
	75	Furnish and handle cement (.20T/CY)		740	TONS	$145.00	$107,300.00
		Sheet Subtotal					**$30,621,820.00**

QUANTITIES		PRICES	
BY Doug Stanton (8130)	CHECKED Dave Godaire (8130)	BY Jeff Morris (8170)	CHECKED 9/12/2008
DATE PREPARED 4/24/04	PEER REVIEW	DATE PREPARED 9/12/08	PEER REVIEW

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	76	Miscellaneous Metalwork Assume ladder in shaft to gate chamber, elevator rail supports, misc metal in gate house, gate chamber and D/S gate house.	D8120	14,000	LBS	$8.40	$117,600.00
		Mechanical					
	77	Furnish and install steel trashracks	D8410	337,500	LBS	$8.30	$2,801,250.00
	78	Furnish and install one bulkhead 22' x 24' @ 400' head	D8410	144,000	LBS	$4.00	$576,000.00
	79	Furnish and install seats and guides with lid	D8410	23,900	LBS	$10.00	$239,000.00
	80	Furnish and install one elevator, capacity = 500 lbs (2 person), speed = 100 fpm, travel = 450', landings = 2, type = freight	D8410	1	UNIT	$175,000.00	$175,000.00
		HVAC for: **4200-ft long by 26-ft dia. penstock tunnel and 430-ft deep by 24'dia shaft to gate chamber)**	D8410				
	81	Centrifugal fan rated: 16,000cfm @ 8" static pressure, 1200 fan rpm max, 2200-fpm max. fan outlet velocity, with adjustable sheave with 2-speed motor for 50% speed (8000-cfm at 2"sp) belt-drive, 30-Hp, 460-V, 3-Ph, 60-Hz, 1800-rpm motor. (approx 700-lbs+motor wt)	D8410	2	EA	$16,000.00	$32,000.00
	82	48" Dia, 16-ga galv st. duct 4700 ft long (Wt with supports approx = 40-lbs/linear ft)	D8410	188,000	LBS	$8.00	$1,504,000.00
		For 50-degree F temperature rise for winter ventilation, Assuming 90% recirculated air &10% outside air					
	83	30-kVa Electric Duct heaters 480-V, 3-ph, 60-hz with thermostats Note: (100% outside air requires total of 515-kW heat for 32000 cfm for construction level ventilation or 210-kW for inspection level ventilation)	D8410	2	EA	$16,000.00	$32,000.00
		Sheet Subtotal					**$5,476,850.00**

QUANTITIES		**PRICES**	
BY Dick LaFond (8120), Mike Weems, P. Schlein, A. Ritt, R. Christensen (8410)	**CHECKED** Alex Ritt (8410)	**BY** Lonnie Zlomke (~~8170~~)	**CHECKED** 8/12/2008
DATE PREPARED 4/24/04, 6/03/08	**PEER REVIEW**	**DATE PREPARED** 8/12/08	**PEER REVIEW**

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River Outlet Works - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont.)					
		Heating and Ventilating	D8410				
		50'x40'x24' Control House					
	84	Centrifugal fan: 1 each Single speed,1500 cfm at 0.50 inches w.g. static pressure, forward curve, direct drive; 3/4 hp motor rated 480 Vac, Three phase, 60 Hz.	D8410	1	EA	$2,600.00	$2,600.00
	85	Propeller fan assembly: 1 each Single speed, 4,800 cfm at 0.50 inches w.g. static pressure, belt drive; 1.5 hp motor rated 460 Vac, three phase, 60 Hz; include fan wall mount housing with motor guard.	D8410	1	EA	$3,000.00	$3,000.00
	86	Unit heaters: Electric horizontal discharge rated 7.5 kw, 460 Vac, 3-phase, 60 Hz. (One each corner -18' throw) with wall thermostats	D8410	4	EA	$670.00	$2,680.00
	87	Control dampers: All motor operated, parallel blade, low leakage type with edge and side seals:	D8410				
		48" wide x 48" high - 1 each		1	EA	$2,600.00	$2,600.00
		36" wide x 36" high - 1 each		1	EA	$1,600.00	$1,600.00
	88	Stationary louvers: All 16 gauge galvanized steel, 4-inch deep frame, 45 degree blades on 4-inch centers, 45 percent free area, with insect and bird screen:	D8410				
		48" wide x 48" high - 1 each		1	EA	$1,800.00	$1,800.00
		36" wide x 36" high - 1 each		1	EA	$1,100.00	$1,100.00
		Sheet Subtotal					**$15,380.00**

QUANTITIES		PRICES	
BY Paul Schlein, Mike Weems (8410)	CHECKED Alex Ritt (8410)	BY Lonnie Zlomke (8170)	CHECKED 8/12/2008
DATE PREPARED 4/24/04, 6/03/08	PEER REVIEW	DATE PREPARED 8/12/08	PEER REVIEW

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
		(Continuation of HVAC System) **(50'x40'x24' Control House)**	D8410				
	89	Fan motor starters: Design, furnish and install control system	D8410	2	EA	$2,600.00	$5,200.00
	90	Ductwork: All 16-gauge galvanized steel with extra heavy (ASTM A90 G120) galvanized coating: Air plenum: 250 lbs.	D8410	250	LBS	$8.00	$2,000.00
	91	48"x48" galv steel intake air filter frames using nine(9) 24"x16"x2" disposable filter elements in frame with dirty filter differential pressure sensor with warning light and remote signal.	D8410	1	EA	$2,100.00	$2,100.00
	92	16"x24"x2" disposable fiberglass, 30% min efficiency, Filter elements (estimate 9 elements with spares for testing, startup and two replacements each.	D8410	36	EA	$2,200.00	$79,200.00
	93	Galv. Steel duct and fan supports.	D8410	200	LBS	$10.00	$2,000.00
		Sheet Subtotal					**$90,500.00**

QUANTITIES		PRICES	
BY Paul Schlein, Mike Weems (8410)	**CHECKED** Alex Ritt (8410)	**BY** Lonnie Zlomke (~~8170~~)	**CHECKED** 8/12/2008
DATE PREPARED 4/24/04, 6/03/08	**PEER REVIEW**	**DATE PREPARED** 8/12/08	**PEER REVIEW**

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Steel penstock					
		FURNISH-AND-INSTALL THE FOLLOWING:	D8420				
	94	240-inch steel pipe, encased in concrete (1000 linear feet, 1-1/2-inch wall, 4290 lb per lin. ft.)		4,260,000	LBS	$2.90	$12,354,000.00
	95	192-inch steel pipe, encased in concrete (1000 linear feet, 1-1/4-inch wall, 2841 lb per lin. ft.)		2,840,000	LBS	$2.90	$8,236,000.00
	96	192-inch steel pipe, buried (273 linear feet, 1-1/16-inch wall, 2412 lb per lin. ft.)		660,000	LBS	$2.90	$1,914,000.00
	97	192-inch steel pipe, buried (601 linear feet, 1-inch wall, 2269 lb per lin. ft.)		1,360,000	LBS	$2.90	$3,944,000.00
	98	192-inch steel pipe, buried (601 linear feet, 15/16-inch wall, 2127 lb per lin. ft.)		1,280,000	LBS	$2.90	$3,712,000.00
	99	192-inch steel pipe, buried (601 linear feet, 7/8-inch wall, 1985 lb per lin. ft.)		1,190,000	LBS	$2.90	$3,451,000.00
	100	192-inch steel pipe, buried (600 linear feet, 13/16-inch wall, 1842 lb per lin. ft.)		1,110,000	LBS	$2.90	$3,219,000.00
	101	120-inch steel pipe, buried and exposed (100 linear feet, 13/16-inch wall, 1154 lb per lin. ft.)		115,000	LBS	$2.80	$322,000.00
	102	60-inch steel pipe, vertical, grouted, air vent (418 linear feet, 3/8-inch wall, 266 lb per lin. ft.)		115,000	LBS	$3.10	$356,500.00
		Sheet Subtotal					**$37,508,500.00**

QUANTITIES		PRICES	
BY Ken Smith (8410)	CHECKED	BY Lonnie Zlomke (8170)	CHECKED 8/12/2008
DATE PREPARED 4/26/04	PEER REVIEW	DATE PREPARED 8/12/08	PEER REVIEW

ESTIMATE WORKSHEET

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PROJECT:
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Gates and Gate Controls					
		Furnish and Install					
	103	F & I -18' x 14' Roller gate w/controls 1 - gate and 1 control box (in shaft house)	D8420	180,400	LBS	$9.00	$1,623,600.00
	104	F&I structural steel for hoist support		10,000	LBS	$4.40	$44,000.00
	105	F & I - 2 - 108-inch jet flow gates w/controls 2 gates and 1 control box		89,400	LBS	$9.25	$826,950.00
	106	F & I - 36-inch jet flow gate w/controls and bypass pipe 1 gate and 1 control box (in shaft house)		30,000	LBS	$9.25	$277,500.00
		Sheet Subtotal					**$2,772,050.00**

QUANTITIES		PRICES	
BY Gary Rood (8420)	**CHECKED**	**BY** Lonnie Zlomke (8170)	**CHECKED** 8/12/2008
DATE PREPARED 4/26/04	**PEER REVIEW**	**DATE PREPARED** 8/12/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
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Most Probable Low Cost Estimate

River Outlet Works - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Dam_Most Probable Low_060608_1.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Electrical					
		This estimate is for 2 ROW control bldgs, one on top of dam and the other downstream for the regulating gates.					
		Assume bringing power to dam part of unlisted items.					
		Furnish and install the following electrical equipment:					
		Grounding System	D8430				
	107	Ground rods, 10 ft, 3/4" dia., copper-clad		6	EA	$200.00	$1,200.00
	108	Stranded bare-copper conductor, 4 AWG		250	LF	$3.20	$800.00
		Conduit System	D8430				
		Rigid steel conduit					
	109	3/4-inch		200	LF	$14.00	$2,800.00
	110	1-inch		100	LF	$20.00	$2,000.00
		PVC conduit, Schedule 40					
	111	1 1/2-inch		600	LF	$13.00	$7,800.00
		HDPE (High-density polyethylene)					
	112	2-inch		1,000	LF	$16.00	$16,000.00
		Conductors & Cable	D8430				
		All cable single conductor, stranded copper					
	113	12 AWG		1,500	LF	$1.05	$1,575.00
	114	10 AWG		500	LF	$1.30	$650.00
	115	2 AWG		2,000	LF	$5.30	$10,600.00
	116	1/0 AWG		400	LF	$5.90	$2,360.00
		Electrical Service Equipment	D8430				
	117	Pole-mounted transformer; 100 kVA, 13.8,kV-480V		1	EA	$37,000.00	$37,000.00
	118	Meter socket, NEMA 3R, 600V, 3-phase		1	EA	$610.00	$610.00
	119	Safety switch, heavy-duty, NEMA 3R, fusible 3-wire, 600V, 100 ampere		1	EA	$2,500.00	$2,500.00
		Panelboards & Electrical Distribution Equipment					
	120	Panelboard, 3-phase, 480V, 250 ampere		1	EA	$8,700.00	$8,700.00
	121	Distribution load center, 15 kVA, 1-phase 480-240/120V		2	EA	$12,000.00	$24,000.00
		River Outlet Works Subtotal					**$106,924,188.00**

QUANTITIES		PRICES	
BY Mike Schuh (8430)	**CHECKED** Cory Maurer (8430)	**BY** Lonnie Zlomke (8170)	**CHECKED** 8/12/2008
DATE PREPARED 5/22/08	**PEER REVIEW** George Girgis (8430)	**DATE PREPARED** 8/12/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Low Cost Estimate

Roads and Utility Relocation

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Dam_Most Probable Low_060608_1.xls]Summary		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		State Highway Relocation (11.8 miles)					
	1	Clear roadway alignment	D8140	280	AC	$3,300.00	$924,000.00
	2	Excavation from borrow	D8140	1,000,000	CY	$4.40	$4,400,000.00
	3	Excavation for roadway (assume 70% rock material)	D8140	5,200,000	CY	$11.50	$59,800,000.00
	4	Compacting roadway embankments (subbase)	D8140	5,900,000	CY	$1.70	$10,030,000.00
	5	Furnish and place base course material	D8140	150,000	TONS	$22.00	$3,300,000.00
	6	Furnish and place asphalt concrete	D8140	97,000	TONS	$70.00	$6,790,000.00
	7	Furnish and install W-beam type guardrail	D8140	58,000	LF	$33.00	$1,914,000.00
	8	Furnish and install miscellaneous pipe culverts Assume 60-inch-diameter, wt/ft=100 lbs/ft.	D8140	1,800	LF	$220.00	$396,000.00
		Utility Relocations within Reservoir Inundation					
	9	Remove Existing Transmission Lines (3.0% per year to 24 month midpoint of construction period) lines, 60-feet apart 954 AWG conductor	D8440	7	miles	$50,000.00	$350,000.00
	10	Construct Transmission Lines Two 115-kV H-frame wood-pole lines, 60-feet apart 954 AWG conductor	D8440	12	miles	$360,000.00	$4,320,000.00
	11	Install new buried fiber optic line along new SH24 ROW Assume abandon existing line.	D-8120	12	miles	$30,000.00	$360,000.00
		Road and Utility Relocations Subtotal					**$92,584,000.00**

QUANTITIES		PRICES	
BY Anne Pavol (8140)	**CHECKED** Chou Cha (8140)	**BY** Jeff Morris (8170) JM.	**CHECKED** 8/12/2008
DATE PREPARED 4/24/04	**PEER REVIEW**	**DATE PREPARED** 8/12/08	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Low Cost Estimate

Downstream Seepage Mitigation - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Dam_Most Probable Low_060608_1.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		MAIN COLLECTION FEATURE (7 MILES DOWNSTREAM)					
	1	Construct concrete diaphragm wall *Assume slurry trench construction, using a hydrofraise machine to 100-ft depth (5000 ft long)* *Assume excavation will be both in soil and rock* *Assume concrete backfill*	D8312	500,000	SF	$160.00	$80,000,000.00
	2	Furnish and construct rockfill embankment *Assume wall forms impervious barrier* *Embankment consists of rockfill obtained from within 2 miles of site* *Rough dimensions are 10 ft high, 5000 ft long, 20 ft wide crest, and 1.5:1 side slopes*	D8312	65,000	CY	$16.00	$1,040,000.00
	3	Install water wells *Assume 10 wells, each 300 ft deep* *Assume finished as water or dewatering wells with gravel pack and well screen*	D8312	1,000	LF	$180.00	$180,000.00
		(3.0% per year to 24 month midpoint of construction period)					
		Sheet Subtotal					**$81,220,000.00**

QUANTITIES		PRICES	
BY Bill Engemoen (8312)	**CHECKED** Bill Engemoen (8312)	**BY** Jerry Zander/Jeff Morris (8170)	**CHECKED** 8/12/2008
DATE PREPARED 6/4/2008	**PEER REVIEW** Al Kiene (8312)	**DATE PREPARED** 8/12/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Low Cost Estimate

Downstream Seepage Mitigation - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Dam_Most Probable Low_060608_1.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Concrete Inlet Structure (Q=70 cfs)					
		Assume inlet structure excavation covered under embankment excavation.					
		Furnish, form, and place reinforced concrete	D8120	30	CY	$1,350.00	$40,500.00
		Furnish and place concrete reinforcement.	D8120	3,900	LBS	$1.75	$6,825.00
		Assume 130 #/CY					
		Furnish and handle cement (.282T/CY)	D8120	9	TONS	$185.00	$1,665.00
		Furnish and install miscellaneous metalwork	D8120	220	LBS	$12.50	$2,750.00
		grating and guardrails					
		Furnish and install steel trashracks (35 psf)	D8120	5,150	LBS	$8.90	$45,835.00
		Furnish and install 54-inch x 54-inch slide gate	D8120	1	LS	$60,000.00	$60,000.00
		steel or stainless steel welded construction					
		self-contained, wall-mounted gate					
		invert to opening= 15.5 feet					
		manual actuation					
		estimated weight: 2,700 LBS					
		Furnish and install trashrake	D8120	1	EA	$175,000.00	$175,000.00
		Assume Brackett Bosker Raking Machine					
		Heavy duty model w/ typical column supports					
		Trashrack height=15 ft, Width= 8-ft					
		Assume 50-ft long curved track.					
		BrackettGreenUSA, Inc. Telephone: 281-480-7955					
		Sheet Subtotal					**$332,575.00**

QUANTITIES		PRICES	
BY	CHECKED	BY	CHECKED
Brad VanOtterloo (8120)	Dick LaFond (8120)	Jerry Zander/Jeff Morris (8170) JM	8/12/2008
DATE PREPARED	PEER REVIEW	DATE PREPARED	PEER REVIEW
06/02/08		8/12/08	

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Low Cost Estimate

Downstream Seepage Mitigation - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Dam_Most Probable Low_060608_1.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Discharge Line					
		Discharge line quantities are from cutoff wall to Yakima River (~20 miles).					
		(Design flow= 70 cfs)					
		Earthwork for Discharge Pipe					
		Price Alternative 2. Alternative 1 for reference only.					
		Alternative 1 - Payline Quantities - Vertical Trench Walls					
		Clearing and Grubbing (150 ft wide along pipeline)	D8120		SY		$0.00
		Common Excavation for pipe	D8120		CY		$0.00
		Rock Excavation for pipe - (drill and shoot)	D8120		CY		$0.00
		Backfill for pipe	D8120		CY		$0.00
		Rockfill for pipe (used instead of backfill under dam)	D8120		CY		$0.00
		Soil Cement Slurry (CLSM)	D8120		CY		$0.00
		Alternative 2 - Takeoff Quantities - 1-1/2:1 Trench Walls					
	1	Clearing and Grubbing (150 ft wide ROW along pipeline)	D8120	1,820,000	SY	$0.70	$1,274,000.00
	2	Common Excavation for pipe	D8120	720,400	CY	$3.00	$2,161,200.00
	3	Backfill for pipe	D8120	581,500	CY	$3.30	$1,918,950.00
	4	Soil Cement Slurry (CLSM)	D8120	88,100	CY	$76.00	$6,695,600.00
		48-inch Diameter Mortar-lined Steel Pipe					
	8	48-inch, pipe thickness = 0.375 (200 lb/ft steel weight)	D8120	109,200	LF	$390.00	$42,588,000.00
		River/Road Crossings	D8120	4	EA	$18,500.00	$74,000.00
		Assume Cold Creek, Dry Creek, and 2 @ SH240					
		Assume creeks have minimal Q during construction.					
		Air Valve Installations (Assume 10 required)	D8140	1	LS	$390,000.00	$390,000.00
		Concrete: 810 CY					
		Cement: 230 Tons					
		Reinforcement: 148,000 LBS					
		Excavation: 4,500 CY					
		Backfill: 247 CY					
		6-inch Air/Vacuum Valves: 10 EA.					
		Sheet Subtotal					**$55,101,750.00**

QUANTITIES		PRICES	
BY Brad VanOtterloo (8120) Dave Gesundheit (8140)	**CHECKED** Dick LaFond (8120), Dave Edwards (8140)	**BY** Jerry Zander/Jeff Morris (8170) JM	**CHECKED** 8/12/2008
DATE PREPARED 06/02/08	**PEER REVIEW** Dave Edwards (8140)	**DATE PREPARED** 8/12/08	**PEER REVIEW**

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Low Cost Estimate

Downstream Seepage Mitigation - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Dam_Most Probable Low_060608_1.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
							$0.00
		Construct Concrete Baffled Outlet Structure (Type 8)					
		Assume inlet structure excavation covered under embankment excavation.					
		(Design flow= 70 cfs)					
		Excavation of common materials for structures	D8120	150	CY	$33.00	$4,950.00
		Furnish and place backfill around structures	D8120	85	CY	$26.00	$2,210.00
		Compact backfill around structures	D8120	85	CY	$22.00	$1,870.00
		Furnish, form, and place reinforced concrete	D8120	21	CY	$1,350.00	$28,350.00
		Furnish and place concrete reinforcement.	D8120	2,730	LBS	$1.75	$4,777.50
		Assume 130 #/CY					
		Furnish and handle cement (.282T/CY)	D8120	6	TONS	$185.00	$1,110.00
		Furnish and install miscellaneous metalwork	D8120	3,900	LBS	$10.00	$39,000.00
		grating, guardrails, safety racks					
		Furnish and install riprap and bedding					
		Riprap (d50=24") (120 lb/cf)	D8120	1,000	TONS	$50.00	$50,000.00
		Riprap Bedding (130 lb/cf)	D8120	400	TONS	$39.00	$15,600.00
		Seepage Mitigation Subtotal					**$136,802,192.50**

QUANTITIES		PRICES	
BY Brad VanOtterloo (8120)	**CHECKED** Dick LaFond (8120)	**BY** Jerry Zander/Jeff Morris (8170) JM	**CHECKED** 8/12/2008
DATE PREPARED 06/02/08	**PEER REVIEW**	**DATE PREPARED** 8/12/08	**PEER REVIEW** JM

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:	PROJECT:			
Black Rock Preferred Alternative Outflow Conveyance System Most Probable Low Cost Estimate Summary	Yakima River Basin Water Storage Study			
	WOID: YAKAP	ESTIMATE LEVEL:	Appraisal	
	REGION PN	PRICE LEVEL:	Apr-07	
Summary Sheet	FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Ouflow_Most Probable High_060608-revision 8-4-08.xls]Summary			

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Outflow Conveyance System sized for 2,500 cfs. **Black Rock Outlet Facility loacted at MP22.6 on Roza Canal** **Bypass capacity: 2,500 cfs, Powerplant capacity: 900 cfs** **Sunnyside Deliveries by Pressure Pipe Option.**					
		Black Rock Outflow Conveyance Subtotal					$381,512,900.00
		Plant - Civil and Structural Subtotal					$30,473,220.00
		Plant - Mechanical Subtotal					$71,485,762.00
		Plant - Electrical Subtotal					$12,804,050.00
		Switchyard & Transmission Line Subtotal					$953,800.00
		Subtotal					**$497,229,732.00**
		Mobilization		5%	(+/-)		$25,000,000.00
		Subtotal with mobilization					**$522,229,732.00**
		Escalation During Construction		0%	(+/-)		$0.00
		Subtotal with mobilization and escalation					**$522,229,732.00**
		Design Contingencies		10%	(+/-)		$47,770,268.00
		CONTRACT COST					**$570,000,000.00**
		Construction Contingencies		20%	(+/-)		$ 120,000,000.00
		FIELD COST					**$690,000,000.00**
		Non-Contract Costs **		20%	(+/-)		$140,000,000.00
		CONSTRUCTION COST					**$830,000,000.00**

Escalation to notice to proceed, allowance for procurement strategies, and utility relocations are not included.

** Land Acquisition Costs of $162,000 associated with these features are included in the Non-Contract Costs.

QUANTITIES		PRICES	
BY Design Team	CHECKED Design Team	BY J. Zander, J. Morris & L. Zlomke (8170)	CHECKED 8-12-08
DATE PREPARED 6/02/08	PEER REVIEW	DATE PREPARED 8/20/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Low Cost Estimate

Intake - Civil Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Ouflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Intake Structure with Fishscreens					
		Assume single level intake at Black Rock Reservoir.					
		Assume Top of Dead Pool @ El. 1500.0					
		Civil/Structural					
		Structural Excavation and Backfill					
		Assume top 5 feet of excavation is common and the remainder is rock					
	1	Excavation of common materials for structures	D8120	1,700	CY	$16.00	$27,200.00
	2	Excavation of rock for structures (drill & shoot)	D8120	1,000	CY	$25.00	$25,000.00
		Assume no backfill.					
		Construct Fishscreened Intake Structure (incl. Manifold Encasement)					
	3	Furnish, form, and place reinforced concrete (f'c=4ksi)	D8120	1,500	CY	$870.00	$1,305,000.00
	4	Furnish and place concrete reinforcement. (110#/CY)	D8120	165,000	LBS	$1.80	$297,000.00
	5	Furnish and handle cement	D8120	423	TONS	$170.00	$71,910.00
		Waste Outflow Tunnel Muck at Black Rock					
		Assume local wasting of material.					
		Quantities include 1/2 outflow tunnel.					
		Waste rock excavation	D8120	510,000	CY	$3.30	$1,683,000.00
		Waste Excess Excavated Material at Roza Canal					
		Assume local wasting of material.					
		Quantities include 1/2 outflow tunnel + outlet structure @ Roza Canal					
		Waste rock excavation	D8120	575,000	CY	$3.30	$1,897,500.00
		Waste common material	D8120	90,000	CY	$2.70	$243,000.00
		Sheet Subtotal					**$5,549,610.00**

QUANTITIES		PRICES	
BY Dick LaFond (8120) 6/3/04	CHECKED Mike O'Shea (8120)	BY Jeff Morris (8170) 8/4/08	CHECKED 8/4/08
DATE PREPARED 6/2/2008	PEER REVIEW	DATE PREPARED 8/4/08	PEER REVIEW 8/4/08

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Low Cost Estimate

Intake - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Ouflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Intake Structure with Fishscreens					
		Mechanical					
	6	Fish screen, radius = 20 ft, 90 ft long half cylinder shape	D-8410				
		structural steel weight		104,000	LBS	$6.00	$624,000.00
		stainless steel weight		70,000	LBS	$20.00	$1,400,000.00
	7	Air burst cleaning system, 250 psi working pressure	D-8410				
		a. 30,000 gallon receiver tank		60,000	LBS	$5.00	$300,000.00
		b. Air compressor units, each 30 hp, 87 cfm @ 250 psi @ 600 lbs each, two required		1,200	LBS	$25.00	$30,000.00
		c. 6" dia. piping and butterfly valves (steel)		10,000	LBS	$8.50	$85,000.00
	8	Bulkhead gates and frames/guides (steel) (assumes four - 10' by 10' bulkhead gates)	D-8410	144,000	LBS	$6.40	$921,600.00
		Sheet Subtotal					**$3,360,600.00**

QUANTITIES		PRICES	
BY Rick Christensen (8410)	**CHECKED** Alex Ritt (8410)	**BY** Jeff Morris (8410) 5/4/08	**CHECKED**
DATE PREPARED 6/1/04, 6/03/08	**PEER REVIEW**	**DATE PREPARED** 5/4/08	**PEER REVIEW** 08/04/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Low Cost Estimate

Outflow Conveyance - Civil/Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Ouflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Tunnel					
		Construct 90,000-ft long, 17.00-ft finished diameter, 19.67-ft minimum bore diameter, tunnel in rock. Tunnel will be excavated with TBM and driven uphill. Water problems will be minimal. Tunnel has three final support reaches.					
		80,600-ft long unreinforced concrete lined reach					
	9	Excavation (907,000 cy, appr 11 cy/lf)	D8140	80,600	lf	$1,400.00	$112,840,000.00
	10	Furnish and place unreinforced concrete tunnel lining	D8140	229,000	cy	$420.00	$96,180,000.00
	11	Cementitious materials for concrete tunnel lining	D8140	64,600	tons	$145.00	$9,367,000.00
	12	Furnish & install 3/4-in dia, 8-ft long rock bolts	D8140	642,000	lin ft	$65.00	$41,730,000.00
		2,000-ft long reinforced concrete lined reach					
	13	Excavation (22,500 cy, appr 11 cy/lf)	D8140	2,000	lf	$1,400.00	$2,800,000.00
	14	Furnish and place reinforced concrete tunnel lining	D8140	5,690	cy	$500.00	$2,845,000.00
	15	Cementitious materials for concrete tunnel lining	D8140	1,600	tons	$170.00	$272,000.00
	16	Furnish and install concrete reinforcement	D8140	81,700	lbs	$1.70	$138,890.00
	17	Furnish and install structural steel tunnel supports	D8140	828,000	lbs	$5.60	$4,636,800.00
		7,400-ft long steel lined portal reach					
	18	Excavation (83,300 cy, appr 11 cy/lf)	D8140	7,400	lf	$1,400.00	$10,360,000.00
		Steel Tunnel Liner:					
		ASTM A572 Gr. 50: Sy = 50 kpsi St = 65 kpsi					
	19	204" Dia., 7/8" wall, L= 7770 ft., 1916 lbs/ft	D8420	19,200,000	LBS	$3.00	$57,600,000.00
	20	Furnish and place backfill concrete	D8140	21,100	cy	$390.00	$8,229,000.00
	21	Cementitious materials for backfill concrete	D8140	5,940	tons	$145.00	$861,300.00
	22	Furnish & install 3/4-in dia, 8-ft long rock bolts	D8140	89,600	lin ft	$65.00	$5,824,000.00
	23	Furnish and install structural steel tunnel supports	D8140	415,000	lbs	$5.60	$2,324,000.00
		Sheet Subtotal					**$356,007,990.00**

QUANTITIES		PRICES	
BY Bill Thompson (8140) Nathan Nakamoto (D-8420)	**CHECKED** Kevin Atwater (8140)/ Rick Frisz (8420)	**BY** Jeff Morris (8170)	**CHECKED**
DATE PREPARED 5/26/04	**PEER REVIEW**	**DATE PREPARED** 8/4/08	**PEER REVIEW** 08/04/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Low Cost Estimate

Outflow Conveyance - Civil/Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Ouflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Surge Shaft					
		Construct 530-ft deep, 40.0-ft finished diameter, 46-ft excavated diameter, shaft in rock. Shaft will be excavated by raise bore and slash method (drill & blast). Water problems will be minimal. Shaft has two final support reaches.					
		430-ft deep unreinforced concrete lined reach					
	24	Excavation (26,500 cy, approx. 62 cy/lf)	D8140	430	lf	$15,500.00	$6,665,000.00
	25	Furnish and place unreinforced concrete shaft lining	D8140	6,450	cy	$460.00	$2,967,000.00
	26	Cementitious materials for concrete shaft lining	D8140	1,820	tons	$170.00	$309,400.00
	27	Furnish & install 1-in dia, 12-ft long rock bolts	D8140	21,000	lin ft	$75.00	$1,575,000.00
		100-ft deep reinforced concrete lined shaft top reach					
	28	Excavation (6,160 cy, approx. 62 cy/lf)	D8140	100	lf	$15,500.00	$1,550,000.00
	29	Furnish and place reinforced concrete shaft lining	D8140	1,500	cy	$460.00	$690,000.00
	30	Cementitious materials for concrete shaft lining	D8140	423	tons	$170.00	$71,910.00
	31	Furnish and install concrete reinforcement	D8140	18,700	lin ft	$1.70	$31,790.00
	32	Furnish & install 1-in dia, 12-ft long rock bolts	D8140	4,800	lin ft	$75.00	$360,000.00
	33	Furnish and install chain link protection	D8140	76,600	sq yd	$31.00	$2,374,600.00
		Black Rock Outflow Conveyance Subtotal					**$381,512,900.00**

QUANTITIES		PRICES	
BY Bill Thompson (8140)	**CHECKED** Kevin Atwater (8140)	**BY** Jeff Morris (8170)	**CHECKED**
DATE PREPARED 4/19/04	**PEER REVIEW**	**DATE PREPARED** 8/4/08	**PEER REVIEW** 8/4/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Low Cost Estimate

Black Rock Outlet Facility - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Ouflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Access Road (60 ft of 24ft wide bituminous surface):					
	1	Clear roadway alignment	D8120	1,440	SF	$1.50	$2,160.00
	2	Furnish and place base course material (9-inch depth)	D8120	75	TONS	$29.00	$2,175.00
	3	Furnish and place asphalt concrete (6-inch depth)	D8120	55	TONS	$145.00	$7,975.00
		Service Yard (6" asphalt concrete surface)					
		Assume T.O Yard= El 1176.0					
	4	Strip and clear pumping plant site to 1 foot depth	D8120	7,100	CY	$2.90	$20,590.00
	5	Common excavation to Yard (25% Strip & Clear)	D8120	1,800	CY	$14.50	$26,100.00
	6	Place and compact embankment for yard (25% Exc.)	D8120	450	CY	$19.50	$8,775.00
	7	Furnish and place base course material (6-inch)	D8120	4,600	TONS	$29.00	$133,400.00
	8	Furnish and place asphalt concrete (6-inch)	D8120	5,100	TONS	$93.00	$474,300.00
	9	Furnish and install 7-foot chain link fence for PP Yard	D8120	1,900	LF	$24.00	$45,600.00
	10	Furnish and install 7-foot x 24-foot access gates	D8120	3	EA	$4,300.00	$12,900.00
		Diversion During Construction:					
		Assume need to pass 900 cfs canal flow during construction. Assume local borrow.					
		Assume no dewwatering required.					
	11	Construct U/S & D/S earth cofferdams. (Height=15 ft)	D8120	2,000	CY	$29.00	$58,000.00
	12	F&I impervious geomembrane on cofferdams.	D8120	350	SY	$19.50	$6,825.00
	13	F&I three 9-ft dia. X .138-in galv., corrugated metal pipes btwn cofferdams. Wt/Ft= 210 lbs/ft.	D8120	1,000	LF	$620.00	$620,000.00
	14	Remove cofferdams and diversion structures	D8120	1	LS	$41,000.00	$41,000.00
		Sheet Subtotal					**$1,459,800.00**

QUANTITIES		PRICES	
BY Dick LaFond (8120)	**CHECKED** Brad Van Otterloo (8120)	**BY** Jerry Zander/Jeff Morris (8170)	**CHECKED**
DATE PREPARED 6/3/04	**PEER REVIEW**	**DATE PREPARED** 8/4/08	**PEER REVIEW** 08-05-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Low Cost Estimate

Black Rock Outlet Facility - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Ouflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Tailrace Channel (Lined - Lining covered under structural)					
		T.O Ground El. 1176. Assume T.O. Rock El. 1145					
		Assume local wasting of material.					
	15	Common excavation for tailrace channel	D8120	34,600	CY	$5.60	$193,760.00
	16	Rock excavation for tailrace channel (drill & shoot)	D8120	4,300	CY	$28.00	$120,400.00
		Structural Excavation and Backfill					
		T.O Ground El. 1176. Assume T.O. Rock El. 1145					
		Assume stockpile rock for later use as riprap.					
	17	Common excavation for structures	D8120	25,600	CY	$9.50	$243,200.00
	18	Rock excavation for structures (drill & shoot)	D8120	6,400	CY	$29.00	$185,600.00
	19	Furnish backfill for structures (reuse excavation)	D8120	6,400	CY	$0.00	$0.00
	20	Place backfill around structures	D8120	6,400	CY	$14.50	$92,800.00
	21	Compact backfill around structures	D8120	6,400	CY	$16.50	$105,600.00
		Pipe Trench Excavation and Backfill					
		Manifold excavation in yard.					
		T.O Ground El. 1176. Assume T.O. Rock El. 1150					
	22	Common excavation for pipe in Service Yard	D8120	16,200	CY	$7.80	$126,360.00
	24	Furnish, place, & compact backfill for pipe (local)	D8120	10,400	CY	$31.00	$322,400.00
		Pipe Trench Excavation and Backfill					
		From Tunnel Portal (Sta. 910+00) to Yard (Sta. 940+00)					
		Assume all common excavation					
	25	Common excavation for pipe	D8140	487,000	CY	$3.50	$1,704,500.00
	26	Furnish backfill for pipe	D8140	461,500	CY	$0.00	$0.00
	27	Place backfill around pipe	D8140	461,500	CY	$4.10	$1,892,150.00
	28	Compact pipe backfill (F&P included in above items)	D8140	36,000	CY	$9.70	$349,200.00
		Sheet Subtotal					**$5,335,970.00**

QUANTITIES		PRICES	
BY Dick LaFond (8120) Linda Bowles (8140)	**CHECKED** B. Van Otterloo (8120) Mike O'Shea (8120), Anne Pavol (8140)	**BY** JZ JM Jerry Zander/Jeff Morris (8170)	**CHECKED** AT
DATE PREPARED 5/15/04	**PEER REVIEW**	**DATE PREPARED** 8/4/08	**PEER REVIEW** DW 08-05-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Low Cost Estimate

Black Rock Outlet Facility - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Ouflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		STRUCTURAL					
		Construct Concrete Tailrace Lining and Retaining Walls					
		Assume lining is 1-foot thick w/ #6@12" EW EF, 1.5:1 side slopes					
	29	Furnish, form, and place reinforced concrete lining in excavated channel (f'c= 4 ksi)	D8120	2,000	CY	$850.00	$1,700,000.00
	30	Furnish, form, and place reinforced concrete walls	D8120	1,500	CY	$870.00	$1,305,000.00
	31	Furnish and place concrete reinforcement. Assume 130 #/CY	D8120	455,000	LBS	$1.75	$796,250.00
	32	Furnish and handle cement (.282T/CY)	D8120	980	TONS	$145.00	$142,100.00
		Construct Powerplant and Bypass Substructure					
	33	Furnish, form, and place reinforced concrete	D8120	13,000	CY	$640.00	$8,320,000.00
	34	Furnish and place concrete reinforcement. Assume 110 #/CY	D8120	1,430,000	LBS	$1.70	$2,431,000.00
	35	Furnish and handle cement (.282T/CY)	D8120	3,670	TONS	$130.00	$477,100.00
	36	**Construct Powerplant and Bypass Superstructure** 212.5-ft x 73.5-ft x 42-ft high superstructure Structural steel superstructure with CMU walls. Stepped columns for 90T crane support Built-up roof on metal roof deck.	D8120	15,620	SF	$230.00	$3,592,600.00
		Sheet Subtotal					**$18,764,050.00**

QUANTITIES		PRICES	
BY Dick LaFond (8120)	CHECKED Mike O'Shea (8120)	BY Jerry Zander/Jeff Morris (8170)	CHECKED
DATE PREPARED 6/4/04	PEER REVIEW	DATE PREPARED 8/4/08	PEER REVIEW 08/05/08

ESTIMATE WORKSHEET

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Black Rock Outlet Facility - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Ouflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		STRUCTURAL (cont.)					
		Construct Pipe Encasements in Yard					
	37	Furnish, form, and place reinforced concrete	D8120	3,100	CY	$800.00	$2,480,000.00
	38	Furnish and place concrete reinforcement. Assume 110 #/CY	D8120	341,000	LBS	$1.80	$613,800.00
	39	Furnish and handle cement (.282T/CY)	D8120	874	TONS	$150.00	$131,100.00
		Structural Steel					
	40	Furnish and install structural steel (painted): Includes crane girder, rail, and hoist frames. Does not include typ. building framework.	D8120	175,000	LBS	$7.00	$1,225,000.00
		Miscellaneous Metalwork					
	41	Furnish and install miscellaneous metalwork Includes grating, hatches, ladders, guardrail, and cable trays	D8120	45,000	LBS	$10.00	$450,000.00
	42	Motor-operated, exterior insulated roll-up door 18' x 20'	D8120	1	EA	$13,500.00	$13,500.00
		Plant - Civil and Structural Subtotal					**$30,473,220.00**

QUANTITIES		PRICES	
BY	CHECKED	BY	CHECKED
Dick LaFond (8120)	Mike O'Shea (8120)	Jerry Zander/Jeff Morris (8170)	
DATE PREPARED	PEER REVIEW	DATE PREPARED	PEER REVIEW
5/15/04		8/4/08	08-05-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
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Black Rock Outlet Facility - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Major Mechanical Equipment					
	1	Turbine-Vertical Francis, 31452 Hp 400 rpm, 339 ft. Design Head CF3 18-8 Stainless Runner 5.5' dia.	D8420	125,000	LBS	$20.00	$2,500,000.00
	2	Digital Governor, 103,905 ft.-lbs. 150 psi system	D8420	1	EA	$300,000.00	$300,000.00
	3	Governor Pressure Tank 875 Gal. Look to Flaming Gorge Oil Tank	D8420	7,640	LBS	$8.30	$63,412.00
		Sheet Subtotal					**$2,863,412.00**

QUANTITIES		PRICES	
BY Toby Turnage (8420)	**CHECKED** John Brooks (8420)	**BY** Lonnie Ziemke (8170)	**CHECKED**
DATE PREPARED 4/14/04; 6/03/08	**PEER REVIEW**	**DATE PREPARED** 8/4/08	**PEER REVIEW** 08.05-08

ESTIMATE WORKSHEET

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Black Rock Outlet Facility - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

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REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Furnish and install the following:					
		Steel Penstock:					
		Steel plate used for pipe fabrication:					
		ASTM A36: Sy = 36 kpsi					
		(All pipe sizes are inside diameters)					
	4	204" Dia., 1 15/16" wall, L= 3,000 ft., 4265 lbs/ft	D8420	12,795,000	LBS	$2.60	$33,267,000.00
	5	84" Dia., 13/16" wall, L= 492 ft., 737 lbs/ft	D8420	363,000	LBS	$2.20	$798,600.00
		Stainless Steel Stilling Basin for Sleeve Valves:					
		ASTM 316L Stainless steel plate					
	6	Four - 396" Dia., 1 1/4" wall cylindrical tanks with baseplates:					
		Each tank height = 20 feet					
		Total weight for four tanks = 1,180,000 lbs.	D8420	1,180,000	LBS	$16.50	$19,470,000.00
		Sleeve valves with hydraulic operators:					
	7	Four - 84" Dia. Inlet X 72" Dia. Outlet Valves	D8420	280,000	LBS	$16.50	$4,620,000.00
		ASTM 316L Stainless steel plate					
		Each valve weight = 70,000					
		Total weight for four valves = 280,000 lbs.					
		Spherical valves with hydraulic operators:					
	8	Sleeve valve guard valves	D8420	240,000	LBS	$11.00	$2,640,000.00
		Four - 60" Dia. Spherical valves with hydraulic operators					
		60,000 lbs. per valve					
		Turbine guard valve					
	9	One - 84" Dia. Spherical valve with hydraulic operator	D8420	140,000	LBS	$11.00	$1,540,000.00
		140,000 lbs. per valve					
		Sunnyside Power Plant Isolation Valve					
	10	One - 84" Dia. Spherical valve with hydraulic operator	D8420	140,000	LBS	$11.00	$1,540,000.00
		140,000 lbs. per valve					
		Sheet Subtotal					**$63,875,600.00**

QUANTITIES		PRICES	
BY Nathan Nakamoto (8420)	CHECKED Rick Frisz (8420)	BY Lonnie Zlomke (8170)	CHECKED
DATE PREPARED 5/26/04		DATE PREPARED 8/12/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
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Black Rock Outlet Facility - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	10	Furnishing and installing one 90-Ton overhead crane, 67.5' span	D8410	157,500	LBS	$6.70	$1,055,250.00
	11	Furnishing and installing Hydraulic elevator capacity = 3500 pounds, travel = 31 ft. landings = 3, speed = 100 ft/min.	D8410	1	unit	$440,000.00	$440,000.00
	12	Bulkhead gates and guides at turbine (steel) (assumes 3 bays of guides and 3 bulkhead gates)	D8410	31,000	LBS	$5.10	$158,100.00
	13	Monorail hoist for bulkhead gate, electric wire rope, motorized trolley, 5-ton capacity	D8410	1,500	LBS	$22.00	$33,000.00
	14	Stoplogs, lifting beam & guides at sleeve valves eight bays fo guides, 2 bays of stoplogs (steel)	D8410	152,000	LBS	$6.20	$942,400.00
	15	CO2 High Pressure Fire Extinguishing System: 12 - 100# Storage Cylinders w/ control panel and appurtenances and 400 lbs. of sch. 80 carbon steel pipe, valves & fittings	D8410	1	L.S.	$39,000.00	$39,000.00
	16	Fire Suppression System: 3 Fire hose reels w/ 100 feet of hose 12 - Portable hand-held 20# extinguishers 2,000 lbs. of sch. 40 carbon steel pipe, valves & fittings 1 - Fire pump, split-case, 500 gpm @ 300 ft of head	D8410	1	L.S.	$55,000.00	$55,000.00
	17	Unit Cooling Water System: 2 - Cooling water pumps, end-suction type, 150 gpm 2 - 8-inch automatic, self-cleaning strainers 1,000 lbs. of type K copper tubing, valves & fittings 4,000 lbs. of ductile iron, mechanical joint pipe & fittings	D8410	1	L.S.	$150,000.00	$150,000.00
	18	Lubricating Oil System: 2- 500 gal carbon steel storage tanks 1 - 10 gpm @ 100 psi oil pump 1 - lube oil filter 1,000 lbs. of sch. 40 carbon steel pipe, valves & fittings	D8410	1	L.S.	$22,000.00	$22,000.00
		Sheet Subtotal					**$2,894,750.00**

QUANTITIES		PRICES	
BY Rick Christensen, B Sund, C Berte, J Grass, Randy Egan (8410)	**CHECKED** Alex Ritt (8410)	**BY** Lonnie Zlomke (8170)	**CHECKED**
DATE PREPARED 5/3/04, 6/03/08	**PEER REVIEW**	**DATE PREPARED** 8/4/08	**PEER REVIEW** 08-05-08

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Low Cost Estimate

Black Rock Outlet Facility - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	19	Compressed Air System: 2 - 100 cfm @ 125 psi rotary screw air compressors 1 - 250 gal. carbon steel air receiver 1 - 100 cfm air dryer 500 lbs. of sch. 40 carbon steel pipe, valves & fittings	D8410	1	L.S.	$55,000.00	$55,000.00
	20	Service Water System: 1 - Service water pump, 75 gpm @ 200 ft. of head 1 - Hydropneumatic Tank, 300 gal. 750 lbs. of type K copper tubing, valves & fittings	D8410	1	L.S.	$110,000.00	$110,000.00
	21	Gravity Drainage System: 12 - Floor drains, cast iron 5,000 lbs. of cast iron hub & spigot, service weight soil pipe	D8410	1	L.S.	$55,000.00	$55,000.00
	22	Plant Unwatering System: 2 - Vertical turbine type sump pump, 500 gpm @ 50 ft hd 1 - Drainage jet type drainage pump 1,000 lbs. of type K copper tube, valves & fittings 3,000 lbs. of ductile iron, mechanical joint pipe & fittings	D8410	1	each	$77,000.00	$77,000.00
	23	Domestic Water and Sanitary Waste System: 2 - Water Closets 1 - Urinal 2 - Lavatories & accessories 1 - Duplex Sewage Ejector 2,000 lbs. of cast iron hub & spigot service weight sewer pipe 400 lbs. of type K copper tubing, valves & fittings	D8410	1	each	$55,000.00	$55,000.00
		Sheet Subtotal					**$352,000.00**

QUANTITIES		**PRICES**	
BY J Grass, Randy Egan (8410)	**CHECKED** Alex Ritt (8410)	**BY** Lonnie Ziomke (8410)	**CHECKED**
DATE PREPARED 5/27/04, 6/03/08	**PEER REVIEW**	**DATE PREPARED** 8/4/08	**PEER REVIEW** 08-05-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
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Black Rock Outlet Facility - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Ouflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Heating, Ventilating, and Air Conditioning Unmanned air cooled plant . OA temp 95 degrees F.	D8410	1	L.S.	$1,500,000.00	$1,500,000.00
		Plant - Mechanical Subtotal					**$71,485,762.00**

QUANTITIES		PRICES	
BY Paul Schlein, Mike Weems (8410)	**CHECKED** Alex Ritt (8410)	**BY** Lonnie Zlomke (8170)	**CHECKED**
DATE PREPARED 6/1/04, 6/03/08	**PEER REVIEW**	**DATE PREPARED** 8/4/08	**PEER REVIEW** 08-05-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Low Cost Estimate

Black Rock Outlet Facility - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Ouflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	1	**Electrical Generator (F&I)** 25,000 kVA, 6,900 volts, 3-phase, 60 Hz 276.9 rpm, 95 % power factor Vertical, synchronous machine Static excitation system & voltage regulator	D8430	1	EA	$10,000,000	$10,000,000.00
		Plant Grounding System (F&I)	D8430				
	2	Ground rods, 10 ft, 3/4" dia, copper-clad		30	EA	$240.00	$7,200.00
		Stranded bare-copper conductor:					
	3	250 MCM		1,200	LF	$12.00	$14,400.00
	4	4/0 AWG		800	LF	$11.50	$9,200.00
	5	2/0 AWG		500	LF	$7.80	$3,900.00
	6	4 AWG		800	LF	$3.10	$2,480.00
		Generator Bus & Metal-Enclosed Switchgear (F&I)	D8430				
	7	Generator isolated phase bus: 15 kV, 3000 amperes, 3-phase, 60 Hz		250	LF	$1,600.00	$400,000.00
	8	Generator power circuit breaker: 15 kV, 3000 amperes, 3-phase, vacuum type		1	EA	$800,000	$800,000.00
	9	Station-service fused interrupter switch: 15 kV, 600 ampere, 3-phase, w/ power fuses		1	EA	$33,000.00	$33,000.00
		Generator Control Equipment (F&I)	D8430				
	10	Duplex control switchboard for operation of the generator		1	EA	$800,000	$800,000.00
		Sheet Subtotal					**$12,070,180.00**

QUANTITIES		PRICES	
BY Mike Schuh (8430)	**CHECKED** Cory Maurer (8430)	**BY** Lonnie Ziomke (8170)	**CHECKED**
DATE PREPARED 5/22/08	**PEER REVIEW** George Girgis (8430)	**DATE PREPARED** 8/4/08	**PEER REVIEW** 08-05-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Low Cost Estimate

Black Rock Outlet Facility - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Ouflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Plant Battery System (F&I)	D8430				
	11	125 volt, 300 ampere-hour, lead-acid battery		1	EA	$27,000.00	$27,000.00
	12	Battery chargers		2	EA	$8,800.00	$17,600.00
	13	DC distribution panelboard, 100 ampere mains, and molded-case circuit breakers		1	EA	$13,500.00	$13,500.00
		Plant Station-Service Equipment (F&I)	D8430				
		Indoor secondary unit substation with following features:					
	14	Dry-type transformer, 6.9 kV-480Y/277, 1500 kVA		1	EA	$60,000.00	$60,000.00
	15	480 volt power-circuit breakers, 600 amperes		5	EA	$4,400.00	$22,000.00
		Building Lighting System (F&I)	D8430				
		Interior luminaires					
	16	High bay, high-pressure sodium, 400 Watt 480 volt, 1-phase		24	EA	$770.00	$18,480.00
	17	4 foot fluorescent lighting fixtures, 2 lamps		36	EA	$250.00	$9,000.00
	18	Emergency lighting system		1	LS	$4,000.00	$4,000.00
		Exterior luminaires					
	19	High-pressure sodium, wall-mounted, outdoor type 70 watt, 120 volt		12	EA	$440.00	$5,280.00
	20	**Building Fire Detection & Alarm System (F&I)**	D8430	1	LS	$165,000	$165,000.00
		Distribution Panelboards (F&I)	D8430				
	21	480-volts, 3-phase, 400 ampere bus, indoor type with 12 molded-case circuit breakers		2	EA	$11,000.00	$22,000.00
		Motor Control Center (F&I)	D8430				
	22	480 volts, 3-phase, 1600 ampere main bus Six 20 inch wide sections		1	EA	$210,000	$210,000.00
		Sheet Subtotal					**$573,860.00**

QUANTITIES		PRICES	
BY Mike Schuh (8430)	**CHECKED** Cory Maurer (8430)	**BY** Lonnie Zlomke (8170)	**CHECKED**
DATE PREPARED 5/22/08	**PEER REVIEW** George Girgis (8430)	**DATE PREPARED** 6/4/08	**PEER REVIEW** 08-05-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Low Cost Estimate

Black Rock Outlet Facility - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP | **ESTIMATE LEVEL:** Appraisal
REGION PN | **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Ouflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Insulated Conductors (F&I)	D8430				
		15 kV shielded power cable:					
	23	4 AWG		300	FT	$24.00	$7,200.00
		600-volt single-conductor, stranded-copper:					
	24	12 AWG		6,000	FT	$1.00	$6,000.00
	25	10 AWG		4,000	FT	$1.30	$5,200.00
	26	6 AWG		1,000	FT	$2.70	$2,700.00
	27	4 AWG		1,000	FT	$3.70	$3,700.00
	28	1/0 AWG		600	FT	$6.00	$3,600.00
	29	4/0 AWG		600	FT	$4.10	$2,460.00
		600-volt multi-conductor control cable:					
	30	9 conductor 14 AWG		1,500	FT	$2.70	$4,050.00
	31	12 conductor 14 AWG		2,000	FT	$3.40	$6,800.00
	32	5 conductor 10 AWG		2,000	FT	$3.10	$6,200.00
		Conduit System (F&I)	D8430				
		Rigid steel conduit:					
	33	1 inch		1,000	FT	$21.00	$21,000.00
	34	1 1/2 inch		500	FT	$27.00	$13,500.00
	35	2 inch		600	FT	$34.00	$20,400.00
	36	2 1/2 inch		350	FT	$52.00	$18,200.00
		Plastic-coated rigid steel:					
	37	2 inch		750	FT	$52.00	$39,000.00
		Plant - Electrical Subtotal					**$12,804,050.00**

QUANTITIES		PRICES	
BY Mike Schuh (8430)	**CHECKED** Cory Maurer (8430)	**BY** Lonnie Zlomke (8170)	**CHECKED**
DATE PREPARED 5/22/08	**PEER REVIEW** George Girgis (8430)	**DATE PREPARED** 8/4/08	**PEER REVIEW** 08-05-08

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Low Cost Estimate

Black Rock Outlet Facility - Incoming Power

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock Ouflow_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Switchyard					
		Furnish and Install:					
	1	Oil-filled power transformer 30 MVA; 34.5-6.9kV, 3-phase	D8430	1	EA	$490,000	$490,000.00
	2	F&I 34.5-KV PRIMARY UNIT SUBSTATION: 'INCOMING 34.5KV SECTION/BUS/INTERRUPTER 'OUTGOING 6.9KV SECTION/BUS/INTERRUPTER 'SURGE ARRESTORS, 30KV	D8430	1	EA	$410,000	$410,000.00
		Tap at existing 34.5-kV line					
		Furnish and Install:					
	3	Wood-pole tap structure	D8430	1	EA	$9,800.00	$9,800.00
	4	**Construct Transmission LIne (By Others)** Assume 1000 feet of transmission line from existing 34.5-kV line wood poles, 1115 AWG conductor	D8430	1,000	FT	$44.00	$44,000.00
		Switchyard & Transmission Line Subtotal					**$953,800.00**

QUANTITIES		PRICES	
BY Lisa Gamuciello (8430)	**CHECKED** Cory Maurer (8430)	**BY** Lonnie Zlomke (8170)	**CHECKED**
DATE PREPARED 5/14/08	**PEER REVIEW** George Girgis (8430)	**DATE PREPARED** 8/4/08	**PEER REVIEW** 08/05/08

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Delivery System - Option 1 Pipeline
Most Probable Low Cost Estimate

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock SunnysideDelivery_Most Probable Low_060608.xls]SS Delivery_Option1

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		12 ft. Dia. Steel Delivery Pipe					
	1	Clearing and grubbing	PN3440	93	ACRES	$3,200.00	$297,600.00
	2	Excavation (common)	D8120	907,400	CY	$2.40	$2,177,760.00
	3	Excavation (rock)	D8120	132,600	CY	$19.00	$2,519,400.00
	4	Soil cement bedding		7,840	CY	$120.00	$940,800.00
	5	Placing and compacting backfill		890,000	CY	$6.10	$5,429,000.00
	6	12 ft. dia. steel pipe, A572 GR 60 steel		62,000,000	LBS	$2.20	$136,400,000.00
		Check Structure on Sunnyside Canal	PN3440				
	7	Structural excavation (common)		1,060	CY	$16.50	$17,490.00
	8	Placing and compacting backfill		750	CY	$29.00	$21,750.00
	9	Concrete in structures		250	CY	$1,200.00	$300,000.00
	10	Langemann gates (26ft. long x 10 ft. tall)		2	EA	$220,000.00	$440,000.00
		Sunnyside Upstream Delivery Pipe	PN3440				
	11	Pumping plant (pump, structure, elec.)		1	LS	$750,000.00	$750,000.00
	12	Excavation, pipe (common)		40,500	CY	$3.30	$133,650.00
	13	Placing and compacting backfill		39,500	CY	$5.70	$225,150.00
	14	PVC pipe (diameter varies 18-inch to 6-inch)		1	LS	$450,000.00	$450,000.00
		Sheet Subtotal					**$150,102,600.00**

QUANTITIES		**PRICES**	
BY Dick LaFond (8120) Guy Grooms (PN-3444)	**CHECKED** S. Montague (PN-3440) Brad VanOtterloo (8120)	**BY** Jeff Morris (8170) 7/31/08	**CHECKED** 8/1/08
DATE PREPARED 12/01/04 6/6/06	**PEER REVIEW**	**DATE PREPARED** 7/31/2008	**PEER REVIEW** 08-01-08

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Delivery System - Option 1 Pipeline
Most Probable Low Cost Estimate

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MP\[Black Rock SunnysideDelivery_Most Probable_060208 Rev.xls]SS Delivery_Option1		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Subtotal					**$150,102,600.00**
		Mobilization		5%	(+/-)		$7,500,000.00
		Subtotal with mobilization					**$157,602,600.00**
		Escalation During Construction		0%	(+/-)		$0.00
		Subtotal with mobilization and escalation					**$157,602,600.00**
		Design Contingencies		15%	(+/-)		$22,397,400.00
		CONTRACT COST					**$180,000,000.00**
		Construction Contingencies		15%	(+/-)		$ 30,000,000.00
		FIELD COST					**$210,000,000.00**
		Non-Contract Costs **		20%	(+/-)		$40,000,000.00
		CONSTRUCTION COST					**$250,000,000.00**

Escalation to notice to proceed, allowance for procurement strategies, and utility relocations are not included.

** Land Acquisition Costs of $486,000 associated with these features are included in the Non-Contract Costs.

QUANTITIES		PRICES	
BY Guy Grooms (PN-3444)	**CHECKED** Steve Montague (PN-3440)	**BY** Jeff Morris (8170)	**CHECKED** MC Greg Thom 8/20/08
DATE PREPARED Dec-04	**PEER REVIEW**	**DATE PREPARED** 8/20/08	**PEER REVIEW**

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable Low Cost Estimate
Summary

Summary Sheet

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\[Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock SunnysidePP_Most Probable Low_060608.xls]Sitework

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Sitework Subtotal					$2,513,378.00
		Structural & Architectural Subtotal					$9,093,635.00
		Mechanical Subtotal					$25,552,248.00
		Electrical Subtotal					$13,829,600.00
		Switchyard & Transmission Line Subtotal					$1,573,000.00
		Subtotal					**$52,561,861.00**
		Mobilization		5%	(+/-)		$2,600,000.00
		Subtotal with mobilization					**$55,161,861.00**
		Escalation during construction		0%	(+/-)		$0.00
		Subtotal with mobilization and escalation					**$ 55,161,861.00**
		Design Contingencies		10%	(+/-)		$5,838,139.00
		CONTRACT COST					**$61,000,000.00**
		Construction Contingencies		15%	(+/-)		$ 9,000,000.00
		FIELD COST					**$70,000,000.00**
		Non-Contract Costs **		20%	(+/-)		$14,000,000.00
		CONSTRUCTION COST					**$84,000,000.00**

Escalation to notice to proceed, allowance for procurement strategies, and utility relocations are not included.

** Land Acquisition Costs of $27,000 associated with these features are included in the Non-Contract Costs.

QUANTITIES		PRICES	
BY Design Team	**CHECKED** Design Team	**BY** Greg Akins & Lonnie Zlomke (8170)	**CHECKED**
DATE PREPARED 6/6/08	**PEER REVIEW**	**DATE PREPARED** 8/21/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable Low Cost Estimate

Plant - Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock SunnysidePP_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Access Road (60 ft of 24ft wide bituminous surface):					
	1	Clear roadway alignment	D8120	1,440	SF	$1.20	$1,728.00
	2	Furnish and place base course material (9-inch depth)	D8120	75	TONS	$28.00	$2,100.00
	3	Furnish and place asphalt concrete (6-inch depth)	D8120	55	TONS	$145.00	$7,975.00
		Service Yard (6" asphalt concrete surface)					
		Assume T.O Ground= T.O Yard= El 894.5					
	4	Strip and clear pumping plant site to 1 foot depth	D8120	3,500	CY	$2.90	$10,150.00
	5	Common excavation to Yard (±50% Strip & Clear)	D8120	1,800	CY	$11.50	$20,700.00
	6	Place and compact embankment for yard (50% Exc.)	D8120	900	CY	$19.00	$17,100.00
	7	Furnish and place base course material (6-inch)	D8120	3,600	TONS	$27.00	$97,200.00
	8	Furnish and place asphalt concrete (6-inch)	D8120	4,000	TONS	$94.00	$376,000.00
	9	Furnish and install 7-foot chain link fence for PP Yard	D8120	1,400	LF	$24.00	$33,600.00
	10	Furnish and install 7-foot x 24-foot access gates	D8120	3	EA	$4,200.00	$12,600.00
		Diversion During Construction:					
		Assume need to pass 900 cfs canal flow during construction. Assume loacl borrow.					
		Assume no dewwatering required.					
	11	Construct U/S & D/S earth cofferdams. (Height=15 ft)	D8120	2,000	CY	$29.00	$58,000.00
	12	F&I impervious geomembrane on cofferdams.	D8120	350	SY	$19.50	$6,825.00
	13	F&I three 9-ft dia. X .138-in galv., corrugated metal pipes btwn cofferdams. Wt/Ft= 210 lbs/ft.	D8120	1,000	LF	$610.00	$610,000.00
	14	Remove cofferdams and diversion structures	D8120	1	LS	$80,000.00	$80,000.00
		Sheet Subtotal					**$1,333,978.00**

QUANTITIES		PRICES	
BY Dick Lafond (8120) Brad VanOtterloo (8120)	**CHECKED** Mike O'Shea/Dick LaFond (8120)	**BY** Greg Akins (8170) Greg Akins	**CHECKED** 8/13/2008
DATE PREPARED 5/15/04, 6/6/08	**PEER REVIEW**	**DATE PREPARED** 8/13/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable Low Cost Estimate

Plant - Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock SunnysidePP_Most Probable Low_060608.xls]Sitework

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Tailrace Channel (Unlined)					
		Assume T.O. Rock El. 875					
		Assume local wasting of excess excavated material.					
	15	Common excavation for tailrace channel	D8120	4,600	CY	$8.80	$40,480.00
	16	Rock excavation for tailrace channel (drill and shoot)	D8120	1,100	CY	$26.00	$28,600.00
	17	Furnish and place riprap bedding (1-ft depth)	D8120	700	CY	$56.00	$39,200.00
	18	Furnish and place riprap (2-ft depth)	D8120	1,400	CY	$37.00	$51,800.00
		Structural Excavation and Backfill					
		Assume T. O Rock El. 875.0					
		Assume local wasting of excess excavated material.					
	19	Common excavation for structures	D8120	17,300	CY	$9.20	$159,160.00
	20	Rock excavation for structures (drill & shoot)	D8120	14,350	CY	$22.00	$315,700.00
	21	Furnish backfill for structures (reuse excavation)	D8120	6,200	CY	$2.20	$13,640.00
	22	Place backfill around structures	D8120	6,200	CY	$7.80	$48,360.00
	23	Compact backfill around structures	D8120	6,200	CY	$16.50	$102,300.00
		Pipe Trench Excavation and Backfill					
	24	Common excavation for pipe in Service Yard	D8120	9,300	CY	$8.20	$76,260.00
	25	Rock Excavation for pipe in Service Yard	D8120	950	CY	$27.00	$25,650.00
	26	Furnish, place, & compact backfill for pipe (local)	D8120	7,350	CY	$29.00	$213,150.00
	27	Furnish & place soil cement for pipe	D8120	525	CY	$124.00	$65,100.00
		Sitework Subtotal					**$2,513,378.00**

QUANTITIES		PRICES	
BY Dick Lafond (8120) Brad VanOtterloo (8120)	CHECKED Mike O'Shea/Dick LaFond (8120)	BY Greg Akins (8170)	CHECKED
DATE PREPARED 5/15/04, 6/6/08	PEER REVIEW	DATE PREPARED 8/20/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable Low Cost Estimate

Plant - Structural & Architectural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		STRUCTURAL					
		Construct Concrete Tailrace Structure					
	1	Furnish, form, and place reinforced concrete	D8120	560	CY	$930.00	$520,800.00
	2	Furnish and place concrete reinforcement. Assume 130 #/CY	D8120	72,800	LBS	$1.70	$123,760.00
	3	Furnish and handle cement (.282T/CY)	D8120	158	TONS	$125.00	$19,750.00
		Construct Powerplant Substructure					
	4	Furnish, form, and place reinforced concrete	D8120	2,830	CY	$700.00	$1,981,000.00
	5	Furnish and place concrete reinforcement. Assume 110 #/CY	D8120	311,300	LBS	$1.60	$498,080.00
	6	Furnish and handle cement (.282T/CY)	D8120	800	TONS	$140.00	$112,000.00
	7	**Construct Powerplant Superstructure** 72.5-ft x 62-ft x 37-ft high superstructure Structural steel superstructure with CMU walls. Stepped columns for 125T crane support Built-up roof on metal roof deck.	D8120	4,500	SF	$220.00	$990,000.00
		Construct Byapss Substructure					
	8	Furnish, form, and place reinforced concrete	D8120	3,040	CY	$700.00	$2,128,000.00
	9	Furnish and place concrete reinforcement. Assume 120 #/CY	D8120	334,400	LBS	$1.60	$535,040.00
	10	Furnish and handle cement (.282T/CY)	D8120	860	TONS	$123.00	$105,780.00
	11	**Construct Bypass Superstructure** 74.0-ft x 37-ft x 16-ft high superstructure Built-up roof on metal roof deck supported by open web joists. CMU bearing walls. No crane.	D8120	2,740	SF	$220.00	$602,800.00
		Sheet Subtotal					**$7,617,010.00**

QUANTITIES		PRICES	
BY Dick LaFond (8120)	CHECKED Mike O'Shea/ Brad VanOtterloo (8120)	BY Greg Akins (8170)	CHECKED 8/13/2008
DATE PREPARED 5/15/04, 6/6/08	PEER REVIEW	DATE PREPARED 8/13/08	PEER REVIEW

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable Low Cost Estimate

Plant - Structural & Architectural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		STRUCTURAL (cont.)					
		Construct Pipe Encasements					
	12	Furnish, form, and place reinforced concrete	D8120	1,050	CY	$780.00	$819,000.00
	13	Furnish and place concrete reinforcement. Assume 110 #/CY	D8120	115,500	LBS	$1.65	$190,575.00
	14	Furnish and handle cement (.282T/CY)	D8120	295	TONS	$130.00	$38,350.00
		Structural Steel					
	15	Furnish and install structural steel (painted): Includes crane girder, rail, and hoist frames. Does not include typ. building framework.	D8120	34,000	LBS	$7.80	$265,200.00
		Miscellaneous Metalwork					
	16	Furnish and install miscellaneous metalwork Includes grating, hatches, ladders, guardrail, and cable trays	D8120	15,000	LBS	$10.00	$150,000.00
	17	Motor-operated, exterior insulated roll-up door 18' x 20'	D8120	1	EA	$13,500.00	$13,500.00
		Structural & Architectural Subtotal					**$9,093,635.00**

QUANTITIES		PRICES	
BY Dick LaFond (8120)	CHECKED Mike O'Shea (8120)	BY Greg Akins (8120)	CHECKED 8/13/2008
DATE PREPARED 5/15/04	PEER REVIEW	DATE PREPARED 8/13/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable Low Cost Estimate

Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock SunnysidePP_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Major Mechanical Equipment					
	1	Turbine-Vertical Francis, 40485 Hp 400 rpm, 435 ft. Design Head CF3 18-8 Stainless Runner 5.4' dia.	D8420	200,000	LBS	$22.00	$4,400,000.00
	2	Digital Governor, 156,523 ft.-lbs. 150 psi system	D8420	1	EA	$500,000	$500,000.00
	3	Governor Pressure Tank 875 Gal. Look to Flaming Gorge Oil Tank	D8420	7,640	LBS	$8.20	$62,648.00
		Sheet Subtotal					**$4,962,648.00**

QUANTITIES		PRICES	
BY Toby Turnage (8420)	CHECKED John Brooks (8420)	BY Lonnie Zlomke (8170)	CHECKED 8/13/2008
DATE PREPARED 4/14/04; 6/03/08	PEER REVIEW	DATE PREPARED 8/13/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable Low Cost Estimate

Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock SunnysidePP_Most Probable Low_060608.xls]Summary		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Furnish and install the following:					
		Steel Penstock:					
		Steel plate used for pipe fabrication:					
		ASTM A36: Sy = 36 kpsi					
		(All pipe sizes are inside diameters)					
	4	144" Dia., 2 1/4" wall, L= 252 ft.	D8420	890,000	LBS	$4.50	$4,005,000.00
	5	84" Dia., 1 5/16" wall, L= 311 ft.	D8420	665,000	LBS	$4.50	$2,992,500.00
	6	144" Dia., 3/4" wall, L= 132 ft.	D8420	155,000	LBS	$2.70	$418,500.00
		Stainless Steel Stilling Basin for Sleeve Valves:					
		ASTM 316L Stainless steel plate					
	7	Two - 396" Dia., 1 1/4" wall cylindrical tanks with baseplates:	D8420	295,000	LBS	$16.50	$4,867,500.00
		Each tank height = 20 feet					
		Total weight for both tanks = 295,000 lbs.					
		Sleeve valves with hydraulic operators:					
	8	Two - 84" Dia. Inlet X 72" Dia. Outlet Valves	D8420	140,000	LBS	$16.50	$2,310,000.00
		ASTM 316L Stainless steel plate					
		Each valve weight = 70,000					
		Total weight for both valves = 140,000 lbs.					
		Spherical valves with hydraulic operators:					
	9	Sleeve valve guard valves	D8420	120,000	LBS	$11.00	$1,320,000.00
		Two - 60" Dia. Spherical valves with hydraulic operators					
		60,000 lbs. per valve					
		Turbine guard valve					
	10	One - 78" Dia. Spherical valve with hydraulic operator	D8420	115,000	LBS	$11.00	$1,265,000.00
		115,000 lbs. per valve					
		Sheet Subtotal					**$17,178,500.00**

QUANTITIES		PRICES	
BY: Nathan Nakamoto (8420)	CHECKED: Rick Frisz (8420)	BY: Lonnie Zlomke (8170)	CHECKED: 8/13/2008
DATE PREPARED: 5/6/04		DATE PREPARED: 8/13/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable Low Cost Estimate

Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock SunnysidePP_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	11	Furnishing and installing one 125-Ton overhead crane, 50' span	D8410	153,000	LBS	$6.70	$1,025,100.00
	12	Furnishing and installing Hydraulic elevator capacity = 3500 pounds, travel = 31 ft. landings = 3, speed = 100 ft/min.	D8410	1	unit	$440,000	$440,000.00
	13	Bulkhead gates and guides at power plant (steel) (assumes two gates)	D8410	25,000	LBS	$5.00	$125,000.00
	14	Two fixed hoists for bulkhead gates, 2-ton capacity (each hoist weighs 200 lbs)	D8410	400	LBS	$55.00	$22,000.00
	15	Bulkhead gate, liftin beam & guides at sleeve valve pipe discharge to canal (steel)	D8410	32,000	LBS	$4.50	$144,000.00
	16	CO2 High Pressure Fire Extinguishing System: 10 - 100# Storage Cylinders w/ control panel and appurtenances and 300 lbs. of sch. 80 carbon steel pipe, valves & fittings	D8410	1	L.S.	$33,000.00	$33,000.00
	17	Fire Suppression System: 3 Fire hose reels w/ 100 feet of hose 12 - Portable hand-held 20# extinguishers 2,000 lbs. of sch. 40 carbon steel pipe, valves & fittings 1 - Fire pump, split-case, 500 gpm @ 300 ft of head	D8410	1	L.S.	$55,000.00	$55,000.00
	18	Unit Cooling Water System: 2 - Cooling water pumps, end-suction type, 150 gpm 2 - 8-inch automatic, self-cleaning strainers 1,000 lbs. of type K copper tubing, valves & fittings 4,000 lbs. of ductile iron, mechanical joint pipe & fittings	D8410	1	L.S.	$143,000.00	$143,000.00
	19	Lubricating Oil System: 2- 500 gal carbon steel storage tanks 1 - 10 gpm @ 100 psi oil pump 1 - lube oil filter 1,000 lbs. of sch. 40 carbon steel pipe, valves & fittings	D8410	1	L.S.	$22,000.00	$22,000.00
		Sheet Subtotal					**$2,009,100.00**

QUANTITIES		PRICES	
BY Rick Christensen, B Sund C Berte, J Grass, Randy Egan (84'	**CHECKED** Alex Ritt (8410)	**BY** Lonnie Ziomke (8170)	**CHECKED** 8/13/2008
DATE PREPARED 5/3/04, 6/03/08	**PEER REVIEW**	**DATE PREPARED** 6/13/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable Low Cost Estimate

Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock SunnysidePP_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	20	Compressed Air System: 2 - 100 cfm @ 125 psi rotary screw air compressors 1 - 250 gal. carbon steel air receiver 1 - 100 cfm air dryer 500 lbs. of sch. 40 carbon steel pipe, valves & fittings	D8410	1	L.S.	$55,000.00	$55,000.00
	21	Service Water System: 1 - Service water pump, 75 gpm @ 200 ft. of head 1 - Hydropneumatic Tank, 300 gal. 750 lbs. of type K copper tubing, valves & fittings	D8410	1	L.S.	$110,000.00	$110,000.00
	22	Gravity Drainage System: 12 - Floor drains, cast iron 5,000 lbs. of cast iron hub & spigot, service weight soil pipe	D8410	1	L.S.	$55,000.00	$55,000.00
	23	Plant Unwatering System: 2 - Vertical turbine type sump pump, 500 gpm @ 50 ft hd 1 - Drainage jet type drainage pump 1,000 lbs. of type K copper tube, valves & fittings 3,000 lbs. of ductile iron, mechanical joint pipe & fittings	D8410	1	L.S.	$77,000.00	$77,000.00
	24	Domestic Water and Sanitary Waste System: 2 - Water Closets 1 - Urinal 2 - Lavatories & accessories 1 - Duplex Sewage Ejector 2,000 lbs. of cast iron hub & spigot service weight sewer pipe 400 lbs. of type K copper tubing, valves & fittings	D8410	1	L.S.	$55,000.00	$55,000.00
		Sheet Subtotal					**$352,000.00**

QUANTITIES		PRICES	
BY J Grass, Randy Egan (8410)	**CHECKED** Alex Ritt (8410)	**BY** Lonnie Zlomke (8170)	**CHECKED** 8/13/2008
DATE PREPARED 5/3/04, 6/03/08	**PEER REVIEW**	**DATE PREPARED** 8/13/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable Low Cost Estimate

Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock SunnysidePP_Most Probable Low_060608.xls]Summary		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Heating, Ventilating, and Air Conditioning	D8410	1	L.S.	$1,050,000.00	$1,050,000.00
		Unmanned air cooled BUILDING AND VAULTS OA temp 95 degrees F.					
		Mechanical Subtotal					**$25,552,248.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Paul Schlein/ Mike Weems (8410)	Alex Ritt (8410)	Lonnie Ziomke (8170)	8/13/2008
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
5/3/04, 6/03/08		8/13/08	

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable Low Cost Estimate

Plant - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-04

FILE: H:\D8170\ES1\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock SunnysidePP_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	1	**Electrical Generator (F&I)** 30,000 kVA, 6,900 volts, 3-phase, 60 Hz 400 rpm, 95 % power factor Vertical, synchronous machine Static excitation system & voltage regulator	D8430	1	EA	$11,500,000	$11,500,000.00
		Plant Grounding System (F&I)	D8430				
	2	Ground rods, 10 ft, 3/4" dia, copper-clad		30	EA	$240.00	$7,200.00
		Stranded bare-copper conductor:					
	3	250 MCM		1,200	LF	$12.00	$14,400.00
	4	4/0 AWG		800	LF	$11.50	$9,200.00
	5	2/0 AWG		500	LF	$7.70	$3,850.00
	6	4 AWG		800	LF	$3.10	$2,480.00
		Generator Bus & Metal-Enclosed Switchgear (F&I)	D8430				
	7	Generator isolated phase bus: 15 kV, 3000 amperes, 3-phase, 60 Hz		250	LF	$2,000.00	$500,000.00
	8	Generator power circuit breaker: 15 kV, 3000 amperes, 3-phase, vacuum type		1	EA	$750,000	$750,000.00
	9	Station-service fused interrupter switch: 15 kV, 600 ampere, 3-phase, w/ power fuses		1	EA	$31,000.00	$31,000.00
		Generator Control Equipment (F&I)	D8430				
	10	Duplex control switchboard for operation of the generator		1	EA	$330,000	$330,000.00
		Sheet Subtotal					**$13,148,130.00**

QUANTITIES		PRICES	
BY Mike Schuh (8430)	**CHECKED** Cory Maurer (8430)	**BY** Lonnie Zlomke (8170)	**CHECKED** 8/13/2008
DATE PREPARED 5/22/08	**PEER REVIEW** George Girgis (8430)	**DATE PREPARED** 8/13/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable Low Cost Estimate

Plant - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock SunnysidePP_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Plant Battery System (F&I)	D8430				
	11	125 volt, 300 ampere-hour, lead-acid battery		1	EA	$26,000.00	$26,000.00
	12	Battery chargers		2	EA	$8,400.00	$16,800.00
	13	DC distribution panelboard, 100 ampere mains, and molded-case circuit breakers		1	EA	$13,000.00	$13,000.00
		Plant Station-Service Equipment (F&I)	D8430				
		Indoor secondary unit substation with following features:					
	14	Dry-type transformer, 6.9 kV-480Y/277, 1000 kVA		1	EA	$57,000.00	$57,000.00
	15	480 volt power-circuit breakers, 600 amperes		5	EA	$4,200.00	$21,000.00
		Building Lighting System (F&I)	D8430				
		Interior luminaires					
	16	High bay, high-pressure sodium, 400 Watt 480 volt, 1-phase		20	EA	$730.00	$14,600.00
	17	Emergency lighting system		1	LS	$3,900.00	$3,900.00
		Exterior luminaires					
	18	High-pressure sodium, wall-mounted, outdoor type 70 watt, 120 volt		12	EA	$430.00	$5,160.00
	19	**Building Fire Detection & Alarm System (F&I)**	D8430	1	LS	$155,000.00	$155,000.00
		Distribution Panelboards (F&I)	D8430				
	20	480-volts, 3-phase, 400 ampere bus, indoor type with molded-case circuit breakers		2	EA	$11,000.00	$22,000.00
		Motor Control Center (F&I)	D8430				
	21	480 volts, 3-phase, 1200 ampere main bus Four 20 inch wide sections		1	EA	$114,000	$114,000.00
		Sheet Subtotal					**$448,460.00**

QUANTITIES		PRICES	
BY: Mike Schuh (8430)	CHECKED: Cory Maurer (8430)	BY: Lonnie Zlomke (8170)	CHECKED: 8/13/2008
DATE PREPARED: 5/22/08	PEER REVIEW: George Girgis (8430)	DATE PREPARED: 8/13/08	PEER REVIEW:

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable Low Cost Estimate

Plant - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock SunnysidePP_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Insulated Conductors (F&I)	8430				
		15 kV shielded power cable:					
	22	4 AWG		200	FT	$8.60	$1,720.00
		600-volt single-conductor, stranded-copper:					
	23	12 AWG		6,000	FT	$1.00	$6,000.00
	24	10 AWG		4,000	FT	$1.30	$5,200.00
	25	6 AWG		1,000	FT	$2.70	$2,700.00
	26	4 AWG		1,000	FT	$3.70	$3,700.00
	27	1/0 AWG		600	FT	$5.90	$3,540.00
	28	4/0 AWG		600	FT	$4.00	$2,400.00
		600-volt multi-conductor control cable:					
	29	9 conductor 14 AWG		1,500	FT	$2.70	$4,050.00
	30	12 conductor 14 AWG		2,000	FT	$3.40	$6,800.00
	31	5 conductor 10 AWG		2,000	FT	$3.10	$6,200.00
		Conduit System (F&I)	8430				
		Rigid steel conduit:					
	32	1 inch		800	FT	$20.00	$16,000.00
	33	1 1/2 inch		500	FT	$27.00	$13,500.00
	34	2 inch		500	FT	$34.00	$17,000.00
	35	2 1/2 inch		350	FT	$51.00	$17,850.00
		Plastic-coated rigid steel:					
	36	2 inch		750	FT	$51.00	$38,250.00
		Sheet Subtotal					**$144,910.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Mike Schuh (8430)	Cory Maurer (8430)	~~Lonnie Zlomke (8170)~~	8/13/2008
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
5/22/08	George Girgis (8430)	8/13/08	

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable Low Cost Estimate

Plant - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock SunnysidePP_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Bypass Structure Electrical System					
		Service Equipment (F&I)	D8430				
	37	Distribution panelboard, indoor type		1	EA	$23,000.00	$23,000.00
		480 volts, 3-phase, 225 ampere bus,					
		with molded-case circuit breakers					
		Transformer load center					
	40	15 kVA, 1-phase, 480-240/120		1	EA	$11,500.00	$11,500.00
		Combination Motor Starters (F&I)	D8430				
	41	NEMA size 2 non-reversing contactor,		6	EA	$7,300.00	$43,800.00
		480-120 volt control transformer					
		NEMA type 12 enclosure					
		Building Lighting System (F&I)	D8430				
		Interior luminaires					
	42	Fluorescent fixtures with two 4 foot lamps		8	EA	$240.00	$1,920.00
		Exterior luminaires					
	43	High-pressure sodium, wall-mounted, outdoor type		6	EA	$430.00	$2,580.00
		70 watt, 120 volt					
		Insulated Conductors (F&I)	D8430				
		600 volt, single-conductor, stranded copper					
	44	12 AWG		600	FT	$1.00	$600.00
	45	10 AWG		400	FT	$1.30	$520.00
	46	8 AWG		100	FT	$1.80	$180.00
		Conduit System (F&I)	D8430				
		Rigid steel conduit					
	47	1 inch		200	FT	$20.00	$4,000.00
		Electrical Subtotal					**$13,829,600.00**

QUANTITIES		PRICES	
BY Mike Schuh (8430)	**CHECKED** Cory Maurer (8430)	**BY** Lonnie Zlomke (8170)	**CHECKED** 8/13/2008
DATE PREPARED 5/22/08	**PEER REVIEW** George Girgis (8430)	**DATE PREPARED** 8/13/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable Low Cost Estimate

Plant - Incoming Power

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPL\[Black Rock SunnysidePP_Most Probable Low_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Switchyard					
		Furnish and Install:					
	1	Oil-filled, conservator-type power transformer 40 MVA; 69-6.9kV, 3-phase	D8430	1	EA	$850,000	$850,000.00
	2	69-kV disconnect switches, 1200 amp, 3-phase	D8430	2	EA	$37,000.00	$74,000.00
	3	69-kV circuit breakers, 1200 amp, 3-phase	D8430	1	EA	$210,000	$210,000.00
		Tap at existing 69-kV line					
		Furnish and Install:					
	4	69-kV disconnect switches, 1200 amp, 3-phase	D8430	2	EA	$37,000.00	$74,000.00
	5	69-kV circuit breakers, 1200 amp, 3-phase	D8430	1	EA	$210,000	$210,000.00
	6	**Construct Transmission LIne (By Others)** Assume 1 mile of transmission line from existing 69-kV line to the southwest wood poles, 795 AWG conductor	D8430	1	MILES	$155,000	$155,000.00
		Switchyard & Transmission Line Subtotal					**$1,573,000.00**

QUANTITIES		PRICES	
BY Lisa Gamuciello (8430)	**CHECKED** Cory Maurer (8430)	**BY** Connie Ziemke (8170)	**CHECKED** 8/13/2008
DATE PREPARED 5/14/2008	**PEER REVIEW** George Girgis (8430)	**DATE PREPARED** 8/13/08	**PEER REVIEW**

Black Rock Alternative

Most Probable (MP) Field Cost Estimate

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

SHEET 1 OF 22

FEATURE: Black Rock Preferred Alternative Inflow Conveyance System Most Probable Cost Estimate Summary Summary Sheet 1 of 1	**PROJECT:** Yakima River Basin Water Storage Study
	WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
	REGION: PN **PRICE LEVEL:** Apr-07
	FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MP\[Black Rock Inflow_Most Probable_060208 Rev.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Intake and Pumping Plant on Priest Rapids Reservoir					
		Design Flow capacity: 3,500 cfs					
		All Tunnel Option to Black Rock Reservoir					
		Intake - Civil/Structural Subtotal					$76,780,355.00
		Intake - Mechanical/Electrical Subtotal					$14,727,541.00
		Plant - Civil/Structural Subtotal					$102,143,580.00
		Plant - Mechanical Subtotal					$131,615,300.00
		Plant - Electrical Subtotal					$7,564,970.00
		Switchyard & Transmission Line Subtotal					$29,896,050.00
		Discharge (All Tunnel) - Subtotal					$348,257,760.00
		Subtotal					**$710,985,556.00**
		Mobilization		5%	(+/-)		$36,000,000.00
		Subtotal with mobilization					**$746,985,556.00**
		Escalation During Construction		0%	(+/-)		$0.00
		Subtotal with mobilization and escalation					**$746,985,556.00**
		Design Contingencies		10%	(+/-)		$73,014,444.00
		CONTRACT COST					**$820,000,000.00**
		Construction Contingencies		25%	(+/-)		$230,000,000.00
		FIELD COST					**$1,050,000,000.00**
		Non-Contract Costs **		25%	(+/-)		$250,000,000.00
		CONSTRUCTION COST					**$1,300,000,000.00**

Escalation to notice to proceed, allowance for procurement strategies, and utility relocations are not included.

** Land Acquisition Costs of $21,875 associated with these features are included in the Non-Contract Costs.

QUANTITIES		PRICES	
BY Design Team	CHECKED Design Team	BY J. Morris; G. Akins L. Zlomke	CHECKED
DATE PREPARED 6/2/08	PEER REVIEW	DATE PREPARED 8/12/08	PEER REVIEW

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:	PROJECT:	
Black Rock Preferred Alternative Inflow Conveyance System Most Probable Cost Estimate	Yakima River Basin Water Storage Study	
	WOID: YAKAP	ESTIMATE LEVEL: Appraisal
	REGION PN	PRICE LEVEL: Apr-07
	FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Inflow_Most Probable_060208.xls]Plant-Mechanical	
Intake - Civil/Structural		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		CIVIL					
		Construct/Remove Cellular Cofferdam around Reservoir Intake					
		Assume construct from shore without barge.					
		Assume circular cellular cofferdam.					
		Length= 380 feet, 32-ft dia. cells, 33 ft high					
		Top of cofferdam - El. 488, Bottom of cofferdam - El. 455					
		Assume top of rock 5-ft below reservoir bottom.					
		Assume do not need to dredge reservoir bottom for wall.					
	1	Furnish and install sheet pile walls	D8120	655	TONS	$3,300.00	$2,161,500.00
		Arbed AS 500-12, 30 psf					
	2	Backfill cells with free-draining granular material	D8120	11,700	CY	$38.00	$444,600.00
	3	Unwater behind cofferdam	D8120	9	MOS	$66,000.00	$594,000.00
		Assume sumps and surface pumps					
		Remove Cofferdam					
	4	Remove and stockpile granular material	D8120	11,700	CY	$31.00	$362,700.00
	5	Extract and salvage sheet pile cutoff wall	D8120	655	TONS	$500.00	$327,500.00
		Dewatering Intake and Pumping Plant					
	6	Wellpoints about Intake and PP structures	D8120	1	LS	$3,400,000.00	$3,400,000.00
		- Install and remove 130 wellpoints					
		- Operate well points approximately 9 months					
		- Assume well points are jetted in place..					
		- Install wellpoint using 1.5" steel riser pipe w/ self jetting wellpoint screen (2" dia typ)					
		- Wellpoints are placed at 20 ft centers 20 ft deep					
		Sheet Subtotal					**$7,290,300.00**

QUANTITIES		PRICES	
BY Brad VanOtterloo -8120	CHECKED Dick LaFond (8120)	BY Jeff Morris (8170) 7/31/08	CHECKED
DATE PREPARED 6/2/08	PEER REVIEW	DATE PREPARED	PEER REVIEW 7/31/08

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Cost Estimate

Intake - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Inflow_Most Probable_060208.xls]Plant-Mechanical

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Unwatering Intake and Pumping Plant					
	7	Unwatering at base of rock excavation	D8120	1	LS	$590,000.00	$590,000.00
		- Furnish and operate sump pumps					
		- Operate 10 sump pumps for 9 months					
		- Each pump should have a 100 ft lift and have a flow of about 5 gpm					
		Sheet Subtotal					**$590,000.00**

QUANTITIES

BY	CHECKED
Brad VanOtterloo -8120	Dick LaFond (8120)
DATE PREPARED	**PEER REVIEW**
6/2/08	

PRICES

BY	CHECKED
Jeff Morris (8170) 7/31/08	
DATE PREPARED	**PEER REVIEW**
	7/31/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Cost Estimate

Intake - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Inflow_Most Probable_060208.xls]Plant-Mechanical

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Structural Excavation and Backfill					
		Assume dam excavation is all common.					
		Assume top 5 feet of excavation is common and the remainder is rock					
		Assume stockpile some common material and use for backfill or embankment.					
		Waste material deposition covered under Pumping Plant excavation.					
	8	Excavation of common materials for structures	D8140	388,500	CY	$7.80	$3,030,300.00
	9	Excavation of rock for structures (drill & shoot)	D8140	671,700	CY	$21.00	$14,105,700.00
	10	Furnish & place backfill for structures (assume local borrow)	D8140	35,800	CY	$5.00	$179,000.00
	11	Place backfill around structures	D8140	35,800	CY	$0.00	$0.00
	12	Compact backfill around structures	D8140	35,800	CY	$9.30	$332,940.00
		Roads and Fencing					
	13	Gravel surfacing		2,270	TONS	$57.00	$129,390.00
		20 ft wide road right side of channel					
		12 ft wide road left side of channel					
	14	Safety fencing		4,750	LF	$38.00	$180,500.00
		8' chainlink fence					
		STRUCTURAL					
		Construct Gated Intake and Fishscreen Structure					
	15	Furnish, form, and place reinforced concrete (f'c=4ksi)	D8140	40,150	CY	$570.00	$22,885,500.00
	16	Furnish and place concrete reinforcement.	D8140	6,424,000	LBS	$1.60	$10,278,400.00
	17	Furnish and handle cement	D8140	11,325	TONS	$155.00	$1,755,375.00
		Construct Lined Intake Canal					
	18	Furnish, form, and place unreinforced concrete	D8140	2,350	CY	$490.00	$1,151,500.00
		lining in excavated channel (f'c= 3 ksi)					
	19	Furnish and handle cement	D8140	665	TONS	$170.00	$113,050.00
		Construct Bypass Pipe					
	20	3 - 54" Dia. steel pipe for fish bypass.		15,840	LF	$360.00	$5,702,400.00
		Mortar line pipe					
	21	Bypass pipe common excavation		270,000	CY	$4.00	$1,080,000.00
	22	Bypass pipe rock excavation		130,000	CY	$25.00	$3,250,000.00
	23	Bypass pipe backfill		380,000	CY	$7.70	$2,926,000.00
	24	Bypass pipe soil cement bedding (100 psi)		12,000	CY	$150.00	$1,800,000.00
		Miscellaneous Metalwork					
		Listed under Intake - Mechanical Items					
		Intake - Civil/Structural Subtotal					**$76,780,355.00**

QUANTITIES		PRICES	
BY Chou Cha	CHECKED David Gesundheit/Anne Pavol (8140)	BY Jeff Morris (8170) 7/31/08	CHECKED
DATE PREPARED 4/19/04	PEER REVIEW	DATE PREPARED	PEER REVIEW 7/31/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Cost Estimate

Intake - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP | **ESTIMATE LEVEL:** Appraisal
REGION PN | **PRICE LEVEL:** Apr-07
FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Inflow_Most Probable_060208.xls]Plant-Mechanical

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
	1	Furnish and install steel stoplog guides and seats (upstream of radial gates)	D8410	13,500	LBS	$11.00	$148,500.00
	2	Furnish and install steel trashracks	D8410	102,000	LBS	$8.10	$826,200.00
	3	Furnish and install one trash rake, rails, supports (assume Atlas Polar DT8300 rake)	D8410	21,000	LBS	$10.50	$220,500.00
	4	Furnish and install one conveyor, steel	D8410	13,000	LBS	$10.50	$136,500.00
	5	Furnish and install steel fish screen guides, supports, embedded seats, and bypass walls	D8410	360,000	LBS	$8.10	$2,916,000.00
	6	Furnish and install fish screens, 10' W x14' H panel 70 panels + 6 spares	D8410				
		Structural steel		106,400	LBS	$8.10	$861,840.00
		Stainless steel		106,400	LBS	$25.00	$2,660,000.00
	7	Furnish and install barrier panels above fish screens 10' W x 11' H panels, 70 panels + 6 spares	D8410				
		Structural steel		209,000	LBS	$5.00	$1,045,000.00
	8	Furnish and install adjustable baffle panels 10' W x 25' H panels, 70 panels + 6 spares	D8410				
		Structural steel		570,000	LBS	$5.00	$2,850,000.00
	9	Furnish and install fish screen cleaners with travel rail, 5 systems with 2 brush cleaner arms per system	D8410				
		a. Structural steel		40,000	LBS	$6.10	$244,000.00
		b. Stainless steel		2,500	LBS	$25.00	$62,500.00
		c. 2 Hp motors/gear reducers, with adj. speed controllers, and limit switches		5	UNITS	$10,000.00	$50,000.00
	10	Furnish and install water level measuring systems	D8410	12	UNITS	$15,000.00	$180,000.00
		Sheet Subtotal					**$12,201,040.00**

QUANTITIES		PRICES	
BY Rick Christensen/B Sund (8410)	CHECKED Alex Ritt (8410)	BY Lonnie Zlomke (8170)	CHECKED
DATE PREPARED 4/21/2004, 6/2/2008	PEER REVIEW	DATE PREPARED	PEER REVIEW 7/31/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Cost Estimate

Intake - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Inflow_Most Probable_060208.xls]Plant-Mechanical

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont)					
	11	Furnish and install steel stoplog guides and seats (downstream of fish screens)	D8410	13,500	LBS	$11.00	$148,500.00
	12	Furnish and install one set of steel stoplogs for the two different size bays with lifting beam	D8410	101,000	LBS	$4.20	$424,200.00
	13	3' wide walkway, steel, safety grating along fish screens	D8410	19,500	LBS	$9.30	$181,350.00
	14	Handrail along each side of fish screen walkway	D8410	1,520	LF	$61.00	$92,720.00
		Radial Gates in Intake Structure					
		Furnish and install two 36.5-ft x 8.5-ft top seal radial gates and hoist equipment:	D8420				
	15	Gate (Weight/gate= 34,650 lbs)		69,120	LBS	$9.10	$628,992.00
	16	Embedded metalwork (Weight/bay= 5,000 lbs)		10,000	LBS	$7.50	$75,000.00
	17	Hoist operator (Weight/gate operator= 11,300 lbs)		22,600	LBS	$24.00	$542,400.00
	18	Motor - 5 hp (One per gate)		2	EA	$880.00	$1,760.00
		Furnish and install one 15.0-ft x 8.5-ft top seal radial gate and hoist equipment:	D8420				
	19	Gate (Weight/gate= 20,790 lbs)		20,790	LBS	$9.10	$189,189.00
	20	Embedded metalwork (Weight/bay= 3,000 lbs)		3,000	LBS	$7.50	$22,500.00
	21	Hoist operator (Weight/gate operator= 6,150 lbs)		6,150	LBS	$24.00	$147,600.00
	22	Motor - 3 hp		1	EA	$860.00	$860.00
		Sheet Subtotal					**$2,455,071.00**

QUANTITIES		PRICES	
BY Rick Christensen/B Sund (8410) Peter Hoffman (8420)	CHECKED Alex Ritt (8410)	BY Lonnie Ziomke (8170)	CHECKED
DATE PREPARED 4/21/2004, 6/2/2008	PEER REVIEW	DATE PREPARED	PEER REVIEW 7/31/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Cost Estimate

Intake - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Inflow_Most Probable_060208.xls]Plant-Mechanical		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		ELECTRICAL					
		Service Equipment (F&I)	D8430				
	23	Distribution panelboard, outdoor type 480 volts, 3-phase with 225 ampere bus		1	EA	$12,000.00	$12,000.00
	24	Outdoor transformer load center 15 kVA, 1-phase, 480-240/120 volt		1	EA	$8,600.00	$8,600.00
		Combination Motor Starters	D8430				
	25	NEMA size 2 non-reversing contactor, 480-120 volt control transformer NEMA type 4 enclosure		6	EA	$4,600.00	$27,600.00
		Insulated Conductors (F&I)					
		600-volt, single-conductor, stranded copper					
	26	12 AWG		500	LF	$1.10	$550.00
	27	10 AWG		200	LF	$1.50	$300.00
	28	8 AWG		100	LF	$1.80	$180.00
		Conduit System (F&I)					
		Rigid steel conduit					
	29	1 inch		150	LF	$20.00	$3,000.00
		Lighting System (F&I)	D8430				
	30	High-pressure sodium, pole mounted, outdoor 70 watt, 120 volt		6	EA	$3,200.00	$19,200.00
		Intake - Mechanical/Electrical Subtotal					**$14,727,541.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Mike Schuh (8430)	Cory Maurer (8430)	~~Lonnie Zlomke (8170)~~	
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
5/22/08	George Girgis (8430)		7/31/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Cost Estimate

Plant - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Inflow_Most Probable_060208.xls]Plant-Mechanical

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Access Road (9.75 miles of 2-lane access road):					
		Assume construct access road from SH24 to PP.					
		Assume place road along abandoned railroad alignment					
		Assume no major excavation or embankment sections.					
	1	Clear roadway alignment	D8140	45	AC	$4,700.00	$211,500.00
	2	Furnish and place base course material (9-inch depth)	D8140	96,000	TONS	$40.00	$3,840,000.00
	3	Furnish and place asphalt concrete (6-inch depth)	D8140	70,000	TONS	$92.00	$6,440,000.00
	4	Furnish and install W-beam type guardrail	D8140	10,000	LF	$95.00	$950,000.00
	5	Furnish and install miscellaneous pipe culverts	D8140	1,000	LF	$180.00	$180,000.00
		Assume 36-inch-diameter, wt/ft= 35#/ft)					
		Service Yard (6" asphalt concrete surface)					
	6	Strip and clear pumping plant site to 1 foot depth	D8120	15,300	CY	$5.90	$90,270.00
	7	Common excavation to Service Yard El. 505.0	D8120	164,000	CY	$4.60	$754,400.00
	8	Rock excavation to Service Yard El. 505.0	D8120	208,000	CY	$24.00	$4,992,000.00
	9	Place and compact embankment for service yard	D8120	19,200	CY	$9.20	$176,640.00
	10	Furnish and place base course material (6-inch)	D8120	10,000	TONS	$41.00	$410,000.00
	11	Furnish and place asphalt concrete (6-inch)	D8120	11,000	TONS	$99.00	$1,089,000.00
	12	Furnish and install 7-foot chain link fence for PP Yard	D8120	3,100	LF	$30.00	$93,000.00
	13	Furnish and install 7-foot x 24-foot access gate	D8120	3	EA	$4,700.00	$14,100.00
		Unwatering/Dewatering During Construction:					
		Included in Intake Unwatering/Dewatering System.					
		Structural Excavation and Backfill					
		Assume all common material excavated under site excavation for yard.					
	14	Excavation of rock for structures (drill & shoot)	D8120	200,000	CY	$29.00	$5,800,000.00
	15	Furnish backfill for structures (assume local borrow)	D8120	40,000	CY	$5.80	$232,000.00
	16	Place backfill around structures	D8120	40,000	CY	$0.00	$0.00
	17	Compact backfill around structures	D8120	40,000	CY	$8.80	$352,000.00
	18	Rock Exc. for manifold pipe to edge of Service Yard	D8120	78,000	CY	$21.00	$1,638,000.00
	19	Furnish, place, & compact backfill for manifold pipe trench(a	D8120	63,480	CY	$10.00	$634,800.00
	20	Furnish & place soil cement for manifold pipe trench	D8120	8,160	CY	$132.00	$1,077,120.00
							$0.00
		Sheet Subtotal					**$28,974,830.00**

QUANTITIES		PRICES	
BY Dick LaFond (8120) Mike O'Shea (8120)	**CHECKED** Mike O'Shea, Dick LaFond (8120)	**BY** Greg Akins (8170)	**CHECKED**
DATE PREPARED 4/19/2004	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW** 07-31-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Cost Estimate

Plant - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Waste Excess Excavated Material at Priest Rapids					
		Assume waste material within 2 miles of excavation.					
		Quantities include intake, plant, and 1/2 tunnel.					
		Waste rock excavation	D8120	1,523,000	CY	Included in Item 8 of Intake (C/S) and Item 7 of Plant (C/S)	
		Waste common material	D8120	296,000	CY	Included in Item 9 of Intake (C/S) and Items 8,14,18 of Plant (C/S)	
		STRUCTURAL					
		Construct Building Structure					
	21	Furnish, form, and place reinforced concrete	D8120	91,300	CY	$530.00	$48,389,000.00
	22	Furnish and place concrete reinforcement.	D8120	10,956,000	LBS	$1.50	$16,434,000.00
		Assume 120 #/CY					
	23	Furnish and handle cement (.282T/CY)	D8120	25,750	TONS	$145.00	$3,733,750.00
		Furnish & install precast, prestressed double tees for roof					
	24	10LDT 32+2 = 10' wide & 32" deep - 80' Span	D8120	36	EA.	$60,000.00	$2,160,000.00
		Structural Steel					
	25	Furnish and install structural steel (painted):	D8120	60,000	LBS	$4.20	$252,000.00
		crane rails, baseplates					
		Miscellaneous Metalwork					
	26	Furnish and install miscellaneous metalwork	D8120	250,000	LBS	$8.80	$2,200,000.00
		Includes gratings, hatches, ladders, guardrails,					
		catwalk, and cable trays and supports					
		Plant - Civil/Structural Subtotal					**$102,143,580.00**

QUANTITIES		**PRICES**	
BY Mike O'Shea (8120	**CHECKED** Dick LaFond (8120)	**BY** Greg Arins (8170)	**CHECKED**
DATE PREPARED 4/19/2004 , 6/2/2008	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW** 07-31-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Cost Estimate

Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Inflow_Most Probable_060208.xls]Plant-Mechanical

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Major Mechanical Equipment					
		Prices below telephone quote from Bob Rittase, Voith Hydro, 717-792-7206					
		500 cfs two-stage spiral case pump, rated 500cfs at 1430 ft total dynamic head, overall efficiency more than 83% operating range from 1030 to 1430 feet					
	1	Pumps		3	EA	$6,200,000.00	$18,600,000.00
	2	Motors		3	EA	$3,100,000.00	$9,300,000.00
	3	Spherical discharge valves, with operators, rated at 1500 ft working pressure and 2000 ft surge pressure, with operators		3	EA	$3,700,000.00	$11,100,000.00
	4	Installation supervision of 500 cfs pumping unit		3	EA	$1,250,000.00	$3,750,000.00
		1000 cfs two-stage spiral case pump, rated 1000 cfs at 1430 ft total dynamic head, overall efficiency more than 83% operating range 1030 to 1430 ft					
	5	Pumps		2	EA	$11,000,000.00	$22,000,000.00
	6	Motors		2	EA	$5,500,000.00	$11,000,000.00
	7	Spherical discharge valves, with operators, rated at 1500 ft working pressure and 2000 ft surge pressure, with operators		2	EA	$5,500,000.00	$11,000,000.00
	8	Installation supervision of 1000 cfs pumping unit		2	EA	$1,850,000.00	$3,700,000.00
		Sheet Subtotal					**$90,450,000.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Richard Fehr (8420	Robert Zelenka (8420)	Lonnie Zlomke (8170)	
DATE PREPARED		**DATE PREPARED**	**PEER REVIEW**
4/16/2004,6/2/2008			07-31-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Cost Estimate

Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		FURNISH-AND-INSTALL THE FOLLOWING:					
		Steel Manifold and Suction Tubes Steel plate used for pipe fabrication: ASTM A572 Gr. 50: Sy = 50 kpsi St = 65 kpsi (All pipe sizes are inside diameters)	D8420				
	9	192" Inside Dia., 3 5/8" wall, L= 340 ft.	D-8420	2,600,000	LBS	$5.70	$14,820,000.00
	10	192" Dia., 3 3/4" wall, L= 152 ft.		1,200,000	LBS	$5.20	$6,240,000.00
	11	175" Dia., 3 3/8" wall, L= 58 ft.		375,000	LBS	$5.20	$1,950,000.00
	12	170" Dia., 1" wall, L= 134 ft.		260,000	LBS	$3.00	$780,000.00
	13	135" Dia., 2 5/8" wall, L= 54 ft.		210,000	LBS	$5.30	$1,113,000.00
	14	120" Dia., 1/8" wall, L= 122 ft.		150,000	LBS	$2.90	$435,000.00
	15	110" Dia., 2 1/8" wall, L= 261 ft.		670,000	LBS	$5.30	$3,551,000.00
	16	78" Dia., 1 1/2" wall, L= 260 ft.		340,000	LBS	$3.00	$1,020,000.00
		Sheet Subtotal					**$29,909,000.00**

QUANTITIES		PRICES	
BY Nathan Nakamoto (8420)	**CHECKED** Rick Frisz (8420)	**BY** Lonnie Ziomke (8470)	**CHECKED**
DATE PREPARED 4/16/04		**DATE PREPARED**	**PEER REVIEW** 07-21-08

ESTIMATE WORKSHEET

FEATURE: Black Rock Preferred Alternative Inflow Conveyance System Most Probable Cost Estimate Plant - Mechanical	**PROJECT:** Yakima River Basin Water Storage Study **WOID:** YAKAP **ESTIMATE LEVEL:** Appraisal **REGION** PN **PRICE LEVEL:** Apr-07 **FILE:** H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Inflow_Most Probable_060208.xls]Plant-Mechanical

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont)					
	17	CO2 High Pressure Fire Extinguishing System: 16 - 100# Storage Cylinders w/ control panel and appurtenances and 2,000 lbs. of sch. 80 carbon steel pipe, valves & fittings	D8410	2	each	$125,000.00	$250,000.00
	18	Fire Suppression System: 10 Fire hose reels w/ 100 feet of hose 20 - Portable hand-held 20# extinguishers 12,000 lbs. of sch. 40 carbon steel pipe, valves & fittings 1 - Fire pump, split-case, 500 gpm @ 300 ft of head	D8410	1	L.S.	$210,000.00	$210,000.00
	19	Unit Cooling Water System: 6 - Cooling water pumps, end-suction type, 150 gpm 2 - 8-inch automatic, self-cleaning strainers 4,000 lbs. of type K copper tubing, valves & fittings 5,000 lbs. of ductile iron, mechanical joint pipe & fittings	D8410	1	L.S.	$320,000.00	$320,000.00
	20	Lubricating Oil System: 2- 500 gal carbon steel storage tanks 1 - 10 gpm @ 100 psi oil pump 1 - lube oil filter 3,000 lbs. of sch. 40 carbon steel pipe, valves & fittings	D8410	1	L.S.	$62,000.00	$62,000.00
	21	Compressed Air System: 2 - 100 cfm @ 125 psi rotary screw air compressors 1 - 250 gal. carbon steel air receiver 1 - 200 cfm air dryer 3,000 lbs. of sch. 40 carbon steel pipe, valves & fittings	D8410	1	L.S.	$120,000.00	$120,000.00
	22	Service Water System: 1 - Service water pump, 75 gpm @ 200 ft. of head 1 - Hydropneumatic Tank, 300 gal. 1,500 lbs. of type K copper tubing, valves & fittings	D8410	1	L.S.	$120,000.00	$120,000.00
	23	Gravity Drainage System: 50 - Floor drains, cast iron 25,000 lbs. of cast iron hub & spigot, service weight soil pipe	D8410	1	L.S.	$370,000.00	$370,000.00
		Sheet Subtotal					**$1,452,000.00**

QUANTITIES		PRICES	
BY John Grass, Randy Egan (8410)	**CHECKED** A. Ritt (8410)	**BY** Lonnie Ziomke (8170)	**CHECKED**
DATE PREPARED 4/16/2004, 6/2/2008	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW** 07-31-08

ESTIMATE WORKSHEET

FEATURE: Black Rock Preferred Alternative Inflow Conveyance System Most Probable Cost Estimate Plant - Mechanical	**PROJECT:** Yakima River Basin Water Storage Study **WOID:** YAKAP **ESTIMATE LEVEL:** Appraisal **REGION** PN **PRICE LEVEL:** Apr-07 **FILE:** H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Inflow_Most Probable_060208.xls]Plant-Mechanical

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont)					
	24	Plant Unwatering System: 2 - Vertical turbine type sump pump, 1000 gpm @ 50 ft hd 1 - Drainage jet type drainage pump 1,500 lbs. of type K copper tube, valves & fittings 4,000 lbs. of ductile iron, mechanical joint pipe & fittings	D8410	1	L.S.	$210,000.00	$210,000.00
	25	Domestic Water and Sanitary Waste System: 4 - Water Closets 2 - Urinal 4 - Lavatories & accessories 1 - Duplex Sewage Ejector 2,000 lbs. of cast iron hub & spigot service weight sewer pipe 800 lbs. of type K copper tubing, valves & fittings	D8410	1	L.S.	$125,000.00	$125,000.00
	26	100-Ton overhead crane, 72'-6" span	D8410	153,000	LBS	$7.50	$1,147,500.00
	27	200-Ton overhead crane, 72'-6" span, two required	D8410	520,000	LBS	$7.50	$3,900,000.00
	28	Electric traction elevator overhead, geared, capacity = 3500 pounds, travel = 100 feet, landings = 6, speed = 200 ft/min.	D8410	1	unit	$620,000.00	$620,000.00
	29	Ultrasonic flowmeter, 4-path	D8410	1	meter	$43,000.00	$43,000.00
	30	Trashracks (steel) at pumping plant	D8410	77,000	LBS	$6.90	$531,300.00
	31	Stoplogs, lifting beams and guides (steel) (assumes one set of stoplogs for each size bay)	D8410	45,000	LBS	$9.50	$427,500.00
		Sheet Subtotal					**$7,004,300.00**

QUANTITIES		PRICES	
BY Rick Christensen, B. Sund, Randy Egan Alex Ritt, C. Berte, P. Schlien, J. Grass	**CHECKED** A. Ritt (8410)	**BY** Lonnie Ziomke (8170)	**CHECKED**
DATE PREPARED 4/16/04; 6/2/08	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW** 07-31-08

ESTIMATE WORKSHEET

FEATURE: Black Rock Preferred Alternative Inflow Conveyance System Most Probable Cost Estimate Plant - Mechanical	**PROJECT:** Yakima River Basin Water Storage Study
WOID: YAKAP	**ESTIMATE LEVEL:** Appraisal
REGION PN	**PRICE LEVEL:** Apr-07
FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Inflow_Most Probable_060208.xls]Plant-Mechanical	

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont)					
		Heating, Ventilating, and Air Conditioning HVAC for bulding except bus & switchgear 372-ft long by 77'-ft wide by 70-ft high unit/service bay 54-ft long by 77-ft wide by 20-ft high control bay Two each 54-ft long by 77-ft wide by 17-ft equipment rooms 308-ft long by 56'-ft wide by 20-ft high Electrical Gallery Pump/Motor/Valve Galleries= 756,000 ft^3	D8410	1	L.S.	$2,800,000.00	$2,800,000.00
		Plant - Mechanical Subtotal					**$131,615,300.00**

QUANTITIES		PRICES	
BY Paul Schlein, Mike Weems (8410)	**CHECKED** Alex Ritt (8410)	**BY** Lonnie Zionke (8170)	**CHECKED**
DATE PREPARED 4/16/2004, 6/2/2008	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW** 07-31-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Cost Estimate

Plant - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Inflow_Most Probable_060208.xls]Plant-Mechanical

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Plant Grounding System (F&I)	D8430				
	1	Ground rods, 10 ft, 3/4" dia., copper-clad		50	EA	$240.00	$12,000.00
		Stranded bare-copper conductor					
	2	250 MCM		1,500	LF	$12.00	$18,000.00
	3	4/0 AWG		1,000	LF	$12.00	$12,000.00
	4	2/0 AWG		1,000	LF	$7.90	$7,900.00
	5	4 AWG		700	LF	$3.20	$2,240.00
		Motor Bus & Switchgear (F&I)	D8430				
	6	Main motor isolated-phase bus:		400	LF	$3,800.00	$1,520,000.00
		15 kV; 24,000 amperes; 3-phase; 60 hz.					
		Self-cooled					
	7	Individual motor isolated-phase bus:					
		15 kV; 3,500 amperes; 3-phase; 60 hz.		150	LF	$1,700.00	$255,000.00
		Self-cooled					
	8	15 kV; 7,000 amperes; 3-phase; 60 hz.		100	LF	$1,550.00	$155,000.00
		Self-cooled					
		Motor reduced-voltage, static starting system with 15 kV, SF6 type unit circuit-breakers					
	9	3,500 amperes continous current		3	EA	$320,000.00	$960,000.00
	10	7,000 amperes continuous current		2	EA	$360,000.00	$720,000.00
		Synchronous motor static excitation system					
	10A	65,000 HP motor		3	EA	$430,000.00	$1,290,000.00
	10B	125,000 HP motor		2	EA	$430,000.00	$860,000.00
		Motor Control Equipment (F&I)	D8430				
	11	Duplex control switchboard for operation of 5 main pumping motors.		1	EA	$220,000.00	$220,000.00
		Motors					
		Listed under Plant-Mechanical					
		Sheet Subtotal					**$6,032,140.00**

QUANTITIES		PRICES	
BY	CHECKED	BY	CHECKED
Mike Schuh (8430)	Cory Maurer (8430)	Lonnie Zlomke (8170)	
DATE PREPARED	PEER REVIEW	DATE PREPARED	PEER REVIEW
5/22/08	George Girgis (8430)		07-31-08

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Cost Estimate

Plant - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Inflow_Most Probable_060208.xls]Plant-Mechanical

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		15 kV Metal-Clad Switchgear (F&I)	D8430				
	12	15 kV metal-clad switchgear rated 1200 amperes with two 1200 ampere vacuum type power circuit breakers		1	EA	$400,000	$400,000.00
		15 kV Non-Segregated-Phasae Bus (F&I)	D8430				
	13	15 kV, 1200 amperes		200	LF	$900.00	$180,000.00
		Plant Station-Service Equipment (F&I)	D8430				
		Indoor double-ended secondary unit substation with following features:					
	14	Dry-type transformer 13.8 kV-480Y277 V, 2,500 KVA		2	EA	$100,000.00	$200,000.00
	15	480 V power-circuit breakers, 600 amperes		10	EA	$5,100.00	$51,000.00
		Building Lighting System (F&I)	D8430				
		Interior luminaires					
	16	High bay, high-pressure sodium, 400 W, 480 V		30	EA	$790.00	$23,700.00
	17	Emergency lighting system		1	LS	$13,500.00	$13,500.00
	18	Exterior luminaires High-pressure sodium, wall mounted, outdoor 70 watt, 120 volt		10	EA	$450.00	$4,500.00
		Sheet Subtotal					**$872,700.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Mike Schuh (8430)	Cory Maurer (8430)	Lonnie Ziemke (8170)	
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
5/22/08	George Girgis (8430)		07-31-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Cost Estimate

Plant - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Inflow_Most Probable_060208.xls]Plant-Mechanical		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	19	**Building Fire Detection and Alarm System (F&I)**	D8430	1	LS	$170,000.00	$170,000.00
	20	**Distribution Panelboards (F&I)** 480 volts, 3-phase with 400 ampere bus	D8430	3	EA	$11,500.00	$34,500.00
	21	**Motor Control Centers (F&I)** 480 volts, 3-phase with1200 ampere bus Five 20 inch wide sections	D8430	2	EA	$135,000	$270,000.00
		Insulated Conductors (F&I) 600-volt, single-conductor, stranded copper	D8430				
	22	14 AWG		12,000	LF	$0.99	$11,880.00
	23	12 AWG		15,000	LF	$1.00	$15,000.00
	24	10 AWG		15,000	LF	$1.30	$19,500.00
	25	6 AWG		3,000	LF	$2.80	$8,400.00
	26	4 AWG		3,000	LF	$3.80	$11,400.00
	27	1/0 AWG		2,000	LF	$6.00	$12,000.00
		600-volt multi-conductor control cable					
	28	9 conductor 16 AWG		2,000	LF	$3.10	$6,200.00
	29	12 conductor 16 AWG		3,000	LF	$3.30	$9,900.00
	30	5 conductor 10 AWG		3,000	LF	$3.80	$11,400.00
		Conduit System (F&I) Rigid steel conduit	D8430				
	31	1 inch		800	LF	$21.00	$16,800.00
	32	2 inch		500	LF	$35.00	$17,500.00
	33	2 1/2 inch		250	LF	$53.00	$13,250.00
	34	3 inch		250	LF	$66.00	$16,500.00
		Plastic-coated rigid steel					
	35	2 inch		300	LF	$53.00	$15,900.00
		Plant - Electrical Subtotal					**$7,564,970.00**

QUANTITIES		PRICES	
BY Mike Schuh (8430)	**CHECKED** Cory Maurer (8430)	**BY** Lonnie Zlomke	**CHECKED**
DATE PREPARED 5/22/08	**PEER REVIEW** George Girgis 98430)	**DATE PREPARED**	**PEER REVIEW** 07-31-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Cost Estimate

Switchyard - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Inflow_Most Probable_060208.xls]Plant-Mechanical

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		CIVIL/STRUCTURAL	D8120				
		Switchyard					
	1	Excavation (Common)		1,200	CY	$19.50	$23,400.00
	2	Structural Concrete (Switchyard foundations and pullboxes)		150	CY	$1,400.00	$210,000.00
	3	Concrete Reinforcement (130lbs/CY)		19,500	LBS	$1.95	$38,025.00
	4	Compacting Backfill about Structures		1,000	CY	$14.00	$14,000.00
	5	Switchyard Steel Structures		80,000	LBS	$5.40	$432,000.00
	6	Gravel Surfacing - 6-inch thick		4,000	SY	$12.50	$50,000.00
	7	Oil-Spill Containment System Geotextile fabric 4,500 SF (12 oz per sq yard, 110 mils non-woven) Geomembrane liner: 2,500 SF (30 Mils XR-5 Seaman Corporation) Geocel: 1,700 SF (8" deep "enviro grid" polymeric cellular confinement system) Piping: 150 LF (6" Dia. Schedule 80 PVC pipe perforated) Preservative-Treated Lumber: 100 LF (2"x4") Excavation: Included in excavation for structures Uncompacted crushed aggregate: 150 CY (ASTM C33 Size No 4, 1 1/2" to 3/4")		1	LS	$38,000.00	$38,000.00
	8	Gravelfill for Switchyard Foundations (Compacted)		75	CY	$55.00	$4,125.00
	9	5-Inch PVC Schedule 80 Conduit (CIP Power Duct Bank) Includes: 115 LF of 1.5' tall x 2.33' wide concrete CIP 15 CY of concrete 1970 lbs of reinforcement		150	LF	$270.00	$40,500.00
	10	7-foot Chain link fence		1,000	LF	$36.00	$36,000.00
		Sheet Subtotal					**$886,050.00**

QUANTITIES		PRICES	
BY Dick LaFond (8120)	CHECKED	BY Greg Akins (8170) Lonnie Zlomke (8170)	CHECKED
DATE PREPARED 6/2/2008	PEER REVIEW	DATE PREPARED	PEER REVIEW 07-31-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Cost Estimate

Switchyard - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Inflow_Most Probable_060208.xls]Plant-Mechanical

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		ELECTRICAL					
		Switchyard					
		Furnish and Install:					
	11	Oil-filled, conservator-type power transformer 600 MVA; 500-13.8kV, 1-phase	D8430	3	EA	6,900,000	$20,700,000.00
	12	500-kV disconnect switches, 1200 amp, 3-phase	D8430	2	EA	230,000	$460,000.00
	13	500-kV circuit breakers, 1200 amp, 3-phase	D8430	1	EA	1,250,000	$1,250,000.00
	14	**Construct Transmission Line (by others)** Assume 6 miles of transmission line from Midway substation to the east 500-kV, steel towers, 2167 AWG conductor	D8430	6	MILES	1,100,000	$6,600,000.00
		Switchyard Subtotal					**$29,896,050.00**

QUANTITIES		PRICES	
BY	CHECKED	BY	CHECKED
L. Gamuciello (8430)	Cory Maurer (8430)	Lonnie Ziomke (8170)	
DATE PREPARED	PEER REVIEW	DATE PREPARED	PEER REVIEW
5/14/2008	George Girgis (8430)		07-31-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Cost Estimate
All Tunnel Alternative (Discharge 1)

Tunnel /Alternative (Discharge 1) - Civil/Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Inflow_Most Probable_060208.xls]Plant-Mechanical		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Tunnel					
		Construct 34,850-ft long, 17.00-ft finished diameter, 20.67-ft minimum bore diameter, tunnel in rock. Tunnel will be excavated with TBM and driven uphill. Water problems will be minimal. Tunnel has three final support reaches.					
		31,350-ft long unreinforced concrete lined reach					
	1	Excavation (appr 12.4 cy/lf)	68140	31,350	lf	$2,150.00	$67,402,500.00
	2	Furnish and place unreinforced concrete tunnel lining	68140	126,000	cy	$475.00	$59,850,000.00
	3	Cementitious materials for concrete tunnel lining	68140	35,500	tons	$140.00	$4,970,000.00
	4	Furnish & install 7/8-in dia, 10-ft long rock bolts	68140	602,000	lin ft	$78.00	$46,956,000.00
		1,000-ft long reinforced concrete lined reach					
	5	Excavation (appr 12.4 cy/lf)	68140	1,000	lf	$2,150.00	$2,150,000.00
	6	Furnish and place reinforced concrete tunnel lining	68140	4,020	cy	$550.00	$2,211,000.00
	7	Cementitious materials for concrete tunnel lining	68140	1,130	tons	$155.00	$175,150.00
	8	Furnish and install concrete reinforcement	68140	20,200	lbs	$1.85	$37,370.00
	9	Furnish and install structural steel tunnel supports	68140	730,000	lbs	$5.90	$4,307,000.00
		2,500-ft long steel lined portal reach					
	10	Excavation (appr 12.4 cy/lf)	68140	2,500	lf	$2,150.00	$5,375,000.00
		Steel Tunnel Liner:					
		ASTM A572 Gr. 50: Sy = 50 kpsi St = 65 kpsi					
	10a	204" Inside Dia., 3 7/8" wall, L= 2500 ft.	68420	21,500,000	LBS	$3.40	$73,100,000.00
	11	Furnish and place backfill concrete	68140	8,420	cy	$500.00	$4,210,000.00
	12	Cementitious materials for backfill concrete	68140	2,370	tons	$140.00	$331,800.00
	13	Furnish & install 7/8-in dia, 10-ft long rock bolts	68140	0	lin ft	0	$0.00
	14	Furnish and install structural steel tunnel supports	68140	3,650,000	lbs	$5.90	$21,535,000.00
		Sheet Subtotal					**$292,610,820.00**

QUANTITIES		PRICES	
BY Kevin Atwater (8140) Rick Frisz (8420)	**CHECKED** Dave Gesundheit (8140)	**BY** Greg Atkins (8170)	**CHECKED**
DATE PREPARED 5/30/08	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW** 7/31/08

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Cost Estimate
All Tunnel Alternative (Discharge 1)

Tunnel/Alternative (Discharge 1) - Civil/Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Inflow_Most Probable_060208.xls]Plant-Mechanical

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Surge Shaft					
		Construct 1506-ft deep, 22.0-ft finished diameter, 24.34-ft minimum bore diameter, shaft in rock. Shaft will be excavated by raise bore and drill down method. Water problems will be minimal. Shaft has two final support reaches.					
		1,200-ft deep unreinforced concrete lined reach					
	15	Excavation (appr 17 cy/lf)	D8140	1,200	lf	$7,700.00	$9,240,000.00
	16	Furnish and place unreinforced concrete shaft lining	D8140	3,800	cy	$500.00	$1,900,000.00
	17	Cementitious materials for concrete shaft lining	D8140	1,070	tons	$145.00	$155,150.00
	18	Furnish & install 5/8-in dia, 6-ft long rock bolts	D8140	63,100	lin ft	$74.00	$4,669,400.00
		300-ft long reinforced concrete lined shaft top reach					
	19	Excavation (appr 17 cy/lf)	D8140	300	lf	$7,700.00	$2,310,000.00
	20	Furnish and place reinforced concrete shaft lining	D8140	945	cy	$500.00	$472,500.00
	21	Cementitious materials for concrete shaft lining	D8140	265	tons	$145.00	$38,425.00
	22	Furnish and install concrete reinforcement	D8140	15,700	lbs	$1.95	$30,615.00
	23	Furnish & install 5/8-in dia, 6-ft long rock bolts	D8140	15,600	lin ft	$74.00	$1,154,400.00
	24	Furnish and install chain link protection	D8140	13,000	sq yd	$33.00	$429,000.00
		Waste Tunnel Muck at Black Rock					
		Assume waste material within 2 miles of portal.					
		Quantities include 1/2 inflow tunnel.					
	24a	Waste rock excavation	D8120	210,000	CY	$5.90	$1,239,000.00
		Sheet Subtotal					**$21,638,490.00**

QUANTITIES		PRICES	
BY Bill Thompson	CHECKED	BY Greg Atkins (8170)	CHECKED
DATE PREPARED 4/19/04	PEER REVIEW	DATE PREPARED	PEER REVIEW 7/31/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable Cost Estimate
All Tunnel Alternative (Discharge 1)

Tunnel/Alternative (Discharge 1) - Civil/Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Inflow_Most Probable_060208.xls]Plant-Mechanical

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Tunnel Outlet Features Assume ~100' head to valley invert and L~ 4000' Assume need to control flow from tunnel portal to bottom of reservoir during initial fill.					
		Earthwork					
	25	Excavation at outlet area for portal and channel	D8130	50,000	CY	$14.50	$725,000.00
	26	Excavation for pipe trench	D8130	307,000	CY	$5.00	$1,535,000.00
	27	Excavation for thrust block	D8130	1,500	CY	$18.50	$27,750.00
	28	Concrete for open channel	D8130	500	CY	$540.00	$270,000.00
	29	F & P reinforcement (160 lbs/CY)	D8130	83,000	LBS	$1.85	$153,550.00
	30	Furnish and handle cement (.282T/CY)	D8130	150	TONS	$155.00	$23,250.00
	31	Concrete for thrust block	D8130	1,000	CY	$550.00	$550,000.00
	32	F & P reinforcement (100 lbs/CY)	D8130	100,000	LBS	$1.85	$185,000.00
	33	Furnish and handle cement (.235T/CY)	D8130	240	TONS	$155.00	$37,200.00
	34	Furnish and place Zone 3 bedding for pipe	D8130	24,000	CY	$41.00	$984,000.00
	35	Backfill pipe with excavated material	D8130	237,000	CY	$7.10	$1,682,700.00
	36	Furnish and place zone 3 bedding for riprap	D8130	5,000	CY	$41.00	$205,000.00
	37	Furnish and place riprap	D8130	10,000	CY	$59.00	$590,000.00
	38	20 ' dia. Steel pipe L = 4000' t= 3/4 inches Wt/ft + 10% for couplings and connections	D8130	8,500,000	LBS	$3.00	$25,500,000.00
	39	Steel safety trashracks	D8410	80,000	LBS	$7.70	$616,000.00
	40	Steel Bulkhead	D8410	120,000	LBS	$7.70	$924,000.00
	41	Remove and salvage 20' dia. Steel pipe Assume diver-assisted removal in wet at a max depth = 100'. Assume removal of 90% of the pipe. Assume lift bags to raise pipe and barge-mounted crane to handle pipe at surface. Salvage at $50/ton (quote), but salvage value is much less than the cost to remove and cut up pipe.	D8410	7,650,000	LBS	0	$0.00
		Discharge 1 - Subtotal					**$348,257,760.00**

QUANTITIES		**PRICES**	
BY Doug Stanton (8130) Rick Christensen (8410)	**CHECKED** Alex Ritt (8410)	**BY** Greg Akins (8130)	**CHECKED**
DATE PREPARED 4/27/2004, 6/2/2008	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW** 7/31/08

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:	PROJECT:	
Black Rock Preferred Alternative Central Core Rockfill Dam - 1.3 MAF Most Probable Cost Estimate Summary	Yakima River Basin Water Storage Study	
	WOID: YAKAP	ESTIMATE LEVEL: Appraisal
	REGION PN	PRICE LEVEL: Apr-07
	FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MP\[Black Rock Inflow_Most Probable_060208 Rev.xls]Summary	

Summary Sheet

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Central Core Rockfill Dam **Large Reservoir - 1.3 MAF** **Includes foundation treatment, dam structure, river outlet works, relocation of State Highway 24, and seepage mitigation features.**					
		Dam Subtotal					$1,193,825,400.00
		River Outlet Works Subtotal					$125,537,315.00
		Roads and Utility Relocations					$102,891,000.00
		Downstream Seepage Mitigation Features					$246,940,609.00
		Subtotal					**$1,669,194,324.00**
		Mobilization		5%	(+/-)		$83,000,000.00
		Subtotal with mobilization					**$1,752,194,324.00**
		Escalation During Construction		0%	(+/-)		$0.00
		Subtotal with mobilization and escalation					**$1,752,194,324.00**
		Design Contingencies		10%	(+/-)		$197,805,676.00
		CONTRACT COST					**$1,950,000,000.00**
		Construction Contingencies		25%	(+/-)		$ 450,000,000.00
		FIELD COST					**$2,400,000,000.00**
		Non-Contract Costs **		25%	(+/-)		$600,000,000.00
		CONSTRUCTION COST					**$3,000,000,000.00**

Escalation to notice to proceed, allowance for procurement strategies, and utility relocations are not included.

** Land Acquisition Costs of $5,902,500 associated with these features are included in the Non-Contract Costs.

QUANTITIES		PRICES	
BY Design Team	CHECKED Design Team	BY J. Zander, J. Morris, L. Domke	CHECKED
DATE PREPARED 6/02/08	PEER REVIEW	DATE PREPARED 8/12/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Cost Estimate

Dam - Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: R:\D8170\EST\Spreadsheet\[Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MP\[Black Rock Dam_Most Probable_060208 Rev.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		GENERAL SITEWORK					
		Assume no clearing and grubbing required					
		Assume road improvements and haul roads are part of unlisted items					
		DIVERSION & DEWATERING					
		Assume groundwater is below excavation					
		Assume natural stream beds in area are dry					
		FOUNDATION EXCAVATION					
		Assume common material stockpiled for reuse					
		Assume rock material stockpiled for reuse					
		Stockpiles will be upstream, within 1/2 mile of dam					
	1	Excavation, stripping, of dam foundation	D8312	370,000	CY	$2.20	$814,000.00
		Assume depth of stripping 12 inches or less					
		Assume stripping will be stockpiled for topsoil use					
	2	Excavation, common, for dam foundation	D8312	25,250,000	CY	$3.50	$88,375,000.00
		Assume about 35% of volume requires ripping					
		Assume fine-grained and coarse-grained materials will be separately stockpiled					
	3	Excavation, rock, for dam foundation	D8312	5,000	CY	$31.00	$155,000.00
		Assume drill and blast in random locations					
		FOUNDATION TREATMENT					
		Includes misc. foundation treatment, fault zone treatment, consolidation grouting, and curtain grouting					
		Miscellaneous Foundation Areas					
		Applied in areas of poor quality rock					
	4	Slush grouting of foundation surface	D8312	62,000	SF	$5.20	$322,400.00
		Over assumed 10% of area beneath zone 1					
	5	Dental concrete	D8312	5,000	CY	$190.00	$950,000.00
	6	Furnish/place zone 2 sand filter on foundation	D8312	140,000	CY	$38.00	$5,320,000.00
		Over 10% of area between zone 1 and d/s toe					
		Assume a 3-ft thickness					
	7	Furnish/place zone 3 gravel drain on foundation	D8312	140,000	CY	$31.00	$4,340,000.00
		Over the zone 2 filter in a 3-ft thickness					
		Sheet Subtotal					**$100,276,400.00**

QUANTITIES		PRICES	
BY Chris Strickland (8361)	CHECKED Bill Engemoen (8312)	BY #3 Jerry Zander (8170)	CHECKED 7/30/2008
DATE PREPARED 5/30/2008	PEER REVIEW Bill Engemoen	DATE PREPARED 07/30/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Cost Estimate

Dam - Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Dam_Most Probable_060208.xls]DS Seepage Mitigation

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		FOUNDATION TREATMENT (continued)					
		Treatment of south abutment fault area					
	8	Extra rock excavation for fault treatment					
		Assume south abutment is fractured	D8312	220,000	CY	$23.00	$5,060,000.00
		Assume excavate with hydraulic excavator					
	8A	Replace rock excavation with RCC	D8312	220,000	CY	$96.00	$21,120,000.00
	9	Dental concrete for fault treatment	D8312	5,000	CY	$190.00	$950,000.00
	10	Furnish/place zone 2 sand filter downstream of zone 1	D8312	100,000	CY	$38.00	$3,800,000.00
		Assume a 3-ft thickness, 500' by 1000' area					
		Assume same source as listed under emb.					
	11	Furnish/place zone 3 gravel drain d/s of zone 1	D8312	100,000	CY	$28.00	$2,800,000.00
		Assume 3-ft thickness, over zone 2 filter					
		Consolidation Grouting of Foundation					
		Generally limited to area beneath zone 1					
	12	Setups for drilling grout holes	D8312	6,800	EA	$95.00	$646,000.00
		Assume 2-inch dia. drilled on 10-foot centers					
	13	Drill grout holes	D8312	300,000	LF	$29.00	$8,700,000.00
		Assume 2-inch dia. w/length= 45 feet					
	14	Hookups to grout holes	D8312	6,800	EA	$57.00	$387,600.00
	15	Pressure grout	D8312	600,000	CF	$9.50	$5,700,000.00
		Assume grouting process only minus cement					
		Assume 2 CF per 1 LF of hole					
	16	Furnish and handle cement for pressure grouting	D8312	600,000	BAGS	$9.50	$5,700,000.00
		Assume 1 bag per CF					
		Curtain Grouting of Foundation					
		Two-row curtain beneath zone 1					
	17	Setups for drilling grout holes	D8312	1,700	EA	$100.00	$170,000.00
		Assume 2-rows of 2-inch dia.on 10-ft centers					
	18	Drill grout holes	D8312	340,000	LF	$29.00	$9,860,000.00
		Assume 2-inch dia. w/length from 60 to 250 feet					
	19	Hookups to grout holes	D8312	1,700	EA	$62.00	$105,400.00
	20	Pressure grout	D8312	850,000	CF	$9.50	$8,075,000.00
		Assume grouting process only minus cement					
		Assume 2.5 CF per 1 LF of hole					
	21	Furnish and handle cement for pressure grouting	D8312	850,000	BAGS	$9.50	$8,075,000.00
		Assume 1 bag per CF					
		Sheet Subtotal					**$81,149,000.00**

QUANTITIES		PRICES	
BY	CHECKED	BY	CHECKED
Chris Strickland (8361)	Bill Engemoen (8312)	Jerry Zander (8170)	7/30/2008
DATE PREPARED	PEER REVIEW	DATE PREPARED	PEER REVIEW
5/30/2008	Bill Engemoen (8312)	07/30/08	

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Cost Estimate

Dam - Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Dam_Most Probable_060208.xls]DS Seepage Mitigation

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		EMBANKMENT CONSTRUCTION					
		Items are set up as furnish and place, which would include purchasing from commercial sites, processing onsite, development of quarry, or transporting from stockpiles of required excavation					
	22	Furnish and place zone 1 core	D8312	8,400,000	CY	$15.50	$130,200,000.00
		Acquired from source 6 miles from dam					
		Compacted to 6-inch lifts by tamping roller					
	23	Furnish and place zone 2 filters	D8312	2,900,000	CY	$34.00	$98,600,000.00
		Sand/gravel material processed commercially or developed onsite					
		If commercial, assume 17 mile one-way haul					
		Compacted to 12-inch layers by vibratory steel drum					
		Zones have 15-ft horizontal width					
	24	Furnish and place zone 3 drain	D8312	1,450,000	CY	$34.00	$49,300,000.00
		Gravel/cobble material processed commercially or developed onsite					
		If commercial, assume 17 mile one-way haul					
		Compacted to 12-inch layers by vibratory steel drum					
		Zone has 15-ft horizontal width					
	25	Furnish and place zone 4 rockfill	D8312	55,150,000	CY	$8.20	$452,230,000.00
		Developed from basalt ridges surrounding reservoir					
		Assume average 1-mile haul to dam					
		Rock sizes up to 3-foot					
		Compacted in 3-ft layers by vibratory steel drum					
	26	Furnish and place zone 5 coarse grained random fill	D8312	13,950,000	CY	$4.80	$66,960,000.00
		Comes from stockpiles of required excavation within 1/2 mile of dam					
		Generally consists of gravelly soils					
		Compacted in 2-ft layers by vibratory steel drum					
	27	Furnish and place zone 6 fine grained random fill	D8312	7,500,000	CY	$5.90	$44,250,000.00
		Comes from stockpiles of required excavation within 1/2 mile of dam					
		Generally consists of sands/silts/clays					
		Compacted to 9-inch layers by tamping rollers					
		Sheet Subtotal					**$841,540,000.00**

QUANTITIES		PRICES	
BY	CHECKED	BY	CHECKED
Chris Strickland (8316)	Bill Engemoen (8312)	Jerry Zander (8170)	7/30/2008
DATE PREPARED	PEER REVIEW	DATE PREPARED	PEER REVIEW
5/30/2008	Bill Engemoen (8312)	07/30/08	

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Cost Estimate

Dam - Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Dam_Most Probable_060208.xls]DS Seepage Mitigation

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		RIGHT ABUTMENT SEEPAGE MITIGATION FEATURES *These are features incorporated into the right abutment of the dam, designed to reduce or collect seepage through the pervious abutment bedrock*					
	28	Construct two drainage tunnels *Assume two 10-ft diameter, 1500-ft long tunnels* *Assume drill and blast excavation in bedrock* *Assume appreciable tunnel stabilization (steel sets on frequent spacing)* *Assume concrete lining*	D8312	3,000	LF	$1,100.00	$3,300,000.00
	29	Drill drainage holes through tunnel *Assume 600 holes, each 200-ft long*	D8312	120,000	LF	$43.00	$5,160,000.00
	30	Construct concrete diaphragm wall *Assume slurry trench construction, using a hydrofraise machine to 400-ft depth (1000 ft long)* *Assume concrete backfill*	D8312	650,000	SF	$220.00	$143,000,000.00
	31	Construct RCC working surface *Assume around 25 benches on abutment* *Assume benches constructed of RCC* *Benches about 100 ft wide by maximum 33 ft high*	D8312	200,000	CY	$97.00	$19,400,000.00
		MISCELLANEOUS					
		Instrumentation *Assume part of unlisted items*					
		Toe Drains *Assume part of unlisted items*					
		Site cleanup and relandscaping *Assume part of unlisted items*					
		Dam Subtotal					**$1,193,825,400.00**

QUANTITIES		PRICES	
BY Chris Strickland (8361)	CHECKED Bill Engemoen (8312)	BY Jerry Zander (8170)	CHECKED 7/30/2008
DATE PREPARED 5/30/2008	PEER REVIEW Bill Engemoen (8312)	DATE PREPARED 07/30/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Cost Estimate

River Outlet Works - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Dam_Most Probable_060208.xls]DS Seepage Mitigation

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Establish Upstream Portal	D8130				
	1	Common excavation to establish tunnel portal		67,000	CY	$11.50	$770,500.00
	2	Rock excavation to establish tunnel portal		8,300	CY	$31.00	$257,300.00
	3	Furnish and install chain link fabric around portal		350	SY	$27.00	$9,450.00
	4	F&I 18-inch x 1/2 in. dia resin anchors for fabric support		40	EA	$76.00	$3,040.00
		Establish Downstream Portal	D8130				
	5	Common excavation to establish tunnel portal		67,000	CY	$11.50	$770,500.00
	6	Rock excavation to establish tunnel portal		8,300	CY	$31.00	$257,300.00
	7	Furnish and install chain link fabric around portal		350	SY	$27.00	$9,450.00
	8	F&I 18-inch x 1/2 in. dia resin anchors for fabric		40	EA	$76.00	$3,040.00
		Construct ROW tunnel u/s of gate chamber	D8130				
	9	Drill and shoot 28-ft Dia.circular shaped u/s tunnel (18,400 CY)		700	LF	$4,400.00	$3,080,000.00
	10	Remove and stockpile rock (assume local stockpile)		18,400	CY	$20.00	$368,000.00
	11	Furnish and install 790-10-ft long x 1-inch dia. A307, 20K rockbolts		7,900	LF	$74.00	$584,600.00
	12	Furnish and install 9 steel sets (W8 x 48) in crown		45,000	LBS	$6.00	$270,000.00
		Construct ROW tunnel d/s of gate chamber	D8130				
	13	Drill and shoot 32-ft OD mod.HS shaped d/s tunnel (23,000 CY)		600	LF	$5,900.00	$3,540,000.00
	14	Remove and stockpile rock (assume local stockpile)		23,000	CY	$20.00	$460,000.00
	15	Furnish and install 740-10-ft long x 1-inch dia. A307, 20K rockbolts		7,400	LF	$74.00	$547,600.00
	16	Furnish and install 9 steel sets (W10 x 54) in crown		47,000	LBS	$6.00	$282,000.00
		Construct ROW Gate Chamber and Shaft	D8130				
	17	Drill and shoot 24-ft diameter shaft (800 CY)		40	LF	$7,400.00	$296,000.00
	18	Remove and stockpile rock (assume local stockpile)		800	CY	$20.00	$16,000.00
	19	Furnish and install 64 - 10-ft long x 1-inch dia. A307, 20K rockbolts		640	LF	$84.00	$53,760.00
	20	Furnish and install 4 circular steel sets (W8 x 48)		17,000	LBS	$5.90	$100,300.00
		Place Conc. Lining In Tunnel, Shaft & Gate Chamber	D8130				
	21	FF&P reinf. Concrete in u/s steel-lined tunnel		10,200	CY	$440.00	$4,488,000.00
	22	FF&P reinf. concrete gate chamber		600	CY	$930.00	$558,000.00
	23	FF&P reinf. Concrete in d/s tunnel		11,400	CY	$540.00	$6,156,000.00
	24	Furnish and place reinforcement (160 lbs/CY)		3,550,000	LBS	$1.65	$5,857,500.00
	25	Furnish and handle cement (.282T/CY)		6,300	TONS	$150.00	$945,000.00
		Sheet Subtotal					**$29,683,340.00**

QUANTITIES		PRICES	
BY: Doug Stanton (8130)	CHECKED: Tom Scobell (8130)	BY: Jeff Morris (8170) 7/30/08	CHECKED: 7/30/2008
DATE PREPARED: 06/02/08	PEER REVIEW:	DATE PREPARED: 07/30/08	PEER REVIEW:

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Cost Estimate

River Outlet Works - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Dam_Most Probable_060208.xls]DS Seepage Mitigation

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Ring Grout Upstream Conduit	D8130				
	26	Setups for drilling grout holes (2-in dia holes, 20 ft ctrs, and 8 holes per ring)		36	EA	$250.00	$9,000.00
	27	Drill grout holes (2-in dia and L=30 ft)		8,640	LF	$27.00	$233,280.00
	28	Hookups to grout holes		288	EA	$150.00	$43,200.00
	29	Pressure grout (grouting process only minus cement) Assume 2 CF per 1 LF of hole		17,300	CF	$16.00	$276,800.00
	30	Furnish and handle cement for pressure grouting Assume 1 bag per CF		17,300	BAGS	$16.00	$276,800.00
		Ring Grout Shaft and Gate Chamber	D8130				
	31	Setups for drilling grout holes (2-in dia holes, 20 ft ctrs, and 8 holes per ring)		5	EA	$340.00	$1,700.00
	32	Drill grout holes (2-in dia and L=30 ft)		1,200	LF	$37.00	$44,400.00
	33	Hookups to grout holes		40	EA	$200.00	$8,000.00
	34	Pressure grout (grouting process only minus cement) Assume 2 CF per 1 LF of hole		2,400	CF	$20.00	$48,000.00
	35	Furnish and handle cement for pressure grouting Assume 1 bag per CF		2,400	BAGS	$19.00	$45,600.00
		Ring Grout Downstream Conduit	D8130				
	36	Setups for drilling grout holes (2-in dia holes, 20 ft ctrs, and 8 holes per ring)		6	EA	$340.00	$2,040.00
	37	Drill grout holes (2-in dia and L=30 ft)		1,440	LF	$37.00	$53,280.00
	38	Hookups to grout holes		48	EA	$200.00	$9,600.00
	39	Pressure grout (grouting process only minus cement) Assume 2 CF per 1 LF of hole		2,880	CF	$20.00	$57,600.00
	40	Furnish and handle cement for pressure grouting Assume 1 bag per CF		2,880	BAGS	$19.00	$54,720.00
		Earthwork - intake, u/s conduit, d/s pipe, stilling basin and discharge channel	D8130				
	41	Excavation of common materials for basin and channel		400,000	CY	$5.30	$2,120,000.00
	42	F & P impervious material (Zone 6 Ringold - local)		20,000	CY	$12.50	$250,000.00
	43	F & P bedding for riprap (zone 3 gravel)		10,000	CY	$40.00	$400,000.00
	44	F & P rockfill from dam excavation (riprap)		30,000	CY	$15.00	$450,000.00
	45	F & P backfill for intake and u/s conduit (Ringold - local)		16,000	CY	$12.50	$200,000.00
	46	Excavation of common materials for burying 16' pipe		312,000	CY	$4.00	$1,248,000.00
	47	Backfill for burying 16' dia. Pipe - zone 3 bedding		20,000	CY	$44.00	$880,000.00
	48	Backfill for burying 16' dia. Pipe - From common exc.		197,000	CY	$6.20	$1,221,400.00
		Sheet Subtotal					**$7,933,420.00**

QUANTITIES		PRICES	
BY	CHECKED	BY	CHECKED
Doug Stanton (8130)	Tom Scobell (8130)	Jeff Morris (8170) 7/30/08	7/30/2008
DATE PREPARED	PEER REVIEW	DATE PREPARED	PEER REVIEW
06/02/08		07/30/08	

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Cost Estimate

River Outlet Works - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP | **ESTIMATE LEVEL:** Appraisal
REGION PN | **PRICE LEVEL:** Apr-07
FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Dam_Most Probable_060208.xls]DS Seepage Mitigation

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct ROW cast in place (CIP) concrete	D8130				
	49	Furnish, form, and place reinf. Conc - Intake structure		12,000	CY	$630.00	$7,560,000.00
	50	Furnish and place reinforcement (est 180#/CY)		2,160,000	LBS	$1.65	$3,564,000.00
	51	Furnish and handle cement (.282T/CY)		3,400	TONS	$155.00	$527,000.00
	52	FFP Reinf. Conc - Steel lined U/S Conduit (L=400')		11,000	CY	$630.00	$6,930,000.00
	53	Furnish and place reinforcement (est 170#/CY)		1,870,000	LBS	$1.65	$3,085,500.00
	54	Furnish and handle cement (.282T/CY)		3,100	TONS	$155.00	$480,500.00
	55	FFP reinf. concrete - CIP shaft (L=375)		6,400	CY	$500.00	$3,200,000.00
	56	Furnish and place reinforcement (est 170#/CY)		1,088,000	LBS	$1.65	$1,795,200.00
	57	Furnish and handle cement (.282T/CY)		1,800	TONS	$155.00	$279,000.00
	58	FFP reinf. concrete - shaft control house		440	CY	$910.00	$400,400.00
	59	Furnish and place reinforcement (160#/CY)		70,000	LBS	$1.85	$129,500.00
	60	Furnish and handle cement (.282T/CY)		120	TONS	$155.00	$18,600.00
	61	FFP reinf. Concrete in gate chamber		450	CY	$910.00	$409,500.00
	62	Furnish and place reinforcement (160#/CY)		72,000	LBS	$1.85	$133,200.00
	63	Furnish and handle cement (.282T/CY)		130	TONS	$155.00	$20,150.00
	64	FFP reinf. concrete - D/S access house		500	CY	$910.00	$455,000.00
	65	Furnish and place reinforcement (160#/CY)		80,000	LBS	$1.85	$148,000.00
	66	Furnish and handle cement (.282T/CY)		140	TONS	$155.00	$21,700.00
	67	FFP reinf. concrete for thrust block @ 80 deg bend		5,100	CY	$540.00	$2,754,000.00
	68	Furnish and place reinforcement (130 #/cy)		663,000	LBS	$1.75	$1,160,250.00
	69	Furnish and handle cement (.20T/CY)		1,020	TONS	$155.00	$158,100.00
	70	FFP reinf. concrete - jet flow gate control house		700	CY	$930.00	$651,000.00
	71	Furnish and place reinforcement (160#/CY)		112,000	LBS	$1.85	$207,200.00
	72	Furnish and handle cement (.282T/CY)		200	TONS	$155.00	$31,000.00
	73	FFP reinf. concrete for thrust block @ jet gate house		4,100	CY	$530.00	$2,173,000.00
	74	Furnish and place reinforcement (130 #/cy)		533,000	LBS	$1.75	$932,750.00
	75	Furnish and handle cement (.20T/CY)		820	TONS	$155.00	$127,100.00
		Sheet Subtotal					**$37,351,650.00**

QUANTITIES		PRICES	
BY: Doug Stanton (8130)	CHECKED: Tom Scobell (8130)	BY: Jeff Morris (8170) 7/30/08	CHECKED: 7/30/2008
DATE PREPARED: 06/02/08	PEER REVIEW:	DATE PREPARED: 07/30/08	PEER REVIEW:

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Cost Estimate

River Outlet Works - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Dam_Most Probable_060208.xls]DS Seepage Mitigation		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	76	Miscellaneous Metalwork Assume ladder in shaft to gate chamber, elevator rail supports, misc metal in gate house, gate chamber and D/S gate house.	D8120	14,000	LBS	$9.70	$135,800.00
		Mechanical					
	77	Furnish and install steel trashracks	D8410	337,500	LBS	$9.10	$3,071,250.00
	78	Furnish and install one bulkhead 22' x 24' @ 400' head	D8410	144,000	LBS	$4.50	$648,000.00
	79	Furnish and install seats and guides with lid	D8410	23,900	LBS	$11.00	$262,900.00
	80	Furnish and install one elevator, capacity = 500 lbs (2 person), speed = 100 fpm, travel = 450', landings = 2, type = freight	D8410	1	UNIT	$190,000.00	$190,000.00
		HVAC for: **4200-ft long by 26-ft dia. penstock tunnel and 430-ft deep by 24'dia shaft to gate chamber)**	D-8410				
	81	Centrifugal fan rated: 16,000cfm @ 8" static pressure, 1200 fan rpm max, 2200-fpm max. fan outlet velocity, with adjustable sheave with 2-speed motor for 50% speed (8000-cfm at 2"sp) belt-drive, 30-Hp, 460-V, 3-Ph, 60-Hz, 1800-rpm motor. (approx 700-lbs+motor wt)	D-8410	2	EA	$17,500.00	$35,000.00
	82	48" Dia, 16-ga galv st. duct 4700 ft long (Wt with supports approx = 40-lbs/linear ft)	D-8410	188,000	LBS	$8.70	$1,635,600.00
		For 50-degree F temperature rise for winter ventilation, Assuming 90% recirculated air &10% outside air					
	83	30-kVa Electric Duct heaters 480-V, 3-ph, 60-hz with thermostats Note: (100% outside air requires total of 515-kW heat for 32000 cfm for construction level ventilation or 210-kW for inspection level ventilation)	D-8410	2	EA	$17,500.00	$35,000.00
		Sheet Subtotal					**$6,013,550.00**

QUANTITIES		**PRICES**	
BY Dick LaFond (8120) Weems,Schlein,Ritt,Christensen (8410)	**CHECKED** Alex Ritt (8410)	**BY** Lonnie Zlomke (8170)	**CHECKED** 7/30/2008
DATE PREPARED 4/24/2004, 6/02/2008	**PEER REVIEW**	**DATE PREPARED** 07/30/08	**PEER REVIEW**

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Cost Estimate

River Outlet Works - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Dam_Most Probable_060208.xls]DS Seepage Mitigation		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont.)					
		Heating and Ventilating	D8410				
		50'x40'x24' Control House					
	84	Centrifugal fan: 1 each Single speed,1500 cfm at 0.50 inches w.g. static pressure, forward curve, direct drive; 3/4 hp motor rated 480 Vac, Three phase, 60 Hz.	D8410	1	EA	$2,900.00	$2,900.00
	85	Propeller fan assembly: 1 each Single speed, 4,800 cfm at 0.50 inches w.g. static pressure, belt drive; 1.5 hp motor rated 460 Vac, three phase, 60 Hz; include fan wall mount housing with motor guard.	D8410	1	EA	$3,300.00	$3,300.00
	86	Unit heaters: Electric horizontal discharge rated 7.5 kw, 460 Vac, 3-phase, 60 Hz. (One each corner -18' throw) with wall thermostats	D8410	4	EA	$730.00	$2,920.00
	87	Control dampers: All motor operated, parallel blade, low leakage type with edge and side seals:	D8410				
		48" wide x 48" high - 1 each		1	EA	$2,900.00	$2,900.00
		36" wide x 36" high - 1 each		1	EA	$1,700.00	$1,700.00
	88	Stationary louvers: All 16 gauge galvanized steel, 4-inch deep frame, 45 degree blades on 4-inch centers, 45 percent free area, with insect and bird screen:	D8410				
		48" wide x 48" high - 1 each		1	EA	$2,000.00	$2,000.00
		36" wide x 36" high - 1 each		1	EA	$1,150.00	$1,150.00
		Sheet Subtotal					**$16,870.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Paul Schlein, Mike Weems (8410)	Alex Ritt (8410)	Lonnie Zlomke (8170)	7/30/2008
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
4/24/2004, 6/02/2008		07/30/08	

ESTIMATE WORKSHEET

FEATURE:
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River Outlet Works - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Dam_Most Probable_060208.xls]DS Seepage Mitigation

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
		(Continuation of HVAC System) **(50'x40'x24' Control House)**	D8410				
	89	Fan motor starters: Design, furnish and install control system	D8410	2	EA	$2,900.00	$5,800.00
	90	Ductwork: All 16-gauge galvanized steel with extra heavy (ASTM A90 G120) galvanized coating: Air plenum: 250 lbs.	D8410	250	LBS	$8.70	$2,175.00
	91	48"x48" galv steel intake air filter frames using nine(9) 24"x16"x2" disposable filter elements in frame with dirty filter differential pressure sensor with warning light and remote signal.	D8410	1	EA	$2,300.00	$2,300.00
	92	16"x24"x2" disposable fiberglass, 30% min efficiency, Filter elements (estimate 9 elements with spares for testing, startup and two replacements each.	D8410	36	EA	$2,400.00	$86,400.00
	93	Galv. Steel duct and fan supports.	D8410	200	LBS	$11.00	$2,200.00
		Sheet Subtotal					**$98,875.00**

QUANTITIES		PRICES	
BY Paul Schlein, Mike Weems (8410)	**CHECKED** Alex Ritt (8410)	**BY** Lonnie Zlomke (8170)	**CHECKED** 7/30/2008
DATE PREPARED 4/24/2004, 6/02/2008	**PEER REVIEW**	**DATE PREPARED** 07/30/08	**PEER REVIEW**

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
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River Outlet Works - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Dam_Most Probable_060208.xls]DS Seepage Mitigation		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Steel penstock					
		FURNISH-AND-INSTALL THE FOLLOWING:	D8420				
	94	240-inch steel pipe, encased in concrete (1000 linear feet, 1-1/2-inch wall, 4290 lb per lin. ft.)		4,260,000	LBS	$3.20	$13,632,000.00
	95	192-inch steel pipe, encased in concrete (1000 linear feet, 1-1/4-inch wall, 2841 lb per lin. ft.)		2,840,000	LBS	$3.20	$9,088,000.00
	96	192-inch steel pipe, buried (273 linear feet, 1-1/16-inch wall, 2412 lb per lin. ft.)		660,000	LBS	$3.20	$2,112,000.00
	97	192-inch steel pipe, buried (601 linear feet, 1-inch wall, 2269 lb per lin. ft.)		1,360,000	LBS	$3.20	$4,352,000.00
	98	192-inch steel pipe, buried (601 linear feet, 15/16-inch wall, 2127 lb per lin. ft.)		1,280,000	LBS	$3.20	$4,096,000.00
	99	192-inch steel pipe, buried (601 linear feet, 7/8-inch wall, 1985 lb per lin. ft.)		1,190,000	LBS	$3.20	$3,808,000.00
	100	192-inch steel pipe, buried (600 linear feet, 13/16-inch wall, 1842 lb per lin. ft.)		1,110,000	LBS	$3.20	$3,552,000.00
	101	120-inch steel pipe, buried and exposed (100 linear feet, 13/16-inch wall, 1154 lb per lin. ft.)		115,000	LBS	$3.20	$368,000.00
	102	60-inch steel pipe, vertical, grouted, air vent (418 linear feet, 3/8-inch wall, 266 lb per lin. ft.)		115,000	LBS	$3.30	$379,500.00
		Sheet Subtotal					**$41,387,500.00**

QUANTITIES		PRICES	
BY Ken Smith (8420)	CHECKED	BY Lonnie Zumke (8170)	CHECKED 7/30/2008
DATE PREPARED 4/26/04	PEER REVIEW	DATE PREPARED 07/30/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Cost Estimate

River Outlet Works - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Dam_Most Probable_060208.xls]DS Seepage Mitigation		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Gates and Gate Controls					
		Furnish and Install					
	103	F & I -18' x 14' Roller gate w/controls 1 - gate and 1 control box (in shaft house)	D8420	180,400	LBS	$9.60	$1,731,840.00
	104	F&I structural steel for hoist support		10,000	LBS	$4.80	$48,000.00
	105	F & I - 2 - 108-inch jet flow gates w/controls 2 gates and 1 control box		89,400	LBS	$9.60	$858,240.00
	106	F & I - 36-inch jet flow gate w/controls and bypass pipe 1 gate and 1 control box (in shaft house)		30,000	LBS	$9.60	$288,000.00
		Sheet Subtotal					**$2,926,080.00**

QUANTITIES		PRICES	
BY Gary Rood (8420)	**CHECKED**	**BY** Lonnie Zlomke (8170)	**CHECKED** 7/30/2008
DATE PREPARED 4/26/04	**PEER REVIEW**	**DATE PREPARED** 07/30/08	**PEER REVIEW**

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Cost Estimate

River Outlet Works - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Dam_Most Probable_060208.xls]DS Seepage Mitigation

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Electrical					
		This estimate is for 2 ROW control bldgs, one on top of dam and the other downstream for the regulating gates.					
		Assume bringing power to dam part of unlisted items.					
		Furnish and install the following electrical equipment:					
		Grounding System	8430				
	107	Ground rods, 10 ft, 3/4" dia., copper-clad		6	EA	$260.00	$1,560.00
	108	Stranded bare-copper conductor, 4 AWG		250	LF	$3.40	$850.00
		Conduit System	8430				
		Rigid steel conduit					
	109	3/4-inch		200	LF	$14.50	$2,900.00
	110	1-inch		100	LF	$22.00	$2,200.00
		PVC conduit, Schedule 40					
	111	1 1/2-inch		600	LF	$13.50	$8,100.00
		HDPE (High-density polyethylene)					
	112	2-inch		1,000	LF	$17.50	$17,500.00
		Conductors & Cable	8430				
		All cable single conductor, stranded copper					
	113	12 AWG		1,500	LF	$1.10	$1,650.00
	114	10 AWG		500	LF	$1.40	$700.00
	115	2 AWG		2,000	LF	$5.70	$11,400.00
	116	1/0 AWG		400	LF	$6.30	$2,520.00
		Electrical Service Equipment	8430				
	117	Pole-mounted transformer; 100 kVA, 13.8,kV-480V		1	EA	$39,000.00	$39,000.00
	118	Meter socket, NEMA 3R, 600V, 3-phase		1	EA	$650.00	$650.00
	119	Safety switch, heavy-duty, NEMA 3R, fusible 3-wire, 600V, 100 ampere		1	EA	$2,700.00	$2,700.00
		Panelboards & Electrical Distribution Equipment					
	120	Panelboard, 3-phase, 480V, 250 ampere		1	EA	$9,300.00	$9,300.00
	121	Distribution load center, 15 kVA, 1-phase 480-240/120V		2	EA	$12,500.00	$25,000.00
		River Outlet Works Subtotal					**$125,537,315.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Mike Schuh (8430)	Cory Maurer (8430)	Lonnie Zlomke (8170)	7/30/2008
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
5/22/08	George Girgis (8430)	07/30/08	

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Cost Estimate

Roads and Utility Relocation

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Dam_Most Probable_060208.xls]DS Seepage Mitigation

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		State Highway Relocation (11.8 miles)					
	1	Clear roadway alignment	D8140	280	AC	$3,600.00	$1,008,000.00
	2	Excavation from borrow	D8140	1,000,000	CY	$4.70	$4,700,000.00
	3	Excavation for roadway (assume 70% rock material)	D8140	5,200,000	CY	$13.00	$67,600,000.00
	4	Compacting roadway embankments (subbase)	D8140	5,900,000	CY	$1.80	$10,620,000.00
	5	Furnish and place base course material	D8140	150,000	TONS	$24.00	$3,600,000.00
	6	Furnish and place asphalt concrete	D8140	97,000	TONS	$79.00	$7,663,000.00
	7	Furnish and install W-beam type guardrail	D8140	58,000	LF	$36.00	$2,088,000.00
	8	Furnish and install miscellaneous pipe culverts Assume 60-inch-diameter, wt/ft=100 lbs/ft.	D8140	1,800	LF	$250.00	$450,000.00
		Utility Relocations within Reservoir Inundation					
	9	Remove Existing Transmission Lines Two 115-kV H-frame wood-pole lines, 60-feet apart 954 AWG conductor	D8440	7	miles	$50,000.00	$350,000.00
	10	Construct Transmission Lines Two 115-kV H-frame wood-pole lines, 60-feet apart 954 AWG conductor	D8440	12	miles	$370,000.00	$4,440,000.00
	11	Install new buried fiber optic line along new SH24 ROW Assume abandon existing line.	D-8120	12	miles	$31,000.00	$372,000.00
		Road and Utility Relocations Subtotal					**$102,891,000.00**

QUANTITIES		PRICES	
BY Anne Pavol (8140)	**CHECKED** Chou Cha (8140)	**BY** Jeff Morris (8170) 7/30/08	**CHECKED** 7/30/2008
DATE PREPARED 4/24/04	**PEER REVIEW**	**DATE PREPARED** 07/30/08	**PEER REVIEW** 7/31/08

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Cost Estimate

Downstream Seepage Mitigation - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Dam_Most Probable_060208.xls]DS Seepage Mitigation

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		MAIN COLLECTION FEATURE (7 MILES DOWNSTREAM)					
	1	Construct concrete diaphragm wall *Assume slurry trench construction, using a hydrofraise machine to 200-ft depth (5500 ft long)* *Assume excavation will be both in soil and rock* *Assume concrete backfill*	D8312	1,100,000	SF	$170.00	$187,000,000.00
	2	Furnish and construct rockfill embankment *Assume wall forms impervious barrier* *Embankment consists of rockfill obtained from within 2 miles of site* *Rough dimensions are 15 ft high, 5500 ft long, 20 ft wide crest, and 1.5:1 side slopes*	D8312	130,000	CY	$17.00	$2,210,000.00
	3	Install water wells *Assume 10 wells, each 300 ft deep* *Assume finished as water or dewatering wells with gravel pack and well screen*	D8312	3,000	LF	$195.00	$585,000.00
		Sheet Subtotal					**$189,795,000.00**

QUANTITIES		PRICES	
BY Bill Engemoen (8312)	**CHECKED** Bill Engemoen (8312)	**BY** Jerry Zander (8170)	**CHECKED** 7/30/2008
DATE PREPARED 06/04/08	**PEER REVIEW** Al Kiene (8312)	**DATE PREPARED** 07/30/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Cost Estimate

Downstream Seepage Mitigation - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Dam_Most Probable_060208.xls]DS Seepage Mitigation

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Concrete Inlet Structure (Q=70 cfs)					
		Assume inlet structure excavation covered under embankment excavation.					
	4	Furnish, form, and place reinforced concrete	D8120	30	CY	$1,400.00	$42,000.00
	5	Furnish and place concrete reinforcement. Assume 130 #/CY	D8120	3,900	LBS	$1.80	$7,020.00
	6	Furnish and handle cement (.282T/CY)	D8120	9	TONS	$190.00	$1,710.00
	7	Furnish and install miscellaneous metalwork grating and guardrails	D8120	220	LBS	$13.50	$2,970.00
	8	Furnish and install steel trashracks (35 psf)	D8120	5,150	LBS	$9.50	$48,925.00
	9	Furnish and install 54-inch x 54-inch slide gate steel or stainless steel welded construction self-contained, wall-mounted gate invert to opening= 15.5 feet manual actuation estimated weight: 2,700 LBS	D8120	1	LS	$64,000.00	$64,000.00
	10	Furnish and install trashrake Assume Brackett Bosker Raking Machine Heavy duty model w/ typical column supports Trashrack height=15 ft, Width= 8-ft Assume 50-ft long curved track. BrackettGreenUSA, Inc. Telephone: 281-480-7955	8D120	1	EA	$190,000.00	$190,000.00
		Sheet Subtotal					**$356,625.00**

QUANTITIES		PRICES	
BY Brad VanOtterloo (8120)	CHECKED Dick LaFond (8120)	BY Jerry Zander (8170)	CHECKED 7/30/2008
DATE PREPARED 06/02/08	PEER REVIEW	DATE PREPARED 07/30/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Cost Estimate

Downstream Seepage Mitigation - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Discharge Line					
		Discharge line quantities are from cutoff wall to Yakima River (~20 miles).					
		(Design flow= 70 cfs)					
		Earthwork for Discharge Pipe					
		Price Alternative 2. Alternative 1 for reference only.					
		Alternative 1 - Payline Quantities - Vertical Trench Walls					
		Clearing and Grubbing (150 ft wide along pipeline)	D8120		SY		
		Common Excavation for pipe	D8120		CY		
		Rock Excavation for pipe - (drill and shoot)	D8120		CY		
		Backfill for pipe	D8120		CY		
		Rockfill for pipe (used instead of backfill under dam)	D8120		CY		
		Soil Cement Slurry (CLSM)	D8120		CY		
		Alternative 2 - Takeoff Quantities - 1-1/2:1 Trench Walls					
	11	Clearing and Grubbing (150 ft wide ROW along pipeline)	D8120	1,820,000	SY	$0.76	$1,383,200.00
	12	Common Excavation for pipe	D8120	720,400	CY	$3.40	$2,449,360.00
	13	Backfill for pipe	D8120	581,500	CY	$3.80	$2,209,700.00
	14	Soil Cement Slurry (CLSM)	D8120	88,100	CY	$85.00	$7,488,500.00
		48-inch Diameter Mortar-lined Steel Pipe					
	15	48-inch, pipe thickness = 0.375 (200 lb/ft steel weight)	D8120	109,200	LF	$390.00	$42,588,000.00
	16	River/Road Crossings	D8120	4	EA	$21,000.00	$84,000.00
		Assume Cold Creek, Dry Creek, and 2 @ SH240					
		Assume creeks have minimal Q during construction.					
	17	Air Valve Installations (Assume 10 required)	D8140	1	LS	$420,000.00	$420,000.00
		Concrete: 810 CY					
		Cement: 230 Tons					
		Reinforcement: 148,000 LBS					
		Excavation: 4,500 CY					
		Backfill: 247 CY					
		6-inch Air/Vacuum Valves: 10 EA.					
		Sheet Subtotal					**$56,622,760.00**

QUANTITIES

BY Brad VanOtterloo (8120) Dave Gesundheit (8140)	**CHECKED** Dick LaFond (8120), Dave Edwards (8140)	**DATE PREPARED** 06/02/08	**PEER REVIEW** Dave Edwards (8140)

PRICES

BY AZ Jerry Zander (8170)	**CHECKED** 7/30/2008	**DATE PREPARED** 07/30/08	**PEER REVIEW**

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable Cost Estimate

Downstream Seepage Mitigation - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Dam_Most Probable_060208.xls]DS Seepage Mitigation

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Concrete Baffled Outlet Structure (Type 8)					
		Assume inlet structure excavation covered under embankment excavation.					
		(Design flow= 70 cfs)					
	18	Excavation of common materials for structures	D8120	150	CY	$38.00	$5,700.00
	19	Furnish and place backfill around structures	D8120	85	CY	$28.00	$2,380.00
	20	Compact backfill around structures	D8120	85	CY	$24.00	$2,040.00
	21	Furnish, form, and place reinforced concrete	D8120	21	CY	$1,400.00	$29,400.00
	22	Furnish and place concrete reinforcement.	D8120	2,730	LBS	$1.80	$4,914.00
		Assume 130 #/CY					
	23	Furnish and handle cement (.282T/CY)	D8120	6	TONS	$190.00	$1,140.00
	24	Furnish and install miscellaneous metalwork grating, guardrails, safety racks	D8120	3,900	LBS	$11.50	$44,850.00
		Furnish and install riprap and bedding					
	25	Riprap (d50=24") (120 lb/cf)	D8120	1,000	TONS	$57.00	$57,000.00
	26	Riprap Bedding (130 lb/cf)	D8120	400	TONS	$47.00	$18,800.00
		Seepage Mitigation Subtotal					**$246,940,609.00**

QUANTITIES		PRICES	
BY	CHECKED	BY	CHECKED
Brad VanOtterloo (8120)	Dick LaFond (8120)	Jerry Zander (8170)	7/30/2008
DATE PREPARED	PEER REVIEW	DATE PREPARED	PEER REVIEW
06/02/08		07/30/08	

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:	PROJECT:	
Black Rock Preferred Alternative Outflow Conveyance System Most Probable Cost Estimate Summary	Yakima River Basin Water Storage Study	
	WOID: YAKAP	ESTIMATE LEVEL: Appraisal
	REGION PN	PRICE LEVEL: Apr-07
Summary Sheet	FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MP\[Black Rock Ouflow_Most Probable_060208 Rev.xls]Summary	

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Outflow Conveyance System sized for 2,500 cfs. **Black Rock Outlet Facility loacted at MP22.6 on Roza Canal** **Bypass capacity: 2,500 cfs, Powerplant capacity: 900 cfs** **Sunnyside Deliveries by Pressure Pipe Option.**					
		Black Rock Outflow Conveyance Subtotal					$415,741,270.00
		Plant - Civil and Structural Subtotal					$35,544,819.00
		Plant - Mechanical Subtotal					$76,188,749.57
		Plant - Electrical Subtotal					$14,051,630.48
		Switchyard & Transmission Line Subtotal					$1,048,500.00
		Subtotal					**$542,574,969.05**
		Mobilization		5%	(+/-)		$27,000,000.00
		Subtotal with mobilization					**$569,574,969.05**
		Escalation During Construction		0%	(+/-)		$0.00
		Subtotal with mobilization and escalation					**$569,574,969.05**
		Design Contingencies		10%	(+/-)		$60,425,030.95
		CONTRACT COST					**$630,000,000.00**
		Construction Contingencies		25%	(+/-)		$ 150,000,000.00
		FIELD COST					**$780,000,000.00**
		Non-Contract Costs **		25%	(+/-)		$200,000,000.00
		CONSTRUCTION COST					**$980,000,000.00**

Escalation to notice to proceed, allowance for procurement strategies, and utility relocations are not included.

** Land Acquisition Costs of $168,750 associated with these features are included in the Non-Contract Costs.

QUANTITIES		PRICES	
BY Design Team	CHECKED	BY J. Morris, J. Zander L. Zander (D8170)	CHECKED
DATE PREPARED 6/02/08	PEER REVIEW	DATE PREPARED 6/12/08	PEER REVIEW

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Cost Estimate

Intake - Civil Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MP\[Black Rock Ouflow_Most Probable_060208 Rev.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Intake Structure with Fishscreens					
		Assume single level intake at Black Rock Reservoir.					
		Assume Top of Dead Pool @ El. 1500.0					
		Civil/Structural					
		Structural Excavation and Backfill					
		Assume top 5 feet of excavation is common and the remainder is rock					
	1	Excavation of common materials for structures	D8120	1,700	CY	$19.00	$32,300.00
	2	Excavation of rock for structures (drill & shoot)	D8120	1,000	CY	$29.00	$29,000.00
		Assume no backfill.					
		Construct Fishscreened Intake Structure (incl. Manifold Encasement)					
	3	Furnish, form, and place reinforced concrete (f'c=4ksi)	D8120	1,500	CY	$930.00	$1,395,000.00
	4	Furnish and place concrete reinforcement. (110#/CY)	D8120	165,000	LBS	$2.00	$330,000.00
	5	Furnish and handle cement	D8120	423	TONS	$175.00	$74,025.00
		Waste Outflow Tunnel Muck at Black Rock					
		Assume waste material within 2 miles of portal.					
		Quantities include 1/2 outflow tunnel.					
		Waste rock excavation	D8120	510,000	CY	$4.90	$2,499,000.00
		Waste Excess Excavated Material at Roza Canal					
		Assume waste material within 2 miles of excavation					
		Quantities include 1/2 outflow tunnel + outlet structure @ Roza Canal					
		Waste rock excavation	D8120	575,000	CY	$4.90	$2,817,500.00
		Waste common material	D8120	90,000	CY	$4.20	$378,000.00
		Sheet Subtotal					**$7,554,825.00**

QUANTITIES		PRICES	
BY Dick LaFond (8120) 6/3/2004	CHECKED Mike O'Shea (8120)	BY Jeff Morris (8170)	CHECKED 8/04/08
DATE PREPARED 6/2/2008	PEER REVIEW	DATE PREPARED 07/30/08	PEER REVIEW 08/04/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Cost Estimate

Intake - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP
ESTIMATE LEVEL: Appraisal
REGION PN
PRICE LEVEL: Apr-07
FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Ouflow_Most Probable_060208.xls]Switchyd&TLine

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Intake Structure with Fishscreens					
		Mechanical					
	6	Fish screen, radius = 20 ft, 90 ft long half cylinder shape	D-8410				
		structural steel weight		104,000	LBS	$6.60	$686,400.00
		stainless steel weight		70,000	LBS	$22.00	$1,540,000.00
	7	Air burst cleaning system, 250 psi working pressure	D-8410				
		a. 30,000 gallon receiver tank		60,000	LBS	$5.40	$324,000.00
		b. Air compressor units, each 30 hp, 87 cfm @ 250 psi @ 600 lbs each, two required		1,200	LBS	$27.00	$32,400.00
		c. 6" dia. piping and butterfly valves (steel)		10,000	LBS	$9.40	$94,000.00
	8	Bulkhead gates and frames/guides (steel) (assumes four - 10' by 10' bulkhead gates)	D-8410	144,000	LBS	$6.90	$993,600.00
		Sheet Subtotal					**$3,670,400.00**

QUANTITIES		PRICES	
BY: Rich Christensen (8410)	CHECKED: Alex Ritt (8410)	BY: Jeff Morris (8170) 7/31/08	CHECKED: 7/31/08
DATE PREPARED: 6/1/04, 6/02/2008	PEER REVIEW:	DATE PREPARED: 07/30/08	PEER REVIEW: 7/31/08

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Cost Estimate

Outflow Conveyance - Civil/Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Ouflow_Most Probable_060208.xls]Switchyd&TLine

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Tunnel					
		Construct 90,000-ft long, 17.00-ft finished diameter, 19.67-ft minimum bore diameter, tunnel in rock. Tunnel will be excavated with TBM and driven uphill. Water problems will be minimal. Tunnel has three final support reaches.					
		80,600-ft long unreinforced concrete lined reach					
	9	Excavation (907,000 cy, appr 11 cy/lf)	D-8140	80,600	lf	$1,500.00	$120,900,000.00
	10	Furnish and place unreinforced concrete tunnel lining	D-8140	229,000	cy	$460.00	$105,340,000.00
	11	Cementitious materials for concrete tunnel lining	D-8140	64,600	tons	$150.00	$9,690,000.00
	12	Furnish & install 3/4-in dia, 8-ft long rock bolts	D-8140	642,000	lin ft	$71.00	$45,582,000.00
		2,000-ft long reinforced concrete lined reach					
	13	Excavation (22,500 cy, appr 11 cy/lf)	D-8140	2,000	lf	$1,500.00	$3,000,000.00
	14	Furnish and place reinforced concrete tunnel lining	D-8140	5,690	cy	$550.00	$3,129,500.00
	15	Cementitious materials for concrete tunnel lining	D-8140	1,600	tons	$175.00	$280,000.00
	16	Furnish and install concrete reinforcement	D-8140	81,700	lbs	$1.80	$147,060.00
	17	Furnish and install structural steel tunnel supports	D-8140	828,000	lbs	$6.10	$5,050,800.00
		7,400-ft long steel lined portal reach					
	18	Excavation (83,300 cy, appr 11 cy/lf)	D-8140	7,400	lf	$1,500.00	$11,100,000.00
		Steel Tunnel Liner:					
		ASTM A572 Gr. 50: Sy = 50 kpsi St = 65 kpsi					
	19	204" Dia., 7/8" wall, L= 7770 ft., 1916 lbs/ft	D-8420	19,200,000	LBS	$3.30	$63,360,000.00
	20	Furnish and place backfill concrete	D-8140	21,100	cy	$430.00	$9,073,000.00
	21	Cementitious materials for backfill concrete	D-8140	5,940	tons	$150.00	$891,000.00
	22	Furnish & install 3/4-in dia, 8-ft long rock bolts	D-8140	89,600	lin ft	$71.00	$6,361,600.00
	23	Furnish and install structural steel tunnel supports	D-8140	415,000	lbs	$6.10	$2,531,500.00
		Sheet Subtotal					**$386,436,460.00**

QUANTITIES		PRICES	
BY Bill Thompson (8140) Nathan Nakamoto (8420)	CHECKED Kevin Atwater (8140), Rick Frisz, (8420)	BY Jeff Morris (8170) 7/31/08	CHECKED 7/31/08
DATE PREPARED 5/26/04	PEER REVIEW	DATE PREPARED 07/30/08	PEER REVIEW 7/31/08

ESTIMATE WORKSHEET

FEATURE: Black Rock Preferred Alternative Outflow Conveyance System Most Probable Cost Estimate	**PROJECT:** Yakima River Basin Water Storage Study
	WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
	REGION PN **PRICE LEVEL:** Apr-07
Outflow Conveyance - Civil/Mechanical	**FILE:** H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Ouflow_Most Probable_060208.xls]Switchyd&TLine

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Surge Shaft					
		Construct 530-ft deep, 40.0-ft finished diameter, 46-ft excavated diameter, shaft in rock. Shaft will be excavated by raise bore and slash method (drill & blast). Water problems will be minimal. Shaft has two final support reaches.					
		430-ft deep unreinforced concrete lined reach					
	24	Excavation (26,500 cy, approx. 62 cy/lf)	D8140	430	lf	$17,000.00	$7,310,000.00
	25	Furnish and place unreinforced concrete shaft lining	D8140	6,450	cy	$500.00	$3,225,000.00
	26	Cementitious materials for concrete shaft lining	D8140	1,820	tons	$175.00	$318,500.00
	27	Furnish & install 1-in dia, 12-ft long rock bolts	D8140	21,000	lin ft	$80.00	$1,680,000.00
		100-ft deep reinforced concrete lined shaft top reach					
	28	Excavation (6,160 cy, approx. 62 cy/lf)	D8140	100	lf	$17,000.00	$1,700,000.00
	29	Furnish and place reinforced concrete shaft lining	D8140	1,500	cy	$500.00	$750,000.00
	30	Cementitious materials for concrete shaft lining	D8140	423	tons	$175.00	$74,025.00
	31	Furnish and install concrete reinforcement	D8140	18,700	lin ft	$1.80	$33,660.00
	32	Furnish & install 1-in dia, 12-ft long rock bolts	D8140	4,800	lin ft	$80.00	$384,000.00
	33	Furnish and install chain link protection	D8140	76,600	sq yd	$34.00	$2,604,400.00
		Black Rock Outflow Conveyance Subtotal					**$415,741,270.00**

QUANTITIES		PRICES	
BY Bill Thompson	**CHECKED** Kevin Atwater (8140)	**BY** Jeff Morris (8170) 7/31/08	**CHECKED** 7/31/08
DATE PREPARED 4/19/04	**PEER REVIEW**	**DATE PREPARED** 07/30/08	**PEER REVIEW** 7/31/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Cost Estimate

Black Rock Outlet Facility - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Ouflow_Most Probable_060208.xls]Switchyd&TLine

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Access Road (60 ft of 24ft wide bituminous surface):					
	1	Clear roadway alignment	D8120	1,440	SF	$1.60	$2,304.00
	2	Furnish and place base course material (9-inch depth)	D8120	75	TONS	$32.00	$2,400.00
	3	Furnish and place asphalt concrete (6-inch depth)	D8120	55	TONS	$160.00	$8,800.00
		Service Yard (6" asphalt concrete surface)					
		Assume T.O Yard= El 1176.0					
	4	Strip and clear pumping plant site to 1 foot depth	D8120	7,850	CY	$3.20	$25,120.00
	5	Common excavation to Yard (25% Strip & Clear)	D8120	2,000	CY	$16.00	$32,000.00
	6	Place and compact embankment for yard (25% Exc.)	D8120	500	CY	$21.00	$10,500.00
	7	Furnish and place base course material (6-inch)	D8120	4,600	TONS	$32.00	$147,200.00
	8	Furnish and place asphalt concrete (6-inch)	D8120	5,100	TONS	$100.00	$510,000.00
	9	Furnish and install 7-foot chain link fence for PP Yard	D8120	1,900	LF	$27.00	$51,300.00
	10	Furnish and install 7-foot x 24-foot access gates	D8120	3	EA	$4,700.00	$14,100.00
		Diversion During Construction:					
		Assume need to pass 900 cfs canal flow during construction. Assume local borrow.					
		Assume no dewwatering required.					
	11	Construct U/S & D/S earth cofferdams. (Height=15 ft)	D8120	2,000	CY	$32.00	$64,000.00
	12	F&I impervious geomembrane on cofferdams.	D8120	350	SY	$21.00	$7,350.00
	13	F&I three 9-ft dia. X .138-in galv., corrugated metal pipes btwn cofferdams. Wt/Ft= 210 lbs/ft.	D8120	1,000	LF	$680.00	$680,000.00
	14	Remove cofferdams and diversion structures	D8120	1	LS	$45,000.00	$45,000.00
		Sheet Subtotal					**$1,600,074.00**

QUANTITIES		PRICES	
BY Dick LaFond (8120)	CHECKED Brad VanOtterloo	BY Jerry Zander (8170)	CHECKED OK 7/31/08
DATE PREPARED 6/3/04	PEER REVIEW	DATE PREPARED 07/30/08	PEER REVIEW 07-31-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Cost Estimate

Black Rock Outlet Facility - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Ouflow_Most Probable_060208.xls]Switchyd&TLine

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Tailrace Channel (Lined - Lining covered under structural)					
		T.O Ground El. 1176. Assume T.O. Rock El. 1150					
		Assume waste rock and common material within 2 miiesof excavation. See Sht 2.					
	15	Common excavation for tailrace channel	D8120	32,000	CY	$7.40	$236,800.00
	16	Rock excavation for tailrace channel (drill & shoot)	D8120	6,700	CY	$32.00	$214,400.00
		Structural Excavation and Backfill					
		T.O Ground El. 1176. Assume T.O. Rock El. 1150					
		Assume stockpile rock for later use as riprap.					
	17	Common excavation for structures	D8120	22,500	CY	$10.50	$236,250.00
	18	Rock excavation for structures (drill & shoot)	D8120	9,500	CY	$32.00	$304,000.00
	19	Furnish backfill for structures (reuse excavation)	D8120	6,400	CY	$0.00	$0.00
	20	Place backfill around structures	D8120	6,400	CY	$16.00	$102,400.00
	21	Compact backfill around structures	D8120	6,400	CY	$18.00	$115,200.00
		Pipe Trench Excavation and Backfill					
		Manifold excavation in yard.					
		T.O Ground El. 1176. Assume T.O. Rock El. 1150					
	22	Common excavation for pipe in Service Yard	D8120	18,000	CY	$8.70	$156,600.00
	24	Furnish, place, & compact backfill for pipe (local)	D8120	11,500	CY	$34.15	$392,725.00
		Pipe Trench Excavation and Backfill					
		From Tunnel Portal (Sta. 910+00) to Yard (Sta. 940+00)					
		Assume all common excavation					
	25	Common excavation for pipe	D8140	487,000	CY	$4.00	$1,948,000.00
	26	Furnish backfill for pipe	D8140	461,500	CY	$0.00	$0.00
	27	Place backfill around pipe	D8140	461,500	CY	$4.70	$2,169,050.00
	28	Compact pipe backfill (F&P included in above items)	D8140	36,000	CY	$10.50	$378,000.00
		Sheet Subtotal					**$6,253,425.00**

QUANTITIES		PRICES	
BY Dick LaFond (8120) Linda Bowles (8140)	CHECKED Mike O'Shea (8120), Ann Pavol (8140)	BY Jerry Zander (8170)	CHECKED 7/31/08
DATE PREPARED 5/15/04	PEER REVIEW	DATE PREPARED 07/30/08	PEER REVIEW 07.31.08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Cost Estimate

Black Rock Outlet Facility - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Ouflow_Most Probable_060208.xls]Switchyd&TLine		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		STRUCTURAL					
		Construct Concrete Tailrace Lining and Retaining Walls					
		Assume lining is 1-foot thick w/ #6@12" EW EF, 1.5:1 side slopes					
	29	Furnish, form, and place reinforced concrete lining in excavated channel (f'c= 4 ksi)	D8120	2,000	CY	$930.00	$1,860,000.00
	30	Furnish, form, and place reinforced concrete walls	D8120	1,500	CY	$960.00	$1,440,000.00
	31	Furnish and place concrete reinforcement. Assume 130 #/CY	D8120	455,000	LBS	$1.95	$887,250.00
	32	Furnish and handle cement (.282T/CY)	D8120	980	TONS	$150.00	$147,000.00
		Construct Powerplant and Bypass Substructure					
	33	Furnish, form, and place reinforced concrete	D8120	14,500	CY	$710.00	$10,295,000.00
	34	Furnish and place concrete reinforcement. Assume 120 #/CY	D8120	1,740,000	LBS	$1.85	$3,219,000.00
	35	Furnish and handle cement (.282T/CY)	D8120	4,090	TONS	$135.00	$552,150.00
	36	**Construct Powerplant and Bypass Superstructure** 212.5-ft x 73.5-ft x 42-ft high superstructure Structural steel superstructure with CMU walls. Stepped columns for 90T crane support Built-up roof on metal roof deck.	D8120	15,620	SF	$250.00	$3,905,000.00
		Sheet Subtotal					**$22,305,400.00**

QUANTITIES		PRICES	
BY Dick LaFond (8120)	CHECKED Mike O'Shea (8120)	BY Jerry Zander (8170)	CHECKED DK 7/31/08
DATE PREPARED 6/4/04	PEER REVIEW	DATE PREPARED 07/30/08	PEER REVIEW DW 07-31-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Cost Estimate

Black Rock Outlet Facility - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Ouflow_Most Probable_060208.xls]Switchyd&TLine

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		STRUCTURAL (cont.)					
		Construct Pipe Encasements in Yard					
	37	Furnish, form, and place reinforced concrete	D8120	3,100	CY	$880.00	$2,728,000.00
	38	Furnish and place concrete reinforcement. Assume 110 #/CY	D8120	341,000	LBS	$1.95	$664,950.00
	39	Furnish and handle cement (.282T/CY)	D8120	874	TONS	$155.00	$135,470.00
		Structural Steel					
	40	Furnish and install structural steel (painted): Includes crane girder, rail, and hoist frames. Does not include typ. building framework.	D8120	175,000	LBS	$7.70	$1,347,500.00
		Miscellaneous Metalwork					
	41	Furnish and install miscellaneous metalwork Includes grating, hatches, ladders, guardrail, and cable trays	D8120	45,000	LBS	$11.00	$495,000.00
	42	Motor-operated, exterior insulated roll-up door 18' x 20'	D8120	1	EA	$15,000.00	$15,000.00
		Plant - Civil and Structural Subtotal					**$35,544,819.00**

QUANTITIES		PRICES	
BY Dick LaFond (8120)	**CHECKED** Mike O'Shea (8120)	**BY** Jerry Zander (8170)	**CHECKED** 7/31/08
DATE PREPARED 5/15/04	**PEER REVIEW**	**DATE PREPARED** 07/30/08	**PEER REVIEW** 07-31-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Cost Estimate

Black Rock Outlet Facility - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Ouflow_Most Probable_060208.xls]Switchyd&TLine

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Major Mechanical Equipment					
	1	Turbine-Vertical Francis, 31452 Hp 400 rpm, 339 ft. Design Head CF3 18-8 Stainless Runner 5.5' dia.	D8420	125,000	LBS	$22.00	$2,750,000.00
	2	Digital Governor, 103,905 ft.-lbs. 150 psi system	D8420	1	EA	$330,000.00	$330,000.00
	3	Governor Pressure Tank 875 Gal. Look to Flaming Gorge Oil Tank	D8420	7,640	LBS	$9.00	$68,760.00
		Sheet Subtotal					**$3,148,760.00**

QUANTITIES		PRICES	
BY Toby Turnage (8420)	CHECKED John Brooks (8420)	BY Lonnie Zlomke (8170)	CHECKED 7/31/07
DATE PREPARED 4/14/2004; 6/2/08	PEER REVIEW	DATE PREPARED 07/30/08	PEER REVIEW 07/31/08

ESTIMATE WORKSHEET

FEATURE: Black Rock Preferred Alternative Outflow Conveyance System Most Probable Cost Estimate	**PROJECT:** Yakima River Basin Water Storage Study
	WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
	REGION PN **PRICE LEVEL:** Apr-07
Black Rock Outlet Facility - Mechanical	**FILE:** H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MP\[Black Rock Ouflow_Most Probable_060208 Rev.xls]Plant-Mechanical

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Furnish and install the following:					
		Steel Penstock:					
		Steel plate used for pipe fabrication:					
		ASTM A36: Sy = 36 kpsi					
		(All pipe sizes are inside diameters)					
	4	204" Dia., 1 15/16" wall, L= 3,000 ft., 4265 lbs/ft	D8420	12,795,000	LBS	$2.70	$34,546,500.00
	5	84" Dia., 13/16" wall, L= 492 ft., 737 lbs/ft	D8420	363,000	LBS	$2.30	$834,900.00
		Stainless Steel Stilling Basin for Sleeve Valves:					
		ASTM 316L Stainless steel plate					
	6	Four - 396" Dia., 1 1/4" wall cylindrical tanks with baseplates:					
		Each tank height = 20 feet					
		Total weight for four tanks = 1,180,000 lbs.	D8420	1,180,000	LBS	$18.00	$21,240,000.00
		Sleeve valves with hydraulic operators:					
	7	Four - 84" Dia. Inlet X 72" Dia. Outlet Valves	D8420	280,000	LBS	$18.00	$5,040,000.00
		ASTM 316L Stainless steel plate					
		Each valve weight = 70,000					
		Total weight for four valves = 280,000 lbs.					
		Spherical valves with hydraulic operators:					
	8	Sleeve valve guard valves	D8420	240,000	LBS	$12.00	$2,880,000.00
		Four - 60" Dia. Spherical valves with hydraulic operators					
		60,000 lbs. per valve					
		Turbine guard valve					
	9	One - 84" Dia. Spherical valve with hydraulic operator	D8420	140,000	LBS	$12.00	$1,680,000.00
		140,000 lbs. per valve					
		Sunnyside Power Plant Isolation Valve					
	10	One - 84" Dia. Spherical valve with hydraulic operator	D8420	140,000	LBS	$12.00	$1,680,000.00
		140,000 lbs. per valve					
		Sheet Subtotal					**$67,901,400.00**

QUANTITIES		PRICES	
BY	CHECKED	BY	CHECKED
Nathan Nakamoto (8420)	Rick Frisz (8420)	Lonnie Ziemke (8170)	
DATE PREPARED		DATE PREPARED	PEER REVIEW
5/26/04		8/12/08	

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Cost Estimate

Black Rock Outlet Facility - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Ouflow_Most Probable_060208.xls]Switchyd&TLine

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	10	Furnishing and installing one 90-Ton overhead crane, 67.5' span	D8410	157,500	LBS	$7.30	$1,149,750.00
	11	Furnishing and installing Hydraulic elevator capacity = 3500 pounds, travel = 31 ft. landings = 3, speed = 100 ft/min.	D8410	1	unit	$480,000.00	$480,000.00
	12	Bulkhead gates and guides at turbine (steel) (assumes 3 bays of guides and 3 bulkhead gates)	D8410	31,000	LBS	$5.60	$173,600.00
	13	Monorail hoist for bulkhead gate, electric wire rope, motorized trolley, 5-ton capacity	D8410	1,500	LBS	$24.00	$36,000.00
	14	Stoplogs, lifting beam & guides at sleeve valves eight bays fo guides, 2 bays of stoplogs (steel)	D8410	152,000	LBS	$6.80	$1,033,600.00
	15	CO2 High Pressure Fire Extinguishing System: 12 - 100# Storage Cylinders w/ control panel and appurtenances and 400 lbs. of sch. 80 carbon steel pipe, valves & fittings	D8410	1	L.S.	$43,000.00	$43,000.00
	16	Fire Suppression System: 3 Fire hose reels w/ 100 feet of hose 12 - Portable hand-held 20# extinguishers 2,000 lbs. of sch. 40 carbon steel pipe, valves & fittings 1 - Fire pump, split-case, 500 gpm @ 300 ft of head	D8410	1	L.S.	$60,000.00	$60,000.00
	17	Unit Cooling Water System: 2 - Cooling water pumps, end-suction type, 150 gpm 2 - 8-inch automatic, self-cleaning strainers 1,000 lbs. of type K copper tubing, valves & fittings 4,000 lbs. of ductile iron, mechanical joint pipe & fittings	D8410	1	L.S.	$155,000.00	$155,000.00
	18	Lubricating Oil System: 2- 500 gal carbon steel storage tanks 1 - 10 gpm @ 100 psi oil pump 1 - lube oil filter 1,000 lbs. of sch. 40 carbon steel pipe, valves & fittings	D8410	1	L.S.	$24,000.00	$24,000.00
		Sheet Subtotal					**$3,154,950.00**

QUANTITIES		**PRICES**	
BY Rick Chnstensen . Bob Sund (8410) Connie Berte, John Grass, Randy Egan	**CHECKED** Alex Ritt (8410)	**BY** Lonnie Zlomke (8170)	**CHECKED** 7/31/08
DATE PREPARED 5/3/2004, 5/02/2008	**PEER REVIEW**	**DATE PREPARED** 07/30/08	**PEER REVIEW** 07/31/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Cost Estimate

Black Rock Outlet Facility - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Ouflow_Most Probable_060208.xls]Switchyd&TLine		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	19	Compressed Air System: 2 - 100 cfm @ 125 psi rotary screw air compressors 1 - 250 gal. carbon steel air receiver 1 - 100 cfm air dryer 500 lbs. of sch. 40 carbon steel pipe, valves & fittings	D8410	1	L.S.	$60,000.00	$60,000.00
	20	Service Water System: 1 - Service water pump, 75 gpm @ 200 ft. of head 1 - Hydropneumatic Tank, 300 gal. 750 lbs. of type K copper tubing, valves & fittings	D8410	1	L.S.	$120,000.00	$120,000.00
	21	Gravity Drainage System: 12 - Floor drains, cast iron 5,000 lbs. of cast iron hub & spigot, service weight soil pipe	D8410	1	L.S.	$60,000.00	$60,000.00
	22	Plant Unwatering System: 2 - Vertical turbine type sump pump, 500 gpm @ 50 ft hd 1 - Drainage jet type drainage pump 1,000 lbs. of type K copper tube, valves & fittings 3,000 lbs. of ductile iron, mechanical joint pipe & fittings	D8410	1	each	$83,639.57	$83,639.57
	23	Domestic Water and Sanitary Waste System: 2 - Water Closets 1 - Urinal 2 - Lavatories & accessories 1 - Duplex Sewage Ejector 2,000 lbs. of cast iron hub & spigot service weight sewer pipe 400 lbs. of type K copper tubing, valves & fittings	D8410	1	each	$60,000.00	$60,000.00
		Sheet Subtotal					**$383,639.57**

QUANTITIES		**PRICES**	
BY J Grass, R Egan (8410)	**CHECKED** Alex Ritt (8410)	**BY** Lonnie Zlomke (8170)	**CHECKED** D. K 7/31/08
DATE PREPARED 5/27/2004, 6/02/2008	**PEER REVIEW**	**DATE PREPARED** 07/30/08	**PEER REVIEW** 07/31/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Cost Estimate

Black Rock Outlet Facility - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Ouflow_Most Probable_060208.xls]Switchyd&TLine		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Heating, Ventilating, and Air Conditioning Unmanned air cooled plant . OA temp 95 degrees F.	D8410	1	L.S.	$1,600,000.00	$1,600,000.00
		Plant - Mechanical Subtotal					**$76,188,749.57**

QUANTITIES		PRICES	
BY Paul Schlein, Michael Weems (8410)	**CHECKED** Alex Ritt (8410)	**BY** Lonnie Zlomke (8170)	**CHECKED** D. K 7/31/08
DATE PREPARED 6/1/2004, 6/02/2008	**PEER REVIEW**	**DATE PREPARED** 07/30/08	**PEER REVIEW** 07/31/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Cost Estimate

Black Rock Outlet Facility - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Ouflow_Most Probable_060208.xls]Switchyd&TLine

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	1	**Electrical Generator (F&I)** 25,000 kVA, 6,900 volts, 3-phase, 60 Hz 276.9 rpm, 95 % power factor Vertical, synchronous machine Static excitation system & voltage regulator	8430	1	EA	$11,000,000	$11,000,000.00
		Plant Grounding System (F&I)	8430				
	2	Ground rods, 10 ft, 3/4" dia, copper-clad		30	EA	$250.00	$7,500.00
		Stranded bare-copper conductor:					
	3	250 MCM		1,200	LF	$13.00	$15,600.00
	4	4/0 AWG		800	LF	$12.00	$9,600.00
	5	2/0 AWG		500	LF	$8.30	$4,150.00
	6	4 AWG		800	LF	$3.30	$2,640.00
		Generator Bus & Metal-Enclosed Switchgear (F&I)	8430				
	7	Generator isolated phase bus: 15 kV, 3000 amperes, 3-phase, 60 Hz		250	LF	$1,750.00	$437,500.00
	8	Generator power circuit breaker: 15 kV, 3000 amperes, 3-phase, vacuum type		1	EA	$870,000	$870,000.00
	9	Station-service fused interrupter switch: 15 kV, 600 ampere, 3-phase, w/ power fuses		1	EA	$36,000.00	$36,000.00
		Generator Control Equipment (F&I)	8430				
	10	Duplex control switchboard for operation of the generator		1	EA	$870,000	$870,000.00
		Sheet Subtotal					**$13,252,990.00**

QUANTITIES		PRICES	
BY Mike Schuh (8430)	**CHECKED** Cory Maurer (8430)	**BY** Lonnie Zlomke (8170)	**CHECKED** 7/31/08
DATE PREPARED 5/22/08	**PEER REVIEW** George Girgis (8430)	**DATE PREPARED** 07/30/08	**PEER REVIEW** 07/31/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Cost Estimate

Black Rock Outlet Facility - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Ouflow_Most Probable_060208.xls]Switchyd&TLine

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Plant Battery System (F&I)	D8430				
	11	125 volt, 300 ampere-hour, lead-acid battery		1	EA	$30,000.00	$30,000.00
	12	Battery chargers		2	EA	$9,700.00	$19,400.00
	13	DC distribution panelboard, 100 ampere mains, and molded-case circuit breakers		1	EA	$15,000.00	$15,000.00
		Plant Station-Service Equipment (F&I)	D8430				
		Indoor secondary unit substation with following features:					
	14	Dry-type transformer, 6.9 kV-480Y/277, 1500 kVA		1	EA	$66,000.00	$66,000.00
	15	480 volt power-circuit breakers, 600 amperes		5	EA	$4,800.00	$24,000.00
		Building Lighting System (F&I)	D8430				
		Interior luminaires					
	16	High bay, high-pressure sodium, 400 Watt 480 volt, 1-phase		24	EA	$840.00	$20,160.00
	17	4 foot fluorescent lighting fixtures, 2 lamps		36	EA	$270.00	$9,720.00
	18	Emergency lighting system		1	LS	$4,200.00	$4,200.00
		Exterior luminaires					
	19	High-pressure sodium, wall-mounted, outdoor type 70 watt, 120 volt		12	EA	$482.54	$5,790.48
	20	**Building Fire Detection & Alarm System (F&I)**	D8430	1	LS	$180,000	$180,000.00
		Distribution Panelboards (F&I)	D8430				
	21	480-volts, 3-phase, 400 ampere bus, indoor type with 12 molded-case circuit breakers		2	EA	$12,000.00	$24,000.00
		Motor Control Center (F&I)	D8430				
	22	480 volts, 3-phase, 1600 ampere main bus Six 20 inch wide sections		1	EA	$230,000	$230,000.00
		Sheet Subtotal					**$628,270.48**

QUANTITIES		PRICES	
BY Mike Schuh (8430)	**CHECKED** Cory Maurer (8430)	**BY** Lonnie Zlomke (8170)	**CHECKED** D.K 7/31/08
DATE PREPARED 5/22/08	**PEER REVIEW** George Girgis (8430)	**DATE PREPARED** 07/30/08	**PEER REVIEW** 7/31/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Cost Estimate

Black Rock Outlet Facility - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MP\[Black Rock Ouflow_Most Probable_060208 Rev.xls]Plant-Electrical

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Insulated Conductors (F&I)	D8430				
		15 kV shielded power cable:					
	23	4 AWG		300	FT	$26.00	$7,800.00
		600-volt single-conductor, stranded-copper:					
	24	12 AWG		6,000	FT	$1.05	$6,300.00
	25	10 AWG		4,000	FT	$1.35	$5,400.00
	26	6 AWG		1,000	FT	$2.90	$2,900.00
	27	4 AWG		1,000	FT	$4.00	$4,000.00
	28	1/0 AWG		600	FT	$6.30	$3,780.00
	29	4/0 AWG		600	FT	$4.40	$2,640.00
		600-volt multi-conductor control cable:					
	30	9 conductor 14 AWG		1,500	FT	$2.90	$4,350.00
	31	12 conductor 14 AWG		2,000	FT	$3.70	$7,400.00
	32	5 conductor 10 AWG		2,000	FT	$3.30	$6,600.00
		Conduit System (F&I)	D8430				
		Rigid steel conduit:					
	33	1 inch		1,000	FT	$22.00	$22,000.00
	34	1 1/2 inch		500	FT	$29.00	$14,500.00
	35	2 inch		600	FT	$37.00	$22,200.00
	36	2 1/2 inch		350	FT	$55.00	$19,250.00
		Plastic-coated rigid steel:					
	37	2 inch		750	FT	$55.00	$41,250.00
		Plant - Electrical Subtotal					**$14,051,630.48**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Mike Schuh (8430)	Cory Maurer (8430)	Lonnie Ziomke (8170)	
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
5/22/08	George Girgis (8430)	8/12/08	

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable Cost Estimate

Black Rock Outlet Facility - Incoming Power

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock Ouflow_Most Probable_060208.xls]Switchyd&TLine		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Switchyard					
		Furnish and Install:					
	1	Oil-filled power transformer 30 MVA; 34.5-6.9kV, 3-phase	D8430	1	EA	$540,000	$540,000.00
	2	F&I 34.5-KV PRIMARY UNIT SUBSTATION: 'INCOMING 34.5KV SECTION/BUS/INTERRUPTER 'OUTGOING 6.9KV SECTION/BUS/INTERRUPTER 'SURGE ARRESTORS, 30KV	D8430	1	EA	$450,000	$450,000.00
		Tap at existing 34.5-kV line					
		Furnish and Install:					
	3	Wood-pole tap structure	D8430	1	EA	$10,500.00	$10,500.00
	4	**Construct Transmission Line (By Others)** Assume 1000 feet of transmission line from existing 34.5-kV line wood poles, 1115 AWG conductor	D8430	1,000	FT	$48.00	$48,000.00
		Switchyard & Transmission Line Subtotal					**$1,048,500.00**

QUANTITIES		PRICES	
BY Lisa Gamuciello (8430)	**CHECKED** Cory Maurer (8430)	**BY** Lonnie Ziomke (8170)	**CHECKED** DK 7/31/08
DATE PREPARED 5/14/08	**PEER REVIEW** George Girgis (8430)	**DATE PREPARED** 07/30/08	**PEER REVIEW** 07/31/08

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Delivery System - Option 1 Pipeline
Most Probable Cost Estimate

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MP\[Black Rock SunnysideDelivery_Most Probable_060208 Rev.xls]SS Delivery_Option1

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		12 ft. Dia. Steel Delivery Pipe					
	1	Clearing and grubbing	PN3440	93	ACRES	$3,500.00	$325,500.00
	2	Excavation (common)		884,000	CY	$2.80	$2,475,200.00
	3	Excavation (rock)		156,000	CY	$25.00	$3,900,000.00
	4	Soil cement bedding		7,840	CY	$135.00	$1,058,400.00
	5	Placing and compacting backfill		890,000	CY	$7.10	$6,319,000.00
	6	12 ft. dia. steel pipe, A572 GR 60 steel		62,000,000	LBS	$2.50	$155,000,000.00
		Check Structure on Sunnyside Canal	PN3440				
	7	Structural excavation (common)		1,060	CY	$22.00	$23,320.00
	8	Placing and compacting backfill		750	CY	$38.00	$28,500.00
	9	Concrete in structures		250	CY	$1,300.00	$325,000.00
	10	Langemann gates (26ft. long x 10 ft. tall)		2	EA	$280,000.00	$560,000.00
		Sunnyside Upstream Delivery Pipe	PN3440				
	11	Pumping plant (pump, structure, elec.)		1	LS	$890,000.00	$890,000.00
	12	Excavation, pipe (common)		40,500	CY	$4.70	$190,350.00
	13	Placing and compacting backfill		39,500	CY	$6.80	$268,600.00
	14	PVC pipe (diameter varies 18-inch to 6-inch)		1	LS	$510,000.00	$510,000.00
		Sheet Subtotal					**$171,873,870.00**

QUANTITIES		PRICES	
BY Guy Grooms (PN-3444)	**CHECKED** Steve Montague (PN-3440)	**BY** BJ For J M. Jeff Morris (8170)	**CHECKED** GMB
DATE PREPARED 12/01/04	**PEER REVIEW**	**DATE PREPARED** 7/30/2008	**PEER REVIEW**

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Delivery System - Option 1 Pipeline
Most Probable Cost Estimate

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MP\[Black Rock SunnysideDelivery_Most Probable_060208 Rev.xls]SS Delivery_Option1

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Subtotal					**$171,873,870.00**
		Mobilization		5%	(+/-)		$8,600,000.00
		Subtotal with mobilization					**$180,473,870.00**
		Escalation During Construction		0%	(+/-)		$0.00
		Subtotal with mobilization and escalation					**$180,473,870.00**
		Design Contingencies		15%	(+/-)		$29,526,130.00
		CONTRACT COST					**$210,000,000.00**
		Construction Contingencies		20%	(+/-)		$ 40,000,000.00
		FIELD COST					**$250,000,000.00**
		Non-Contract Costs **		25%	(+/-)		$60,000,000.00
		CONSTRUCTION COST					**$310,000,000.00**

Escalation to notice to proceed, allowance for procurement strategies, and utility relocations are not included.

** Land Acquisition Costs of $506,250 associated with these features are included in the Non-Contract Costs.

QUANTITIES		PRICES	
BY Guy Grooms (PN-3444)	CHECKED Steve Montague (PN-3440)	BY Jeff Morris (8170)	CHECKED MC Greg Hunt 8/20/08
DATE PREPARED Dec-04	PEER REVIEW	DATE PREPARED 8/20/08	PEER REVIEW

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable Cost Estimate
Summary

Summary Sheet

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MP\[Black Rock SunnysidePP_Most Probable_060208 Rev.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Sitework Subtotal					$2,766,440.00
		Structural & Architectural Subtotal					$10,649,900.00
		Mechanical Subtotal					$27,644,932.00
		Electrical Subtotal					$14,994,865.00
		Switchyard & Transmission Line Subtotal					$1,700,000.00
		Subtotal					**$57,756,137.00**
		Mobilization		5%	(+/-)		$2,900,000.00
		Subtotal with mobilization					**$60,656,137.00**
		Escalation During Construction		0%	(+/-)		$0.00
		Subtotal with mobilization and escalation					**$60,656,137.00**
		Design Contingencies		10%	(+/-)		$6,343,863.00
		CONTRACT COST					**$67,000,000.00**
		Construction Contingencies		20%	(+/-)		$ 13,000,000.00
		FIELD COST					**$80,000,000.00**
		Non-Contract Costs **		25%	(+/-)		$20,000,000.00
		CONSTRUCTION COST					**$100,000,000.00**

Escalation to notice to proceed, allowance for procurement strategies, and utility relocations are not included.

** Land Acquisition Costs of $28,125 associated with these features are included in the Non-Contract Costs.

QUANTITIES		PRICES	
BY Design Team	**CHECKED** Design Team	**BY** G. Akins, L. Zlomke (D8170)	**CHECKED** MC 8/20/08
DATE PREPARED 6/2/08	**PEER REVIEW** 6/3/2008	**DATE PREPARED** 8/20/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable Cost Estimate

Plant - Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock SunnysidePP_Most Probable_060208.xls]Switchyd&TLine		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Access Road (60 ft of 24ft wide bituminous surface):					
	1	Clear roadway alignment	D8120	1,440	SF	$1.25	$1,800.00
	2	Furnish and place base course material (9-inch depth)	D8120	75	TONS	$30.00	$2,250.00
	3	Furnish and place asphalt concrete (6-inch depth)	D8120	55	TONS	$160.00	$8,800.00
		Service Yard (6" asphalt concrete surface)					
		Assume T.O Ground= T.O Yard= El 894.5					
	4	Strip and clear pumping plant site to 1 foot depth	D8120	3,900	CY	$3.10	$12,090.00
	5	Common excavation to Yard (±50% Strip & Clear)	D8120	2,000	CY	$13.00	$26,000.00
	6	Place and compact embankment for yard (50% Exc.)	D8120	1,000	CY	$21.00	$21,000.00
	7	Furnish and place base course material (6-inch)	D8120	3,600	TONS	$30.00	$108,000.00
	8	Furnish and place asphalt concrete (6-inch)	D8120	4,000	TONS	$100.00	$400,000.00
	9	Furnish and install 7-foot chain link fence for PP Yard	D8120	1,400	LF	$26.00	$36,400.00
	10	Furnish and install 7-foot x 24-foot access gates	D8120	3	EA	$4,600.00	$13,800.00
		Diversion During Construction:					
		Assume need to pass 900 cfs canal flow during construction. Assume loacl borrow.					
		Assume no dewwatering required.					
	11	Construct U/S & D/S earth cofferdams. (Height=15 ft)	D8120	2,000	CY	$31.00	$62,000.00
	12	F&I impervious geomembrane on cofferdams.	D8120	350	SY	$21.00	$7,350.00
	13	F&I three 9-ft dia. X .138-in galv., corrugated metal pipes btwn cofferdams. Wt/Ft= 210 lbs/ft.	D8120	1,000	LF	$660.00	$660,000.00
	14	Remove cofferdams and diversion structures	D8120	1	LS	$86,000.00	$86,000.00
		Sheet Subtotal					**$1,445,490.00**

QUANTITIES		PRICES	
BY Dick LaFond (8120)	**CHECKED** Mike O'Shea (8120)	**BY** Greg Akins (8170)	**CHECKED** 7/31/2008
DATE PREPARED 5/15/04	**PEER REVIEW**	**DATE PREPARED** 07/31/08	**PEER REVIEW** 07/31/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable Cost Estimate

Plant - Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock SunnysidePP_Most Probable_060208.xls]Switchyd&TLine

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Tailrace Channel (Unlined)					
		Assume T.O. Rock El. 880					
		Assume local wasting of excess excavated material.					
	15	Common excavation for tailrace channel	D8120	3,800	CY	$9.60	$36,480.00
	16	Rock excavation for tailrace channel (drill and shoot)	D8120	1,900	CY	$28.00	$53,200.00
	17	Furnish and place riprap bedding (1-ft depth)	D8120	700	CY	$60.00	$42,000.00
	18	Furnish and place riprap (2-ft depth)	D8120	1,400	CY	$40.00	$56,000.00
		Structural Excavation and Backfill					
		Assume T. O Rock El. 880.0					
		Assume local wasting of excess excavated material.					
	19	Common excavation for structures	D8120	12,800	CY	$10.00	$128,000.00
	20	Rock excavation for structures (drill & shoot)	D8120	18,150	CY	$24.00	$435,600.00
	21	Furnish backfill for structures (reuse excavation)	D8120	5,675	CY	$2.40	$13,620.00
	22	Place backfill around structures	D8120	5,675	CY	$9.00	$51,075.00
	23	Compact backfill around structures	D8120	5,675	CY	$18.00	$102,150.00
		Pipe Trench Excavation and Backfill					
	24	Common excavation for pipe in Service Yard	D8120	6,900	CY	$9.10	$62,790.00
	25	Rock Excavation for pipe in Service Yard	D8120	2,270	CY	$28.00	$63,560.00
	26	Furnish, place, & compact backfill for pipe (local)	D8120	6,425	CY	$32.00	$205,600.00
	27	Furnish & place soil cement for pipe	D8120	525	CY	$135.00	$70,875.00
		Sitework Subtotal					**$2,766,440.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Dick LaFond (8120)	Mike O'Shea (8120)	Greg Akins (8170)	7/31/2008
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
5/15/04		07/31/08	07/31/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
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Plant - Structural & Architectural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		STRUCTURAL					
		Construct Concrete Tailrace Structure					
	1	Furnish, form, and place reinforced concrete	D8120	560	CY	$1,000.00	$560,000.00
	2	Furnish and place concrete reinforcement. Assume 130 #/CY	D8120	72,800	LBS	$1.85	$134,680.00
	3	Furnish and handle cement (.282T/CY)	D8120	158	TONS	$140.00	$22,120.00
		Construct Powerplant Substructure					
	4	Furnish, form, and place reinforced concrete	D8120	3,140	CY	$760.00	$2,386,400.00
	5	Furnish and place concrete reinforcement. Assume 120 #/CY	D8120	376,800	LBS	$1.75	$659,400.00
	6	Furnish and handle cement (.282T/CY)	D8120	885	TONS	$150.00	$132,750.00
	7	**Construct Powerplant Superstructure** 72.5-ft x 62-ft x 37-ft high superstructure Structural steel superstructure with CMU walls. Stepped columns for 125T crane support Built-up roof on metal roof deck.	D8120	4,500	SF	$240.00	$1,080,000.00
		Construct Byapss Substructure					
	8	Furnish, form, and place reinforced concrete	D8120	3,375	CY	$760.00	$2,565,000.00
	9	Furnish and place concrete reinforcement. Assume 120 #/CY	D8120	405,000	LBS	$1.75	$708,750.00
	10	Furnish and handle cement (.282T/CY)	D8120	950	TONS	$140.00	$133,000.00
	11	**Construct Bypass Superstructure** 74.0-ft x 37-ft x 16-ft high superstructure Built-up roof on metal roof deck supported by open web joists. CMU bearing walls. No crane.	D8120	2,740	SF	$240.00	$657,600.00
		Sheet Subtotal					**$9,039,700.00**

QUANTITIES		PRICES	
BY Dick Lafond (8120)	CHECKED Mike O'Shea (8120)	BY Greg Akins (8170)	CHECKED 7/31/2008
DATE PREPARED 5/15/04	PEER REVIEW	DATE PREPARED 07/31/08	PEER REVIEW 07/31/08

FEATURE:
Black Rock Preferred Alternative
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Plant - Structural & Architectural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		STRUCTURAL (cont.)					
		Construct Pipe Encasements					
	12	Furnish, form, and place reinforced concrete	D8120	1,050	CY	$850.00	$892,500.00
	13	Furnish and place concrete reinforcement. Assume 110 #/CY	D8120	115,500	LBS	$1.80	$207,900.00
	14	Furnish and handle cement (.282T/CY)	D8120	295	TONS	$140.00	$41,300.00
		Structural Steel					
	15	Furnish and install structural steel (painted): Includes crane girder, rail, and hoist frames. Does not include typ. building framework.	D8120	34,000	LBS	$8.50	$289,000.00
		Miscellaneous Metalwork					
	16	Furnish and install miscellaneous metalwork Includes grating, hatches, ladders, guardrail, and cable trays	D8120	15,000	LBS	$11.00	$165,000.00
	17	Motor-operated, exterior insulated roll-up door 18' x 20'	D8120	1	EA	$14,500.00	$14,500.00
		Structural & Architectural Subtotal					**$10,649,900.00**

QUANTITIES		PRICES	
BY Dick LaFond	CHECKED	BY Greg Akins (8170)	CHECKED 7/31/2008
Dick Lafond (8120)	Mike O'Shea (8120)		
DATE PREPARED	PEER REVIEW	DATE PREPARED	PEER REVIEW 07/31/08
5/15/04		07/31/08	

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
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Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Major Mechanical Equipment					
	1	Turbine-Vertical Francis, 40485 Hp 400 rpm, 435 ft. Design Head CF3 18-8 Stainless Runner 5.4' dia.	D8420	200,000	LBS	$24.00	$4,800,000.00
	2	Digital Governor, 156,523 ft.-lbs. 150 psi system	D8420	1	EA	$540,000	$540,000.00
	3	Governor Pressure Tank 875 Gal. Look to Flaming Gorge Oil Tank	D8420	7,640	LBS	$8.80	$67,232.00
		Sheet Subtotal					**$5,407,232.00**

QUANTITIES		PRICES	
BY Toby Turnage (8420)	CHECKED John Brooks (8420)	BY Lonnie Zlomke (8170)	CHECKED 7/31/2008
DATE PREPARED 4/14/04	PEER REVIEW	DATE PREPARED 07/31/08	PEER REVIEW 07/31/08

FEATURE:
Black Rock Preferred Alternative
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Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

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REGION	PN	**PRICE LEVEL:**	Apr-07
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Furnish and install the following:					
		Steel Penstock:					
		Steel plate used for pipe fabrication:					
		ASTM A36: Sy = 36 kpsi					
		(All pipe sizes are inside diameters)					
	4	144" Dia., 2 1/4" wall, L= 252 ft.	D8420	890,000	LBS	$4.80	$4,272,000.00
	5	84" Dia., 1 5/16" wall, L= 311 ft.	D8420	665,000	LBS	$4.80	$3,192,000.00
	6	144" Dia., 3/4" wall, L= 132 ft.	D8420	155,000	LBS	$2.90	$449,500.00
		Stainless Steel Stilling Basin for Sleeve Valves:					
		ASTM 316L Stainless steel plate					
	7	Two - 396" Dia., 1 1/4" wall cylindrical tanks with baseplates:	D8420	295,000	LBS	$18.00	$5,310,000.00
		Each tank height = 20 feet					
		Total weight for both tanks = 295,000 lbs.					
		Sleeve valves with hydraulic operators:					
	8	Two - 84" Dia. Inlet X 72" Dia. Outlet Valves	D8420	140,000	LBS	$18.00	$2,520,000.00
		ASTM 316L Stainless steel plate					
		Each valve weight = 70,000					
		Total weight for both valves = 140,000 lbs.					
		Spherical valves with hydraulic operators:					
	9	Sleeve valve guard valves	D8420	120,000	LBS	$12.00	$1,440,000.00
		Two - 60" Dia. Spherical valves with hydraulic operators					
		60,000 lbs. per valve					
		Turbine guard valve					
	10	One - 78" Dia. Spherical valve with hydraulic operator	D8420	115,000	LBS	$12.00	$1,380,000.00
		115,000 lbs. per valve					
		Sheet Subtotal					**$18,563,500.00**

QUANTITIES		PRICES	
BY	CHECKED	BY	CHECKED
Nathan Nakamoto (8420)	Rick Frisz (8420)	Lonnie Ziomke (8170)	7/31/2008
DATE PREPARED		DATE PREPARED	PEER REVIEW
5/6/04		07/31/08	07/31/08

ESTIMATE WORKSHEET

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	11	Furnishing and installing one 125-Ton overhead crane, 50' span	D8410	153,000	LBS	$7.30	$1,116,900.00
	12	Furnishing and installing Hydraulic elevator capacity = 3500 pounds, travel = 31 ft. landings = 3, speed = 100 ft/min.	D8410	1	unit	$480,000	$480,000.00
	13	Bulkhead gates and guides at power plant (steel) (assumes two gates)	D8410	25,000	LBS	$5.50	$137,500.00
	14	Two fixed hoists for bulkhead gates, 2-ton capacity (each hoist weighs 200 lbs)	D8410	400	LBS	$60.00	$24,000.00
	15	Bulkhead gate, liftin beam & guides at sleeve valve pipe discharge to canal (steel)	D8410	32,000	LBS	$4.90	$156,800.00
	16	CO2 High Pressure Fire Extinguishing System: 10 - 100# Storage Cylinders w/ control panel and appurtenances and 300 lbs. of sch. 80 carbon steel pipe, valves & fittings	D8410	1	L.S.	$36,000.00	$36,000.00
	17	Fire Suppression System: 3 Fire hose reels w/ 100 feet of hose 12 - Portable hand-held 20# extinguishers 2,000 lbs. of sch. 40 carbon steel pipe, valves & fittings 1 - Fire pump, split-case, 500 gpm @ 300 ft of head	D8410	1	L.S.	$60,000.00	$60,000.00
	18	Unit Cooling Water System: 2 - Cooling water pumps, end-suction type, 150 gpm 2 - 8-inch automatic, self-cleaning strainers 1,000 lbs. of type K copper tubing, valves & fittings 4,000 lbs. of ductile iron, mechanical joint pipe & fittings	D8410	1	L.S.	$155,000.00	$155,000.00
	19	Lubricating Oil System: 2- 500 gal carbon steel storage tanks 1 - 10 gpm @ 100 psi oil pump 1 - lube oil filter 1,000 lbs. of sch. 40 carbon steel pipe, valves & fittings	D8410	1	L.S.	$24,000.00	$24,000.00
		Sheet Subtotal					**$2,190,200.00**

QUANTITIES		PRICES	
BY Rick Christensen (8410), B Sund C Berte, J Grass, R Egan	**CHECKED** Alex Ritt (8410)	**BY** Lonnie Klomke (8170)	**CHECKED** 7/31/2008
DATE PREPARED 5/3/2004, 6/02/2008	**PEER REVIEW**	**DATE PREPARED** 07/31/08	**PEER REVIEW** 07/31/08

FEATURE:
Black Rock Preferred Alternative
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Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	20	Compressed Air System: 2 - 100 cfm @ 125 psi rotary screw air compressors 1 - 250 gal. carbon steel air receiver 1 - 100 cfm air dryer 500 lbs. of sch. 40 carbon steel pipe, valves & fittings	D8410	1	L.S.	$60,000.00	$60,000.00
	21	Service Water System: 1 - Service water pump, 75 gpm @ 200 ft. of head 1 - Hydropneumatic Tank, 300 gal. 750 lbs. of type K copper tubing, valves & fittings	D8410	1	L.S.	$120,000.00	$120,000.00
	22	Gravity Drainage System: 12 - Floor drains, cast iron 5,000 lbs. of cast iron hub & spigot, service weight soil pipe	D8410	1	L.S.	$60,000.00	$60,000.00
	23	Plant Unwatering System: 2 - Vertical turbine type sump pump, 500 gpm @ 50 ft hd 1 - Drainage jet type drainage pump 1,000 lbs. of type K copper tube, valves & fittings 3,000 lbs. of ductile iron, mechanical joint pipe & fittings	D8410	1	L.S.	$84,000.00	$84,000.00
	24	Domestic Water and Sanitary Waste System: 2 - Water Closets 1 - Urinal 2 - Lavatories & accessories 1 - Duplex Sewage Ejector 2,000 lbs. of cast iron hub & spigot service weight sewer pipe 400 lbs. of type K copper tubing, valves & fittings	D8410	1	L.S.	$60,000.00	$60,000.00
		Sheet Subtotal					**$384,000.00**

QUANTITIES		PRICES	
BY J Grass, R Egan (8410)	CHECKED Alex Ritt (8410)	BY Lonnie Zomke (8170)	CHECKED 7/31/2008
DATE PREPARED 5/3/2004, 6/02/2008	PEER REVIEW	DATE PREPARED 07/31/08	PEER REVIEW 07/31/08

ESTIMATE WORKSHEET

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Black Rock Preferred Alternative
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Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Heating, Ventilating, and Air Conditioning Unmanned air cooled BUILDING AND VAULTS OA temp 95 degrees F.	D8410	1	L.S.	$1,100,000.00	$1,100,000.00
		Mechanical Subtotal					**$27,644,932.00**

QUANTITIES		PRICES	
BY P Schlein, M Weems (8410)	**CHECKED** Alex Ritt (8410)	**BY** Lonnie Alonzo (8170)	**CHECKED** 7/31/2008
DATE PREPARED 5/3/2004, 6/02/2008	**PEER REVIEW**	**DATE PREPARED** 07/31/08	**PEER REVIEW** 07/31/08

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Black Rock Preferred Alternative
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Plant - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	1	**Electrical Generator (F&I)** 30,000 kVA, 6,900 volts, 3-phase, 60 Hz 400 rpm, 95 % power factor Vertical, synchronous machine Static excitation system & voltage regulator	D8430	1	EA	$12,500,000	$12,500,000.00
		Plant Grounding System (F&I)	D8430				
	2	Ground rods, 10 ft, 3/4" dia, copper-clad		30	EA	$250.00	$7,500.00
		Stranded bare-copper conductor:					
	3	250 MCM		1,200	LF	$12.50	$15,000.00
	4	4/0 AWG		800	LF	$12.00	$9,600.00
	5	2/0 AWG		500	LF	$8.10	$4,050.00
	6	4 AWG		800	LF	$3.20	$2,560.00
		Generator Bus & Metal-Enclosed Switchgear (F&I)	D8430				
	7	Generator isolated phase bus: 15 kV, 3000 amperes, 3-phase, 60 Hz		250	LF	$2,100.00	$525,000.00
	8	Generator power circuit breaker: 15 kV, 3000 amperes, 3-phase, vacuum type		1	EA	$820,000	$820,000.00
	9	Station-service fused interrupter switch: 15 kV, 600 ampere, 3-phase, w/ power fuses		1	EA	$34,000.00	$34,000.00
		Generator Control Equipment (F&I)	D8430				
	10	Duplex control switchboard for operation of the generator		1	EA	$340,000	$340,000.00
		Sheet Subtotal					**$14,257,710.00**

QUANTITIES		PRICES	
BY Mike Schuh (8430)	CHECKED Cory Maurer (8430)	BY Lonnie Zlomke (8170)	CHECKED 7/31/2008
DATE PREPARED 5/22/08	PEER REVIEW George Girgis (8430)	DATE PREPARED 07/31/08	PEER REVIEW 07/31/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
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Plant - Electrical

PROJECT:
Yakima River Basin Water Storage Study

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REGION PN **PRICE LEVEL:** Apr-07
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Plant Battery System (F&I)	D8430				
	11	125 volt, 300 ampere-hour, lead-acid battery		1	EA	$28,000.00	$28,000.00
	12	Battery chargers		2	EA	$9,100.00	$18,200.00
	13	DC distribution panelboard, 100 ampere mains, and molded-case circuit breakers		1	EA	$14,000.00	$14,000.00
		Plant Station-Service Equipment (F&I)	D8430				
		Indoor secondary unit substation with following features:					
	14	Dry-type transformer, 6.9 kV-480Y/277, 1000 kVA		1	EA	$62,000.00	$62,000.00
	15	480 volt power-circuit breakers, 600 amperes		5	EA	$4,600.00	$23,000.00
		Building Lighting System (F&I)	D8430				
		Interior luminaires					
	16	High bay, high-pressure sodium, 400 Watt 480 volt, 1-phase		20	EA	$790.00	$15,800.00
	17	Emergency lighting system		1	LS	$4,100.00	$4,100.00
		Exterior luminaires					
	18	High-pressure sodium, wall-mounted, outdoor type 70 watt, 120 volt		12	EA	$460.00	$5,520.00
	19	**Building Fire Detection & Alarm System (F&I)**	D8430	1	LS	$170,000.00	$170,000.00
		Distribution Panelboards (F&I)	D8430				
	20	480-volts, 3-phase, 400 ampere bus, indoor type with molded-case circuit breakers		2	EA	$11,500.00	$23,000.00
		Motor Control Center (F&I)	D8430				
	21	480 volts, 3-phase, 1200 ampere main bus Four 20 inch wide sections		1	EA	$125,000	$125,000.00
		Sheet Subtotal					**$488,620.00**

QUANTITIES		PRICES	
BY	CHECKED	BY	CHECKED
Mike Schuh (8430)	Cory Maurer (8430)	Lonnie Zionkey (8170)	7/31/2008
DATE PREPARED	PEER REVIEW	DATE PREPARED	PEER REVIEW
5/22/08	George Girgis (8430)	07/31/08	07/31/08

ESTIMATE WORKSHEET

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Black Rock Preferred Alternative
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Plant - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock SunnysidePP_Most Probable_060208.xls]Switchyd&TLine

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Insulated Conductors (F&I)	D8430				
		15 kV shielded power cable:					
	22	4 AWG		200	FT	$9.10	$1,820.00
		600-volt single-conductor, stranded-copper:					
	23	12 AWG		6,000	FT	$1.05	$6,300.00
	24	10 AWG		4,000	FT	$1.35	$5,400.00
	25	6 AWG		1,000	FT	$2.90	$2,900.00
	26	4 AWG		1,000	FT	$3.90	$3,900.00
	27	1/0 AWG		600	FT	$6.20	$3,720.00
	28	4/0 AWG		600	FT	$4.30	$2,580.00
		600-volt multi-conductor control cable:					
	29	9 conductor 14 AWG		1,500	FT	$2.80	$4,200.00
	30	12 conductor 14 AWG		2,000	FT	$3.60	$7,200.00
	31	5 conductor 10 AWG		2,000	FT	$3.30	$6,600.00
		Conduit System (F&I)	D8430				
		Rigid steel conduit:					
	32	1 inch		800	FT	$22.00	$17,600.00
	33	1 1/2 inch		500	FT	$28.00	$14,000.00
	34	2 inch		500	FT	$35.00	$17,500.00
	35	2 1/2 inch		350	FT	$54.00	$18,900.00
		Plastic-coated rigid steel:					
	36	2 inch		750	FT	$54.00	$40,500.00
		Sheet Subtotal					**$153,120.00**

QUANTITIES		PRICES	
BY	CHECKED	BY	CHECKED
Mike Schuh (8430)	Cory Maurer (8430)	Lonnie Zfonka (8170)	7/31/2008
DATE PREPARED	PEER REVIEW	DATE PREPARED	PEER REVIEW
5/22/08	George Girgis (8430)	07/31/08	07/31/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable Cost Estimate

Plant - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock SunnysidePP_Most Probable_060208.xls]Switchyd&TLine		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Bypass Structure Electrical System					
		Service Equipment (F&I)	D8430				
	37	Distribution panelboard, indoor type 480 volts, 3-phase, 225 ampere bus, with molded-case circuit breakers		1	EA	$25,000.00	$25,000.00
		Transformer load center					
	40	15 kVA, 1-phase, 480-240/120		1	EA	$12,500.00	$12,500.00
		Combination Motor Starters (F&I)	D8430				
	41	NEMA size 2 non-reversing contactor, 480-120 volt control transformer NEMA type 12 enclosure		6	EA	$7,900.00	$47,400.00
		Building Lighting System (F&I)	D8430				
		Interior luminaires					
	42	Fluorescent fixtures with two 4 foot lamps		8	EA	$250.00	$2,000.00
		Exterior luminaires					
	43	High-pressure sodium, wall-mounted, outdoor type 70 watt, 120 volt		6	EA	$460.00	$2,760.00
		Insulated Conductors (F&I)	D8430				
		600 volt, single-conductor, stranded copper					
	44	12 AWG		600	FT	$1.05	$630.00
	45	10 AWG		400	FT	$1.35	$540.00
	46	8 AWG		100	FT	$1.85	$185.00
		Conduit System (F&I)	D8430				
		Rigid steel conduit					
	47	1 inch		200	FT	$22.00	$4,400.00
		Electrical Subtotal					**$14,994,865.00**

QUANTITIES		PRICES	
BY Mike Schuh (8430)	CHECKED Cory Maurer (8430)	BY Lonnie Zlomke (8170)	CHECKED 7/31/2008
DATE PREPARED 5/22/08	PEER REVIEW George Girgis (8430)	DATE PREPARED 07/31/08	PEER REVIEW 07/31/08

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable Cost Estimate

Plant - Incoming Power

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\Common\JMorris\Black Rock - Cost Worksheets from Designers\[Black Rock SunnysidePP_Most Probable_060208.xls]Switchyd&TLine		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Switchyard					
		Furnish and Install:					
	1	Oil-filled, conservator-type power transformer 40 MVA; 69-6.9kV, 3-phase	D8430	1	EA	$930,000.00	$930,000.00
	2	69-kV disconnect switches, 1200 amp, 3-phase	D8430	2	EA	$40,000.00	$80,000.00
	3	69-kV circuit breakers, 1200 amp, 3-phase	D8430	1	EA	$220,000.00	$220,000.00
		Tap at existing 69-kV line					
		Furnish and Install:					
	4	69-kV disconnect switches, 1200 amp, 3-phase	D8430	2	EA	$40,000.00	$80,000.00
	5	69-kV circuit breakers, 1200 amp, 3-phase	D8430	1	EA	$220,000.00	$220,000.00
	6	**Construct Transmission LIne (By Others)** Assume 1 mile of transmission line from existing 69-kV line to the southwest wood poles, 795 AWG conductor	D8430	1	MILES	$170,000.00	$170,000.00
		Switchyard & Transmission Line Subtotal					**$1,700,000.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Lisa Gamuciello (8430)	Cory Maurer (8430)	Lonnie Zlomke	7/31/2008
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
5/14/2008	George Girgis (8430)	07/31/08	07/31/08

Black Rock Alternative

Most Probable High (MPH) Field Cost Estimate

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable High Cost Estimate
Summary

Summary Sheet 1 of 1

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Inflow_Most Probable High_060608.xls]Summary		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Intake and Pumping Plant on Priest Rapids Reservoir					
		Design Flow capacity: 3,500 cfs					
		All Tunnel Option to Black Rock Reservoir					
		Intake - Civil/Structural Subtotal					$95,972,345.00
		Intake - Mechanical/Electrical Subtotal					$19,240,305.00
		Plant - Civil/Structural Subtotal					$116,469,880.00
		Plant - Mechanical Subtotal					$153,861,100.00
		Plant - Electrical Subtotal					$8,763,440.00
		Switchyard & Transmission Line Subtotal					$36,279,475.00
		Discharge (All Tunnel) - Subtotal					$524,329,820.00
		Subtotal					**$954,916,365.00**
		Mobilization		5%	(+/-)		$48,000,000.00
		Subtotal with mobilization					**$1,002,916,365.00**
		Escalation During Construction		0%	(+/-)		$0.00
		Subtotal with mobilization and escalation					**$ 1,002,916,365.00**
		Design Contingencies		15%	(+/-)		$147,083,635.00
		CONTRACT COST					**$1,150,000,000.00**
		Construction Contingencies		30%	(+/-)		$ 350,000,000.00
		FIELD COST					**$1,500,000,000.00**
		Non-Contract Costs **		30%	(+/-)		$450,000,000.00
		CONSTRUCTION COST					**$1,950,000,000.00**

Escalation to notice to proceed, allowance for procurement strategies, and utility relocations are not included.

** Land Acquisition Costs of $22,750 associated with these features are included in the Non-Contract Costs.

QUANTITIES		PRICES	
BY Design Team	CHECKED	BY G. Akins, J. Morris & L. Zlomke (8170)	CHECKED
DATE PREPARED 6/2/08	PEER REVIEW	DATE PREPARED 8/20/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE: Black Rock Preferred Alternative Inflow Conveyance System Most Probable High Cost Estimate Intake - Civil/Structural	**PROJECT:** Yakima River Basin Water Storage Study **WOID:** YAKAP **ESTIMATE LEVEL:** Appraisal **REGION** PN **PRICE LEVEL:** Apr-07 **FILE:** H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Inflow_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		CIVIL					
		Construct/Remove Cellular Cofferdam around Reservoir Intake					
		Assume construct from shore without barge.					
		Assume circular cellular cofferdam.					
		Length= 380 feet, 32-ft dia. cells, 33 ft high					
		Top of cofferdam - El. 488, Bottom of cofferdam - El. 455					
		Assume top of rock 5-ft below reservoir bottom.					
		Assume do not need to dredge reservoir bottom for wall.					
	1	Furnish and install sheet pile walls	D8120	655	TONS	$4,100.00	$2,685,500.00
		Arbed AS 500-12, 30 psf					
	2	Backfill cells with free-draining granular material	D8120	11,700	CY	$44.00	$514,800.00
	3	Unwater behind cofferdam	D8120	9	MOS	$74,000.00	$666,000.00
		Assume sumps and surface pumps					
		Remove Cofferdam					
	4	Remove and stockpile granular material	D8120	11,700	CY	$37.00	$432,900.00
	5	Extract and salvage sheet pile cutoff wall	D8120	655	TONS	$620.00	$406,100.00
		Dewatering Intake and Pumping Plant					
	6	Wellpoints about Intake and PP structures	D8120	1	LS	$6,800,000.00	$6,800,000.00
		- Install and remove 260 wellpoints					
		- Operate well points approximately 9 months					
		- Assume well points are jetted in place..					
		- Install wellpoint using 1.5" steel riser pipe w/ self jetting wellpoint screen (2" dia typ)					
		- Wellpoints are placed at 10 ft centers 20 ft deep					
		Sheet Subtotal					**$11,505,300.00**

QUANTITIES		PRICES	
BY Brad VanOtterloo (D8120)	**CHECKED** Dick LaFond (D8120)	**BY** Jeff Merrill (D8170)	**CHECKED**
DATE PREPARED 06/02/08	**PEER REVIEW**	**DATE PREPARED** 8/15/08	**PEER REVIEW**

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable High Cost Estimate

Intake - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Inflow_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Unwatering Intake and Pumping Plant					
	7	Unwatering at base of rock excavation - Furnish and operate sump pumps - Operate 20 sump pumps for 9 months - Each pump should have a 100 ft lift and have a flow of about 5 gpm	D8120	1	LS	$1,000,000.00	$1,000,000.00
		Protect Priest Rapids Dam Embankment Drive sheet pile to isolate intake and plant dewatering and unwatering from dam embankment					
	7a	Furnish and install sheet pile wall: 115' L x 20' H Arbed AS 500-12, 30 psf	D8120	35	TONS	$4,100.00	$143,500.00
		Sheet Subtotal					**$1,143,500.00**

QUANTITIES		PRICES	
BY Brad VanOtterloo (D8120)	CHECKED Dick LaFond (D8120)	BY Jeff Morris (D8170)	CHECKED
DATE PREPARED 06/02/08	PEER REVIEW	DATE PREPARED 8/15/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable High Cost Estimate

Intake - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Inflow_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Structural Excavation and Backfill					
		Assume dam excavation is all common.					
		Assume top 5 feet of excavation is common and the remainder is rock					
		Assume stockpile some common material and use for backfill or embankment.					
		Waste material deposition covered under Pumping Plant excavation.					
	8	Excavation of common materials for structures	D8140	388,500	CY	$9.60	$3,729,600.00
	9	Excavation of rock for structures (drill & shoot)	D8140	671,700	CY	$26.00	$17,464,200.00
	10	Furnish & place backfill for structures (assume local borrow)	D8140	35,800	CY	$6.10	$218,380.00
	11	Place backfill around structures	D8140	35,800	CY	$0.00	$0.00
	12	Compact backfill around structures	D8140	35,800	CY	$13.50	$483,300.00
		Roads and Fencing					
	13	Gravel surfacing		2,270	TONS	$67.00	$152,090.00
		20 ft wide road right side of channel					
		12 ft wide road left side of channel					
	14	Safety fencing		4,750	LF	$47.00	$223,250.00
		8' chainlink fence					
		STRUCTURAL					
		Construct Gated Intake and Fishscreen Structure					
	15	Furnish, form, and place reinforced concrete (f'c=4ksi)	D8140	40,150	CY	$700.00	$28,105,000.00
	16	Furnish and place concrete reinforcement.	D8140	6,424,000	LBS	$1.75	$11,242,000.00
	17	Furnish and handle cement	D8140	11,325	TONS	$165.00	$1,868,625.00
		Construct Lined Intake Canal					
	18	Furnish, form, and place unreinforced concrete	D8140	2,350	CY	$580.00	$1,363,000.00
		lining in excavated channel (f'c= 3 ksi)					
	19	Furnish and handle cement	D8140	665	TONS	$180.00	$119,700.00
		Construct Bypass Pipe					
	20	3 - 54" Dia. steel pipe for fish bypass.		15,840	LF	$410.00	$6,494,400.00
		Mortar line pipe					
	21	Bypass pipe common excavation		270,000	CY	$5.40	$1,458,000.00
	22	Bypass pipe rock excavation		130,000	CY	$33.00	$4,290,000.00
	23	Bypass pipe backfill		380,000	CY	$10.40	$3,952,000.00
	24	Bypass pipe soil cement bedding (100 psi)		12,000	CY	$180.00	$2,160,000.00
		Miscellaneous Metalwork					
		Listed under Intake - Mechanical Items					
		Intake - Civil/Structural Subtotal					**$95,972,345.00**

QUANTITIES		PRICES	
BY	CHECKED	BY	CHECKED
Chou Cha (D8140)	David Gesundheit/Anne Pavol (D8140)	Jeff Morris (D8170)	
DATE PREPARED	PEER REVIEW	DATE PREPARED	PEER REVIEW
4/19/04		8/15/08	

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable High Cost Estimate

Intake - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
	1	Furnish and install steel stoplog guides and seats (upstream of radial gates)	D8410	13,500	LBS	$13.00	$175,500.00
	2	Furnish and install steel trashracks	D8410	102,000	LBS	$9.40	$958,800.00
	3	Furnish and install one trash rake, rails, supports (assume Atlas Polar DT8300 rake)	D8410	21,000	LBS	$12.00	$252,000.00
	4	Furnish and install one conveyor, steel	D8410	13,000	LBS	$12.50	$162,500.00
	5	Furnish and install steel fish screen guides, supports, embedded seats, and bypass walls	D8410	360,000	LBS	$9.40	$3,384,000.00
	6	Furnish and install fish screens, 10' W x14' H panel 70 panels + 6 spares	D8410				
		Structural steel			LBS		
		Stainless steel		212,800	LBS	$29.00	$6,171,200.00
	7	Furnish and install barrier panels above fish screens 10' W x 11' H panels, 70 panels + 6 spares	D8410				
		Structural steel		209,000	LBS	$5.90	$1,233,100.00
	8	Furnish and install adjustable baffle panels 10' W x 25' H panels, 70 panels + 6 spares	D8410				
		Structural steel		570,000	LBS	$5.90	$3,363,000.00
	9	Furnish and install fish screen cleaners with travel rail, 5 systems with 2 brush cleaner arms per system	D8410				
		a. Structural steel		40,000	LBS	$7.10	$284,000.00
		b. Stainless steel		2,500	LBS	$29.00	$72,500.00
		c. 2 Hp motors/gear reducers, with adj. speed controllers, and limit switches		5	UNITS	$12,000.00	$60,000.00
	10	Furnish and install water level measuring systems	D8410	12	UNITS	$18,000.00	$216,000.00
		Sheet Subtotal					**$16,332,600.00**

QUANTITIES		PRICES	
BY R Christensen/B Sund (D8410)	CHECKED Alex Ritt (D8410)	BY Lonnie Zlomke (D8170)	CHECKED
DATE PREPARED 4/21/2004, 6/03/2008	PEER REVIEW	DATE PREPARED 8/15/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable High Cost Estimate

Intake - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont)					
	11	Furnish and install steel stoplog guides and seats (downstream of fish screens)	D8410	13,500	LBS	$12.00	$162,000.00
	12	Furnish and install one set of steel stoplogs for the two different size bays with lifting beam	D8410	101,000	LBS	$4.70	$474,700.00
	13	3' wide walkway, steel, safety grating along fish screens	D8410	19,500	LBS	$11.00	$214,500.00
	14	Handrail along each side of fish screen walkway	D8410	1,520	LF	$71.00	$107,920.00
		Radial Gates in Intake Structure					
		Furnish and install two 36.5-ft x 8.5-ft top seal radial gates and hoist equipment:	D8420				
	15	Gate (Weight/gate= 34,650 lbs)		69,120	LBS	$10.50	$725,760.00
	16	Embedded metalwork (Weight/bay= 5,000 lbs)		10,000	LBS	$8.70	$87,000.00
	17	Hoist operator (Weight/gate operator= 11,300 lbs)		22,600	LBS	$28.00	$632,800.00
	18	Motor - 5 hp (One per gate)		2	EA	$1,000.00	$2,000.00
		Furnish and install one 15.0-ft x 8.5-ft top seal radial gate and hoist equipment:	D8420				
	19	Gate (Weight/gate= 20,790 lbs)		20,790	LBS	$10.50	$218,295.00
	20	Embedded metalwork (Weight/bay= 3,000 lbs)		3,000	LBS	$8.70	$26,100.00
	21	Hoist operator (Weight/gate operator= 6,150 lbs)		6,150	LBS	$28.00	$172,200.00
	22	Motor - 3 hp		1	EA	$1,000.00	$1,000.00
		Sheet Subtotal					**$2,824,275.00**

QUANTITIES		PRICES	
BY R Christensen/B Sund (D8410), P. Hoffman (D8420)	CHECKED A. Ritt (D8410)	BY Lonnie Ziomke (D8170)	CHECKED
DATE PREPARED 4/21/2004, 6/03/2008	PEER REVIEW	DATE PREPARED 8/15/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable High Cost Estimate

Intake - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Inflow_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		ELECTRICAL					
		Service Equipment (F&I)	D8430				
	23	Distribution panelboard, outdoor type 480 volts, 3-phase with 225 ampere bus		1	EA	$14,000.00	$14,000.00
	24	Outdoor transformer load center 15 kVA, 1-phase, 480-240/120 volt		1	EA	$10,000.00	$10,000.00
		Combination Motor Starters	D8430				
	25	NEMA size 2 non-reversing contactor, 480-120 volt control transformer NEMA type 4 enclosure		6	EA	$5,400.00	$32,400.00
		Insulated Conductors (F&I)					
		600-volt, single-conductor, stranded copper					
	26	12 AWG		500	LF	$1.30	$650.00
	27	10 AWG		200	LF	$1.85	$370.00
	28	8 AWG		100	LF	$2.10	$210.00
		Conduit System (F&I)					
		Rigid steel conduit					
	29	1 inch		150	LF	$24.00	$3,600.00
		Lighting System (F&I)	D8430				
	30	High-pressure sodium, pole mounted, outdoor 70 watt, 120 volt		6	EA	$3,700.00	$22,200.00
		Intake - Mechanical/Electrical Subtotal					**$19,240,305.00**

QUANTITIES		PRICES	
BY Mike Schuh (D8430)	CHECKED Cory Maurer (D8430)	BY Lonnie Ziemke (D8170)	CHECKED
DATE PREPARED 5/22/08	PEER REVIEW George Girgis (D8430)	DATE PREPARED 8/15/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable High Cost Estimate

Plant - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Inflow_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Access Road (9.75 miles of 2-lane access road):					
		Assume construct access road from SH24 to PP.					
		Assume place road along abandoned railroad alignment					
		Assume no major excavation or embankment sections.					
	1	Clear roadway alignment	D8140	45	AC	$5,300.00	$238,500.00
	2	Furnish and place base course material (9-inch depth)	D8140	96,000	TONS	$46.00	$4,416,000.00
	3	Furnish and place asphalt concrete (6-inch depth)	D8140	70,000	TONS	$105.00	$7,350,000.00
	4	Furnish and install W-beam type guardrail	D8140	10,000	LF	$110.00	$1,100,000.00
	5	Furnish and install miscellaneous pipe culverts	D8140	1,000	LF	$210.00	$210,000.00
		Assume 36-inch-diameter, wt/ft= 35#/ft)					
		Service Yard (6" asphalt concrete surface)					
	6	Strip and clear pumping plant site to 1 foot depth	D8120	15,300	CY	$6.70	$102,510.00
	7	Common excavation to Service Yard El. 505.0	D8120	164,000	CY	$5.30	$869,200.00
	8	Rock excavation to Service Yard El. 505.0	D8120	208,000	CY	$28.00	$5,824,000.00
	9	Place and compact embankment for service yard	D8120	19,200	CY	$11.00	$211,200.00
	10	Furnish and place base course material (6-inch)	D8120	10,000	TONS	$46.00	$460,000.00
	11	Furnish and place asphalt concrete (6-inch)	D8120	11,000	TONS	$110.00	$1,210,000.00
	12	Furnish and install 7-foot chain link fence for PP Yard	D8120	3,100	LF	$34.00	$105,400.00
	13	Furnish and install 7-foot x 24-foot access gate	D8120	3	EA	$5,300.00	$15,900.00
		Unwatering/Dewatering During Construction:					
		Included in Intake Unwatering/Dewatering System.					
		Structural Excavation and Backfill					
		Assume all common material excavated under site excavation for yard.					
	14	Excavation of rock for structures (drill & shoot)	D8120	200,000	CY	$33.00	$6,600,000.00
	15	Furnish backfill for structures (assume local borrow)	D8120	40,000	CY	$6.90	$276,000.00
	16	Place backfill around structures	D8120	40,000	CY	$0.00	$0.00
	17	Compact backfill around structures	D8120	40,000	CY	$10.00	$400,000.00
	18	Rock Exc. for manifold pipe to edge of Service Yard	D8120	78,000	CY	$24.00	$1,872,000.00
	19	Furnish, place, & compact backfill for manifold pipe trench(a	D8120	63,480	CY	$11.50	$730,020.00
	20	Furnish & place soil cement for manifold pipe trench	D8120	8,160	CY	$150.00	$1,224,000.00
		Sheet Subtotal					**$33,214,730.00**

QUANTITIES		PRICES	
BY Dick LaFond (D8120) Mike O'Shea (D8120)	**CHECKED** MikeO'Shea, RW LaFond (D8120)	**BY** Greg Akins (D8170)	**CHECKED**
DATE PREPARED 4/19/04	**PEER REVIEW**	**DATE PREPARED** 8/15/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable High Cost Estimate

Plant - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Inflow_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Waste Excess Excavated Material at Priest Rapids					
		Assume waste material within 5 miles of excavation.					
		Quantities include intake, plant, and 1/2 tunnel.					
		Waste rock excavation	D8120	1,523,000	CY	Included in Item 8 of Intake (C/S) and Item 7 of Plant (C/S)	
		Waste common material	D8120	296,000	CY	Included in Item 9 of Intake (C/S) and Items 8,14,18 of Plant (C/S)	
		STRUCTURAL					
		Construct Building Structure					
	21	Furnish, form, and place reinforced concrete	D8120	91,300	CY	$600.00	$54,780,000.00
	22	Furnish and place concrete reinforcement. Assume 130 #/CY	D8120	11,869,000	LBS	$1.60	$18,990,400.00
	23	Furnish and handle cement (.282T/CY)	D8120	25,750	TONS	$165.00	$4,248,750.00
	24	Furnish & install precast, prestressed double tees for roof 10LDT 32+2 = 10' wide & 32" deep - 80' Span	D8120	36	EA.	$68,000.00	$2,448,000.00
		Structural Steel					
	25	Furnish and install structural steel (painted): crane rails, baseplates	D8120	60,000	LBS	$4.80	$288,000.00
		Miscellaneous Metalwork					
	26	Furnish and install miscellaneous metalwork Includes gratings, hatches, ladders, guardrails, catwalk, and cable trays and supports	D8120	250,000	LBS	$10.00	$2,500,000.00
		Plant - Civil/Structural Subtotal					**$116,469,880.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Mike O-Shea (D8120)	Dick LaFond (D8120)	Greg Atkins (D8170)	
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
4/19/04 and 6/2/08		8/15/08	

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE: Black Rock Preferred Alternative Inflow Conveyance System Most Probable High Cost Estimate Plant - Mechanical	**PROJECT:** Yakima River Basin Water Storage Study
WOID: YAKAP	**ESTIMATE LEVEL:** Appraisal
REGION PN	**PRICE LEVEL:** Apr-07
FILE: H:\D8170\ES1\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Inflow_Most Probable High_060608.xls]Summary	

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Major Mechanical Equipment					
		Prices below telephone quote from Bob Rittase, Voith Hydro, 717-792-7206					
		500 cfs two-stage spiral case pump, rated 500cfs at 1430 ft total dynamic head, overall efficiency more than 83% operating range from 1030 to 1430 feet					
	1	Pumps		3	EA	$7,100,000.00	$21,300,000.00
	2	Motors		3	EA	$3,600,000.00	$10,800,000.00
	3	Spherical discharge valves, with operators, rated at 1500 ft working pressure and 2000 ft surge pressure, with operators		3	EA	$4,300,000.00	$12,900,000.00
	4	Installation supervision of 500 cfs pumping unit		3	EA	$1,400,000.00	$4,200,000.00
		1000 cfs two-stage spiral case pump, rated 1000 cfs at 1430 ft total dynamic head, overall efficiency more than 83% operating range 1030 to 1430 ft					
	5	Pumps		2	EA	$13,000,000.00	$26,000,000.00
	6	Motors		2	EA	$6,400,000.00	$12,800,000.00
	7	Spherical discharge valves, with operators, rated at 1500 ft working pressure and 2000 ft surge pressure, with operators		2	EA	$6,400,000.00	$12,800,000.00
	8	Installation supervision of 1000 cfs pumping unit		2	EA	$2,100,000.00	$4,200,000.00
		Sheet Subtotal					**$105,000,000.00**

QUANTITIES		PRICES	
BY Richard Fehr (D8420)	**CHECKED** Robert Zelenka (D8420)	**BY** Lonnie Zlomke (D8170)	**CHECKED**
DATE PREPARED 4/16/04	**PEER REVIEW**	**DATE PREPARED** 8/15/08	**PEER REVIEW**

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable High Cost Estimate

Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Inflow_Most Probable High_060608.xls]Summary		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		FURNISH-AND-INSTALL THE FOLLOWING:					
		Steel Manifold and Suction Tubes Steel plate used for pipe fabrication: ASTM A572 Gr. 50: Sy = 50 kpsi St = 65 kpsi (All pipe sizes are inside diameters)	D8420				
	9	192" Inside Dia., 3 5/8" wall, L= 340 ft.	D8420	2,600,000	LBS	$6.60	$17,160,000.00
	10	192" Dia., 3 3/4" wall, L= 152 ft.		1,200,000	LBS	$6.60	$7,920,000.00
	11	175" Dia., 3 3/8" wall, L= 58 ft.		375,000	LBS	$6.60	$2,475,000.00
	12	170" Dia., 1" wall, L= 134 ft.		260,000	LBS	$3.50	$910,000.00
	13	135" Dia., 2 5/8" wall, L= 54 ft.		210,000	LBS	$6.60	$1,386,000.00
	14	120" Dia., 1/8" wall, L= 122 ft.		150,000	LBS	$3.40	$510,000.00
	15	110" Dia., 2 1/8" wall, L= 261 ft.		670,000	LBS	$6.60	$4,422,000.00
	16	78" Dia., 1 1/2" wall, L= 260 ft.		340,000	LBS	$3.40	$1,156,000.00
		Sheet Subtotal					**$35,939,000.00**

QUANTITIES		PRICES	
BY Nathan Nakamoto (D8420)	CHECKED Rick Frisz (D8420)	BY Lonnie Zlomke (D8170)	CHECKED
DATE PREPARED 4/16/04	PEER REVIEW	DATE PREPARED 8/15/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE: Black Rock Preferred Alternative Inflow Conveyance System Most Probable High Cost Estimate Plant - Mechanical	**PROJECT:** Yakima River Basin Water Storage Study
	WOID: YAKAP — **ESTIMATE LEVEL:** Appraisal
	REGION PN — **PRICE LEVEL:** Apr-07
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont)					
	17	CO2 High Pressure Fire Extinguishing System: 16 - 100# Storage Cylinders w/ control panel and appurtenances and 2,000 lbs. of sch. 80 carbon steel pipe, valves & fittings	D8410	2	each	$140,000.00	$280,000.00
	18	Fire Suppression System: 10 Fire hose reels w/ 100 feet of hose 20 - Portable hand-held 20# extinguishers 12,000 lbs. of sch. 40 carbon steel pipe, valves & fittings 1 - Fire pump, split-case, 500 gpm @ 300 ft of head	D8410	1	L.S.	$250,000.00	$250,000.00
	19	Unit Cooling Water System: 6 - Cooling water pumps, end-suction type, 150 gpm 2 - 8-inch automatic, self-cleaning strainers 4,000 lbs. of type K copper tubing, valves & fittings 5,000 lbs. of ductile iron, mechanical joint pipe & fittings	D8410	1	L.S.	$370,000.00	$370,000.00
	20	Lubricating Oil System: 2- 500 gal carbon steel storage tanks 1 - 10 gpm @ 100 psi oil pump 1 - lube oil filter 3,000 lbs. of sch. 40 carbon steel pipe, valves & fittings	D8410	1	L.S.	$71,000.00	$71,000.00
	21	Compressed Air System: 2 - 100 cfm @ 125 psi rotary screw air compressors 1 - 250 gal. carbon steel air receiver 1 - 200 cfm air dryer 3,000 lbs. of sch. 40 carbon steel pipe, valves & fittings	D8410	1	L.S.	$140,000.00	$140,000.00
	22	Service Water System: 1 - Service water pump, 75 gpm @ 200 ft. of head 1 - Hydropneumatic Tank, 300 gal. 1,500 lbs. of type K copper tubing, valves & fittings	D8410	1	L.S.	$140,000.00	$140,000.00
	23	Gravity Drainage System: 50 - Floor drains, cast iron 25,000 lbs. of cast iron hub & spigot, service weight soil pipe	D8410	1	L.S.	$430,000.00	$430,000.00
		Sheet Subtotal					**$1,681,000.00**

QUANTITIES		PRICES	
BY John Grass, Randy Egan (D8410)	**CHECKED** Alex Ritt (D8410)	**BY** Lonnie Zlomke (D8170)	**CHECKED**
DATE PREPARED 4/16/2004, 6/03/2008	**PEER REVIEW**	**DATE PREPARED** 8/15/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable High Cost Estimate

Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont)					
	24	Plant Unwatering System: 2 - Vertical turbine type sump pump, 1000 gpm @ 50 ft hd 1 - Drainage jet type drainage pump 1,500 lbs. of type K copper tube, valves & fittings 4,000 lbs. of ductile iron, mechanical joint pipe & fittings	D8410	1	L.S.	$250,000.00	$250,000.00
	25	Domestic Water and Sanitary Waste System: 4 - Water Closets 2 - Urinal 4 - Lavatories & accessories 1 - Duplex Sewage Ejector 2,000 lbs. of cast iron hub & spigot service weight sewer pipe 800 lbs. of type K copper tubing, valves & fittings	D8410	1	L.S.	$140,000.00	$140,000.00
	26	100-Ton overhead crane, 72'-6" span	D8410	153,000	LBS	$8.60	$1,315,800.00
	27	200-Ton overhead crane, 72'-6" span, two required	D8410	520,000	LBS	$8.60	$4,472,000.00
	28	Electric traction elevator overhead, geared, capacity = 3500 pounds, travel = 100 feet, landings = 6, speed = 200 ft/min.	D8410	1	unit	$710,000.00	$710,000.00
	29	Ultrasonic flowmeter, 4-path	D8410	1	meter	$50,000.00	$50,000.00
	30	Trashracks (steel) at pumping plant	D8410	77,000	LBS	$7.90	$608,300.00
	31	Stoplogs, lifting beams and guides (steel) (assumes one set of stoplogs for each size bay)	D8410	45,000	LBS	$11.00	$495,000.00
		Sheet Subtotal					**$8,041,100.00**

QUANTITIES		PRICES	
BY R. Christensen, B. Sund, R. Egan A. Ritt, C. Berte, P. Schlien, J. Grass (D8410)	**CHECKED** A.lex Ritt (D8410)	**BY** Lonnie Zlomke (D8170)	**CHECKED**
DATE PREPARED 4/16/2004, 6/03/2008	**PEER REVIEW**	**DATE PREPARED** 8/15/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable High Cost Estimate

Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont)					
		Heating, Ventilating, and Air Conditioning	D8410	1	L.S.	$3,200,000.00	$3,200,000.00
		HVAC for bulding except bus & switchgear					
		372-ft long by 77'-ft wide by 70-ft high unit/service bay					
		54-ft long by 77-ft wide by 20-ft high control bay					
		Two each 54-ft long by 77-ft wide by 17-ft equipment rooms					
		308-ft long by 56'-ft wide by 20-ft high Electrical Gallery					
		Pump/Motor/Valve Galleries= 756,000 ft^3					
		Plant - Mechanical Subtotal					**$153,861,100.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Paul Schlein, Mike Weems (D8410)	Alex Ritt (D8410)	Lonnie Zlomke (D8170)	
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
4/16/2004, 6/03/2008		8/15/08	

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable High Cost Estimate

Plant - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Plant Grounding System (F&I)	D8430				
	1	Ground rods, 10 ft, 3/4" dia., copper-clad		50	EA	$280.00	$14,000.00
		Stranded bare-copper conductor					
	2	250 MCM		1,500	LF	$14.50	$21,750.00
	3	4/0 AWG		1,000	LF	$13.50	$13,500.00
	4	2/0 AWG		1,000	LF	$9.20	$9,200.00
	5	4 AWG		700	LF	$3.70	$2,590.00
		Motor Bus & Switchgear (F&I)	D8430				
	6	Main motor isolated-phase bus:		400	LF	$4,400.00	$1,760,000.00
		15 kV; 24,000 amperes; 3-phase; 60 hz.					
		Self-cooled					
	7	Individual motor isolated-phase bus:					
		15 kV; 3,500 amperes; 3-phase; 60 hz.		150	LF	$1,900.00	$285,000.00
		Self-cooled					
	8	15 kV; 7,000 amperes; 3-phase; 60 hz.		100	LF	$1,700.00	$170,000.00
		Self-cooled					
		Motor reduced-voltage, static starting system with 15 kV, SF6 type unit circuit-breakers					
	9	3,500 amperes continous current		3	EA	$370,000.00	$1,110,000.00
	10	7,000 amperes continuous current		2	EA	$420,000.00	$840,000.00
		Synchronous motor static excitation system					
	10A	65,000 HP motor		3	EA	$500,000.00	$1,500,000.00
	10B	125,000 HP motor		2	EA	$510,000.00	$1,020,000.00
		Motor Control Equipment (F&I)	D8430				
	11	Duplex control switchboard for operation of 5 main pumping motors.		1	EA	$260,000.00	$260,000.00
		Motors					
		Listed under Plant-Mechanical					
		Sheet Subtotal					**$7,006,040.00**

QUANTITIES		PRICES	
BY Mike Schuh (8430)	CHECKED Cory Maurer (D8430)	BY Lonnie Ziemke (8170)	CHECKED
DATE PREPARED 5/22/08	PEER REVIEW George Girgis (D8430)	DATE PREPARED 8/15/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable High Cost Estimate

Plant - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		15 kV Metal-Clad Switchgear (F&I)	D8430				
	12	15 kV metal-clad switchgear rated 1200 amperes with two 1200 ampere vacuum type power circuit breakers		1	EA	$450,000.00	$450,000.00
		15 kV Non-Segregated-Phasae Bus (F&I)	D8430				
	13	15 kV, 1200 amperes		200	FT	$1,050.00	$210,000.00
		Plant Station-Service Equipment (F&I)	D8430				
		Indoor double-ended secondary unit substation with following features:					
	14	Dry-type transformer 13.8 kV-480Y277 V, 2,500 KVA		2	EA	$115,000.00	$230,000.00
	15	480 V power-circuit breakers, 600 amperes		10	EA	$5,800.00	$58,000.00
		Building Lighting System (F&I)	D8430				
		Interior luminaires					
	16	High bay, high-pressure sodium, 400 W, 480 V		30	EA	$910.00	$27,300.00
	17	Emergency lighting system		1	LS	$15,500.00	$15,500.00
	18	Exterior luminaires High-pressure sodium, wall mounted, outdoor 70 watt, 120 volt		10	EA	$520.00	$5,200.00
		Sheet Subtotal					**$996,000.00**

QUANTITIES		PRICES	
BY Mike Schuh (D8430)	CHECKED Cory Maurer (D8430)	BY Lonnie Zlomke (D8170)	CHECKED
DATE PREPARED 5/22/08	PEER REVIEW George Girgis (D8430)	DATE PREPARED 8/15/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable High Cost Estimate

Plant - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	19	**Building Fire Detection and Alarm System (F&I)**	D8430	1	LS	$195,000.00	$195,000.00
	20	**Distribution Panelboards (F&I)** 480 volts, 3-phase with 400 ampere bus	D8430	3	EA	$13,000.00	$39,000.00
	21	**Motor Control Centers (F&I)** 480 volts, 3-phase with1200 ampere bus Five 20 inch wide sections	D8430	2	EA	$155,000	$310,000.00
		Insulated Conductors (F&I)	D8430				
		600-volt, single-conductor, stranded copper					
	22	14 AWG		12,000	LF	$1.40	$16,800.00
	23	12 AWG		15,000	LF	$1.15	$17,250.00
	24	10 AWG		15,000	LF	$1.50	$22,500.00
	25	6 AWG		3,000	LF	$3.20	$9,600.00
	26	4 AWG		3,000	LF	$4.40	$13,200.00
	27	1/0 AWG		2,000	LF	$7.00	$14,000.00
		600-volt multi-conductor control cable					
	28	9 conductor 16 AWG		2,000	LF	$3.60	$7,200.00
	29	12 conductor 16 AWG		3,000	LF	$3.80	$11,400.00
	30	5 conductor 10 AWG		3,000	LF	$4.40	$13,200.00
		Conduit System (F&I)	D8430				
		Rigid steel conduit					
	31	1 inch		800	LF	$24.00	$19,200.00
	32	2 inch		500	LF	$41.00	$20,500.00
	33	2 1/2 inch		250	LF	$61.00	$15,250.00
	34	3 inch		250	LF	$76.00	$19,000.00
		Plastic-coated rigid steel					
	35	2 inch		300	LF	$61.00	$18,300.00
		Plant - Electrical Subtotal					**$8,763,440.00**

QUANTITIES		PRICES	
BY Mike Schuh (D8430)	CHECKED Cory Maurer (D8430)	BY Lonnie Zlomke (D8170)	CHECKED
DATE PREPARED 5/22/08	PEER REVIEW George Girgis (D8430)	DATE PREPARED 8/15/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable High Cost Estimate

Switchyard - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		CIVIL/STRUCTURAL	D8120				
		Switchyard					
	1	Excavation (Common)		1,200	CY	$22.00	$26,400.00
	2	Structural Concrete (Switchyard foundations and pullboxes)		150	CY	$1,600.00	$240,000.00
	3	Concrete Reinforcement (130lbs/CY)		19,500	LBS	$2.30	$44,850.00
	4	Compacting Backfill about Structures		1,000	CY	$16.00	$16,000.00
	5	Switchyard Steel Structures		80,000	LBS	$6.10	$488,000.00
	6	Gravel Surfacing - 6-inch thick		4,000	SY	$14.00	$56,000.00
	7	Oil-Spill Containment System Geotextile fabric 4,500 SF (12 oz per sq yard, 110 mils non-woven) Geomembrane liner: 2,500 SF (30 Mils XR-5 Seaman Corporation) Geocel: 1,700 SF (8" deep "enviro grid" polymeric cellular confinement system) Piping: 150 LF (6" Dia. Schedule 80 PVC pipe perforated) Preservative-Treated Lumber: 100 LF (2"x4") Excavation: Included in excavation for structures Uncompacted crushed aggregate: 150 CY (ASTM C33 Size No 4, 1 1/2" to 3/4")		1	LS	$44,000.00	$44,000.00
	8	Gravelfill for Switchyard Foundations (Compacted)		75	CY	$63.00	$4,725.00
	9	5-Inch PVC Schedule 80 Conduit (CIP Power Duct Bank) Includes: 115 LF of 1.5' tall x 2.33' wide concrete CIP 15 CY of concrete 1970 lbs of reinforcement		150	LF	$310.00	$46,500.00
	10	7-foot Chain link fence		1,000	LF	$43.00	$43,000.00
		Sheet Subtotal					**$1,009,475.00**

QUANTITIES		**PRICES**	
BY Dick LaFond (D8120)	**CHECKED**	**BY** Greg Akins, Lonnie Zlomke (D8170)	**CHECKED**
DATE PREPARED 6/2/2008	**PEER REVIEW**	**DATE PREPARED** 8/15/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable High Cost Estimate

Switchyard - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Inflow_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		ELECTRICAL					
		Switchyard					
		Furnish and Install:					
	11	Oil-filled, conservator-type power transformer 600 MVA; 500-13.8kV, 1-phase	D8430	3	EA	$8,000,000.00	$24,000,000.00
	12	500-kV disconnect switches, 1200 amp, 3-phase	D8430	2	EA	$260,000.00	$520,000.00
	13	500-kV circuit breakers, 1200 amp, 3-phase	D8430	1	EA	$1,450,000.00	$1,450,000.00
	14	**Construct Transmission Line (by others)** Assume 6 miles of transmission line from Midway substation to the east 500-kV, steel towers, 2167 AWG conductor	D8430	6	MILES	$1,550,000.00	$9,300,000.00
		Switchyard & Transmission Line Subtotal					**$36,279,475.00**

QUANTITIES		PRICES	
BY Lisa Gamuciello (D8430)	**CHECKED** Cory Maurer (D8430)	**BY** Lonnie Zlomke (D8170)	**CHECKED**
DATE PREPARED 5/14/2008	**PEER REVIEW** George Girgis (D8430)	**DATE PREPARED** 8/15/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable High Cost Estimate
All Tunnel Alternative (Discharge 1)

Tunnel - Civil/Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Inflow_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Tunnel					
		Construct 34,850-ft long, 21.00-ft finished diameter, 25.00-ft minimum bore diameter, tunnel in rock. Tunnel will be excavated with TBM and driven uphill. Water problems will be minimal. Tunnel has three final support reaches.					
		31,350-ft long unreinforced concrete lined reach					
	1	Excavation (appr 18.2 cy/lf)	68140	31,350	lf	$3,100.00	$97,185,000.00
	2	Furnish and place unreinforced concrete tunnel lining	68140	168,000	cy	$540.00	$90,720,000.00
	3	Cementitious materials for concrete tunnel lining	68140	47,300	tons	$145.00	$6,858,500.00
	4	Furnish & install 1-in dia, 13-ft long rock bolts	68140	876,000	lin ft	$86.00	$75,336,000.00
		1,000-ft long reinforced concrete lined reach					
	5	Excavation (appr 18.2 cy/lf)	68140	1,000	lf	$3,100.00	$3,100,000.00
	6	Furnish and place reinforced concrete tunnel lining	68140	5,350	cy	$640.00	$3,424,000.00
	7	Cementitious materials for concrete tunnel lining	68140	1,510	tons	$165.00	$249,150.00
	8	Furnish and install concrete reinforcement	68140	29,900	lbs	$2.20	$65,780.00
	9	Furnish and install structural steel tunnel supports	68140	1,010,000	lbs	$7.00	$7,070,000.00
		2,500-ft long steel lined portal reach					
	10	Excavation (appr 18.2 cy/lf)	68140	2,500	lf	$3,100.00	$7,750,000.00
		Steel Tunnel Liner:					
		ASTM A572 Gr. 50: Sy = 50 kpsi St = 65 kpsi					
	10a	252" Inside Dia., 4 3/4" wall, L= 2500 ft.	68420	32,600,000	LBS	$3.80	$123,880,000.00
	11	Furnish and place backfill concrete	68140	10,900	cy	$580.00	$6,322,000.00
	12	Cementitious materials for backfill concrete	68140	3,080	tons	$150.00	$462,000.00
	13	Furnish & install 1-in dia, 13-ft long rock bolts	68140	0	lin ft		$0.00
	14	Furnish and install structural steel tunnel supports	68140	5,060,000	lbs	$7.00	$35,420,000.00
		Sheet Subtotal					**$457,842,430.00**

QUANTITIES		PRICES	
BY Kevin Atwater (D8140) Rick Frisz (D8420)	CHECKED Dave Gesundheit (D8180)	BY Greg Akins (D8170)	CHECKED
DATE PREPARED 5/30/08	PEER REVIEW	DATE PREPARED 8/15/08	PEER REVIEW

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable High Cost Estimate
All Tunnel Alternative (Discharge 1)

Tunnel - Civil/Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Inflow_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Surge Shaft					
		Construct 1506-ft deep, 22.0-ft finished diameter, 24.34-ft minimum bore diameter, shaft in rock. Shaft will be excavated by raise bore and drill down method. Water problems will be minimal. Shaft has two final support reaches.					
		1,200-ft deep unreinforced concrete lined reach					
	15	Excavation (appr 17 cy/lf)	D8140	1,200	lf	$9,200.00	$11,040,000.00
	16	Furnish and place unreinforced concrete shaft lining	D8140	3,800	cy	$550.00	$2,090,000.00
	17	Cementitious materials for concrete shaft lining	D8140	1,070	tons	$160.00	$171,200.00
	18	Furnish & install 5/8-in dia, 6-ft long rock bolts	D8140	63,100	lin ft	$80.00	$5,048,000.00
		300-ft long reinforced concrete lined shaft top reach					
	19	Excavation (appr 17 cy/lf)	D8140	300	lf	$9,200.00	$2,760,000.00
	20	Furnish and place reinforced concrete shaft lining	D8140	945	cy	$550.00	$519,750.00
	21	Cementitious materials for concrete shaft lining	D8140	265	tons	$160.00	$42,400.00
	22	Furnish and install concrete reinforcement	D8140	15,700	lbs	$2.20	$34,540.00
	23	Furnish & install 5/8-in dia, 6-ft long rock bolts	D8140	15,600	lin ft	$80.00	$1,248,000.00
	24	Furnish and install chain link protection	D8140	13,000	sq yd	$39.00	$507,000.00
		Waste Tunnel Muck at Black Rock					
		Assume waste material within 5 miles of portal.					
		Quantities include 1/2 inflow tunnel.					
	24a	Waste rock excavation	D8120	210,000	CY	$9.00	$1,890,000.00
		Sheet Subtotal					**$25,350,890.00**

QUANTITIES		**PRICES**	
BY Bill Thompson	**CHECKED**	**BY** Greg Akins (D8170)	**CHECKED**
DATE PREPARED 4/19/04	**PEER REVIEW**	**DATE PREPARED** 8/15/08	**PEER REVIEW**

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Inflow Conveyance System
Most Probable High Cost Estimate
All Tunnel Alternative (Discharge 1)

Tunnel - Civil/Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Inflow_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Tunnel Outlet Features					
		Assume ~100' head to valley invert and L~ 4000'					
		Assume need to control flow from tunnel portal to bottom of reservoir during initial fill.					
		Earthwork					
	25	Excavation at outlet area for portal and channel	D8130	55,000	CY	$16.50	$907,500.00
	26	Excavation for pipe trench	D8130	338,000	CY	$5.70	$1,926,600.00
	27	Excavation for thrust block	D8130	1,500	CY	$23.00	$34,500.00
	28	Concrete for open channel	D8130	550	CY	$620.00	$341,000.00
	29	F & P reinforcement (180 lbs/CY)	D8130	99,000	LBS	$2.20	$217,800.00
	30	Furnish and handle cement (.282T/CY)	D8130	155	TONS	$180.00	$27,900.00
	31	Concrete for thrust block	D8130	1,100	CY	$630.00	$693,000.00
	32	F & P reinforcement (120 lbs/CY)	D8130	132,000	LBS	$2.20	$290,400.00
	33	Furnish and handle cement (.235T/CY)	D8130	260	TONS	$180.00	$46,800.00
	34	Furnish and place Zone 3 bedding for pipe	D8130	29,000	CY	$49.00	$1,421,000.00
	35	Backfill pipe with excavated material	D8130	261,000	CY	$10.00	$2,610,000.00
	36	Furnish and place zone 3 bedding for riprap	D8130	6,000	CY	$49.00	$294,000.00
	37	Furnish and place riprap	D8130	12,000	CY	$68.00	$816,000.00
	38	20 ' dia. Steel pipe L = 4000' t= 3/4 inches	D8130	8,500,000	LBS	$3.50	$29,750,000.00
		Wt/ft + 10% for couplings and connections					
	39	Steel safety trashracks	D8410	80,000	LBS	$8.80	$704,000.00
	40	Steel Bulkhead	D8410	120,000	LBS	$8.80	$1,056,000.00
	41	Remove and salvage 20' dia. Steel pipe	D8410	7,650,000	LBS	$0.00	$0.00
		Assume diver-assisted removal in wet at a max depth = 100'.					
		Assume removal of 90% of the pipe.					
		Assume lift bags to raise pipe and barge-mounted crane to handle pipe at surface.					
		Salvage at $50/ton (quote), but salvage value is much less than the cost to remove and cut up pipe.					
		Discharge 1 - Subtotal					**$524,329,820.00**

QUANTITIES		PRICES	
BY Doug Stanton (D8130) Rick Christensen (8410)	**CHECKED** Alex Ritt (D8140)	**BY** Greg Akins (D8170)	**CHECKED**
DATE PREPARED 4/27/2004, 6/03/2008	**PEER REVIEW**	**DATE PREPARED** 8/15/08	**PEER REVIEW**

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable High Cost Estimate
Summary

Summary Sheet

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-04

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Dam_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Central Core Rockfill Dam **Large Reservoir - 1.3 MAF** **Includes foundation treatment, dam structure, river outlet works, relocation of State Highway 24, and seepage mitigation features.**					
		Dam Subtotal					$2,114,941,800.00
		River Outlet Works Subtotal					$158,063,250.00
		Roads and Utility Relocations					$139,004,000.00
		Downstream Seepage Mitigation Features					$832,612,392.00
		Subtotal					**$3,244,621,442.00**
		Mobilization		5%	(+/-)		$160,000,000.00
		Subtotal with mobilization					**$3,404,621,442.00**
		Escalation During Construction		0%	(+/-)		$0.00
		Subtotal with mobilization and escalation					**$3,404,621,442.00**
		Design Contingencies		15%	(+/-)		$495,378,558.00
		CONTRACT COST					**$3,900,000,000.00**
		Construction Contingencies		30%	(+/-)		$ 1,200,000,000.00
		FIELD COST					**$5,100,000,000.00**
		Non-Contract Costs **		30%	(+/-)		$1,500,000,000.00
		CONSTRUCTION COST					**$6,600,000,000.00**

Escalation to notice to proceed, allowance for procurement strategies, and utility relocations are not included.

** Land Acquisition Costs of $6,138,600 associated with these features are included in the Non-Contract Costs.

QUANTITIES		PRICES	
BY Design Team	CHECKED	BY J. Zander, J. Morris, L. Zlomke	CHECKED 8/20/2008
DATE PREPARED 6/02/08	PEER REVIEW	DATE PREPARED 8/20/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable High Cost Estimate

Dam - Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP | **ESTIMATE LEVEL:** Appraisal
REGION PN | **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\[rockfill Dam comparison MP-MPH.xls]Sheet1

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		GENERAL SITEWORK					
		Assume no clearing and grubbing required					
		Assume road improvements and haul roads are part of unlisted items					
		DIVERSION & DEWATERING					
		Assume groundwater is below excavation					
		Assume natural stream beds in area are dry					
		FOUNDATION EXCAVATION					
		Assume common material stockpiled for reuse					
		Assume rock material stockpiled for reuse					
		Stockpiles will be upstream, within 1/2 mile of dam					
	1	Excavation, stripping, of dam foundation	D8312	370,000	CY	$2.50	$925,000.00
		Assume depth of stripping 12 inches or less					
		Assume stripping will be stockpiled for topsoil use					
	2	Excavation, common, for dam foundation	D8312	41,130,000	CY	$4.10	$168,633,000.00
		Assume about 35% of volume requires ripping					
		Assume fine-grained and coarse-grained materials		0			
		(5.0 will be separately stockpiled					
	3	Excavation, rock, for dam foundation	D8312	10,000	CY	$38.00	$380,000.00
		Assume drill and blast in random locations					
		FOUNDATION TREATMENT					
		Includes misc. foundation treatment, fault zone treatment, consolidation grouting, and curtain grouting					
		Miscellaneous Foundation Areas					
		Applied in areas of poor quality rock					
	4	Slush grouting of foundation surface	D8312	93,000	SF	$6.10	$567,300.00
		Over assumed 10% of area beneath zone 1					
	5	Dental concrete	D8312	10,000	CY	$220.00	$2,200,000.00
	6	Furnish/place zone 2 sand filter on foundation	D8312	280,000	CY	$45.00	$12,600,000.00
		Over 10% of area between zone 1 and d/s toe					
		Assume a 3-ft thickness					
	7	Furnish/place zone 3 gravel drain on foundation	D8312	280,000	CY	$37.00	$10,360,000.00
		Over the zone 2 filter in a 3-ft thickness					
		Sheet Subtotal					**$195,665,300.00**

QUANTITIES		PRICES	
BY Chris Strickland (D8361)	**CHECKED** Bill Engemoen (D8312)	**BY** Jerry Zander/Jeff Morris (D8170) JZ/JM	**CHECKED** M Hyndman 8/12/08
DATE PREPARED 5/30/08	**PEER REVIEW** Bill Engemoen (D8312)	**DATE PREPARED** 8/13/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable High Cost Estimate

Dam - Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\[rockfill Dam comparison MP-MPH.xls]Sheet1

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		FOUNDATION TREATMENT (continued)					
		Treatment of south abutment fault area					
	8	Extra rock excavation for fault treatment					
		Assume south abutment is fractured	D8312	300,000	CY	$29.00	$8,700,000.00
		Assume excavate with hydraulic excavator					
	8A	Replace rock excavation with RCC	D8312	300,000	CY	$115.00	$34,500,000.00
	9	Dental concrete for fault treatment	D8312	10,000	CY	$220.00	$2,200,000.00
	10	Furnish/place zone 2 sand filter downstream of zone 1	D8312	156,000	CY	$45.00	$7,020,000.00
		Assume a 3-ft thickness, 1400' by 1000' area					
		Assume same source as listed under emb.					
	11	Furnish/place zone 3 gravel drain d/s of zone 1	D8312	156,000	CY	$35.00	$5,460,000.00
		Assume 3-ft thickness, over zone 2 filter					
		Consolidation Grouting of Foundation					
		Generally limited to area beneath zone 1					
	12	Setups for drilling grout holes	D8312	19,000	EA	$110.00	$2,090,000.00
		Assume 2-inch dia. drilled on 7.5-foot centers					
	13	Drill grout holes	D8312	1,140,000	LF	$35.00	$39,900,000.00
		Assume 2-inch dia. w/length= 60 feet					
	14	Hookups to grout holes	D8312	19,000	EA	$64.00	$1,216,000.00
	15	Pressure grout	D8312	2,850,000	CF	$11.50	$32,775,000.00
		Assume grouting process only minus cement					
		Assume 2.5 CF per 1 LF of hole					
	16	Furnish and handle cement for pressure grouting	D8312	2,850,000	BAGS	$10.00	$28,500,000.00
		Assume 1 bag per CF					
		Curtain Grouting of Foundation					
		Three-row curtain beneath zone 1					
	17	Setups for drilling grout holes	D8312	2,000	EA	$115.00	$230,000.00
		Assume 3 rows of 2-inch dia.on 10-ft centers					
	18	Drill grout holes	D8312	500,000	LF	$37.02	$18,510,000.00
		Assume 2-inch dia. w/length from 60 to 350 feet					
	19	Hookups to grout holes	D8312	2,000	EA	$69.00	$138,000.00
	20	Pressure grout	D8312	1,500,000	CF	$11.50	$17,250,000.00
		Assume grouting process only minus cement					
		Assume 3 CF per 1 LF of hole					
	21	Furnish and handle cement for pressure grouting	D8312	1,500,000	BAGS	$10.00	$15,000,000.00
		Assume 1 bag per CF					
		Sheet Subtotal					**$213,489,000.00**

QUANTITIES		PRICES	
BY	CHECKED	BY	CHECKED
Chris Strickland (D8361)	Bill Engemoen (D8312)	Jerry Zander/Jeff Morris (D8170) J.N.	N L Hyndman 8/12/08
DATE PREPARED	PEER REVIEW	DATE PREPARED	PEER REVIEW
5/30/08	Bill Engemoen (D8312)	8/13/08	

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable High Cost Estimate

Dam - Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\[rockfill Dam comparison MP-MPH.xls]Sheet1

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		EMBANKMENT CONSTRUCTION *Items are set up as furnish and place, which would include purchasing from commercial sites, processing onsite, development of quarry, or transporting from stockpiles of required excavation*					
	22	Furnish and place zone 1 core *Acquired from source 6 miles from dam* *Compacted to 6-inch lifts by tamping roller*	D8312	17,300,000	CY	$19.50	$337,350,000.00
	23	Furnish and place zone 2 filter *Sand/gravel material processed commercially or developed onsite* *If commercial, assume 17 mile one-way haul* *Compacted to 12-inch layers by vibratory steel drum* *Zones have 20-ft horizontal width*	D8312	3,890,000	CY	$40.00	$155,600,000.00
	24	Furnish and place zone 3 drain *Gravel/cobble material processed commercially or developed onsite* *If commercial, assume 17 mile one-way haul* *Compacted to 12-inch layers by vibratory steel drum* *Zone has 20-ft horizontal width*	D8312	1,870,000	CY	$39.00	$72,930,000.00
	25	Furnish and place zone 4 rockfill *Developed from basalt ridges surrounding reservoir* *Assume average 1-mile haul to dam* *Rock sizes up to 3-foot* *Compacted in 3-ft layers by vibratory steel drum*	D8312	66,850,000	CY	$10.50	$701,925,000.00
	26	Furnish and place zone 5 coarse grained random fill *Comes from stockpiles of required excavation within 1/2 mile of dam* *Generally consists of gravelly soils* *Compacted in 2-ft layers by vibratory steel drum*	D8312	13,950,000	CY	$5.60	$78,120,000.00
	27	Furnish and place zone 6 fine grained random fill *Comes from stockpiles of required excavation within 1/2 mile of dam* *Generally consists of sands/silts/clays* *Compacted to 9-inch layers by tamping rollers*	D8312	7,500,000	CY	$6.90	$51,750,000.00
		Sheet Subtotal					**$1,397,675,000.00**

QUANTITIES		PRICES	
BY Chris Strickland (D8361)	CHECKED Bill Engemoen (D8312)	BY Jerry Zander/Jeff Morris (D8170)	CHECKED NC Hyndman 8/12/08
DATE PREPARED 5/30/08	PEER REVIEW Bill Engemoen (D8312)	DATE PREPARED 8/13/08	PEER REVIEW

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable High Cost Estimate

Dam - Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\[rockfill Dam comparison MP-MPH.xls]Sheet1

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		RIGHT ABUTMENT SEEPAGE MITIGATION FEATURES *These are features incorporated into the right abutment of the dam, designed to reduce or collect seepage through the pervious abutment bedrock*					
	28	Construct three drainage tunnels *Assume three 10-ft diameter, 1500-ft long tunnels* *Assume drill and blast excavation in bedrock* *Assume appreciable tunnel stabilization (steel sets on frequent spacing)* *Assume concrete lining*	D8312	4,500	LF	$1,500.00	$6,750,000.00
	29	Drill drainage holes through tunnel *Assume 900 holes, each 200-ft long*	D8312	180,000	LF	$57.00	$10,260,000.00
	30	Construct concrete diaphragm wall *Assume slurry trench construction, using a hydrofraise machine to 400-ft depth (1000 ft long)* *Assume concrete backfill*	D8312	650,000	SF	$270.00	$175,500,000.00
	31	Construct RCC working surface *Assume around 25 benches on abutment* *Assume benches constructed of RCC* *Benches about 100 ft wide by maximum 33 ft high*	D8312	200,000	CY	$125.00	$25,000,000.00
	32	Rock excavation to smooth upstream right abutment *Assume entire hillside excavated to roughly uniform surface by ripping with about 1/3 of surface line drilled and blasted (area = 1,100,000 ft2)*	D8312	420,000	CY	$23.00	$9,660,000.00
	33	Shotcrete upstream blanket foundation *Assume average thickness over area will be around 12 inches (multiple applications)*	D8312	1,100,000	SF	$19.50	$21,450,000.00
	34	Furnish and install geomembrane *Assume 80 mil HDPE*	D8312	125,000	SY	$11.50	$1,437,500.00
	35	Furnish and install geotextile *Assume heavy duty non-woven* *Assume geotextiles sandwich geomembrane*	D8312	250,000	SY	$4.10	$1,025,000.00
	36	Furnish and place soil cover *Assume 8-ft horizontal layer of Ringold materials obtained from required excavation*	D8312	230,000	CY	$6.00	$1,380,000.00
	37	Furnish and place rockfill cover *Assume rockfill obtained within 1 mile*	D8312	5,300,000	CY	$10.50	$55,650,000.00
		Sheet Subtotal					**$308,112,500.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Chris Strickland (D8316)	Bill Engemoen (D8312)	Jerry Zander/Jeff Morris (D8170) JM.	NL Hyndman 8/12/08
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
5/30/08	Bill Engemoen (D8312)	8/13/08	

ESTIMATE WORKSHEET

FEATURE:	PROJECT:
Black Rock Preferred Alternative Central Core Rockfill Dam - 1.3 MAF Most Probable High Cost Estimate Dam - Civil	Yakima River Basin Water Storage Study

WOID:	YAKAP	ESTIMATE LEVEL:	Appraisal
REGION	PN	PRICE LEVEL:	Apr-07
FILE:	H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\[rockfill Dam comparison MP-MPH.xls]Sheet1		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		MISCELLANEOUS					
		Instrumentation *Assume part of unlisted items*					
		Toe Drains *Assume part of unlisted items*					
		Site cleanup and relandscaping *Assume part of unlisted items*					
		Dam Subtotal					**$2,114,941,800.00**

QUANTITIES		PRICES	
BY Chris Strickland (D8361)	CHECKED Bill Engemoen (8312)	BY Jerry Zander/Jeff Morris (D8170) JM	CHECKED NL Hynes 8/12/08
DATE PREPARED 5/30/08	PEER REVIEW Bill Engemoen (D8312)	DATE PREPARED 8/13/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable High Cost Estimate

River Outlet Works - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\[rockfill Dam comparison MP-MPH.xls]Sheet1

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Establish Upstream Portal	D8130				
	1	Common excavation to establish tunnel portal		62,800	CY	$14.50	$910,600.00
	2	Rock excavation to establish tunnel portal		12,500	CY	$41.00	$512,500.00
	3	Furnish and install chain link fabric around portal		450	SY	$29.00	$13,050.00
	4	F&I 18-inch x 1/2 in. dia resin anchors for fabric support		50	EA	$94.00	$4,700.00
		Establish Downstream Portal	D8130				
	5	Common excavation to establish tunnel portal		62,800	CY	$14.50	$910,600.00
	6	Rock excavation to establish tunnel portal		12,500	CY	$41.00	$512,500.00
	7	Furnish and install chain link fabric around portal		450	SY	$30.00	$13,500.00
	8	F&I 18-inch x 1/2 in. dia resin anchors for fabric		50	EA	$94.00	$4,700.00
		Construct ROW tunnel u/s of gate chamber	D8130				
	9	Drill and shoot 28-ft Dia.circular shaped u/s tunnel (20,200 CY)		700	LF	$5,300.00	$3,710,000.00
	10	Remove and stockpile rock (assume local stockpile)		20,200	CY	$25.00	$505,000.00
	11	Furnish and install 790-10-ft long x 1-inch dia. A307, 20K rockbolts		11,900	LF	$90.00	$1,071,000.00
	12	Furnish and install 9 steel sets (W8 x 48) in crown		60,000	LBS	$7.30	$438,000.00
		Construct ROW tunnel d/s of gate chamber	D8130				
	13	Drill and shoot 32-ft OD mod.HS shaped d/s tunnel (23,000 CY)		600	LF	$7,100.00	$4,260,000.00
	14	Rer (5.0% per year to 36 month midpoint of construction period)		25,300	CY	$25.00	$632,500.00
	15	Furnish and install 740-10-ft long x 1-inch dia. A307, 20K rockbolts		11,100	LF	$90.00	$999,000.00
	16	Furnish and install 9 steel sets (W10 x 54) in crown		63,000	LBS	$7.30	$459,900.00
		Construct ROW Gate Chamber and Shaft	D8130				
	17	Drill and shoot 24-ft diameter shaft (800 CY)		40	LF	$9,000.00	$360,000.00
	18	Remove and stockpile rock (assume local stockpile)		900	CY	$25.00	$22,500.00
	19	Furnish and install 64 - 10-ft long x 1-inch dia. A307, 20K rockbolts		960	LF	$90.00	$86,400.00
	20	Furnish and install 4 circular steel sets (W8 x 48)		26,000	LBS	$7.30	$189,800.00
		Place Conc. Lining In Tunnel, Shaft & Gate Chamber	D8130				
	21	FF&P reinf. Concrete in u/s steel-lined tunnel		11,200	CY	$560.00	$6,272,000.00
	22	FF&P reinf. concrete gate chamber		660	CY	$1,100.00	$726,000.00
	23	FF&P reinf. Concrete in d/s tunnel		12,500	CY	$630.00	$7,875,000.00
	24	Furnish and place reinforcement (160 lbs/CY)		4,385,000	LBS	$1.80	$7,893,000.00
	25	Furnish and handle cement (.282T/CY)		6,900	TONS	$165.00	$1,138,500.00
		Sheet Subtotal					**$39,520,750.00**

QUANTITIES		PRICES	
BY Doug Stanton (D8130)	CHECKED Dave Godaire (D8130)	BY Jeff Morris (D8170) J.M.	CHECKED N.L.Hyndman 8/12/08
DATE PREPARED	PEER REVIEW	DATE PREPARED 8/13/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable High Cost Estimate

River Outlet Works - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\[rockfill Dam comparison MP-MPH.xls]Sheet1

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Ring Grout Upstream Conduit	D8130				
	26	Setups for drilling grout holes (2-in dia holes, 15 ft ctrs, and 8 holes per ring)(700 LF)		48	EA	$290.00	$13,920.00
	27	Drill grout holes (2-in dia and L=30 ft)		11,500	LF	$36.00	$414,000.00
	28	Hookups to grout holes		384	EA	$170.00	$65,280.00
	29	Pressure grout (grouting process only minus cement) Assume 2 CF per 1 LF of hole		23,000	CF	$21.00	$483,000.00
	30	Furnish and handle cement for pressure grouting Assume 1 bag per CF		23,000	BAGS	$18.50	$425,500.00
		Ring Grout Shaft and Gate Chamber	D8130				
	31	Setups for drilling grout holes (2-in dia holes, 15 ft ctrs, and 8 holes per ring)(80 LF)		6	EA	$400.00	$2,400.00
	32	Drill grout holes (2-in dia and L=30 ft)		1,400	LF	$50.00	$70,000.00
	33	Hookups to grout holes		48	EA	$230.00	$11,040.00
	34	Pressure grout (grouting process only minus cement) Assume 2 CF per 1 LF of hole		2,800	CF	$26.00	$72,800.00
	35	Furnish and handle cement for pressure grouting Assume 1 bag per CF		2,800	BAGS	$21.00	$58,800.00
		Ring Grout Downstream Conduit	D8130				
	36	Setups for drilling grout holes (2-in dia holes, 15 ft ctrs, and 8 holes per ring)(100 LF)		8	EA	$400.00	$3,200.00
	37	Drill grout holes (2-in dia and L=30 ft)		1,900	LF	$50.00	$95,000.00
	38	Hookups to grout holes		64	EA	$230.00	$14,720.00
	39	Pressure grout (grouting process only minus cement) Assume 2 CF per 1 LF of hole		3,800	CF	$26.00	$98,800.00
	40	Furnish and handle cement for pressure grouting Assume 1 bag per CF		3,800	BAGS	$21.00	$79,800.00
		Earthwork - intake, u/s conduit, d/s pipe, stilling basin and discharge channel	D8130				
	41	Excavation of common materials for basin and channel		480,000	CY	$7.50	$3,600,000.00
	42	F & P impervious material (Zone 6 Ringold - local)		24,000	CY	$16.00	$384,000.00
	43	F & P bedding for riprap (zone 3 gravel)		12,000	CY	$53.00	$636,000.00
	44	F & P rockfill from dam excavation (riprap)		36,000	CY	$23.00	$828,000.00
	45	F & P backfill for intake and u/s conduit (Ringold - local)		19,000	CY	$16.00	$304,000.00
	46	Excavation of common materials for burying 16' pipe		343,000	CY	$4.90	$1,680,700.00
	47	Backfill for burying 16' dia. Pipe - zone 3 bedding		22,000	CY	$60.00	$1,320,000.00
	48	Backfill for burying 16' dia. Pipe - From common exc.		217,000	CY	$8.00	$1,736,000.00
		Sheet Subtotal					**$12,396,960.00**

QUANTITIES		PRICES	
BY	CHECKED	BY	CHECKED
Doug Stanton (D8130)	Dave Godaire (D8130)	Jeff Morris (D8170)	N Hyde 8/12/08
DATE PREPARED	PEER REVIEW	DATE PREPARED 8/13/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
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River Outlet Works - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP | **ESTIMATE LEVEL:** Appraisal
REGION PN | **PRICE LEVEL:** Apr-07
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct ROW cast in place (CIP) concrete	D8130				
	49	Furnish, form, and place reinf. Conc - Intake structure		13,000	CY	$740.00	$9,620,000.00
	50	Furnish and place reinforcement (est 200#/CY)		2,600,000	LBS	$1.80	$4,680,000.00
	51	Furnish and handle cement (.282T/CY)		3,700	TONS	$165.00	$610,500.00
	52	FFP Reinf. Conc - Steel lined U/S Conduit (L=400')		12,000	CY	$740.00	$8,880,000.00
	53	Furnish and place reinforcement (est 190#/CY)		2,280,000	LBS	$1.80	$4,104,000.00
	54	Furnish and handle cement (.282T/CY)		3,380	TONS	$165.00	$557,700.00
	55	FFP reinf. concrete - CIP shaft (L=375)		7,000	CY	$580.00	$4,060,000.00
	56	Furnish and place reinforcement (est 190#/CY)		1,330,000	LBS	$1.80	$2,394,000.00
	57	Furnish and handle cement (.282T/CY)		1,970	TONS	$165.00	$325,050.00
	58	FFP reinf. concrete - shaft control house		480	CY	$1,050.00	$504,000.00
	59	Furnish and place reinforcement (180#/CY)		86,400	LBS	$2.00	$172,800.00
	60	Furnish and handle cement (.282T/CY)		140	TONS	$165.00	$23,100.00
	61	FFP reinf. Concrete in gate chamber		500	CY	$1,050.00	$525,000.00
	62	Furnish and place reinforcement (180#/CY)		90,000	LBS	$2.00	$180,000.00
	63	Furnish and handle cement (.282T/CY)		140	TONS	$165.00	$23,100.00
	64	FFP reinf. concrete - D/S access house		550	CY	$1,050.00	$577,500.00
	65	Furnish and place reinforcement (180#/CY)		99,000	LBS	$2.00	$198,000.00
	66	Furnish and handle cement (.282T/CY)		160	TONS	$165.00	$26,400.00
	67	FFP reinf. concrete for thrust block @ 80 deg bend		5,600	CY	$620.00	$3,472,000.00
	68	Furnish and place reinforcement (150 #/cy)		840,000	LBS	$1.95	$1,638,000.00
	69	Furnish and handle cement (.20T/CY)		1,100	TONS	$165.00	$181,500.00
	70	FFP reinf. concrete - jet flow gate control house		800	CY	$1,100.00	$880,000.00
	71	Furnish and place reinforcement (180#/CY)		144,000	LBS	$2.00	$288,000.00
	72	Furnish and handle cement (.282T/CY)		230	TONS	$165.00	$37,950.00
	73	FFP reinf. concrete for thrust block @ jet gate house		4,500	CY	$620.00	$2,790,000.00
	74	Furnish and place reinforcement (150 #/cy)		675,000	LBS	$1.95	$1,316,250.00
	75	Furnish and handle cement (.20T/CY)		900	TONS	$165.00	$148,500.00
		Sheet Subtotal					**$48,213,350.00**

QUANTITIES		PRICES	
BY	CHECKED		CHECKED
Doug Stanton (D8130)	Dave Godaire (D8130)	Jeff Morris (D8170)	8/12/08
DATE PREPARED	PEER REVIEW	DATE PREPARED 8/13/08	PEER REVIEW

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable High Cost Estimate

River Outlet Works - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	76	Miscellaneous Metalwork Assume ladder in shaft to gate chamber, elevator rail supports, misc metal in gate house, gate chamber and D/S gate house.	D8120	14,000	LBS	$12.50	$175,000.00
		Mechanical					
	77	Furnish and install steel trashracks	D8410	337,500	LBS	$10.50	$3,543,750.00
	78	Furnish and install one bulkhead 22' x 24' @ 400' head	D8410	144,000	LBS	$5.20	$748,800.00
	79	Furnish and install seats and guides with lid	D8410	23,900	LBS	$13.00	$310,700.00
	80	Furnish and install one elevator, capacity = 500 lbs (2 person), speed = 100 fpm, travel = 450', landings = 2, type = freight	D8410	1	UNIT	$220,000.00	$220,000.00
		HVAC for: **4200-ft long by 26-ft dia. penstock tunnel and 430-ft deep by 24'dia shaft to gate chamber)**	D-8410				
	81	Centrifugal fan rated: 16,000cfm @ 8" static pressure, 1200 fan rpm max, 2200-fpm max. fan outlet velocity, with adjustable sheave with 2-speed motor for 50% speed (8000-cfm at 2"sp) belt-drive, 30-Hp, 460-V, 3-Ph, 60-Hz, 1800-rpm motor. (approx 700-lbs+motor wt)	D-8410	2	EA	$20,000.00	$40,000.00
	82	48" Dia, 16-ga galv st. duct 4700 ft long (Wt with supports approx = 40-lbs/linear ft)	D-8410	188,000	LBS	$10.00	$1,880,000.00
		For 50-degree F temperature rise for winter ventilation, Assuming 90% recirculated air &10% outside air					
	83	30-kVa Electric Duct heaters 480-V, 3-ph, 60-hz with thermostats Note: (100% outside air requires total of 515-kW heat for 32000 cfm for construction level ventilation or 210-kW for inspection level ventilation)	D-8410	2	EA	$20,000.00	$40,000.00
		Sheet Subtotal					**$6,958,250.00**

QUANTITIES		PRICES	
BY Dick LaFond (D8120) Weems,Schlein,Ritt,Christensen (D8410)	**CHECKED** Alex Ritt (D8410)	**BY** Lonnie Ziomke (D8170)	**CHECKED** M Hyndman 8/12/08
DATE PREPARED 4/24/2004, 6/03/2008	**PEER REVIEW**	**DATE PREPARED** 8/13/08	**PEER REVIEW**

FEATURE:
Black Rock Preferred Alternative
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River Outlet Works - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont.)					
		Heating and Ventilating	D-8410				
		50'x40'x24' Control House					
	84	Centrifugal fan: 1 each Single speed,1500 cfm at 0.50 inches w.g. static pressure, forward curve, direct drive; 3/4 hp motor rated 480 Vac, Three phase, 60 Hz.	D-8410	1	EA	$3,400.00	$3,400.00
	85	Propeller fan assembly: 1 each Single speed, 4,800 cfm at 0.50 inches w.g. static pressure, belt drive; 1.5 hp motor rated 460 Vac, three phase, 60 Hz; include fan wall mount housing with motor guard.	D-8410	1	EA	$3,800.00	$3,800.00
	86	Unit heaters: Electric horizontal discharge rated 7.5 kw, 460 Vac, 3-phase, 60 Hz. (One each corner -18' throw) with wall thermostats	D-8410	4	EA	$860.00	$3,440.00
	87	Control dampers: All motor operated, parallel blade, low leakage type with edge and side seals:	D-8410				
		48" wide x 48" high - 1 each		1	EA	$3,400.00	$3,400.00
		36" wide x 36" high - 1 each		1	EA	$2,000.00	$2,000.00
	88	Stationary louvers: All 16 gauge galvanized steel, 4-inch deep frame, 45 degree blades on 4-inch centers, 45 percent free area, with insect and bird screen:	D-8410				
		48" wide x 48" high - 1 each		1	EA	$2,300.00	$2,300.00
		36" wide x 36" high - 1 each		1	EA	$1,350.00	$1,350.00
		Sheet Subtotal					**$19,690.00**

QUANTITIES		PRICES	
BY Paul Schlein, Mike Weems (D8410)	**CHECKED** Alex Ritt (D8410)	**BY** Lonnie Zlomke (D8170)	**CHECKED** NL Hymer 8/12/08
DATE PREPARED 4/24/2004, 6/03/2008	**PEER REVIEW**	**DATE PREPARED** 8/13/08	**PEER REVIEW**

ESTIMATE WORKSHEET

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Yakima River Basin Water Storage Study

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
		(Continuation of HVAC System)	D-8410				
		(50'x40'x24' Control House)					
	89	Fan motor starters: Design, furnish and install control system	D-8410	2	EA	$3,400.00	$6,800.00
	90	Ductwork: All 16-gauge galvanized steel with extra heavy (ASTM A90 G120) galvanized coating: Air plenum: 250 lbs.	D-8410	250	LBS	$10.00	$2,500.00
	91	48"x48" galv steel intake air filter frames using nine(9) 24"x16"x2" disposable filter elements in frame with dirty filter differential pressure sensor with warning light and remote signal.	D-8410	1	EA	$2,700.00	$2,700.00
	92	16"x24"x2" disposable fiberglass, 30% min efficiency, Filter elements (estimate 9 elements with spares for testing, startup and two replacements each.	D-8410	36	EA	$2,800.00	$100,800.00
	93	Galv. Steel duct and fan supports.	D-8410	200	LBS	$12.90	$2,580.00
		Sheet Subtotal					**$115,380.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Paul Schlein, Mike Weems (D8410)	Alex Ritt (D8410)	Lonnie Ziomke (D8170)	N L Hyndman 8/12/08
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
4/24/2004, 6/03/2008		8/13/08	

FEATURE:
Black Rock Preferred Alternative
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River Outlet Works - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

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REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Steel penstock					
		FURNISH-AND-INSTALL THE FOLLOWING:	D8420				
	94	240-inch steel pipe, encased in concrete (1000 linear feet, 1-1/2-inch wall, 4290 lb per lin. ft.)		4,260,000	LBS	$3.65	$15,549,000.00
	95	192-inch steel pipe, encased in concrete (1000 linear feet, 1-1/4-inch wall, 2841 lb per lin. ft.)		2,840,000	LBS	$3.65	$10,366,000.00
	96	192-inch steel pipe, buried (273 linear feet, 1-1/16-inch wall, 2412 lb per lin. ft.)		660,000	LBS	$3.65	$2,409,000.00
	97	192-inch steel pipe, buried (601 linear feet, 1-inch wall, 2269 lb per lin. ft.)		1,360,000	LBS	$3.65	$4,964,000.00
	98	192-inch steel pipe, buried (601 linear feet, 15/16-inch wall, 2127 lb per lin. ft.)		1,280,000	LBS	$3.65	$4,672,000.00
	99	192-inch steel pipe, buried (601 linear feet, 7/8-inch wall, 1985 lb per lin. ft.)		1,190,000	LBS	$3.65	$4,343,500.00
	100	192-inch steel pipe, buried (600 linear feet, 13/16-inch wall, 1842 lb per lin. ft.)		1,110,000	LBS	$3.65	$4,051,500.00
	101	120-inch steel pipe, buried and exposed (100 linear feet, 13/16-inch wall, 1154 lb per lin. ft.)		115,000	LBS	$3.60	$414,000.00
	102	60-inch steel pipe, vertical, grouted, air vent (418 linear feet, 3/8-inch wall, 266 lb per lin. ft.)		115,000	LBS	$3.90	$448,500.00
		Sheet Subtotal					**$47,217,500.00**

QUANTITIES		PRICES	
BY Ken Smith (D8420)	**CHECKED**	**BY** Lonnie Zlomke (D8170)	**CHECKED** NL Hyndman 8/12/08
DATE PREPARED 4/26/04	**PEER REVIEW**	**DATE PREPARED** 8/13/08	**PEER REVIEW**

ESTIMATE WORKSHEET

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Gates and Gate Controls					
		Furnish and Install					
	103	F & I -18' x 14' Roller gate w/controls 1 - gate and 1 control box (in shaft house)	D8420	180,400	LBS	$11.00	$1,984,400.00
	104	F&I structural steel for hoist support		10,000	LBS	$5.60	$56,000.00
	105	F & I - 2 - 108-inch jet flow gates w/controls 2 gates and 1 control box		89,400	LBS	$12.00	$1,072,800.00
	106	F & I - 36-inch jet flow gate w/controls and bypass pipe 1 gate and 1 control box (in shaft house)		30,000	LBS	$12.00	$360,000.00
		Sheet Subtotal					**$3,473,200.00**

QUANTITIES		PRICES	
BY G. Rood (D8420)	**CHECKED**	**BY** Lonnie Zlomke (D8170)	**CHECKED** NLH 8/12/08
DATE PREPARED 4/26/04	**PEER REVIEW**	**DATE PREPARED** 8/13/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable High Cost Estimate

River Outlet Works - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\[rockfill Dam comparison MP-MPH.xls]Sheet1

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Electrical					
		This estimate is for 2 ROW control bldgs, one on top of dam and the other downstream for the regulating gates.					
		Assume bringing power to dam part of unlisted items.					
		Furnish and install the following electrical equipment:					
		Grounding System	8430				
	107	Ground rods, 10 ft, 3/4" dia., copper-clad		6	EA	$300.00	$1,800.00
	108	Stranded bare-copper conductor, 4 AWG		250	LF	$4.00	$1,000.00
		Conduit System	8430				
		Rigid steel conduit					
	109	3/4-inch		200	LF	$17.00	$3,400.00
	110	1-inch		100	LF	$25.00	$2,500.00
		PVC conduit, Schedule 40					
	111	1 1/2-inch		600	LF	$16.00	$9,600.00
		HDPE (High-density polyethylene)					
	112	2-inch		1,000	LF	$20.00	$20,000.00
		Conductors & Cable	8430				
		All cable single conductor, stranded copper					
	113	12 AWG		1,500	LF	$1.35	$2,025.00
	114	10 AWG		500	LF	$1.65	$825.00
	115	2 AWG		2,000	LF	$6.60	$13,200.00
	116	1/0 AWG		400	LF	$7.40	$2,960.00
		Electrical Service Equipment	8430				
	117	Pole-mounted transformer; 100 kVA, 13.8,kV-480V		1	EA	$46,000.00	$46,000.00
	118	Meter socket, NEMA 3R, 600V, 3-phase		1	EA	$760.00	$760.00
	119	Safety switch, heavy-duty, NEMA 3R, fusible 3-wire, 600V, 100 ampere		1	EA	$3,100.00	$3,100.00
		Panelboards & Electrical Distribution Equipment					
	120	Panelboard, 3-phase, 480V, 250 ampere		1	EA	$11,000.00	$11,000.00
	121	Distribution load center, 15 kVA, 1-phase 480-240/120V		2	EA	$15,000.00	$30,000.00
		River Outlet Works Subtotal					**$158,063,250.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Mike Schuh (D8430)	Cory Maurer (D8430)	Lonnie Zlomke (D8170)	N Hyde 8/12/08
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
5/22/08	George Girgis (D8430)	8/13/08	

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable High Cost Estimate

Roads and Utility Relocation

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\[rockfill Dam comparison MP-MPH.xls]Sheet1

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		State Highway Relocation (11.8 miles)					
	1	Clear roadway alignment	D8140	280	AC	$4,400.00	$1,232,000.00
	2	Excavation from borrow	D8140	1,000,000	CY	$5.50	$5,500,000.00
	3	Excavation for roadway (assume 70% rock material)	D8140	5,200,000	CY	$18.50	$96,200,000.00
	4	Compacting roadway embankments (subbase)	D8140	5,900,000	CY	$2.10	$12,390,000.00
	5	Furnish and place base course material	D8140	150,000	TONS	$31.00	$4,650,000.00
	6	Furnish and place asphalt concrete	D8140	97,000	TONS	$98.00	$9,506,000.00
	7	Furnish and install W-beam type guardrail	D8140	58,000	LF	$42.00	$2,436,000.00
	8	Furnish and install miscellaneous pipe culverts Assume 60-inch-diameter, wt/ft=100 lbs/ft.	D8140	1,800	LF	$320.00	$576,000.00
		Utility Relocations within Reservoir Inundation					
	9	Remove Existing Transmission Lines (5.0% per year to 36 month midpoint of construction period) lines, 60-feet apart 954 AWG conductor	D8440	7	miles	$58,000.00	$406,000.00
	10	Construct Transmission Lines Two 115-kV H-frame wood-pole lines, 60-feet apart 954 AWG conductor	D8440	12	miles	$470,000.00	$5,640,000.00
	11	Install new buried fiber optic line along new SH24 ROW Assume abandon existing line.	D-8120	12	miles	$39,000.00	$468,000.00
		Road and Utility Relocations Subtotal					**$139,004,000.00**

QUANTITIES		PRICES	
BY Anne Pavol (D8140)	**CHECKED** Chou Cha (D8140)	**BY** Jeff Morris (D8170) JM.	**CHECKED** NL Hyden 8/12/08
DATE PREPARED 4/24/04	**PEER REVIEW**	**DATE PREPARED** 8/13/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable High Cost Estimate

Downstream Seepage Mitigation - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\[rockfill Dam comparison MP-MPH.xls]Sheet1

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		MAIN COLLECTION FEATURE (7 MILES DOWNSTREAM)					
	1	Construct concrete diaphragm wall *Assume slurry trench construction, using a hydrofraise machine to 300-ft depth (6000 ft long)* *Assume excavation will be both in soil and rock* *Assume concrete backfill*	D8312	1,800,000	SF	$210.00	$378,000,000.00
	2	Furnish and construct rockfill embankment *Assume wall forms impervious barrier* *Embankment consists of rockfill obtained from within 2 miles of site* *Rough dimensions are 20 ft high, 6000 ft long, 20 ft wide crest, and 1.5:1 side slopes*	D8312	225,000	CY	$21.00	$4,725,000.00
	3	Install water wells *Assume 10 wells, each 300 ft deep* *Assume finished as water or dewatering wells with gravel pack and well screen*	D8312	6,000	LF	$240.00	$1,440,000.00
		SECONDARY COLLECTION FEATURE (Assumed location between dam and main collection feature)					
	1	Construct concrete diaphragm wall *Assume slurry trench construction, using a hydrofraise machine to 300-ft depth (6000 ft long)* *Assume excavation will be both in soil and rock* *Assume concrete backfill*	D8312	1,800,000	SF	$210.00	$378,000,000.00
	2	Furnish and construct rockfill embankment *Assume wall forms impervious barrier* *Embankment consists of rockfill obtained from within 2 miles of site* *Rough dimensions are 20 ft high, 6000 ft long, 20 ft wide crest, and 1.5:1 side slopes*	D8312	225,000	CY	$21.00	$4,725,000.00
	3	Install water wells *Assume 10 wells, each 300 ft deep* *Assume finished as water or dewatering wells with gravel pack and well screen*	D8312	6,000	LF	$240.00	$1,440,000.00
		Sheet Subtotal					**$768,330,000.00**

QUANTITIES		PRICES	
BY Bill Engemoen (D8312)	CHECKED Bill Engemoen (D8312)	BY Jerry Zander/Jeff Morris (D8170) JM.	CHECKED NL Hyndman 8/12/08
DATE PREPARED 06/04/08	PEER REVIEW Al Kiene (D8312)	DATE PREPARED 8/13/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Central Core Rockfill Dam - 1.3 MAF
Most Probable High Cost Estimate

Downstream Seepage Mitigation - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\[rockfill Dam comparison MP-MPH.xls]Sheet1

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Two Concrete Inlet Structures (Q=70 cfs)					
		One Intake at Primary Collection Feature, one intake at Secondary Collection Feature					
		Assume inlet structure excavation covered under embankment excavation.					
		Furnish, form, and place reinforced concrete	D8120	60	CY	$1,600.00	$96,000.00
		Furnish and place concrete reinforcement.	D8120	7,800	LBS	$1.90	$14,820.00
		Assume 130 #/CY					
		Furnish and handle cement (.282T/CY)	D8120	18	TONS	$195.00	$3,510.00
		Furnish and install miscellaneous metalwork	D8120	440	LBS	$15.00	$6,600.00
		grating and guardrails					
		Furnish and install steel trashracks (35 psf)	D8120	10,300	LBS	$10.50	$108,150.00
		Furnish and install 54-inch x 54-inch slide gate	D8120	2	LS	$72,000.00	$144,000.00
		steel or stainless steel welded construction					
		self-contained, wall-mounted gate					
		invert to opening= 15.5 feet					
		manual actuation					
		estimated weight: 2,700 LBS					
		Furnish and install trashrake	D8120	2	EA	$210,000.00	$420,000.00
		Assume Brackett Bosker Raking Machine					
		Heavy duty model w/ typical column supports					
		Trashrack height=15 ft, Width= 8-ft					
		Assume 50-ft long curved track.					
		BrackettGreenUSA, Inc. Telephone: 281-480-7955					
		Sheet Subtotal					**$793,080.00**

QUANTITIES		PRICES	
BY	CHECKED	BY	CHECKED
Brad VanOtterloo (8120)	Dick LaFond (D8120)	Jerry Zander/Jeff Morris (D8170) J.M.	M Hyslop 8/12/08
DATE PREPARED	PEER REVIEW	DATE PREPARED	PEER REVIEW
06/06/08		8/13/08	

ESTIMATE WORKSHEET

FEATURE:	PROJECT:			
Black Rock Preferred Alternative Central Core Rockfill Dam - 1.3 MAF Most Probable High Cost Estimate	Yakima River Basin Water Storage Study			
	WOID: YAKAP	ESTIMATE LEVEL:	Appraisal	
	REGION PN	PRICE LEVEL:	Apr-07	
Downstream Seepage Mitigation - Civil/Structural	FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\[rockfill Dam comparison MP-MPH.xls]Sheet1			

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Discharge Line					
		Discharge line quantities are from cutoff wall to Yakima River (~20 miles).					
		(Design flow= 70 cfs)					
		Earthwork for Discharge Pipe					
		Price Alternative 2. Alternative 1 for reference only.					
		Alternative 1 - Payline Quantities - Vertical Trench Walls					
		Clearing and Grubbing (150 ft wide along pipeline)	D8120		SY		
		Common Excavation for pipe	D8120		CY		
		Rock Excavation for pipe - (drill and shoot)	D8120		CY		
		Backfill for pipe	D8120		CY		
		Rockfill for pipe (used instead of backfill under dam)	D8120		CY		
		Soil Cement Slurry (CLSM)	D8120		CY		
		Alternative 2 - Takeoff Quantities - 1-1/2:1 Trench Walls					
	1	Clearing and Grubbing (150 ft wide ROW along pipeline)	D8120	1,833,400	SY	$1.00	$1,833,400.00
	2	Common Excavation for pipe	D8120	725,700	CY	$4.30	$3,120,510.00
	3	Backfill for pipe	D8120	585,600	CY	$4.90	$2,869,440.00
	4	Soil Cement Slurry (CLSM)	D8120	88,750	CY	$110.00	$9,762,500.00
		48-inch Diameter Mortar-lined Steel Pipe					
	8	48-inch, pipe thickness = 0.375 (200 lb/ft steel weight)	D8120	110,000	LF	$410.00	$45,100,000.00
		River/Road Crossings	D8120	4	EA	$27,000.00	$108,000.00
		Assume Cold Creek, Dry Creek, and 2 @ SH240					
		Assume creeks have minimal Q during construction.					
		Air Valve Installations (Assume 10 required)	D8140	1	LS	$490,000.00	$490,000.00
		Concrete: 810 CY					
		Cement: 230 Tons					
		Reinforcement: 148,000 LBS					
		Excavation: 4,500 CY					
		Backfill: 247 CY					
		6-inch Air/Vacuum Valves: 10 EA.					
		Sheet Subtotal					**$63,283,850.00**

QUANTITIES		PRICES	
BY Brad VanOtterloo (D8120) Dave Gesundheit (8140)	CHECKED Dick LaFond (D8120), Dave Edwards (D8140)	BY Jerry Zander/Jeff Morris (D8170)	CHECKED 8/12/08
DATE PREPARED 06/06/08	PEER REVIEW Dave Edwards (D8140)	DATE PREPARED 8/13/08	PEER REVIEW

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

SHEET__20__ OF __20__

FEATURE:	PROJECT:	
Black Rock Preferred Alternative Central Core Rockfill Dam - 1.3 MAF Most Probable High Cost Estimate	Yakima River Basin Water Storage Study	
	WOID: YAKAP	ESTIMATE LEVEL: Appraisal
	REGION PN	PRICE LEVEL: Apr-07
Downstream Seepage Mitigation - Civil/Structural	FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\[rockfill Dam comparison MP-MPH.xls]Sheet1	

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Concrete Baffled Outlet Structure (Type 8)					
		(Design flow= 70 cfs)					
		Excavation of common materials for structures	D8120	150	CY	$49.00	$7,350.00
		Furnish and place backfill around structures	D8120	85	CY	$35.00	$2,975.00
		Compact backfill around structures	D8120	85	CY	$28.00	$2,380.00
		Furnish, form, and place reinforced concrete	D8120	21	CY	$1,600.00	$33,600.00
		Furnish and place concrete reinforcement. Assume 130 #/CY	D8120	2,730	LBS	$1.90	$5,187.00
		Furnish and handle cement (.282T/CY)	D8120	6	TONS	$195.00	$1,170.00
		Furnish and install miscellaneous metalwork grating, guardrails, safety racks	D8120	3,900	LBS	$14.00	$54,600.00
		Furnish and install riprap and bedding					
		Riprap (d50=24") (120 lb/cf)	D8120	1,000	TONS	$75.00	$75,000.00
		Riprap Bedding (130 lb/cf)	D8120	400	TONS	$58.00	$23,200.00
		Seepage Mitigation Subtotal					**$832,612,392.00**

QUANTITIES		PRICES	
BY Brad VanOtterloo (D8120)	CHECKED Dick LaFond (D8120)	BY J.M. Jerry Zander/Jeff Morris (D8170)	CHECKED N.K.Hyde 8/12/08
DATE PREPARED 06/02/08	PEER REVIEW	DATE PREPARED 8/13/08	PEER REVIEW

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable High Cost Estimate
Summary

Summary Sheet

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Ouflow_Most Probable High_060608-revision 8-4-08.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Outflow Conveyance System sized for 2,500 cfs.					
		Black Rock Outlet Facility loacted at MP22.6 on Roza Canal					
		Bypass capacity: 2,500 cfs, Powerplant capacity: 900 cfs					
		Sunnyside Deliveries by Pressure Pipe Option.					
		Black Rock Outflow Conveyance Subtotal					$500,448,695.00
		Plant - Civil and Structural Subtotal					$44,499,320.00
		Plant - Mechanical Subtotal					$94,481,320.00
		Plant - Electrical Subtotal					$16,991,810.00
		Switchyard & Transmission Line Subtotal					$1,194,500.00
		Subtotal					**$657,615,645.00**
		Mobilization		5%	(+/-)		$33,000,000.00
		Subtotal with mobilization					**$690,615,645.00**
		Escalation During Construction		0%	(+/-)		$0.00
		Subtotal with mobilization and escalation					**$690,615,645.00**
		Design Contingencies		15%	(+/-)		$99,384,355.00
		CONTRACT COST					**$790,000,000.00**
		Construction Contingencies		30%	(+/-)		$ 260,000,000.00
		FIELD COST					**$1,050,000,000.00**
		Non-Contract Costs **		30%	(+/-)		$300,000,000.00
		CONSTRUCTION COST					**$1,350,000,000.00**

Escalation to notice to proceed, allowance for procurement strategies, and utility relocations are not included.

** Land Acquisition Costs of $175,500 associated with these features are included in the Non-Contract Costs.

QUANTITIES		PRICES	
BY Design Team	**CHECKED**	**BY** J. Zander, J. Morris & T. Tomke (8170)	**CHECKED**
DATE PREPARED 6/02/08	**PEER REVIEW**	**DATE PREPARED** 8/20/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE: Black Rock Preferred Alternative Outflow Conveyance System Most Probable High Cost Estimate Intake - Civil Structural	**PROJECT:** Yakima River Basin Water Storage Study
WOID: YAKAP	**ESTIMATE LEVEL:** Appraisal
REGION PN	**PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Ouflow_Most Probable High_060608.xls]Summary	

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Intake Structure with Fishscreens					
		Assume single level intake at Black Rock Reservoir.					
		Assume Top of Dead Pool @ El. 1500.0					
		Civil/Structural					
		Structural Excavation and Backfill					
		Assume top 5 feet of excavation is common and the remainder is rock					
	1	Excavation of common materials for structures	D8120	1,700	CY	$25.00	$42,500.00
	2	Excavation of rock for structures (drill & shoot)	D8120	1,000	CY	$37.00	$37,000.00
		Assume no backfill.					
		Construct Fishscreened Intake Structure (incl. Manifold Encasement)					
	3	Furnish, form, and place reinforced concrete (f'c=4ksi)	D8120	1,500	CY	$1,050.00	$1,575,000.00
	4	Furnish and place concrete reinforcement. (110#/CY)	D8120	165,000	LBS	$2.20	$363,000.00
	5	Furnish and handle cement	D8120	423	TONS	$180.00	$76,140.00
		Waste Outflow Tunnel Muck at Black Rock					
		Assume waste material within 5 miles of portal.					
		Quantities include 1/2 outflow tunnel.					
		Waste rock excavation	D8120	510,000	CY	$8.30	$4,233,000.00
		Waste Excess Excavated Material at Roza Canal					
		Assume waste material within 5 miles of excavation					
		Quantities include 1/2 outflow tunnel + outlet structure @ Roza Canal					
		Waste rock excavation	D8120	575,000	CY	$8.30	$4,772,500.00
		Waste common material	D8120	90,000	CY	$7.60	$684,000.00
		Sheet Subtotal					**$11,783,140.00**

QUANTITIES		PRICES	
BY Dick LaFond (D8120) 6/3/2004	CHECKED Mike O'Shea (D8120)	BY Jeff Morris (D8170) 8/4/08	CHECKED D. K 8/1/08
DATE PREPARED 6/2/2008	PEER REVIEW	DATE PREPARED 8/4/08	PEER REVIEW 8/4/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable High Cost Estimate

Intake - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Ouflow_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Intake Structure with Fishscreens					
		Mechanical					
	6	Fish screen, radius = 20 ft, 90 ft long half cylinder shape	D8410				
		structural steel weight		0	LBS		
		stainless steel weight		174,000	LBS	$25.00	$4,350,000.00
	7	Air burst cleaning system, 250 psi working pressure	D8410				
		a. 30,000 gallon receiver tank		60,000	LBS	$6.30	$378,000.00
		b. Air compressor units, each 30 hp, 87 cfm @ 250 psi @ 600 lbs each, two required		1,200	LBS	$31.00	$37,200.00
		c. 6" dia. piping and butterfly valves (steel)		10,000	LBS	$10.50	$105,000.00
	8	Bulkhead gates and frames/guides (steel) (assumes four - 10' by 10' bulkhead gates)	D8410	144,000	LBS	$8.00	$1,152,000.00
		Sheet Subtotal					**$6,022,200.00**

QUANTITIES		PRICES	
BY Rick Christensen (D8410)	**CHECKED** Alex Ritt (D8410)	**BY** Jeff Morris (D8170) 8/4/08	**CHECKED** 8/1/08
DATE PREPARED 6/1/04, 6/03/2008	**PEER REVIEW**	**DATE PREPARED** 8/4/08	**PEER REVIEW** 8/4/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable High Cost Estimate

Outflow Conveyance - Civil/Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Ouflow_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Tunnel					
		Construct 90,000-ft long, 17.00-ft finished diameter, 19.67-ft minimum bore diameter, tunnel in rock. Tunnel will be excavated with TBM and driven uphill. Water problems will be minimal. Tunnel has three final support reaches.					
		80,600-ft long unreinforced concrete lined reach					
	9	Excavation (907,000 cy, appr 11 cy/lf)	D8140	80,600	lf	$1,900.00	$153,140,000.00
	10	Furnish and place unreinforced concrete tunnel lining	D8140	229,000	cy	$540.00	$123,660,000.00
	11	Cementitious materials for concrete tunnel lining	D8140	64,600	tons	$155.00	$10,013,000.00
	12	Furnish & install 3/4-in dia, 8-ft long rock bolts	D8140	642,000	lin ft	$80.00	$51,360,000.00
		2,000-ft long reinforced concrete lined reach					
	13	Excavation (22,500 cy, appr 11 cy/lf)	D8140	2,000	lf	$1,900.00	$3,800,000.00
	14	Furnish and place reinforced concrete tunnel lining	D8140	5,690	cy	$630.00	$3,584,700.00
	15	Cementitious materials for concrete tunnel lining	D8140	1,600	tons	$180.00	$288,000.00
	16	Furnish and install concrete reinforcement	D8140	81,700	lbs	$2.00	$163,400.00
	17	Furnish and install structural steel tunnel supports	D8140	828,000	lbs	$7.50	$6,210,000.00
		7,400-ft long steel lined portal reach					
	18	Excavation (83,300 cy, appr 11 cy/lf)	D8140	7,400	lf	$1,900.00	$14,060,000.00
		Steel Tunnel Liner:					
		ASTM A572 Gr. 50: Sy = 50 kpsi St = 65 kpsi					
	19	204" Dia., 7/8" wall, L= 7770 ft., 1916 lbs/ft	D8420	19,200,000	LBS	$3.80	$72,960,000.00
	20	Furnish and place backfill concrete	D8140	21,100	cy	$500.00	$10,550,000.00
	21	Cementitious materials for backfill concrete	D8140	5,940	tons	$155.00	$920,700.00
	22	Furnish & install 3/4-in dia, 8-ft long rock bolts	D8140	89,600	lin ft	$80.00	$7,168,000.00
	23	Furnish and install structural steel tunnel supports	D8140	415,000	lbs	$7.50	$3,112,500.00
		Sheet Subtotal					**$460,990,300.00**

QUANTITIES		PRICES	
BY Bill Thomspon (D8140) Nathan Nakamoto (D-8420)	**CHECKED** Kevin Atwater (D8140), Rick Frisz, (D8420)	**BY** Jeff Morris (D8170) 8/4/08	**CHECKED** D.K 8/1/08
DATE PREPARED 5/26/04	**PEER REVIEW**	**DATE PREPARED** 8/4/08	**PEER REVIEW** 8/4/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable High Cost Estimate

Outflow Conveyance - Civil/Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Ouflow_Most Probable High_060608-revision 8-4-08.xls]BRR Outflow

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct Surge Shaft					
		Construct 530-ft deep, 40.0-ft finished diameter, 46-ft excavated diameter, shaft in rock. Shaft will be excavated by raise bore and slash method (drill & blast). Water problems will be minimal. Shaft has two final support reaches.					
		430-ft deep unreinforced concrete lined reach					
	24	Excavation (26,500 cy, approx. 62 cy/lf)	D8140	430	lf	$21,000.00	$9,030,000.00
	25	Furnish and place unreinforced concrete shaft lining	D8140	6,450	cy	$570.00	$3,676,500.00
	26	Cementitious materials for concrete shaft lining	D8140	1,820	tons	$185.00	$336,700.00
	27	Furnish & install 1-in dia, 12-ft long rock bolts	D8140	21,000	lin ft	$90.00	$1,890,000.00
		100-ft deep reinforced concrete lined shaft top reach					
	28	Excavation (6,160 cy, approx. 62 cy/lf)	D8140	100	lf	$21,000.00	$2,100,000.00
	29	Furnish and place reinforced concrete shaft lining	D8140	1,500	cy	$570.00	$855,000.00
	30	Cementitious materials for concrete shaft lining	D8140	423	tons	$185.00	$78,255.00
	31	Furnish and install concrete reinforcement	D8140	18,700	lb	$2.00	$37,400.00
	32	Furnish & install 1-in dia, 12-ft long rock bolts	D8140	4,800	lin ft	$90.00	$432,000.00
	33	Furnish and install chain link protection	D8140	76,600	sq yd	$42.00	$3,217,200.00
		Black Rock Outflow Conveyance Subtotal					**$500,448,695.00**

QUANTITIES		PRICES	
BY Bill Thompson (D8140)	**CHECKED** Kevin Atwater (D8140)	**BY** Jeff Morris (D8170) 8/4/08	**CHECKED** 8/4/08
DATE PREPARED 4/19/04	**PEER REVIEW**	**DATE PREPARED** 8/4/08	**PEER REVIEW** 8/4/08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
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Black Rock Outlet Facility - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Access Road (60 ft of 24ft wide bituminous surface):					
	1	Clear roadway alignment	D8120	1,440	SF	$2.00	$2,880.00
	2	Furnish and place base course material (9-inch depth)	D8120	75	TONS	$37.00	$2,775.00
	3	Furnish and place asphalt concrete (6-inch depth)	D8120	55	TONS	$190.00	$10,450.00
		Service Yard (6" asphalt concrete surface)					
		Assume T.O Yard= El 1176.0					
	4	Strip and clear pumping plant site to 1 foot depth	D8120	9,000	CY	$3.70	$33,300.00
	5	Common excavation to Yard (25% Strip & Clear)	D8120	2,300	CY	$18.50	$42,550.00
	6	Place and compact embankment for yard (25% Exc.)	D8120	575	CY	$25.00	$14,375.00
	7	Furnish and place base course material (6-inch)	D8120	4,600	TONS	$37.00	$170,200.00
	8	Furnish and place asphalt concrete (6-inch)	D8120	5,100	TONS	$115.00	$586,500.00
	9	Furnish and install 7-foot chain link fence for PP Yard	D8120	1,900	LF	$31.00	$58,900.00
	10	Furnish and install 7-foot x 24-foot access gates	D8120	3	EA	$5,400.00	$16,200.00
		Diversion During Construction:					
		Assume need to pass 900 cfs canal flow during construction. Assume local borrow.					
		Assume no dewwatering required.					
	11	Construct U/S & D/S earth cofferdams. (Height=15 ft)	D8120	2,000	CY	$38.00	$76,000.00
	12	F&I impervious geomembrane on cofferdams.	D8120	350	SY	$25.00	$8,750.00
	13	F&I three 9-ft dia. X .138-in galv., corrugated metal pipes btwn cofferdams. Wt/Ft= 210 lbs/ft.	D8120	1,000	LF	$780.00	$780,000.00
	14	Remove cofferdams and diversion structures	D8120	1	LS	$52,000.00	$52,000.00
		Sheet Subtotal					**$1,854,880.00**

QUANTITIES		PRICES	
BY Dick LaFond (D8120) Brad VanOtterloo (D8120)	**CHECKED** Dick LaFond (D8120)	**BY** Jerry Zender/Jeff Morris (D8170)	**CHECKED** 8/1/08
DATE PREPARED 6/3/04	**PEER REVIEW**	**DATE PREPARED** 8/4/08	**PEER REVIEW** 08/05/08

ESTIMATE WORKSHEET

FEATURE: Black Rock Preferred Alternative Outflow Conveyance System Most Probable High Cost Estimate	**PROJECT:** Yakima River Basin Water Storage Study
	WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
	REGION PN **PRICE LEVEL:** Apr-07
Black Rock Outlet Facility - Civil/Structural	**FILE:** H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Ouflow_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Tailrace Channel (Lined - Lining covered under structural)					
		T.O Ground El. 1176. Assume T.O. Rock El. 1160					
		Assume waste rock and common material within 5 miiesof excavation. See Sht 2.					
	15	Common excavation for tailrace channel	D8120	22,400	CY	$11.50	$257,600.00
	16	Rock excavation for tailrace channel (drill & shoot)	D8120	16,400	CY	$41.00	$672,400.00
		Structural Excavation and Backfill					
		T.O Ground El. 1176. Assume T.O. Rock El. 1160					
		Assume stockpile rock for later use as riprap.					
	17	Common excavation for structures	D8120	14,500	CY	$12.50	$181,250.00
	18	Rock excavation for structures (drill & shoot)	D8120	17,500	CY	$39.00	$682,500.00
	19	Furnish backfill for structures (reuse excavation)	D8120	6,400	CY	$0.00	$0.00
	20	Place backfill around structures	D8120	6,400	CY	$18.50	$118,400.00
	21	Compact backfill around structures	D8120	6,400	CY	$21.00	$134,400.00
		Pipe Trench Excavation and Backfill					
		Manifold excavation in yard.					
		T.O Ground El. 1176. Assume T.O. Rock El. 1150					
	22	Common excavation for pipe in Service Yard	D8120	13,300	CY	$10.00	$133,000.00
	23	Rock excavation for pipe in Service Yard	D8120	4,600	CY	$41.00	$188,600.00
	24	Furnish, place, & compact backfill for pipe (local)	D8120	11,500	CY	$39.00	$448,500.00
		Pipe Trench Excavation and Backfill					
		From Tunnel Portal (Sta. 910+00) to Yard (Sta. 940+00)					
		Assume all common excavation					
	25	Common excavation for pipe	D8140	487,000	CY	$4.70	$2,288,900.00
	26	Furnish backfill for pipe	D8140	461,500	CY	$0.00	$0.00
	27	Place backfill around pipe	D8140	461,500	CY	$6.30	$2,907,450.00
	28	Compact pipe backfill (F&P included in above items)	D8140	36,000	CY	$12.50	$450,000.00
		Sheet Subtotal					**$8,463,000.00**

QUANTITIES		PRICES	
BY Dick LaFond ((D8120) Linda Bowles (D8140)	**CHECKED** M. O'Shea & B. Van Otterloo(8120), A. Pavol (8140)	**BY** Jerry Zander/Jeff Morris (D8170)	**CHECKED** 8/1/08
DATE PREPARED 5/15/04	**PEER REVIEW**	**DATE PREPARED** 8/4/08	**PEER REVIEW** 08-05-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
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Most Probable High Cost Estimate

Black Rock Outlet Facility - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		STRUCTURAL					
		Construct Concrete Tailrace Lining and Retaining Walls					
		Assume lining is 1-foot thick w/ #6@12" EW EF, 1.5:1 side slopes					
	29	Furnish, form, and place reinforced concrete lining in excavated channel (f'c= 4 ksi)	D8120	2,000	CY	$1,100.00	$2,200,000.00
	30	Furnish, form, and place reinforced concrete walls	D8120	1,500	CY	$1,150.00	$1,725,000.00
	31	Furnish and place concrete reinforcement. Assume 130 #/CY	D8120	455,000	LBS	$2.20	$1,001,000.00
	32	Furnish and handle cement (.282T/CY)	D8120	980	TONS	$160.00	$156,800.00
		Construct Powerplant and Bypass Substructure					
	33	Furnish, form, and place reinforced concrete	D8120	16,000	CY	$850.00	$13,600,000.00
	34	Furnish and place concrete reinforcement. Assume 130 #/CY	D8120	2,080,000	LBS	$2.10	$4,368,000.00
	35	Furnish and handle cement (.282T/CY)	D8120	4,500	TONS	$140.00	$630,000.00
	36	**Construct Powerplant and Bypass Superstructure** 212.5-ft x 73.5-ft x 42-ft high superstructure Structural steel superstructure with CMU walls. Stepped columns for 90T crane support Built-up roof on metal roof deck.	D8120	15,620	SF	$280.00	$4,373,600.00
		Sheet Subtotal					**$28,054,400.00**

QUANTITIES		PRICES	
BY Dick LaFond (D8120)	CHECKED Mike O'Shea, Brad VanOtterloo (D8120)	BY Jerry Zander/Jeff Morris (D8170)	CHECKED 8/1/08
DATE PREPARED 6/4/04	PEER REVIEW	DATE PREPARED 8/4/08	PEER REVIEW 08/05/08

ESTIMATE WORKSHEET

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Black Rock Outlet Facility - Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		STRUCTURAL (cont.)					
		Construct Pipe Encasements in Yard					
	37	Furnish, form, and place reinforced concrete	D8120	3,100	CY	$1,000.00	$3,100,000.00
	38	Furnish and place concrete reinforcement. Assume 110 #/CY	D8120	341,000	LBS	$2.20	$750,200.00
	39	Furnish and handle cement (.282T/CY)	D8120	874	TONS	$160.00	$139,840.00
		Structural Steel					
	40	Furnish and install structural steel (painted): Includes crane girder, rail, and hoist frames. Does not include typ. building framework.	D8120	175,000	LBS	$8.90	$1,557,500.00
		Miscellaneous Metalwork					
	41	Furnish and install miscellaneous metalwork Includes grating, hatches, ladders, guardrail, and cable trays	D8120	45,000	LBS	$12.50	$562,500.00
	42	Motor-operated, exterior insulated roll-up door 18' x 20'	D8120	1	EA	$17,000.00	$17,000.00
		Plant - Civil and Structural Subtotal					**$44,499,320.00**

QUANTITIES		PRICES	
BY Dick LaFond (D8120)	CHECKED Mike O'Shea (D8120)	BY JZ JM Jerry Zander/Jeff Morris (D8170)	CHECKED D. K 8/11/08
DATE PREPARED 5/15/04	PEER REVIEW	DATE PREPARED 8/4/08	PEER REVIEW DK 08-05-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
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Black Rock Outlet Facility - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Major Mechanical Equipment					
	1	Turbine-Vertical Francis, 31452 Hp 400 rpm, 339 ft. Design Head CF3 18-8 Stainless Runner 5.5' dia.	D8420	125,000	LBS	$25.00	$3,125,000.00
	2	Digital Governor, 103,905 ft.-lbs. 150 psi system	D8420	1	EA	$380,000.00	$380,000.00
	3	Governor Pressure Tank 875 Gal. Look to Flaming Gorge Oil Tank	D8420	7,640	LBS	$10.50	$80,220.00
		Sheet Subtotal					**$3,585,220.00**

QUANTITIES		PRICES	
BY Toby Turnage (D8420)	**CHECKED** John Brooks (D8420)	**BY** Lonnie Zlomke (D8170)	**CHECKED** D. K 8/1/08
DATE PREPARED 4/14/04	**PEER REVIEW**	**DATE PREPARED** 8/4/08	**PEER REVIEW** 08-05-08

ESTIMATE WORKSHEET

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Black Rock Outlet Facility - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Furnish and install the following:					
		Steel Penstock:					
		Steel plate used for pipe fabrication:					
		ASTM A36: Sy = 36 kpsi					
		(All pipe sizes are inside diameters)					
	4	204" Dia., 1 15/16" wall, L= 3,000 ft., 4265 lbs/ft	D8420	12,795,000	LBS	$3.60	$46,062,000.00
	5	84" Dia., 13/16" wall, L= 492 ft., 737 lbs/ft	D8420	363,000	LBS	$2.70	$980,100.00
		Stainless Steel Stilling Basin for Sleeve Valves:					
		ASTM 316L Stainless steel plate					
	6	Four - 396" Dia., 1 1/4" wall cylindrical tanks with baseplates:					
		Each tank height = 20 feet					
		Total weight for four tanks = 1,180,000 lbs.	D8420	1,180,000	LBS	$21.00	$24,780,000.00
		Sleeve valves with hydraulic operators:					
	7	Four - 84" Dia. Inlet X 72" Dia. Outlet Valves	D8420	280,000	LBS	$21.00	$5,880,000.00
		ASTM 316L Stainless steel plate					
		Each valve weight = 70,000					
		Total weight for four valves = 280,000 lbs.					
		Spherical valves with hydraulic operators:					
	8	Sleeve valve guard valves	D8420	240,000	LBS	$14.00	$3,360,000.00
		Four - 60" Dia. Spherical valves with hydraulic operators					
		60,000 lbs. per valve					
		Turbine guard valve					
	9	One - 84" Dia. Spherical valve with hydraulic operator	D8420	140,000	LBS	$14.00	$1,960,000.00
		140,000 lbs. per valve					
		Sunnyside Power Plant Isolation Valve					
	10	One - 84" Dia. Spherical valve with hydraulic operator	D8420	140,000	LBS	$14.00	$1,960,000.00
		140,000 lbs. per valve					
		Sheet Subtotal					**$84,982,100.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Nathan Nakamoto (D8420)	Rick Frisz (D8420)	Lonnie Zlomke (D8170)	
DATE PREPARED		**DATE PREPARED**	**PEER REVIEW**
5/26/04		8/12/08	

ESTIMATE WORKSHEET

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PROJECT:
Yakima River Basin Water Storage Study

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	10	Furnishing and installing one 90-Ton overhead crane, 67.5' span	D8410	157,500	LBS	$8.40	$1,323,000.00
	11	Furnishing and installing Hydraulic elevator capacity = 3500 pounds, travel = 31 ft. landings = 3, speed = 100 ft/min.	D8410	1	unit	$550,000.00	$550,000.00
	12	Bulkhead gates and guides at turbine (steel) (assumes 3 bays of guides and 3 bulkhead gates)	D8410	31,000	LBS	$6.40	$198,400.00
	13	Monorail hoist for bulkhead gate, electric wire rope, motorized trolley, 5-ton capacity	D8410	1,500	LBS	$28.00	$42,000.00
	14	Stoplogs, lifting beam & guides at sleeve valves eight bays fo guides, 2 bays of stoplogs (steel)	D8410	152,000	LBS	$7.80	$1,185,600.00
	15	CO2 High Pressure Fire Extinguishing System: 12 - 100# Storage Cylinders w/ control panel and appurtenances and 400 lbs. of sch. 80 carbon steel pipe, valves & fittings	D8410	1	L.S.	$50,000.00	$50,000.00
	16	Fire Suppression System: 3 Fire hose reels w/ 100 feet of hose 12 - Portable hand-held 20# extinguishers 2,000 lbs. of sch. 40 carbon steel pipe, valves & fittings 1 - Fire pump, split-case, 500 gpm @ 300 ft of head	D8410	1	L.S.	$69,000.00	$69,000.00
	17	Unit Cooling Water System: 2 - Cooling water pumps, end-suction type, 150 gpm 2 - 8-inch automatic, self-cleaning strainers 1,000 lbs. of type K copper tubing, valves & fittings 4,000 lbs. of ductile iron, mechanical joint pipe & fittings	D8410	1	L.S.	$180,000.00	$180,000.00
	18	Lubricating Oil System: 2- 500 gal carbon steel storage tanks 1 - 10 gpm @ 100 psi oil pump 1 - lube oil filter 1,000 lbs. of sch. 40 carbon steel pipe, valves & fittings	D8410	1	L.S.	$28,000.00	$28,000.00
		Sheet Subtotal					**$3,626,000.00**

QUANTITIES		PRICES	
BY Rick Christensen, B.Sund C Berte, J Grass, R Egan	**CHECKED** Alex Ritt (D-8410)	**BY** Lonnie Zlomke (D8170)	**CHECKED** 8/1/08
DATE PREPARED 5/3/2004, 6/03/2008	**PEER REVIEW**	**DATE PREPARED** 8/4/08	**PEER REVIEW** 08-05-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
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Black Rock Outlet Facility - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	19	Compressed Air System: 2 - 100 cfm @ 125 psi rotary screw air compressors 1 - 250 gal. carbon steel air receiver 1 - 100 cfm air dryer 500 lbs. of sch. 40 carbon steel pipe, valves & fittings	D8410	1	L.S.	$69,000.00	$69,000.00
	20	Service Water System: 1 - Service water pump, 75 gpm @ 200 ft. of head 1 - Hydropneumatic Tank, 300 gal. 750 lbs. of type K copper tubing, valves & fittings	D8410	1	L.S.	$135,000.00	$135,000.00
	21	Gravity Drainage System: 12 - Floor drains, cast iron 5,000 lbs. of cast iron hub & spigot, service weight soil pipe	D8410	1	L.S.	$69,000.00	$69,000.00
	22	Plant Unwatering System: 2 - Vertical turbine type sump pump, 500 gpm @ 50 ft hd 1 - Drainage jet type drainage pump 1,000 lbs. of type K copper tube, valves & fittings 3,000 lbs. of ductile iron, mechanical joint pipe & fittings	D8410	1	each	$96,000.00	$96,000.00
	23	Domestic Water and Sanitary Waste System: 2 - Water Closets 1 - Urinal 2 - Lavatories & accessories 1 - Duplex Sewage Ejector 2,000 lbs. of cast iron hub & spigot service weight sewer pipe 400 lbs. of type K copper tubing, valves & fittings	D8410	1	each	$69,000.00	$69,000.00
		Sheet Subtotal					**$438,000.00**

QUANTITIES		**PRICES**	
BY J Grass, Randy Egan (D8410)	**CHECKED** Alex Ritt (D-8410)	**BY** Lonnie Zlomke (D8170)	**CHECKED** 8/1/08
DATE PREPARED 5/27/2004, 6/03/2008	**PEER REVIEW**	**DATE PREPARED** 8/4/08	**PEER REVIEW** 08-05-08

ESTIMATE WORKSHEET

FEATURE:
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Black Rock Outlet Facility - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Heating, Ventilating, and Air Conditioning Unmanned air cooled plant . OA temp 95 degrees F.	D8410	1	L.S.	$1,850,000.00	$1,850,000.00
		Plant - Mechanical Subtotal					**$94,481,320.00**

QUANTITIES		PRICES	
BY Paul Schlein, Mike Weems (D8410)	**CHECKED** Alex Ritt (D-8410)	**BY** Lonnie Zlomke (D8170)	**CHECKED** 8/1/08
DATE PREPARED 6/1/2004, 6/03/2008	**PEER REVIEW**	**DATE PREPARED** 8/4/08	**PEER REVIEW** 08-05-08

ESTIMATE WORKSHEET

FEATURE:
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Outflow Conveyance System
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Black Rock Outlet Facility - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\[Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Ouflow_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	1	**Electrical Generator (F&I)** 25,000 kVA, 6,900 volts, 3-phase, 60 Hz 276.9 rpm, 95 % power factor Vertical, synchronous machine Static excitation system & voltage regulator	D8430	1	EA	$13,500,000	$13,500,000.00
		Plant Grounding System (F&I)	D8430				
	2	Ground rods, 10 ft, 3/4" dia, copper-clad		30	EA	$290.00	$8,700.00
		Stranded bare-copper conductor:					
	3	250 MCM		1,200	LF	$15.00	$18,000.00
	4	4/0 AWG		800	LF	$14.00	$11,200.00
	5	2/0 AWG		500	LF	$9.50	$4,750.00
	6	4 AWG		800	LF	$3.80	$3,040.00
		Generator Bus & Metal-Enclosed Switchgear (F&I)	D8430				
	7	Generator isolated phase bus: 15 kV, 3000 amperes, 3-phase, 60 Hz		250	LF	$2,000.00	$500,000.00
	8	Generator power circuit breaker: 15 kV, 3000 amperes, 3-phase, vacuum type		1	EA	$1,000,000	$1,000,000.00
	9	Station-service fused interrupter switch: 15 kV, 600 ampere, 3-phase, w/ power fuses		1	EA	$41,000.00	$41,000.00
		Generator Control Equipment (F&I)	D8430				
	10	Duplex control switchboard for operation of the generator		1	EA	$1,000,000	$1,000,000.00
		Sheet Subtotal					**$16,086,690.00**

QUANTITIES		PRICES	
BY Mike Schu (D8430)	**CHECKED** Cory Maurer (D8430)	**BY** Lonnie Zlomke (D8170)	**CHECKED** 8/1/08
DATE PREPARED 5/22/08	**PEER REVIEW** George Girgis (D8430)	**DATE PREPARED** 8/4/08	**PEER REVIEW** 08-05-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable High Cost Estimate

Black Rock Outlet Facility - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock Ouflow_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Plant Battery System (F&I)	D8430				
	11	125 volt, 300 ampere-hour, lead-acid battery		1	EA	$34,000.00	$34,000.00
	12	Battery chargers		2	EA	$11,000.00	$22,000.00
	13	DC distribution panelboard, 100 ampere mains, and molded-case circuit breakers		1	EA	$17,000.00	$17,000.00
		Plant Station-Service Equipment (F&I)	D8430				
		Indoor secondary unit substation with following features:					
	14	Dry-type transformer, 6.9 kV-480Y/277, 1500 kVA		1	EA	$76,000.00	$76,000.00
	15	480 volt power-circuit breakers, 600 amperes		5	EA	$5,500.00	$27,500.00
		Building Lighting System (F&I)	D8430				
		Interior luminaires					
	16	High bay, high-pressure sodium, 400 Watt 480 volt, 1-phase		24	EA	$970.00	$23,280.00
	17	4 foot fluorescent lighting fixtures, 2 lamps		36	EA	$310.00	$11,160.00
	18	Emergency lighting system		1	LS	$4,900.00	$4,900.00
		Exterior luminaires					
	19	High-pressure sodium, wall-mounted, outdoor type 70 watt, 120 volt		12	EA	$550.00	$6,600.00
	20	**Building Fire Detection & Alarm System (F&I)**	D8430	1	LS	$210,000	$210,000.00
		Distribution Panelboards (F&I)	D8430				
	21	480-volts, 3-phase, 400 ampere bus, indoor type with 12 molded-case circuit breakers		2	EA	$13,500.00	$27,000.00
		Motor Control Center (F&I)	D8430				
	22	480 volts, 3-phase, 1600 ampere main bus Six 20 inch wide sections		1	EA	$250,000	$250,000.00
		Sheet Subtotal					**$709,440.00**

QUANTITIES		PRICES	
BY Mike Schuh (D8430)	**CHECKED** Cory Maurer (D8430)	**BY** Lonnie Zlomke (D8170)	**CHECKED** DK MM 8/1/08
DATE PREPARED 5/22/08	**PEER REVIEW** George Girgis (D8430)	**DATE PREPARED** 8/4/08	**PEER REVIEW** 08-05-08

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable High Cost Estimate

Black Rock Outlet Facility - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Insulated Conductors (F&I)	D8430				
		15 kV shielded power cable:					
	23	4 AWG		300	FT	$30.00	$9,000.00
		600-volt single-conductor, stranded-copper:					
	24	12 AWG		6,000	FT	$1.20	$7,200.00
	25	10 AWG		4,000	FT	$1.60	$6,400.00
	26	6 AWG		1,000	FT	$3.40	$3,400.00
	27	4 AWG		1,000	FT	$4.60	$4,600.00
	28	1/0 AWG		600	FT	$7.30	$4,380.00
	29	4/0 AWG		600	FT	$5.00	$3,000.00
		600-volt multi-conductor control cable:					
	30	9 conductor 14 AWG		1,500	FT	$3.30	$4,950.00
	31	12 conductor 14 AWG		2,000	FT	$4.20	$8,400.00
	32	5 conductor 10 AWG		2,000	FT	$3.80	$7,600.00
		Conduit System (F&I)	D8430				
		Rigid steel conduit:					
	33	1 inch		1,000	FT	$25.00	$25,000.00
	34	1 1/2 inch		500	FT	$33.00	$16,500.00
	35	2 inch		600	FT	$42.00	$25,200.00
	36	2 1/2 inch		350	FT	$63.00	$22,050.00
		Plastic-coated rigid steel:					
	37	2 inch		750	FT	$64.00	$48,000.00
		Plant - Electrical Subtotal					**$16,991,810.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Mike Schuh (D8430)	Cory Maurer (D8430)	Lonnie Zlomke (D8170)	8/1/08
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
5/22/08	George Girgis (D8430)	8/4/08	08-05-08

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Outflow Conveyance System
Most Probable High Cost Estimate

Black Rock Outlet Facility - Incoming Power

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Switchyard					
		Furnish and Install:					
	1	Oil-filled power transformer 30 MVA; 34.5-6.9kV, 3-phase	D8430	1	EA	$620,000	$620,000.00
	2	F&I 34.5-KV PRIMARY UNIT SUBSTATION: 'INCOMING 34.5KV SECTION/BUS/INTERRUPTER 'OUTGOING 6.9KV SECTION/BUS/INTERRUPTER 'SURGE ARRESTORS, 30KV	D8430	1	EA	$510,000	$510,000.00
		Tap at existing 34.5-kV line					
		Furnish and Install:					
	3	Wood-pole tap structure	D8430	1	EA	$12,500.00	$12,500.00
	4	**Construct Transmission LIne (By Others)** Assume 1000 feet of transmission line from existing 34.5-kV line wood poles, 1115 AWG conductor	D8430	1,000	FT	$52.00	$52,000.00
		Switchyard & Transmission Line Subtotal					**$1,194,500.00**

QUANTITIES		PRICES	
BY Lisa Gamuciello (D8430)	**CHECKED** Cory Maurer (D8430)	**BY** Lonnie Zlomke (D8170)	**CHECKED** 8/1/08
DATE PREPARED 5/14/08	**PEER REVIEW** George Girgis (D8430)	**DATE PREPARED** 8/4/08	**PEER REVIEW** 08-05-08

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Delivery System - Option 1 Pipeline
Most Probable High Cost Estimate

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP | **ESTIMATE LEVEL:** Appraisal
REGION PN | **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\TBlack Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock SunnysideDelivery_Most Probable High_060608.xls]SS Delivery_Option1

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		12 ft. Dia. Steel Delivery Pipe					
	1	Clearing and grubbing	PN3440	93	ACRES	$4,300.00	$399,900.00
	2	Excavation (common)	D8120	860,000	CY	$3.80	$3,268,000.00
	3	Excavation (rock)	D8120	180,000	CY	$32.00	$5,760,000.00
	4	Soil cement bedding		7,840	CY	$170.00	$1,332,800.00
	5	Placing and compacting backfill		890,000	CY	$9.70	$8,633,000.00
	6	12 ft. dia. steel pipe, A572 GR 60 steel		62,000,000	LBS	$2.90	$179,800,000.00
		Check Structure on Sunnyside Canal	PN3440				
	7	Structural excavation (common)		1,060	CY	$26.00	$27,560.00
	8	Placing and compacting backfill		750	CY	$63.00	$47,250.00
	9	Concrete in structures		250	CY	$1,550.00	$387,500.00
	10	Langemann gates (26ft. long x 10 ft. tall)		2	EA	$350,000.00	$700,000.00
		Sunnyside Upstream Delivery Pipe	PN3440				
	11	Pumping plant (pump, structure, elec.)		1	LS	$1,150,000.00	$1,150,000.00
	12	Excavation, pipe (common)		40,500	CY	$6.50	$263,250.00
	13	Placing and compacting backfill		39,500	CY	$10.00	$395,000.00
	14	PVC pipe (diameter varies 18-inch to 6-inch)		1	LS	$620,000.00	$620,000.00
		Subtotal					**$202,784,260.00**

QUANTITIES		PRICES	
BY Dick LaFond (D8120) G. Grooms	CHECKED Steve Montague, B. Vanotterloo (D8120)	BY Jeff Morris (D8170) 7/31/08	CHECKED O.K. 8/1/08
DATE PREPARED Dec-04	PEER REVIEW	DATE PREPARED 7/31/08	PEER REVIEW DW 08-01-08

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Delivery System - Option 1 Pipeline
Most Probable High Cost Estimate

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock SunnysideDelivery_Most Probable High_060608.xls]SS Delivery_Option1

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Subtotal					**$202,784,260.00**
		Mobilization		5%	(+/-)		$10,000,000.00
		Subtotal with mobilization					**$212,784,260.00**
		Escalation During Construction		0%	(+/-)		$0.00
		Subtotal with mobilization and escalation					**$212,784,260.00**
		Design Contingencies		20%	(+/-)		$47,215,740.00
		CONTRACT COST					**$260,000,000.00**
		Construction Contingencies		25%	(+/-)		$ 60,000,000.00
		FIELD COST					**$320,000,000.00**
		Non-Contract Costs **		30%	(+/-)		$100,000,000.00
		CONSTRUCTION COST					**$420,000,000.00**

Escalation to notice to proceed, allowance for procurement strategies, and utility relocations are not included.

** Land Acquisition Costs of $526,500 associated with these features are included in the Non-Contract Costs.

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Guy Grooms (PN-3444)	Steve Montague (PN 3440)	Jeff Morris (D8470)	8.18.08
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
Dec-04		8/12/08	

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable High Cost Estimate
Summary

Summary Sheet

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock SunnysidePP_Most Probable High_060608.xls]Summary		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Sitework Subtotal					$3,342,786.00
		Structural & Architectural Subtotal					$12,902,040.00
		Mechanical Subtotal					$32,264,920.00
		Electrical Subtotal					$18,848,600.00
		Switchyard & Transmission Line Subtotal					$2,038,000.00
		Subtotal					**$69,396,346.00**
		Mobilization		5%	(+/-)		$3,500,000.00
		Subtotal with mobilization					**$72,896,346.00**
		Escalation during construction		0%	(+/-)		$0.00
		Subtotal with mobilization and escalation					**$ 72,896,346.00**
		Design Contingencies		15%	(+/-)		$11,103,654.00
		CONTRACT COST					**$84,000,000.00**
		Construction Contingencies		25%	(+/-)		$ 21,000,000.00
		FIELD COST					**$105,000,000.00**
		Non-Contract Costs **		30%	(+/-)		$30,000,000.00
		CONSTRUCTION COST					**$135,000,000.00**

Escalation to notice to proceed, allowance for procurement strategies, and utility relocations are not included.

** Land Acquisition Costs of $29,250 associated with these features are included in the Non-Contract Costs.

QUANTITIES		PRICES	
BY Design Team	**CHECKED**	**BY** Greg Akins & Connie Slomka (8170)	**CHECKED** 8/14/2008
DATE PREPARED 6/2/08	**PEER REVIEW**	**DATE PREPARED** 8/14/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable High Cost Estimate

Plant - Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Access Road (60 ft of 24ft wide bituminous surface):					
	1	Clear roadway alignment	D8120	1,440	SF	$1.40	$2,016.00
	2	Furnish and place base course material (9-inch depth)	D8120	75	TONS	$34.00	$2,550.00
	3	Furnish and place asphalt concrete (6-inch depth)	D8120	55	TONS	$180.00	$9,900.00
		Service Yard (6" asphalt concrete surface)					
		Assume T.O Ground= T.O Yard= El 894.5					
	4	Strip and clear pumping plant site to 1 foot depth	D8120	4,500	CY	$3.60	$16,200.00
	5	Common excavation to Yard (±50% Strip & Clear)	D8120	2,300	CY	$14.50	$33,350.00
	6	Place and compact embankment for yard (50% Exc.)	D8120	1,150	CY	$23.00	$26,450.00
	7	Furnish and place base course material (6-inch)	D8120	3,600	TONS	$34.00	$122,400.00
	8	Furnish and place asphalt concrete (6-inch)	D8120	4,000	TONS	$115.00	$460,000.00
	9	Furnish and install 7-foot chain link fence for PP Yard	D8120	1,400	LF	$30.00	$42,000.00
	10	Furnish and install 7-foot x 24-foot access gates	D8120	3	EA	$5,200.00	$15,600.00
		Diversion During Construction:					
		Assume need to pass 900 cfs canal flow during construction. Assume loacl borrow.					
		Assume no dewwatering required.					
	11	Construct U/S & D/S earth cofferdams. (Height=15 ft)	D8120	2,000	CY	$36.00	$72,000.00
	12	F&I impervious geomembrane on cofferdams.	D8120	350	SY	$24.00	$8,400.00
	13	F&I three 9-ft dia. X .138-in galv., corrugated metal pipes btwn cofferdams. Wt/Ft= 210 lbs/ft.	D8120	1,000	LF	$750.00	$750,000.00
	14	Remove cofferdams and diversion structures	D8120	1	LS	$98,000.00	$98,000.00
		Sheet Subtotal					**$1,658,866.00**

QUANTITIES		PRICES	
BY Dick LaFond (8120) Brad VanOtterloo (812	**CHECKED** Mike O'Shea, Dick LaFond (8120)	**BY** Greg Akins (8170)	**CHECKED** 8/14/2008
DATE PREPARED 5/15/2004, 6/6/08	**PEER REVIEW**	**DATE PREPARED** 8/14/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable High Cost Estimate

Plant - Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Tailrace Channel (Unlined)					
		Assume T.O. Rock El. 890					
		Assume local wasting of excess excavated material.					
	15	Common excavation for tailrace channel	D8120	1,200	CY	$11.50	$13,800.00
	16	Rock excavation for tailrace channel (drill and shoot)	D8120	4,550	CY	$31.00	$141,050.00
	17	Furnish and place riprap bedding (1-ft depth)	D8120	700	CY	$69.00	$48,300.00
	18	Furnish and place riprap (2-ft depth)	D8120	1,400	CY	$45.00	$63,000.00
		Structural Excavation and Backfill					
		Assume T. O Rock El. 890.0					
		Assume local wasting of excess excavated material.					
	19	Common excavation for structures	D8120	4,000	CY	$12.00	$48,000.00
	20	Rock excavation for structures (drill & shoot)	D8120	26,300	CY	$27.00	$710,100.00
	21	Furnish backfill for structures (reuse excavation)	D8120	5,150	CY	$2.80	$14,420.00
	22	Place backfill around structures	D8120	5,150	CY	$10.00	$51,500.00
	23	Compact backfill around structures	D8120	5,150	CY	$20.00	$103,000.00
		Pipe Trench Excavation and Backfill					
	24	Common excavation for pipe in Service Yard	D8120	2,150	CY	$11.50	$24,725.00
	25	Rock Excavation for pipe in Service Yard	D8120	5,850	CY	$31.00	$181,350.00
	26	Furnish, place, & compact backfill for pipe (local)	D8120	5,350	CY	$38.00	$203,300.00
	27	Furnish & place soil cement for pipe	D8120	525	CY	$155.00	$81,375.00
		Sitework Subtotal					**$3,342,786.00**

QUANTITIES		PRICES	
BY Dick LaFond (8120) Brad VanOtterloo (8120)	CHECKED Mike O'Shea, Dick LaFond (8120)	BY Greg Wins (8470)	CHECKED 8/14/2008
DATE PREPARED 5/15/2004, 6/6/08	PEER REVIEW	DATE PREPARED 8/14/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable High Cost Estimate

Plant - Structural & Architectural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		STRUCTURAL					
		Construct Concrete Tailrace Structure					
	1	Furnish, form, and place reinforced concrete	D8120	560	CY	$1,150.00	$644,000.00
	2	Furnish and place concrete reinforcement. Assume 130 #/CY	D8120	72,800	LBS	$2.10	$152,880.00
	3	Furnish and handle cement (.282T/CY)	D8120	158	TONS	$155.00	$24,490.00
		Construct Powerplant Substructure					
	4	Furnish, form, and place reinforced concrete	D8120	3,460	CY	$860.00	$2,975,600.00
	5	Furnish and place concrete reinforcement. Assume 130 #/CY	D8120	449,800	LBS	$1.95	$877,110.00
	6	Furnish and handle cement (.282T/CY)	D8120	975	TONS	$165.00	$160,875.00
	7	**Construct Powerplant Superstructure** 72.5-ft x 62-ft x 37-ft high superstructure Structural steel superstructure with CMU walls. Stepped columns for 125T crane support Built-up roof on metal roof deck.	D8120	4,500	SF	$270.00	$1,215,000.00
		Construct Byapss Substructure					
	8	Furnish, form, and place reinforced concrete	D8120	3,710	CY	$860.00	$3,190,600.00
	9	Furnish and place concrete reinforcement. Assume 130 #/CY	D8120	482,300	LBS	$1.95	$940,485.00
	10	Furnish and handle cement (.282T/CY)	D8120	1,050	TONS	$160.00	$168,000.00
	11	**Construct Bypass Superstructure** 74.0-ft x 37-ft x 16-ft high superstructure Built-up roof on metal roof deck supported by open web joists. CMU bearing walls. No crane.	D8120	2,740	SF	$270.00	$739,800.00
		Sheet Subtotal					**$11,088,840.00**

QUANTITIES		PRICES	
BY	CHECKED	BY	CHECKED
Dick LaFond (8120)	Mike O'Shea, Brad VanOtterloo (8120)	Greg Akins (8170)	8/14/2008
DATE PREPARED	PEER REVIEW	DATE PREPARED	PEER REVIEW
5/15/2004, 6/6/08		8/14/08	

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable High Cost Estimate

Plant - Structural & Architectural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		STRUCTURAL (cont.)					
		Construct Pipe Encasements					
	12	Furnish, form, and place reinforced concrete	D8120	1,050	CY	$960.00	$1,008,000.00
	13	Furnish and place concrete reinforcement. Assume 110 #/CY	D8120	115,500	LBS	$2.00	$231,000.00
	14	Furnish and handle cement (.282T/CY)	D8120	295	TONS	$160.00	$47,200.00
		Structural Steel					
	15	Furnish and install structural steel (painted): Includes crane girder, rail, and hoist frames. Does not include typ. building framework.	D8120	34,000	LBS	$9.50	$323,000.00
		Miscellaneous Metalwork					
	16	Furnish and install miscellaneous metalwork Includes grating, hatches, ladders, guardrail, and cable trays	D8120	15,000	LBS	$12.50	$187,500.00
	17	Motor-operated, exterior insulated roll-up door 18' x 20'	D8120	1	EA	$16,500.00	$16,500.00
		Structural & Architectural Subtotal					**$12,902,040.00**

QUANTITIES		PRICES	
BY: Dick Lafond (8120)	CHECKED: Mike O'Shea (8120)	BY: Greg Atkins (8170)	CHECKED: 8/14/2008
DATE PREPARED: 5/15/04	PEER REVIEW:	DATE PREPARED: 8/14/08	PEER REVIEW:

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable High Cost Estimate

Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock SunnysidePP_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Major Mechanical Equipment					
	1	Turbine-Vertical Francis, 40485 Hp 400 rpm, 435 ft. Design Head CF3 18-8 Stainless Runner 5.4' dia.	D8420	200,000	LBS	$28.00	$5,600,000.00
	2	Digital Governor, 156,523 ft.-lbs. 150 psi system	D8420	1	EA	$630,000	$630,000.00
	3	Governor Pressure Tank 875 Gal. Look to Flaming Gorge Oil Tank	D8420	7,640	LBS	$10.50	$80,220.00
		Sheet Subtotal					**$6,310,220.00**

QUANTITIES		PRICES	
BY Toby Turnage (8420)	CHECKED John Brooks (8420)	BY Lonnie Zlomke (8170)	CHECKED 8/14/2008
DATE PREPARED 4/14/04	PEER REVIEW	DATE PREPARED 8/14/08	PEER REVIEW

ESTIMATE WORKSHEET

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Black Rock Preferred Alternative
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Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Furnish and install the following:					
		Steel Penstock:					
		Steel plate used for pipe fabrication:					
		ASTM A36: Sy = 36 kpsi					
		(All pipe sizes are inside diameters)					
	4	144" Dia., 2 1/4" wall, L= 252 ft.	D8420	890,000	LBS	$5.60	$4,984,000.00
	5	84" Dia., 1 5/16" wall, L= 311 ft.	D8420	665,000	LBS	$5.60	$3,724,000.00
	6	144" Dia., 3/4" wall, L= 132 ft.	D8420	155,000	LBS	$3.40	$527,000.00
		Stainless Steel Stilling Basin for Sleeve Valves:					
		ASTM 316L Stainless steel plate					
	7	Two - 396" Dia., 1 1/4" wall cylindrical tanks with baseplates:	D8420	295,000	LBS	$21.00	$6,195,000.00
		Each tank height = 20 feet					
		Total weight for both tanks = 295,000 lbs.					
		Sleeve valves with hydraulic operators:					
	8	Two - 84" Dia. Inlet X 72" Dia. Outlet Valves	D8420	140,000	LBS	$21.00	$2,940,000.00
		ASTM 316L Stainless steel plate					
		Each valve weight = 70,000					
		Total weight for both valves = 140,000 lbs.					
		Spherical valves with hydraulic operators:					
	9	Sleeve valve guard valves	D8420	120,000	LBS	$14.00	$1,680,000.00
		Two - 60" Dia. Spherical valves with hydraulic operators					
		60,000 lbs. per valve					
		Turbine guard valve					
	10	One - 78" Dia. Spherical valve with hydraulic operator	D8420	115,000	LBS	$14.00	$1,610,000.00
		115,000 lbs. per valve					
		Sheet Subtotal					**$21,660,000.00**

QUANTITIES		PRICES	
BY: Nathan Nakamoto (8420)	CHECKED: Rick Frisz, (8420)	BY: Lonnie Zlomke (8170)	CHECKED: 8/14/2008
DATE PREPARED: 5/6/04		DATE PREPARED: 8/14/08	PEER REVIEW:

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable High Cost Estimate

Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock SunnysidePP_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	11	Furnishing and installing one 125-Ton overhead crane, 50' span	D8410	153,000	LBS	$8.50	$1,300,500.00
	12	Furnishing and installing Hydraulic elevator capacity = 3500 pounds, travel = 31 ft. landings = 3, speed = 100 ft/min.	D8410	1	unit	$560,000	$560,000.00
	13	Bulkhead gates and guides at power plant (steel) (assumes two gates)	D8410	25,000	LBS	$6.40	$160,000.00
	14	Two fixed hoists for bulkhead gates, 2-ton capacity (each hoist weighs 200 lbs)	D8410	400	LBS	$70.00	$28,000.00
	15	Bulkhead gate, liftin beam & guides at sleeve valve pipe discharge to canal (steel)	D8410	32,000	LBS	$5.60	$179,200.00
	16	CO2 High Pressure Fire Extinguishing System: 10 - 100# Storage Cylinders w/ control panel and appurtenances and 300 lbs. of sch. 80 carbon steel pipe, valves & fittings	D8410	1	L.S.	$41,000.00	$41,000.00
	17	Fire Suppression System: 3 Fire hose reels w/ 100 feet of hose 12 - Portable hand-held 20# extinguishers 2,000 lbs. of sch. 40 carbon steel pipe, valves & fittings 1 - Fire pump, split-case, 500 gpm @ 300 ft of head	D8410	1	L.S.	$70,000.00	$70,000.00
	18	Unit Cooling Water System: 2 - Cooling water pumps, end-suction type, 150 gpm 2 - 8-inch automatic, self-cleaning strainers 1,000 lbs. of type K copper tubing, valves & fittings 4,000 lbs. of ductile iron, mechanical joint pipe & fittings	D8410	1	L.S.	$180,000.00	$180,000.00
	19	Lubricating Oil System: 2- 500 gal carbon steel storage tanks 1 - 10 gpm @ 100 psi oil pump 1 - lube oil filter 1,000 lbs. of sch. 40 carbon steel pipe, valves & fittings	D8410	1	L.S.	$28,000.00	$28,000.00
		Sheet Subtotal					**$2,546,700.00**

QUANTITIES		**PRICES**	
BY Rick Christensen (8410), B Sund C Berte, J Grass, Randy Egan (8410	**CHECKED** Alex Ritt (8410)	**BY** Lonnie Zlomke (8170)	**CHECKED** 8/14/2008
DATE PREPARED 5/3/2004, 6/03/2008	**PEER REVIEW**	**DATE PREPARED** 8/14/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable High Cost Estimate

Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock SunnysidePP_Most Probable High_060608.xls]Summary		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	20	Compressed Air System: 2 - 100 cfm @ 125 psi rotary screw air compressors 1 - 250 gal. carbon steel air receiver 1 - 100 cfm air dryer 500 lbs. of sch. 40 carbon steel pipe, valves & fittings	D8410	1	L.S.	$70,000.00	$70,000.00
	21	Service Water System: 1 - Service water pump, 75 gpm @ 200 ft. of head 1 - Hydropneumatic Tank, 300 gal. 750 lbs. of type K copper tubing, valves & fittings	D8410	1	L.S.	$140,000.00	$140,000.00
	22	Gravity Drainage System: 12 - Floor drains, cast iron 5,000 lbs. of cast iron hub & spigot, service weight soil pipe	D8410	1	L.S.	$70,000.00	$70,000.00
	23	Plant Unwatering System: 2 - Vertical turbine type sump pump, 500 gpm @ 50 ft hd 1 - Drainage jet type drainage pump 1,000 lbs. of type K copper tube, valves & fittings 3,000 lbs. of ductile iron, mechanical joint pipe & fittings	D8410	1	L.S.	$98,000.00	$98,000.00
	24	Domestic Water and Sanitary Waste System: 2 - Water Closets 1 - Urinal 2 - Lavatories & accessories 1 - Duplex Sewage Ejector 2,000 lbs. of cast iron hub & spigot service weight sewer pipe 400 lbs. of type K copper tubing, valves & fittings	D8410	1	L.S.	$70,000.00	$70,000.00
		Sheet Subtotal					**$448,000.00**

QUANTITIES		PRICES	
BY J Grass, R Egan (8410)	**CHECKED** Alex Ritt (8410)	**BY** Lonnie Zlomke (8170)	**CHECKED** 8/14/2008
DATE PREPARED 5/3/2004, 6/03/2008	**PEER REVIEW**	**DATE PREPARED** 8/14/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable High Cost Estimate

Plant - Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock SunnysidePP_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Heating, Ventilating, and Air Conditioning Unmanned air cooled BUILDING AND VAULTS OA temp 95 degrees F.	D8410	1	L.S.	$1,300,000.00	$1,300,000.00
		Mechanical Subtotal					**$32,264,920.00**

QUANTITIES		PRICES	
BY P Schlein, M Weems (8410)	**CHECKED** Alex Ritt (8410)	**BY** Lonnie Zlomke (8170)	**CHECKED** 8/14/2008
DATE PREPARED 5/3/2004, 6/03/2008	**PEER REVIEW**	**DATE PREPARED** 8/14/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable High Cost Estimate

Plant - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock SunnysidePP_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	1	**Electrical Generator (F&I)** 30,000 kVA, 6,900 volts, 3-phase, 60 Hz 400 rpm, 95 % power factor Vertical, synchronous machine Static excitation system & voltage regulator	D8430	1	EA	$16,000,000	$16,000,000.00
		Plant Grounding System (F&I)	D8430				
	2	Ground rods, 10 ft, 3/4" dia, copper-clad		30	EA	$290.00	$8,700.00
		Stranded bare-copper conductor:					
	3	250 MCM		1,200	LF	$14.50	$17,400.00
	4	4/0 AWG		800	LF	$14.00	$11,200.00
	5	2/0 AWG		500	LF	$9.40	$4,700.00
	6	4 AWG		800	LF	$3.80	$3,040.00
		Generator Bus & Metal-Enclosed Switchgear (F&I)	D8430				
	7	Generator isolated phase bus: 15 kV, 3000 amperes, 3-phase, 60 Hz		250	LF	$2,400.00	$600,000.00
	8	Generator power circuit breaker: 15 kV, 3000 amperes, 3-phase, vacuum type		1	EA	$950,000	$950,000.00
	9	Station-service fused interrupter switch: 15 kV, 600 ampere, 3-phase, w/ power fuses		1	EA	$39,000.00	$39,000.00
		Generator Control Equipment (F&I)	D8430				
	10	Duplex control switchboard for operation of the generator		1	EA	$360,000	$360,000.00
		Sheet Subtotal					**$17,994,040.00**

QUANTITIES		PRICES	
BY Mike Schuh (8430)	CHECKED Cory Maurer (8430)	BY Lonnie Ziemke (8170)	CHECKED 8/14/2008
DATE PREPARED 5/22/08	PEER REVIEW George Girgis (8430)	DATE PREPARED 8/14/08	PEER REVIEW

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable High Cost Estimate

Plant - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock SunnysidePP_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Plant Battery System (F&I)	D8430				
	11	125 volt, 300 ampere-hour, lead-acid battery		1	EA	$33,000.00	$33,000.00
	12	Battery chargers		2	EA	$10,500.00	$21,000.00
	13	DC distribution panelboard, 100 ampere mains, and molded-case circuit breakers		1	EA	$16,000.00	$16,000.00
		Plant Station-Service Equipment (F&I)	D8430				
		Indoor secondary unit substation with following features:					
	14	Dry-type transformer, 6.9 kV-480Y/277, 1000 kVA		1	EA	$72,000.00	$72,000.00
	15	480 volt power-circuit breakers, 600 amperes		5	EA	$5,400.00	$27,000.00
		Building Lighting System (F&I)	D8430				
		Interior luminaires					
	16	High bay, high-pressure sodium, 400 Watt 480 volt, 1-phase		20	EA	$920.00	$18,400.00
	17	Emergency lighting system		1	LS	$4,800.00	$4,800.00
		Exterior luminaires					
	18	High-pressure sodium, wall-mounted, outdoor type 70 watt, 120 volt		12	EA	$540.00	$6,480.00
	19	**Building Fire Detection & Alarm System (F&I)**	D8430	1	LS	$195,000.00	$195,000.00
		Distribution Panelboards (F&I)	D8430				
	20	480-volts, 3-phase, 400 ampere bus, indoor type with molded-case circuit breakers		2	EA	$13,500.00	$27,000.00
		Motor Control Center (F&I)	D8430				
	21	480 volts, 3-phase, 1200 ampere main bus Four 20 inch wide sections		1	EA	$145,000	$145,000.00
		Sheet Subtotal					**$565,680.00**

QUANTITIES		PRICES	
BY Mike Schuh (8430)	CHECKED Cory Maurer (8430)	BY Lonnie Zlomke (8170)	CHECKED 8/14/2008
DATE PREPARED 5/22/08	PEER REVIEW George Girgis (8430)	DATE PREPARED 8/14/08	PEER REVIEW

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable High Cost Estimate

Plant - Electrical

PROJECT:
Yakima River Basin Water Storage Study

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REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock SunnysidePP_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Insulated Conductors (F&I)	D8430				
		15 kV shielded power cable:					
	22	4 AWG		200	FT	$10.50	$2,100.00
		600-volt single-conductor, stranded-copper:					
	23	12 AWG		6,000	FT	$1.20	$7,200.00
	24	10 AWG		4,000	FT	$1.60	$6,400.00
	25	6 AWG		1,000	FT	$3.20	$3,200.00
	26	4 AWG		1,000	FT	$4.50	$4,500.00
	27	1/0 AWG		600	FT	$7.20	$4,320.00
	28	4/0 AWG		600	FT	$5.00	$3,000.00
		600-volt multi-conductor control cable:					
	29	9 conductor 14 AWG		1,500	FT	$3.30	$4,950.00
	30	12 conductor 14 AWG		2,000	FT	$4.20	$8,400.00
	31	5 conductor 10 AWG		2,000	FT	$3.80	$7,600.00
		Conduit System (F&I)	D8430				
		Rigid steel conduit:					
	32	1 inch		800	FT	$25.00	$20,000.00
	33	1 1/2 inch		500	FT	$33.00	$16,500.00
	34	2 inch		500	FT	$41.00	$20,500.00
	35	2 1/2 inch		350	FT	$63.00	$22,050.00
		Plastic-coated rigid steel:					
	36	2 inch		750	FT	$63.00	$47,250.00
		Sheet Subtotal					**$177,970.00**

QUANTITIES		PRICES	
BY Mike Schuh (8430)	**CHECKED** Cory Maurer (8430)	**BY** Lonnie Zlomke (8170)	**CHECKED** 8/14/2008
DATE PREPARED 5/22/08	**PEER REVIEW** George Girgis (8430)	**DATE PREPARED** 8/14/08	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable High Cost Estimate

Plant - Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock SunnysidePP_Most Probable High_060608.xls]Summary

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Bypass Structure Electrical System					
		Service Equipment (F&I)	D8430				
	37	Distribution panelboard, indoor type		1	EA	$29,000.00	$29,000.00
		480 volts, 3-phase, 225 ampere bus,					
		with molded-case circuit breakers					
		Transformer load center					
	40	15 kVA, 1-phase, 480-240/120		1	EA	$14,500.00	$14,500.00
		Combination Motor Starters (F&I)	D8430				
	41	NEMA size 2 non-reversing contactor,		6	EA	$9,200.00	$55,200.00
		480-120 volt control transformer					
		NEMA type 12 enclosure					
		Building Lighting System (F&I)	D8430				
		Interior luminaires					
	42	Fluorescent fixtures with two 4 foot lamps		8	EA	$300.00	$2,400.00
		Exterior luminaires					
	43	High-pressure sodium, wall-mounted, outdoor type		6	EA	$540.00	$3,240.00
		70 watt, 120 volt					
		Insulated Conductors (F&I)	D8430				
		600 volt, single-conductor, stranded copper					
	44	12 AWG		600	FT	$1.20	$720.00
	45	10 AWG		400	FT	$1.60	$640.00
	46	8 AWG		100	FT	$2.10	$210.00
		Conduit System (F&I)	D8430				
		Rigid steel conduit					
	47	1 inch		200	FT	$25.00	$5,000.00
		Electrical Subtotal					**$18,848,600.00**

QUANTITIES		PRICES	
BY Mike Schuh (8430)	CHECKED Cory Maurer (8430)	BY Lonnie Zlomke (8170)	CHECKED 8/14/2008
DATE PREPARED 5/22/08	PEER REVIEW George Girgis (8430)	DATE PREPARED 8/14/08	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Black Rock Preferred Alternative
Sunnyside Canal Powerplant, Bypass, and Switchyard
Most Probable High Cost Estimate

Plant - Incoming Power

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Black Rock - Final Cost Estimate Worksheets\MPH\[Black Rock SunnysidePP_Most Probable High_060608.xls]Summary		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Switchyard					
		Furnish and Install:					
	1	Oil-filled, conservator-type power transformer 40 MVA; 69-6.9kV, 3-phase	D8430	1	EA	$1,100,000	$1,100,000.00
	2	69-kV disconnect switches, 1200 amp, 3-phase	D8430	2	EA	$47,000.00	$94,000.00
	3	69-kV circuit breakers, 1200 amp, 3-phase	D8430	1	EA	$260,000	$260,000.00
		Tap at existing 69-kV line					
		Furnish and Install:					
	4	69-kV disconnect switches, 1200 amp, 3-phase	D8430	2	EA	$47,000.00	$94,000.00
	5	69-kV circuit breakers, 1200 amp, 3-phase	D8430	1	EA	$260,000	$260,000.00
	6	**Construct Transmission LIne (By Others)** Assume 1 mile of transmission line from existing 69-kV line to the southwest wood poles, 795 AWG conductor	D8430	1	MILES	$230,000	$230,000.00
		Switchyard & Transmission Line Subtotal					**$2,038,000.00**

QUANTITIES		PRICES	
BY Lisa Gamuciello (8430)	**CHECKED** Cory Maurer (8430)	**BY** Lonnie Zlomke (8470)	**CHECKED** 8/14/2008
DATE PREPARED 5/14/2008	**PEER REVIEW** George Girgis (8430)	**DATE PREPARED** 8/14/08	**PEER REVIEW**

APPENDIX B

Wymer Dam and Reservoir Alternative
Field Cost Estimates

Wymer Alternative

Most Probable Low (MPL) Field Cost Estimate

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Summary
Yakima River Intake, Pumping Plant,
Switchyard and Transmission Line
Summary Sheet 1 A of 59

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[082608 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Wymer Offstream Storage Facility consists of:					
		Fish-screened Intake on Yakima River, 400 cfs Pumping Plant and Switchyard,					
		Concrete-Faced Rockfill Dam, Crest El. 1745. Central Core Rockfill Dike, Crest EL. 1745.					
		Spillway and Outlet Works, Road (Access and I82) and Lmuma Creek Improvements					
		Yakima River Intake - Sheets 2 - 13					$ 14,734,796.40
		Pumping Plant - Sheets 14 - 25					$ 40,415,275.50
		Switchyard and Transmission Line - Sheets 26 - 27					$ 5,449,851.00
		Subtotal					$ 60,599,922.90
		Mobilization		5%	(+/-)		$ 3,000,000.00
		Subtotal with mobilization					**$ 63,599,922.90**
		Escalation during construction		0%	(+/-)		$ -
		Subtotal					$ 63,599,922.90
		Design Contingencies		10%	(+/-)		$ 6,400,077.10
		CONTRACT COST					**$ 70,000,000.00**
		Construction Contingencies		15%	(+/-)		$ 10,000,000.00
		FIELD COST					**$ 80,000,000.00**
		Non-Contract Costs **		25%	(+/-)		$ 20,000,000.00
		CONSTRUCTION COST					**$ 100,000,000.00**
		Escalation to notice to proceed , allowance for procurement strategies and utility relocations are not included					
		** Land Acquisition Cost of $7,000.00 associated with these features, are included in the Non-Contract Costs.					

QUANTITIES		PRICES	
BY Design Team	**CHECKED**	**BY** Jerry Zander	**CHECKED** 8/26/08
DATE PREPARED June 27, 2008	**PEER REVIEW**	**DATE PREPARED** August 26, 2008	**PEER REVIEW** DCR for DLM

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Summary

Discharge Line
Summary Sheet 1B of 59

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP | **ESTIMATE LEVEL:** Appraisal
REGION PN | **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[082008 - Wymer - MPL Total Est .xls]Summary 1C - Dam,Spill&Misc

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Wymer Offstream Storage Facility consists of:					
		Fish-screened Intake on Yakima River, 400 cfs Pumping Plant and Switchyard,					
		Concrete-Faced Rockfill Dam, Crest El. 1745. Central Core Rockfill Dike, Crest EL. 1745.					
		Spillway and Outlet Works, Road (Access and I82) and Lmuma Creek Improvements					
		Discharge Line - Sheets 28 - 33					$ 35,525,490.00
		Subtotal					$ 35,525,490.00
		Mobilization		5%	(+/-)		$ 1,800,000.00
		Subtotal with mobilization					**$ 37,325,490.00**
		Escalation during construction		0%	(+/-)		$ -
		Subtotal					$ 37,325,490.00
		Design Contingencies		10%	(+/-)		$ 3,674,510.00
		CONTRACT COST					**$ 41,000,000.00**
		Construction Contingencies		15%	(+/-)		$ 6,000,000.00
		FIELD COST					**$ 47,000,000.00**
		Non-Contract Costs **		25%	(+/-)		$ 12,000,000.00
		CONSTRUCTION COST					**$ 59,000,000.00**
		Escalation to notice to proceed , allowance for procurement strategies and utility relocations are not included					
		** Land Acquisition Cost of $0.00 associated with these features, are included in the Non-Contract Costs.					

QUANTITIES		PRICES	
BY Design Team	CHECKED	BY JWZ Jerry Zander	CHECKED MC Greg/Alice 8/20/08
DATE PREPARED June 27, 2008	PEER REVIEW	DATE PREPARED August 20, 2008	PEER REVIEW DLM 8/20/08

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Summary
Concrete-Face Rockfill Dam, Cental Core Rockfill Dike,
Spillway, Outlet Works, Diversion, and Roadwork
Summary Sheet 1C of 59

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[082008 - Wymer - MPL Total Est .xls]Summary 1C - Dam,Spill&Misc

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Wymer Offstream Storage Facility consists of:					
		Fish-screened Intake on Yakima River, 400 cfs Pumping Plant and Switchyard,					
		Concrete-Faced Rockfill Dam, Crest El. 1745. Central Core Rockfill Dike, Crest EL. 1745.					
		Spillway and Outlet Works, Road (Access and I82) and Lmuma Creek Improvements					
		Concrete Face Rockfill Dam - Sheets 34 - 37					$ 206,219,000.00
		Central Core Rockfill Dike - Sheets 38 - 41					$ 41,235,440.00
		Spillway & Outlet Works - Sheets 42 - 52					$ 40,582,235.00
		Diversion During Construction - Sheets 53 - 56					$ 3,703,120.00
		Roadwork & Bridge - Sheets 57 - 59					$ 5,818,435.00
		Subtotal					$ 297,558,230.00
		Mobilization		5%	(+/-)		$ 15,000,000.00
		Subtotal with mobilization					**$ 312,558,230.00**
		Escalation during construction		0%	(+/-)		$ -
		Subtotal					$ 312,558,230.00
		Design Contingencies		10%	(+/-)		$ 27,441,770.00
		CONTRACT COST					**$ 340,000,000.00**
		Construction Contingencies		20%	(+/-)		$ 70,000,000.00
		FIELD COST					**$ 410,000,000.00**
		Non-Contract Costs **		25%	(+/-)		$ 100,000,000.00
		CONSTRUCTION COST					**$ 510,000,000.00**
		Escalation to notice to proceed , allowance for procurement strategies and utility relocations are not included					
		** Land Acquisition Cost of $1,407,000.00 associated with these features, are included in the Non-Contract Costs.					

QUANTITIES		PRICES	
BY Design Team	CHECKED	BY JZ Jerry Zander	CHECKED MC Gustafson 8/20/08
DATE PREPARED June 27, 2008	PEER REVIEW	DATE PREPARED August 20, 2008	PEER REVIEW DCM 8/20/08

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Intake
Dewatering/Unwatering and Cofferdam

Geotechnical/Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct/Remove Cofferdam around Intake					
		Max River WS: El. 1284					
		Bottom of River: El. 1272					
		Assumed Construction WS: El. 1280					
		Assumed top of Rock: ±El. 1260					
	1	Furnish, fill, install, and remove "Super Sacks"		1	LS	$ 70,000.00	$ 70,000.00
		- Use 540 sacks @ 3'x3'x3' = 540 cy of fill					
		- Place sacks with crane - 8 tons at 35ft reach					
		- Use fill from Intake excavation to fill sacks with minor					
		processing for 3"minus (run through "grizzly")					
	2	Furnish, install, and remove 40 mil PVC Geomembrane		600	SY	$ 14.00	$ 8,400.00
		- Use 20 ft long roll					
	3	Furnish, fill, and place Sand Bags		300	CF	$ 22.00	$ 6,600.00
		Placed by hand					
		Unwatering behind cofferdam					
		Furnish and install "french drains"					
	4	Gravel - (sand and/or gravel w/ less then 5% fines)		20	CY	$ 80.00	$ 1,600.00
	5	Slotted 6-in dia. PVC or HDPE		270	LF	$ 11.00	$ 2,970.00
		Sheet Subtotal =					**$ 89,570.00**

QUANTITIES		PRICES	
BY Bob Davis	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED April 30, 2007	**PEER REVIEW** Al Kiene	**DATE PREPARED** August 8, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Intake
Dewatering/Unwatering and Cofferdam

Geotechnical/Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[081308 - Wymer PP & R - MP Total Est.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct/Remove Cofferdam around Intake Fish Return Structure					
		Max River WS: El. 1284					
		Bottom of River: El. 1272					
		Assumed Construction WS: El. 1280 (Q= cfs)					
		Assumed top of Rock: ±El. 1260					
	6	Furnish, fill, install, and remove "Super Sacks"		1	LS	$ 27,000.00	$ 27,000.00
		- Use 200 sacks @ 3'x3'x3' = 200 cy of fill					
		- Place sacks with crane - 8 tons at 35ft reach					
		- Use fill from pipeline excavation to fill sacks with minor processing for 3"minus (run through "grizzly")					
	7	Furnish, install, and remove 40 mil PVC Geomembrane		225	SY	$ 10.00	$ 2,250.00
		- Use 20 ft long roll					
	8	Furnish, fill, and place Sand Bags		115	CF	$ 20.00	$ 2,300.00
		Unwatering behind cofferdam					
		Furnish and install "french drains"					
	9	Gravel - (sand and/or gravel w/ less then 5% fines)		8	CY	$ 80.00	$ 640.00
	10	Slotted 6-in dia. PVC or HDPE		100	LF	$ 11.00	$ 1,100.00
		Sheet Subtotal =					**$ 33,290.00**

QUANTITIES		PRICES	
BY Bob Davis	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED April 30, 2007	**PEER REVIEW** Al Kiene	**DATE PREPARED** August 13, 2008	**PEER REVIEW** DLA

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Intake
Dewatering/Unwatering and Cofferdam

Geotechnical/Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Dewatering Intake and Pumping Plant					
		Max River WS: El. 1284					
		Bottom of River: El. 1272					
		Assumed Construction WS: El. 1280 (Q= cfs)					
		Assumed top of Rock: ±El. 1260					
		Assumed Ground WS: El. 1280 (same as river)					
	11	Wellpoints about Intake and PP structures		1	LS	$ 3,100,000.00	$ 3,100,000.00
		- Install and remove 340 wellpoints					
		- Operate well points approximately 9 months					
		- Do **not** assume well points are jetted.					
		- Each wellpoint installed by:					
		- Drilling borehole, 8" diameter 20-ft deep					
		- Backfill borehole with sand (place with sand casing)					
		- Install wellpoint using 1.5" steel riser pipe w/					
		self jetting wellpoint screen (2" dia typ)					
		- Wellpoints are placed at 6 ft centers 20 ft deep					
		- Assume excavation to El. 1280 before placement of wellpoints					
	12	Wellpoints behind cofferdam		1	LS	$ 600,000.00	$ 600,000.00
		- Install and remove 40 wellpoints					
		- Operate well points approximately 3 months					
		- Do **not** assume well points are jetted.					
		- Each wellpoint installed by:					
		- Drilling borehole, 8" diameter 12-ft deep					
		- Backfill borehole with sand (place with sand casing)					
		- Install wellpoint using 1.5" steel riser pipe w/					
		self jetting wellpoint screen (2" dia typ)					
		- Wellpoints are placed at 6 ft centers 12 ft deep					
		- Assume installation of cofferdam before placement of wellpoints					
		Sheet Subtotal =					**$ 3,700,000.00**

QUANTITIES		**PRICES**	
BY Bob Davis	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED April 30, 2007	**PEER REVIEW** Al Kiene	**DATE PREPARED** August 8, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Intake
Dewatering/Unwatering and Cofferdam

Geotechnical/Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Unwatering Intake and Pumping Plant					
		Max River WS: El. 1284					
		Bottom of River: El. 1272					
		Assumed Construction WS: El. 1280 (Q= cfs)					
		Assumed top of Rock: ±El. 1260					
		Assumed Ground WS: El. 1280 (same as river)					
		Unwatering at base of soil excavation					
		- Furnish, install, and remove (filter toe drain):					
	13	Sand/gravel filter material		715	CY	$ 60.00	$ 42,900.00
	14	Slotted pipe 6-in dia. PVC or HDPE		2,150	LF	$ 10.00	$ 21,500.00
	15	Wrap slotted pipe in non-woven filter fabric		475	SY	$ 5.00	$ 2,375.00
	16	- Furnish and operate sump pumps					
		- Operate 11 sump pumps for 9 months		1	LS	$ 640,000.00	$ 640,000.00
		- Each pump should have a 30 ft lift					
		and have a flow of about 4 gpm					
	17	Unwatering at base of rock excavation					
		- Furnish and operate sump pumps					
		- Operate 10 sump pumps for 9 months		1	LS	$ 700,000.00	$ 700,000.00
		- Each pump should have a 45 ft lift					
		and have a flow of about 5 gpm					
		- Operate 3 sump pumps for 9 months					
		- Each pump should have a 55 ft lift					
		and have a flow of about 5 gpm					
	18	Unwatering about fish return pipeline					
		- Furnish and operate sump pumps					
		- Operate 3 sump pumps for 2 months		1	LS	$ 90,000.00	$ 90,000.00
		- Each pump should have a 12 ft lift					
		and have a flow of about 5 gpm					
		Sheet Subtotal =					**$ 1,496,775.00**

QUANTITIES		PRICES	
BY Bob Davis	**CHECKED** Bill Engemoen	**BY** JWZ Jerry Zander	**CHECKED** NZH Hypolan 8/13/08
DATE PREPARED April 30, 2007	**PEER REVIEW** Al Kiene	**DATE PREPARED** August 8, 2008	**PEER REVIEW** DCH

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Intake

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Structural Excavation and Backfill					
		Excavation and backfill quantities are to existing ground level.					
		Excavation and backfill above existing ground level covered under PP yard.					
		Assume top of rock is at El. 1262					
	19	Excavation of common materials for structures (2:1)	8140	24,400	CY	$ 8.00	$ 195,200.00
	20	Excavation of rock for structures (drill & shoot) (1/2:1)	8140	2,060	CY	$ 51.00	$ 105,060.00
	21	Furnish backfill for structures (assume local borrow)	8140	13,715	CY	$ -	$ -
	22	Place backfill around structures	8140	13,715	CY	$ 13.00	$ 178,295.00
	23	Compact backfill around structures	8140	13,715	CY	$ 14.00	$ 192,010.00
		STRUCTURAL					
		Construct Gated Intake and Fishscreen Structure					
	24	Furnish, form, and place reinforced concrete (f'c=4ksi)	8140	2,950	CY	$ 680.00	$ 2,006,000.00
	25	Furnish and place concrete reinforcement.	8140	353,860	LBS	$ 1.60	$ 566,176.00
	26	Furnish and handle cement	8140	840	TONS	$ 140.00	$ 117,600.00
	27	W-Beam guardrails	8140	40	LF	$ 68.00	$ 2,720.00
		Construct Intake Structure Retaining Walls					
	28	Furnish, form, and place reinforced concrete (f'c=4ksi)	8140	203	CY	$ 860.00	$ 174,580.00
	29	Furnish and place concrete reinforcement.	8140	24,300	LBS	$ 1.60	$ 38,880.00
	30	Furnish and handle cement	8140	58	TONS	$ 140.00	$ 8,120.00
		Construct Sump for Fish Pumps and Bypass					
	31	Furnish, form, and place reinforced concrete (f'c=4ksi)	8140	1,040	CY	$ 765.00	$ 795,600.00
	32	Furnish and place concrete reinforcement.	8140	124,620	LBS	$ 1.60	$ 199,392.00
	33	Furnish and handle cement	8140	295	TONS	$ 140.00	$ 41,300.00
		Sheet Subtotal =					**$ 4,620,933.00**

QUANTITIES		PRICES	
BY Joe Gemperline	**CHECKED** Chou Cha / Dave Gesundheit	**BY** JZ Jerry Zander	**CHECKED** M Hyndman 8/13/08
DATE PREPARED 5/1/2007	**PEER REVIEW** David K. Edwards	**DATE PREPARED** August 8, 2008	**PEER REVIEW** DCA

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Intake

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Earthwork for Fish Bypass Pipe					
		Price Alternative 2. Alternative 1 for reference only.					
		Alternative 1 Prices not included in sheet total					
		Alternative 1 - Payline Quantities - Vertical Trench Walls					
		Bypass pipe common excavation	8140	580	CY		
		Bypass pipe backfill	8140	310	CY		
		Bypass pipe soil cement bedding (100 psi)	8140	175	CY		
		(Soil Cement Slurry CLSM)					
		Alternative 2 - Takeoff Quantities - 2:1 Trench Walls					
	34	Bypass pipe common excavation	8140	1,600	CY	$ 11.00	$ 17,600.00
	35	Bypass pipe backfill	8140	1,180	CY	$ 15.00	$ 17,700.00
	36	Bypass pipe soil cement bedding (100 psi)	8140	330	CY	$ 150.00	$ 49,500.00
		(Soil Cement Slurry CLSM)					
		Notes:					
		Clearing and grubbing by other group	8120				
		Fencing by other group	8120				
		People guardrail by other group	8120				
		Gravel surfacing by other group	8120				
		Yard earthwork by other group	8120				
		Coffer Dam and Dewatering by other group	8312				
		Waste and borrow included under PP	8120				
		Sheet Subtotal =					**$ 84,800.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Joe Gemperline	Chou Cha / Dave Gesundheit	Jerry Zander	N2 Hymlan 8/13/08
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
5/1/2007	David K. Edwards	August 8, 2008	DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Intake

Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Structural Steel					
	37	Furnish and install structural steel (painted):	8120	2,000	LBS	$ 4.00	$ 8,000.00
		3-Ton Hoist monorail beam and frames					
	38	**Miscellaneous Metalwork**	8120	8,000	LBS	$ 8.00	$ 64,000.00
		3' wide walkway, steel, safety grating along fish screens					
		75-ft ea side with support frames at 11-ft centers					
		Gripstrut panels @ 23.5 lbs/ft					
		Guardrail					
		Ladders and landings into Intake					
		Control Building					
	39	Pre-engineered metal building - 15 ft. eave height	8120	1	EA	$ 53,000.00	$ 53,000.00
		3:12 roof pitch, 20' long x 20' wide					
	40	Furnish, form, and place reinforced concrete (f'c=4ksi)	8120	18	CY	$ 1,000.00	$ 18,000.00
		Assume 1-ft x 22-ft x 22-ft base slab					
	41	Furnish and place concrete reinforcement. (135 lbs/CY)	8120	2,500	LBS	$ 1.60	$ 4,000.00
	42	Furnish and handle cement (.282T/CY)	8120	5	TONS	$ 140.00	$ 700.00
		Sheet Subtotal =					**$ 147,700.00**

QUANTITIES		PRICES	
BY Dick LaFond	**CHECKED** Brian Goplen	**BY** JZ Jerry Zander	**CHECKED** 12H Wymer 8/13/08
DATE PREPARED May 1, 2007	**PEER REVIEW** Brian Goplen	**DATE PREPARED** August 8, 2008	**PEER REVIEW** DLM

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Intake

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total Est - 2008\[081108 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
	43	Ventilating System for Fish Pump	8410	1	L.S.	$ 2,600.00	$ 2,600.00
		Electrical Equipment Control Building:					
		Consists of:					
		1 - Centrifugal fan; 500 cfm					
		1 - Backdraft damper; 24-inch by 24-inch					
		1 - Intake counterbalance damper; 24-inch by 24-inch					
		2 - 24-inch by 24-inch stationary louver					
	44	One (3) ton capacity, electric, wirerope, monorail hoist	8410	1	L.S.	$ 5,000.00	$ 5,000.00
		with manual trolley for intake structure stop logs					
		(hoist only; hoist beam provided by 8120)					
	45	Stoplog guides and seats (steel)	8410	2,800	LBS	$ 10.00	$ 28,000.00
	46	Stoplog lifting beam (steel)	8410	1,000	LBS	$ 4.00	$ 4,000.00
	47	Stoplogs (steel)	8410	13,600	LBS	$ 3.60	$ 48,960.00
	48	Trashracks and seats (steel)	8410	20,400	LBS	$ 7.00	$ 142,800.00
	49	One trash rake, rails, supports	8410	11,000	LBS	$ 9.00	$ 99,000.00
		(assume Atlas Polar DT8300 rake)					
	50	One conveyor (steel)	8410	5,000	LBS	$ 9.00	$ 45,000.00
	51	Fish screen guides, support structure, braces	8410				
		embedded seats, blank panel, and bypass walls					
		Structural steel		105,000	LBS	$ 7.00	$ 735,000.00
		(Does not include walkway, see 8120)					
		Sheet Subtotal =					**$ 1,110,360.00**

QUANTITIES		PRICES	
BY: J. Grass / P. Schlein / A. Ritt R. Christensen	**CHECKED** Rick Christensen / R. Egan	**BY** JZ Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED: 4/28/07, 6/16/08	**PEER REVIEW**	**DATE PREPARED** August 11, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Intake

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP
ESTIMATE LEVEL: Appraisal
REGION PN
PRICE LEVEL: Apr-07
FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total Est - 2008\[082108 - Wymer - MPL Total Est .xls]River Intake (2-13)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
	52	Fish screens 11' W x11' H panels, 10 + 2 spares	8410				
		Stainless steel		14,600	LBS	$ 23.00	$ 335,800.00
		Structural steel		14,600	LBS	$ 6.00	$ 87,600.00
	53	Barrier panels above fish screens, 11' W x 11' H	8410				
		10 + 2 spares					
		Structural steel		36,300	LBS	$ 4.50	$ 163,350.00
	54	Adjustable baffle panels, 10 bays	8410				
		Structural steel		60,500	LBS	$ 4.50	$ 272,250.00
	55	Fish screen cleaner with travel rail, 2 systems with	8410				
		one brush cleaner arm per system					
		a. Structural steel		8,200	LBS	$ 5.00	$ 41,000.00
		b. Stainless steel		1,000	LBS	$ 21.00	$ 21,000.00
		c. 2 Hp motors/gear reducers, with adj. speed		2	UNITS	$ 9,000.00	$ 18,000.00
		controllers and limit switches					
	56	Water level measuring systems	8410				
		Sensors/transducers		6	UNITS	$ 4,500.00	$ 27,000.00
		Receivers/transmitters		2	UNITS	$ 9,000.00	$ 18,000.00
		6" Dia. FRP pipe stilling wells		120	FT	$ 36.00	$ 4,320.00
		Sheet Subtotal =					**$ 988,320.00**

QUANTITIES		PRICES	
BY: R. Christensen	**CHECKED** John Grass, R. Egan	**BY** Jerry Zander	**CHECKED**
DATE PREPARED: 4/28/07, 6/16/08	**PEER REVIEW**	**DATE PREPARED** August 21, 2008	**PEER REVIEW** DLM 8/21/08

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Intake

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP | **ESTIMATE LEVEL:** Appraisal

REGION PN | **PRICE LEVEL:** Apr-07

FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total Est - 2008\[081108 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Pumping Units for Fish Bypass	8420				
		Furnish and Install:					
		Two - Wemco Hidrostal Model N36A screw centrifugal fish pumps w/ shrouded s.st. impellers, s.st. casings and s.st. pump shafts, right-angle gear drives, 60 cfs @ 14' TDH, 150 hp, TEFC, vertical induction motors, and vertical shafting with couplings					
		- Government to witness pump shop test					
		- Field testing with on-site pump mfr's rep.					
	57	a. stainless steel shrouded pump impellers, casings, and shafts		22,000	LBS	$ 72.00	$ 1,584,000.00
	58	b. right-angle gear reducers (4:1)		2,200	LBS	$ 51.00	$ 112,200.00
	59	c. "Premium Efficiency" vertical induction motors, inverter-duty rated, TEFC, hollow shaft, 150 hp, 1200 rpm, 3Ph/60Hz/460 V		6,300	LBS	$ 18.00	$ 113,400.00
	60	d. vertical shafting (30') and couplings		2,800	LBS	$ 14.00	$ 39,200.00
	61	e. common pump/gear reducer baseplate (11.25 ft x 9.25 ft)		14,300	LBS	$ 4.50	$ 64,350.00
		Variable Frequency Drives (on 8430 qty. est. worksheet)					
		Sheet Subtotal =					**$ 1,913,150.00**

QUANTITIES		PRICES	
BY: R. Zelenka	CHECKED: T. Hummel 6/5/08	BY: Jerry Zander	CHECKED: 8/13/08
DATE PREPARED: June 4, 2008	PEER REVIEW: T. Hummel 6/5/08	DATE PREPARED: August 11, 2008	PEER REVIEW: DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Intake

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
		Steel Pipe for Fish Bypass	8420				
	62	36" ID X 1/4" wall steel pipe					
		233 lin. Ft. @ 96 lbs. per lin. Ft. (22368 lbs.)		233	LF	$ 350.00	$ 81,550.00
	63	30" ID X 1/4" wall steel pipe					
		524 lin. Ft. @ 80 lbs. per lin. Ft. (41920 lbs.)		524	LF	$ 290.00	$ 151,960.00
		Flanges					
	64	8 - 36" AWWA Class D flanges		2,144	lbs	$ 3.60	$ 7,718.40
		Rectangular Pipe and Transition (Bypass Inlet)	8420				
	65	All welded steel plates		35,000	lbs	$ 3.60	$ 126,000.00
		Valves for Fish Bypass	8420				
	66	2 - 36" Manually Operated Knifegate Valves					
		2500 lbs per valve		5,000	lbs	$ 10.00	$ 50,000.00
		Sheet Subtotal =					**$ 417,228.40**

QUANTITIES		PRICES	
BY R. Frisz 6/5/08	**CHECKED** R. Zelenka 6/5/08	**BY** JZ Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED 5-4-08	**PEER REVIEW** R. Zelenka 6/5/08	**DATE PREPARED** August 8, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Intake

Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		ELECTRICAL					
		Service Equipment (F&I)	8430				
	67	Distribution panelboard, indoor type		1	EA	$ 9,900.00	$ 9,900.00
		480 volts, 3-phase with 225 ampere bus					
	68	Transformer load center		1	EA	$ 7,470.00	$ 7,470.00
		15 kVA, 1-phase, 480-240/120 volt					
		Combination Motor Starters (F&I)	8430				
	69	NEMA size 2 reversing contactor, 480V, 3-phase		2	EA	$ 4,500.00	$ 9,000.00
		480-120 volt control transformer					
		NEMA type 4 enclosure					
		Adjustable Speed Drives (F&I)	8430				
	70	480 volt, 3-phase, 200 ampere		2	EA	$ 50,000.00	$ 100,000.00
		Lighting System (F&I)	8430				
	71	120 volt, fluorescent fixtures for 10' x 10' bldg		1	LS	$ 6,300.00	$ 6,300.00
		Sheet Subtotal =					**$ 132,670.00**

QUANTITIES		PRICES	
BY Mike Schuh	**CHECKED** Lisa Gamuciello	**BY** Jerry Zander	**CHECKED** NZ Hynds 8/13/08
DATE PREPARED May 28, 2008	**PEER REVIEW** George Girgis	**DATE PREPARED** August 8, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Pumping Plant

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07

FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total Est - 2008\[081108 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		CIVIL	8120				
		HP Pumping Plant Yard= El. 1287					
		Site excavation for intake structure included in yard quantity.					
		Service Yard and Access Road					
	1	Stripping (remove and dispose 6" of topsoil)		34,500	SY	$ 4.00	$ 138,000.00
	2	Common excavation to Service Yard El. 1287		16,530	CY	$ 6.00	$ 99,180.00
	3	Place and compact embankment for service yard		18,500	CY	$ 8.50	$ 157,250.00
	4	Furnish and place 6-inch thick gravel surfacing		19,000	SY	$ 7.00	$ 133,000.00
	5	Furnish and place base course material - 6" thick		1,930	TONS	$ 27.00	$ 52,110.00
	6	Furnish and place bituminous Pavement - 3" thick		1,035	TONS	$ 90.00	$ 93,150.00
	7	Furnish and install 7-foot chain link fence for service yard		2,145	LF	$ 23.00	$ 49,335.00
	8	Furnish and install 7-foot x 24-foot access gate		1	EA	$ 3,700.00	$ 3,700.00
		Dewatering During Construction:					
		Included in quantities under River Intake.					
		Structural Excavation and Backfill					
		Assume top of rock= El. 1262.0					
	9	Excavation of common materials for structures		79,900	CY	$ 6.00	$ 479,400.00
	10	Excavation of rock for structures (drill & shoot)		23,800	CY	$ 27.00	$ 642,600.00
	11	Furnish backfill for structures (assume local borrow)		63,200	CY	$ -	$ -
	12	Place backfill around structures		63,200	CY	$ 3.60	$ 227,520.00
	13	Compact backfill around structures		63,200	CY	$ 3.00	$ 189,600.00
	14a	Furnish & place embedment material for manifold		485	CY	$ 90.00	$ 43,650.00
		pipe trench (CLSM)					
	14b	Waste Excess Material from River Excavations					
		Assume waste material within 1 mile at dam.					
		Quantities include intake, plant, swtchd, & 1/2 discharge.					
	i	Waste rock excavation	8120	72,000	CY	$ 8.00	$ 576,000.00
	ii	Waste common material	8120	115,000	CY	$ 6.00	$ 690,000.00
		Sheet Subtotal =					**$ 3,574,495.00**

QUANTITIES		PRICES	
BY Brian Goplen	**CHECKED** John Pattie	**BY** JWZ Jerry Zander	**CHECKED** M.H. 8/13/08
DATE PREPARED April 26, 2007	**PEER REVIEW** Dick LaFond	**DATE PREPARED** August 11, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Pumping Plant

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total Est - 2008\[082508 - Wymer - MPL Total Est .xls]Pumping Plant (14-25)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		STRUCTURAL	8120				
		Concrete for Structures					
		Includes: Pumping Plant Structure = 11,700 CY					
		Air Chamber Foundation = 1620 CY					
		Flow Meter Vault = 220 CY					
		Miscellaneous Slabs = 10 CY					
	15	Furnish, form, and place reinforced concrete		13,550	CY	$ 540.00	$ 7,317,000.00
	16	Furnish and place concrete reinforcement.		1,626,000	LBS	$ 1.60	$ 2,601,600.00
		Assume 130 #/CY					
	17	Furnish and handle cement (.282T/CY)		3,821	TONS	$ 140.00	$ 534,940.00
	18	Furnish and install 6" PVC Waterstop		8,000	LF	$ 8.00	$ 64,000.00
		Structural Steel					
	19	Furnish and install structural steel (painted):					
		Superstructure roof trusses and crane girders		328,000	LBS	$ 4.50	$ 1,476,000.00
		Miscellaneous Metalwork					
	20	Furnish and install miscellaneous metalwork		73,000	LBS	$ 9.00	$ 657,000.00
	21	Pre-engineered metal stairs		26,000	LBS	$ 7.00	$ 182,000.00
	22	Roof Hatches: Bilco Type 8'x14' Type D Double leaf insul alum.		1	EA	$ 14,000.00	$ 14,000.00
	23	Floor Hatches: 3'x3' Type J alum floor hatch		3	EA	$ 8,100.00	$ 24,300.00
		Metal decking for roof system					
	24	1.5B20		15,820	SF	$ 5.00	$ 79,100.00
	25	1.5VL22		780	SF	$ 9.00	$ 7,020.00
	26	Air chamber cover (Deleted)					
		Sheet Subtotal =					**$ 12,956,960.00**

QUANTITIES		PRICES	
BY Brian Goplen	**CHECKED** Dick LaFond	**BY** JZ Jerry Zander	**CHECKED** 8/25/08
DATE PREPARED April 26, 2007, June 25, 2008	**PEER REVIEW** Dick LaFond	**DATE PREPARED** August 25, 2008	**PEER REVIEW** DCL for DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Pumping Plant

Architectural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		ARCHITECTURAL	8120				
	27	**Standing Seam Roofing System**		15,820	SF	$ 8.00	$ 126,560.00
		Service Bay - 1" high rib @ 18" o.c., 24ga.,					
		G-90 hot-dipped galvanized steel, UL 90 rated					
		Large roof - 3/12 hipped - 3,460 s.f.					
		Small roof - 3/12 hipped - 560 s.f.					
		Unit Bay - 1" high rib @ 18" o.c., 24ga., G-90,					
		hot-dipped galvanized steel, UL 90 rated					
		Gabled with 3/12 pitch each side - 11,800 s.f.					
		Roofing Felt					
	28	2-layers 15# - 31,640 s.f.	8120	31,640	SF	$ 0.50	$ 15,820.00
		Roof Insulation					
	29	4" thick, rigid	8120	4,020	SF	$ 3.40	$ 13,668.00
	30	2" thick, rigid	8120	11,800	SF	$ 1.90	$ 22,420.00
		Roll-up Doors (complete with hardware)					
		Exterior					
	31	4'-0" x 7'-0", manual operated, insulated roll-up door		1	EA.	$ 5,100.00	$ 5,100.00
	32	14'-0" x 14'-0", manual operated, insulated roll-up door		1	EA.	$ 7,000.00	$ 7,000.00
		Steel Doors & Frames (complete with hardware)					
		Interior					
	33	3'-0" x 7'-0" x 1 3/4", single, 90 min.		18	EA.	$ 900.00	$ 16,200.00
	34	3'-0" x 7'-0" x 1 3/4", double, 90 min.		5	EA.	$ 1,400.00	$ 7,000.00
		Sheet Subtotal =					**$ 213,768.00**

QUANTITIES		PRICES	
BY Brian Goplen	**CHECKED** Dick LaFond	**BY** Jerry Zander	**CHECKED** MH Hyndman 8/13/08
DATE PREPARED April 26, 2007	**PEER REVIEW** Dick LaFond	**DATE PREPARED** August 8, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Pumping Plant

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Major Mechanical Equipment:					
		Furnish and Install:					
	35	Seven 60 cfs Pumps	8420	161,000	LBS	$ 20.00	$ 3,220,000.00
		Double suction, horizontal split-case pumps,					
		coupling, 890 rpm, rated 480 feet TDH,					
		ductile iron casing, s.st. impeller w/ s.st.					
		casing/impeller wearing rings, and common					
		steel base plate for pump and motor					
		(23,000 lbs. ea.)					
		- Government to witness pump shop test					
		- pump shop testing with job motor					
	36	Seven 4,000 hp Motors	8430	210,000	LBS	$ 22.00	$ 4,620,000.00
		Horizontal synchronous, 6600 volt, 900 rpm,					
		TEWAC motor enclosure, brushless exciter					
		(30,000 lbs. ea.)					
		Sheet Subtotal =					**$ 7,840,000.00**

QUANTITIES		PRICES	
BY R. Zelenka	**CHECKED** T. Hummel 6/5/08	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED June 4, 2008	**PEER REVIEW** T. Hummel 6/5/08	**DATE PREPARED** August 8, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Pumping Plant

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total Est - 2008\[081108 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Major Mechanical Equipment					
		Valves	8420				
	37	AWWA Class 150, Motor operated butterfly valves:					
		7 -48" Diameter valves, 7725 lbs. per valve.		54,075	LBS	$ 4.50	$ 243,337.50
	38	ANSI Class 300, Motor operated butterfly valves:					
		7 -42" Diameter valves, 6000 lbs. per valve.		42,000	LBS	$ 24.00	$ 1,008,000.00
	39	ANSI Class 300, Tilting disk check valves:					
		7 -42" Diameter valves, 8300 lbs. per valve.		58,100	LBS	$ 22.00	$ 1,278,200.00
	40	ANSI Class 300, Manually operated butterfly valves:					
		4 -24" Diameter valves, 1350 lbs. per valve.		5,400	LBS	$ 20.00	$ 108,000.00
	41	ANSI Class 300, Manually operated butterfly valves:					
		2 -16" Diameter valves, 550 lbs. per valve.		1,100	LBS	$ 23.00	$ 25,300.00
	42	2" Combination Air Valves					
		22 - 300 psi valves, 75 lbs. per valve		1,650	LBS	$ 10.00	$ 16,500.00
	43	2" Ball Valves					
		22 - 300 psi valves, 3 lbs. per valve		66	LBS	$ 85.00	$ 5,610.00
		Sheet Subtotal =					**$ 2,684,947.50**

QUANTITIES

BY	CHECKED
R. Frisz	R. Zelenka 6/5/08
DATE PREPARED	**PEER REVIEW**
6-5-08	R. Zelenka 6/5/08

PRICES

BY	CHECKED
Jerry Zander	8/13/08
DATE PREPARED	**PEER REVIEW**
August 11, 2008	DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Pumping Plant

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[082608 Wymer - MPL Total Est .xls]Pumping Plant (14-25)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Steel Manifold (Suction and Discharge Manifolds)	8420				
		Steel plate used for pipe fabrication:					
		ASTM A36: Sy = 36 kpsi					
		(All pipe sizes are inside diameters)					
	44	120" ID, 3/4" wall, L= 321 ft., 968 lbs/ft (310728 lbs)		321	Lin. Ft.	$ 2,600.00	$ 834,600.00
	45	96" ID, 1" wall, L= 400 ft., 1036 lbs/ft (414400 lbs)		400	Lin. Ft.	$ 2,600.00	$ 1,040,000.00
	46	48" ID, 1/4" wall, L= 210 ft., 128 lbs/ft (26880 lbs)		210	Lin. Ft.	$ 340.00	$ 71,400.00
	47	42" ID., 7/16" wall, L= 210 ft., 198 lbs/ft (41580 lbs)		210	Lin. Ft.	$ 530.00	$ 111,300.00
	48	24" ID, 1/4" wall, L= 40 ft., 64 lbs/ft (2560 lbs)		40	Lin. Ft.	$ 170.00	$ 6,800.00
	49	16" ID, 1/4" wall, L= 90 ft., 43 lbs/ft (3870 lbs)		90	Lin. Ft.	$ 120.00	$ 10,800.00
		Flanges					
	50	2 - 96" AWWA Class E (3625 lb. ea.)		7,250	LBS	$ 3.50	$ 25,375.00
	51	14 - 48" AWWA Class D (440 lb. ea.)		6,160	LBS	$ 5.00	$ 30,800.00
	52	28 - 42" AWWA Class F (992 lb. ea.)		27,780	LBS	$ 4.50	$ 125,010.00
	53	21 - 36" AWWA Class D (268 lb. ea.)		5,630	LBS	$ 5.00	$ 28,150.00
	54	21 - 30" AWWA Class F (545 lb. ea.)		11,450	LBS	$ 5.00	$ 57,250.00
	55	20 - 24" AWWA Class F (384 lb. ea.)		7,680	LBS	$ 4.50	$ 34,560.00
	56	10 - 16" AWWA Class F (174 lb. ea.)		1,740	LBS	$ 5.00	$ 8,700.00
	57	2 - 120" AWWA Class D (3558 lb. ea.)		7,120	LBS	$ 3.50	$ 24,920.00
		Steel Air Chamber	8420				
	58	46 ft. ID, Spherical air chamber		705,000	LBS	$ 4.00	$ 2,820,000.00
		ASTM A 516 Grade 70 steel					
	59	200 horsepower, 750 cfm air compressor, 230 psig		1	LS	$ 200,000.00	$ 200,000.00
		Sheet Subtotal =					**$ 5,429,665.00**

QUANTITIES

BY	CHECKED
R. Frisz	R. Zelenka 6/5/08
DATE PREPARED	**PEER REVIEW**
6-5-08	R. Zelenka 6/5/08

PRICES

BY	CHECKED
Jerry Zander	8/26/08
DATE PREPARED	**PEER REVIEW**
August 26, 2008	Ded for DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Pumping Plant

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total Est - 2008\[081108 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
	60	Fire Suppression System: Consists of	8410	1	L.S.	$ 190,000.00	$ 190,000.00
		10 - Fire hose reels w/ 100 feet of hose					
		20 - Portable hand-held 20 lb. extinguishers					
		3 - Wheeled portable 125 lb. extinguishers					
		55 - Sprinkler system discharge heads					
		1 - 4-inch deluge valve, electric actuated					
		1 - Fire hydrant, dry type					
		1 - Fire department siamese connection					
		1 - Fire pump, horz. split-case, 500 gpm @ 300 ft of hd					
		10,000 lbs. of sch. 40 carbon steel pipe and fittings					
		1 - Clean agent gas fire suppression system for					
		4,500 ft^3 control room					
	61	Unit Cooling Water System: Consists of	8410	1	L.S.	$ 280,000.00	$ 280,000.00
		7 - Supply pumps, end-suction type, 150 gpm at 60 ft hd.					
		2 - 8-inch automatic, self cleaning strainers					
		4,000 lbs. of type K copper tubing & fittings					
		5,000 lbs. of ductile iron, mechanical joint pipe & fittings					
		4,000 lbs. of cast iron valving					
		2 - Mechanical seal end-suction pumping units; 25 gpm					
		at 100 ft hd.					
		2 - 4-inch self-cleaning filters, 25 micron					
	62	Compressed Air System: Consists of	8410	1	L.S.	$ 36,000.00	$ 36,000.00
		2 - 40 cfm @ 125 psi rotary screw air compressors					
		1 - 300 gal. carbon steel air receiver					
		1 - 80 cfm air dryer					
		3,000 lbs. of sch. 40 carbon steel pipe, valves & fittings					
	63	Service Water System: Consists of	8410	1	L.S.	$ 40,000.00	$ 40,000.00
		1 - Service water pump, 75 gpm @ 200 ft. of hd.					
		1 - Hydropneumatic steel tank, 300 gal.					
		1,500 lbs. of type K copper tubing, valves & fittings					
		10 - Service water rubber hose; 1-inch dia., 50 ft lengths					
		Sheet Subtotal =					**$ 546,000.00**

QUANTITIES		PRICES	
BY: J. Grass / R. Egan	**CHECKED** Rick Christensen	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED: 4/27/07, 6/16/08	**PEER REVIEW**	**DATE PREPARED** August 11, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Pumping Plant

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont)					
	64	Gravity Drainage System: Consists of	8410	1	L.S.	$ 130,000.00	$ 130,000.00
		50 - Floor drains, cast iron, 4-inch					
		25,000 lbs. of cast iron hub & spigot, service weight					
		soil pipe					
	65	Plant Unwatering System: Consists of	8410	1	L.S.	$ 180,000.00	$ 180,000.00
		2 - Vertical turbine type sump pump, 1000 gpm @ 50 ft hd					
		1 - Drainage jet type drainage pump					
		1,500 lbs. of type K copper tube, valves & fittings					
		4,000 lbs. of ductile iron, mechanical joint pipe & fittings					
	66	Domestic Water and Sanitary Waste and Vent System:	8410	1	L.S.	$ 60,000.00	$ 60,000.00
		Consists of:					
		4 - Water Closets					
		2 - Urinal					
		4 - Lavatories w/ faucets & accessories					
		1 - Duplex sewage ejector assembly					
		2 - Drench shower and eye wash					
		1 - Water heater, 20 gallons, electric					
		1 - Janitor's service sink, 36" x 36" molded stone					
		2,000 lbs. of cast iron hub & spigot service weight					
		sewer and vent pipe					
		800 lbs. of type K copper tubing, valves & fittings					
	67	20-ton Electric overhead traveling unit bay bridge crane,	8410	1	L.S.	$ 300,000.00	$ 300,000.00
		remote control, 56'-0" span; 30 ft. lift					
	68	20-ton Electric overhead traveling service bay bridge	8410	1	L.S.	$ 250,000.00	$ 250,000.00
		crane, remote control, 55'-0" span; 25 ft. lift					
	69	Electric passenger elevator:	8410	1	L.S.	$ 150,000.00	$ 150,000.00
		Overhead, Geared traction type, Capacity =3500 pounds,					
		Travel = 43 feet, Landings = 4, Speed = 200 ft/min.					
	70	Sump waste oil skimmer assembly, electric operated,	8410	1	L.S.	$ 15,000.00	$ 15,000.00
		w/ 55 gallon collection drum					
		Sheet Subtotal =					**$ 1,085,000.00**

QUANTITIES		PRICES	
BY: J. Grass / A. Ritt / R. Egan	**CHECKED** Rick Christensen	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED: 4/27/07, 6/16/08	**PEER REVIEW**	**DATE PREPARED** August 8, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Pumping Plant

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP
ESTIMATE LEVEL: Appraisal
REGION PN
PRICE LEVEL: Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont)					
	71	Heating, Ventilating, and Air Conditioning System (HVAC)	8410	1	L.S.	$ 900,000.00	$ 900,000.00
		for pumping plant building interior consisting of					
		197-ft long by 57-ft wide by 50-ft high unit bay,					
		55-ft long by 57-ft wide by 82-ft high service bay and					
		250-ft long by 25-ft wide by 12-ft high equipment gallery					
		for a total pumping plant volume of 893,520 ft^3					
		HVAC system designed for:					
		Outdoor summer design conditions: 100 degrees F					
		dry bulb and 86 degrees F wet bulb					
		Outdoor winter design conditions: minus 3.8 degree					
		dry bulb					
		Indoor plant summer design conditions: 90 degrees F					
		Indoor plant winter freeze protection: 45 degrees F dry bulb					
		Indoor control room, communication room and					
		office : 74 degrees F cooling and 68 degrees F heating					
		HVAC equipment consists of:					
		Central air handling units w/ hot water heating coils					
		Hot water boilers, circulating pumps and appurtenances					
		Office, control and communicating rooms air conditioning units					
		Unit heaters - hot water type					
		Electric fan forced wall heaters					
		Stairwell ventilation fans					
		Ducts - galvanized steel					
		Fire and smoke dampers					
		Backdraft dampers					
		Centrifugal fans					
		Propeller fans					
		Register/grills/louvers					
		Panel filters					
		Control system					
		Copper tubing					
		5,000 gallon propane tank and appurtenances					
		Carbon steel gas piping components					
		Sheet Subtotal =					**$ 900,000.00**

QUANTITIES		PRICES	
BY: J. Grass / P. Schlein	**CHECKED** Rick Christensen	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED: 4/27/07, 6/16,08	**PEER REVIEW**	**DATE PREPARED** August 8, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Pumping Plant

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont)					
	72	200 Kw diesel engine generator set with 500 gallon	8410	1	L.S.	$ 110,000.00	$ 110,000.00
		fuel tank (assume ConVault tank)					
		Sheet Subtotal =					**$ 110,000.00**

QUANTITIES		PRICES	
BY: R. Christensen	**CHECKED** John Grass/ R. Egan	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED: 4/28/07, 6/16/08	**PEER REVIEW**	**DATE PREPARED** August 8, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Pumping Plant

Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP
ESTIMATE LEVEL: Appraisal
REGION PN
PRICE LEVEL: Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		15 kV Non-Segregated-Phase Bus (F&I)	8430				
	73	15 kV, 3,000 amperes, outdoor type		300	FT	$ 6,000.00	$ 1,800,000.00
		15 kV Metal-Clad Switchgear (F&I)	8430				
	74	Indoor metal-clad switchgear with following features:		1	EA	$ 360,000.00	$ 360,000.00
		15 kV, 3,000 ampere bus					
		three 3,000 ampere vacuum power circuit breakers*					
		two 1,200 ampere vacuum power circuit breakers*					
		Plant Station-Service Equipment (F&I)	8430				
	75	Indoor double-ended secondary unit substation with		1	EA	$ 200,000.00	$ 200,000.00
		following features:					
		600 volts, 2,000 ampere main bus					
		Two dry-type transformers 6.9 kV-480Y/277 V, 1,500 KVA					
		Two 480 V power-circuit breakers, 2,000 amperes					
		Six 480 V power-circuit breakers, 800 amperes					
		7.2 kV Motor Control Equipment (F&I)	8430				
	76	NEMA 1 enclosure with following features:		1	EA	$ 2,500,000.00	$ 2,500,000.00
		7.2 kV, 3,000 ampere bus					
		Seven 400 ampere, class E2 full-voltage vacuum					
		contactors					
		Excitation equipment for 7 synchronous motors					
		Motor Control Centers (F&I)	8430				
	77	480 volts, 3-phase with 800 ampere bus		2	EA	$ 45,000.00	$ 90,000.00
		Five 20 inch wide sections w/ following equipment:					
		7 NEMA size 0 FVR contactors **					
		2 NEMA size 2 FVNR contactors ***					
		Three 100 A, 3-pole molded-case circuit breakers					
		* Continuous current rating					
		** FVR - Full-voltage reversing					
		*** FVNR - Full-voltage non-reversing					
		Sheet Subtotal =					**$ 4,950,000.00**

QUANTITIES		PRICES	
BY Mike Schuh	**CHECKED** Lisa Gamuciello	**BY** Jerry Zander	**CHECKED** M2Hyde 8/13/08
DATE PREPARED May 28, 2008	**PEER REVIEW** George Girgis	**DATE PREPARED** August 8, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Yakima River Pumping Plant

Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP | **ESTIMATE LEVEL:** Appraisal
REGION PN | **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	78	**Distribution Panelboards (F&I)**	8430				
	a	480 volts, 3-phase with 800 ampere bus &		4	EA	$ 7,000.00	$ 28,000.00
		main circuit breaker					
	b	208Y/120, 3-phase with 225 ampere bus &		3	EA	$ 3,000.00	$ 9,000.00
		main circuit breaker					
	79	**Lighting & Distribution Transformer (F&I)**	8430				
		75 kVA, 480-208Y/120 volt, dry type		3	EA	$ 18,000.00	$ 54,000.00
		Building Lighting System (F&I)	8430				
		Interior luminaires:					
	80	High bay, high-pressure sodium, 400 W, 208 V		14	EA	$ 1,400.00	$ 19,600.00
	81	4 foot, 2 lamp, 120 V fluorescent fixtures		40	EA	$ 220.00	$ 8,800.00
	82	Exterior luminaires:					
		High-pressure sodium, wall mounted, outdoor		12	EA	$ 420.00	$ 5,040.00
		70 watt, 120 volt					
		Assumptions:					
		Redundant power transformers in switchyard					
		Split motor bus with tie breaker					
		Sheet Subtotal =					**$ 124,440.00**

QUANTITIES		PRICES	
BY Mike Schuh	**CHECKED** Lisa Gamuciello	**BY** JWZ Jerry Zander	**CHECKED** NLH 8/13/08
DATE PREPARED May 28, 2008	**PEER REVIEW** George Girgis	**DATE PREPARED** August 8, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Switchyard and Transmission Line

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP | **ESTIMATE LEVEL:** Appraisal
REGION PN | **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		CIVIL/STRUCTURAL	8120				
	1	**Excavation** (Common)		1,005	CY	$ 19.00	$ 19,095.00
	2	**Structural Concrete**		120	CY	$ 1,000.00	$ 120,000.00
		(Switchyard foundations and pullboxes)					
	3	**Concrete Reinforcement**		15,310	LBS	$ 1.60	$ 24,496.00
	4	**Compacting Backfill about Structures**		790	CY	$ 13.00	$ 10,270.00
	5	**Switchyard Steel Structures**		35,800	LBS	$ 5.00	$ 179,000.00
	6	**Gravel Surfacing - 6-inch thick**		2,045	SY	$ 12.00	$ 24,540.00
	7	**Oil-Spill Containment System**		1	LS	$ 34,000.00	$ 34,000.00
		Geotextile fabric 4,255 SF (12 oz per sq yard, 110 mils non-woven)					
		Geomembrane liner: 2,130 SF (30 Mils XR-5 Seaman Corporation)					
		Geocel: 1,635 SF (8" deep "enviro grid" polymeric cellular confinement system)					
		Piping: 140 LF (6" Dia. Schedule 80 PVC pipe perforated)					
		Piping: 3 EA (6" Dia. Schedule 80 PVC "L")					
		Piping: 1 EA (12" Dia. 3'-2" long Schedule 80 PVC Cap)					
		Piping: 3 LF (12" Dia. Schedule 80 PVC perforated pipe)					
		Preservative-Treated Lumber: 75 LF (2"x4")					
		Expansion Anchors (Stainless steel 3/8" x 5" drilled in conc): 84 EA					
		Excavation: Included in excavation for structures					
		Uncompacted crushed aggregate: 135 CY (ASTM C33 Size No 4, 1 1/2" to 3/4")					
	8	**Gravelfill for Switchyard Foundations** (Compacted)		65	CY	$ 50.00	$ 3,250.00
	9	**5-Inch PVC Schedule 80 Conduit** (CIP Power Duct Bank)		115	LF	$ 200.00	$ 23,000.00
		Includes:					
		115 LF of 1.5' tall x 2.33' wide concrete CIP					
		15 CY of concrete					
		1970 lbs of reinforcement					
	10	**7-foot Chain link fence**		400	LF	$ 33.00	$ 13,200.00
		Sheet Subtotal =					**$ 450,851.00**

QUANTITIES		PRICES	
BY Brian Goplen	**CHECKED** Dick LaFond	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED April 26, 2007	**PEER REVIEW** Dick LaFond	**DATE PREPARED** August 8, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Switchyard and Transmission Line

Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		ELECTRICAL					
		Switchyard					
		Furnish and Install:					
	11	Oil-filled, conservator-type power transformer	-68440	2	EA	$ 990,000.00	$ 1,980,000.00
		20/26.66/33.33 MVA OA/FA/FA; 115-6.9kV, 3-phase					
	12	115-kV disconnect switches, 1200 amp, 3-phase	-68440	4	EA	$ 32,000.00	$ 128,000.00
	13	115-kV circuit breakers, 1200 amp, 31.5-kA Int,	-68440	2	EA	$ 140,000.00	$ 280,000.00
		3-phase, dead-tank, SF6 type					
	14	115-kV oil-filled voltage transformers	-68440	3	EA	$ 19,000.00	$ 57,000.00
	15	115-kV oil-filled 1200:5 MR current transformers	-68440	3	EA	$ 18,000.00	$ 54,000.00
	16	**Construct Transmission Line**	-68440	5	MILES	$ 500,000.00	$ 2,500,000.00
		115-kV, steel single-pole towers, 556.5 AWG,					
		26/7 ACSR conductor					
		Sheet Subtotal =					**$ 4,999,000.00**

QUANTITIES		PRICES	
BY Doug Crawford	**CHECKED** Lisa Gamuciello	**BY** Dan Mar DW	**CHECKED** MJ Hyndman 8/13/08
DATE PREPARED May 28, 2008	**PEER REVIEW** George Girgis	**DATE PREPARED** August 8, 2008	**PEER REVIEW** DM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Discharge Line to Reservoir

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total Est - 2008\[082508 - Wymer - MPL Total Est .xls]Discharge (28-33)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Discharge Line					
		Discharge line quantities are from PP yard to outlet.					
		Discharge line piping through dam covered by 8410					
		Discharge line outlet: El. 1610, right abutment					
		Earthwork					
	1	Clearing and Grubbing (150 ft wide along discharge line)	8140	76,000	SY	$ 0.80	$ 60,800.00
		(150 ft wide along discharge line, includes under dam)					
		Earthwork for Discharge Pipe					
		Price Alternative 2. Alternative 1 for reference only.					
		Alternative 1 - Payline Quantities - Vertical Trench Walls					
		Common Excavation for pipe	8140	10,000	CY		
		Rock Excavation for pipe - (drill and shoot)	8140	31,000	CY		
		Backfill for pipe	8140	26,000	CY		
		Soil Cement Slurry (CLSM)	8140	5,000	CY		
		Alternative 2 - Takeoff Quantities - 1-1/2:1 Trench Walls					
	2	Common Excavation for pipe	8140	39,000	CY	$ 4.00	$ 156,000.00
	3	Rock Excavation for pipe - (drill and shoot)	8140	117,000	CY	$ 18.00	$ 2,106,000.00
	4	Backfill for pipe	8140	136,000	CY	$ 4.00	$ 544,000.00
	5	Soil Cement Slurry (CLSM)	8140	12,000	CY	$ 80.00	$ 960,000.00
		Earthwork for Conduit under dam - 1/2:1 Trench Walls					
	6	Common Excavation for conduit	8140	4,000	CY	$ 11.00	$ 44,000.00
	7	Rock Excavation for conduit - (drill and shoot)	8140	35,000	CY	$ 25.00	$ 875,000.00
	8	Mass Concrete backfill	8140	31,000	CY	$ 540.00	$ 16,740,000.00
		(See Access Conduit for conduit lining)					
		96-inch Diameter Steel Pipe - ASTM A139 Gr C					
	9	**(Mortar lined w/ flexible coating)**					
	10	96 pipe thickness = 0.4375 (456 lb/ft steel weight)	8140	2,280	LF	$ 1,030.00	$ 2,348,400.00
	11	96 pipe thickness = 0.5000 (521 lb/ft steel weight)	8140	500	LF	$ 1,170.00	$ 585,000.00
	12	96 pipe thickness = 0.5625 (587 lb/ft steel weight)	8140	300	LF	$ 1,300.00	$ 390,000.00
	13	96 pipe thickness = 0.625 (652 lb/ft steel weight)	8140	300	LF	$ 1,500.00	$ 450,000.00
	14	96 pipe thickness = 0.6875 (718 lb/ft steel weight)	8140	400	LF	$ 1,600.00	$ 640,000.00
	15	96 pipe thickness = 0.75 (784 lb/ft steel weight)	8140	400	LF	$ 1,800.00	$ 720,000.00
	16	Cathodic protection for pipeline	8140	1	LS	$ 57,000.00	$ 57,000.00
		96"x96"x96" Tee for buried manhole	8140	1	EA	$ 100,000.00	$ 100,000.00
		Sheet Subtotal =					**$ 26,776,200.00**

QUANTITIES		PRICES	
BY Anne Pavol	**CHECKED** Kevin Atwater	**BY** Jerry Zander	**CHECKED** 8/25/08
DATE PREPARED June 16, 2008	**PEER REVIEW** Tedd Calhoun	**DATE PREPARED** August 25, 2008	**PEER REVIEW** DCA for DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Discharge Line to Reservoir

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		SH821 Detour for open cut discharge line					
	17	Remove and Replace Concrete Asphalt on SH821	8140	135	ton	$ 100.00	$ 13,500.00
	18	Remove and Replace Aggregate base on SH821	8140	250	ton	$ 45.00	$ 11,250.00
	19	Compacted Embankment	8140	6,900	CY	$ 16.00	$ 110,400.00
	20	Concrete Asphalt for detour	8140	630	ton	$ 90.00	$ 56,700.00
	21	Aggregate base for detour	8140	1,150	ton	$ 45.00	$ 51,750.00
	22	Concrete Jersey Barriers	8140	200	LF	$ 90.00	$ 18,000.00
	23	Detour signage	8140	1	LS	$ 63,000.00	$ 63,000.00
	24	Detour removal	8140	1	LS	$ 36,000.00	$ 36,000.00
		Discharge Line Outlet Structure					
	25	Excavation of common materials for structures (2:1)	8140	960	CY	$ 14.00	$ 13,440.00
	26	Backfill (2:1)	8140	700	CY	$ 13.00	$ 9,100.00
	27	Compacted Backfill (2:1)	8140	700	CY	$ 9.00	$ 6,300.00
	28	Embankment	8140	790	CY	$ 14.00	$ 11,060.00
	29	Compacted Embankment	8140	790	CY	$ 6.00	$ 4,740.00
	30	Riprap (d50=24") (120 lb/cf)	8140	1,100	TONS	$ 63.00	$ 69,300.00
	31	Riprap Bedding (130 lb/cf)	8140	450	TONS	$ 45.00	$ 20,250.00
	32	Furnish, form, and place reinforced concrete	8140	240	CY	$ 900.00	$ 216,000.00
	33	Furnish and place concrete reinforcement.	8140	29,000	LBS	$ 1.60	$ 46,400.00
		Assume 120 #/CY					
	34	Furnish and handle cement (.282T/CY)	8140	60	TONS	$ 180.00	$ 10,800.00
		Discharge Line Outlet Chute					
	35	Excavation of common materials for structures (2:1)	8140	16,000	CY	$ 7.00	$ 112,000.00
	36	Backfill (2:1)	8140	3,600	CY	$ 12.00	$ 43,200.00
	37	Compacted Backfill (2:1)	8140	3,600	CY	$ 7.00	$ 25,200.00
	38	Embankment (chute crosses swale)	8140	44,000	CY	$ 8.00	$ 352,000.00
	39	Compacted Embankment (chute crosses swale)	8140	44,000	CY	$ 3.00	$ 132,000.00
	40	Riprap (d50=24") (120 lb/cf)	8140	8,300	TONS	$ 57.00	$ 473,100.00
	41	Riprap Bedding (130 lb/cf)	8140	3,700	TONS	$ 41.00	$ 151,700.00
	42	Furnish, form, and place reinforced concrete	8140	1,550	CY	$ 720.00	$ 1,116,000.00
	43	Furnish and place concrete reinforcement.	8140	185,000	LBS	$ 1.60	$ 296,000.00
		Assume 120 #/CY					
	44	Furnish and handle cement (.282T/CY)	8140	430	TONS	$ 150.00	$ 64,500.00
		Sheet Subtotal =					**$ 3,533,690.00**

QUANTITIES		PRICES	
BY Anne Pavol	**CHECKED** Joe Gemperline/ K. A. Sayer	**BY** Jerry Zander	**CHECKED**
DATE PREPARED May 1, 2007	**PEER REVIEW** David K. Edwards	**DATE PREPARED** August 8, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Discharge Line
Access conduit

Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total Est - 2008\[081108 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	45	**Concrete**	8130				
		Concrete in access house (18 x 18 x 1 foot walls)		60	CY	$ 1,000.00	$ 60,000.00
		Concrete in access shaft (H = 10')		50	CY	$ 1,000.00	$ 50,000.00
		Concrete in Gate Chamber (20 ft dia.)		210	CY	$ 900.00	$ 189,000.00
		Concrete in access conduit (L =440)		1,980	CY	$ 800.00	$ 1,584,000.00
		Concrete in pipe saddles		35	CY	$ 1,100.00	$ 38,500.00
		(concrete total)		**2,335**			
	46	Furnish and place concrete reinforcement.					
		Assume 150 #/CY		350,000	LBS	$ 1.60	$ 560,000.00
	47	Furnish and handle cement (.282T/CY)		660	TONS	$ 150.00	$ 99,000.00
	48	Waste Excess Material from Discharge & Road Exc near Dam					
		Assume local waste at dam.					
		Quantities include 1/2 discharge, Outlet Chute, Access Roads.					
		Waste rock excavation	8120	116,000	CY	$ 8.00	$ 928,000.00
		Waste common material	8120	0	CY		
	49	Borrow Material for Discharge & Access Roads near Dam					
		Assume 1 way haul of 2 miles.					
		Quantities include 1/2 discharge, Outlet Chute, Access Roads.					
		Borrow Riprap	8120	0	CY		
		Borrow Common	8120	93,000	CY	$ 7.00	$ 651,000.00
		Sheet Subtotal =					**$ 4,159,500.00**

QUANTITIES		PRICES	
BY Doug Stanton (8130), Dick LaFond (8120)	**CHECKED** Jason Schneider (8130), Brian Goplen (8120)	**BY** Jerry Zander	**CHECKED**
DATE PREPARED June 16, 2008	**PEER REVIEW**	**DATE PREPARED** August 11, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Discharge Line to Reservoir

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
	50	Heating and Ventilating System for Discharge	8410	1	L.S.	$ 67,500.00	$ 67,500.00
		Line Valve Access Tunnel:					
		Consists of:					
		2 - Electric unit heater; 7.5 kw					
		1 - Centrifugal fan; 750 cfm					
		1 - Propeller fan; 2400 cfm					
		1 - Axial fan: 5,000 cfm					
		550 ft. Oval steel duct; 38-inch x 16-inch; galvanized					
		2 - Control damper; 60-inch by 60-inch; motor-operated					
		2 - Control damper; 32-inch by 32-inch; motor-operated					
		2 - 60-inch by 60-inch stationary louver					
		2 - 32-inch by 32-inch stationary louver					
	51	Ventilating System for Flowmeter Vault:	8410	1	L.S.	$ 5,400.00	$ 5,400.00
		Consists of:					
		1 - Centrifugal fan, 450 cfm					
		25 ft. carbon steel pipe and fittings, 8-inch dia., galv.					
	52	Ventilating System for Air Chamber	8410	1	L.S.	$ 22,500.00	$ 22,500.00
		Structure:					
		Consists of:					
		1 - Centrifugal fan, 4000 cfm					
		50 ft. carbon steel pipe and fittings, 18-inch dia., galv.					
	53	Ultrasonic flowmeter, 2-path	8410	1	L.S.	$ 90,000.00	$ 90,000.00
	54	Bulkhead gate (13' x 13'), bulkhead gate frame	8410	39,000	LBS	$ 5.00	$ 195,000.00
		and guides above frame (steel)					
		Sheet Subtotal =					**$ 380,400.00**

QUANTITIES		PRICES	
BY: J. Grass / P. Schlein R. Christensen	**CHECKED** Rick Christensen	**BY** Dan Mar	**CHECKED**
DATE PREPARED: 4/28/07, 6/16/08	**PEER REVIEW**	**DATE PREPARED** August 8, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Discharge Line to Reservoir

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
		Discharge/Isolation Valve					
	55	96-inch dia. Motor-operated Slide gate					
		(for Discharge manifold outlet into the					
		reservoir. Pressure on downstream side of gate)					
		Differential head = 132 feet					
		Slide gate frame, slide, and stem: 25,000 #					
		Motor operator: 1,800 #	8420	26,800	LBS	$ 8.00	$ 214,400.00
		Steel Pipe: Sta. 49+00 to Sta. 53+70 (End of Discharge Pipe)					
	56	96-inch ID, 3/8-inch wall, 386 lb/ft	8420	470	LF	$ 900.00	$ 423,000.00
	57	14-inch OD steel pipe for filling line					
		(1/4-inch wall, 38 lb per lin. ft.)	8420	20	LF	$ 90.00	$ 1,800.00
		Valves					
	58	AWWA Class 150, manually operated butterfly valves (for filling line):					
		2 -14" Diameter valves, 400 lbs. per valve.	8420	800	LBS	$ 14.00	$ 11,200.00
		Sheet Subtotal =					**$ 650,400.00**

QUANTITIES

BY	CHECKED
R. Frisz 6/5/08	R. Zelenka 6/5/08
DATE PREPARED	**PEER REVIEW**
June 4, 2008	R. Zelenka 6/5/08

PRICES

BY	CHECKED
Jerry Zander	
DATE PREPARED	**PEER REVIEW**
August 8, 2008	

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Discharge Line to Reservoir

Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		ELECTRICAL					
		Access Shaft/Gate Chamber Structure					
		Bldg Electrical Service Equipment (F&I)	8430				
	59	Distribution panelboard, indoor type		1	EA	$ 9,000.00	$ 9,000.00
		480 volts, 3-phase with 225 ampere bus					
	60	Transformer load center		1	EA	$ 7,500.00	$ 7,500.00
		15 kVA, 1-phase, 480-240/120 volt					
		Combination Motor Starters (F&I)	8430				
	61	NEMA size 2 reversing contactor, 480V, 3-phase		1	EA	$ 4,500.00	$ 4,500.00
		480-120 volt control transformer					
		NEMA type 4 enclosure					
		Lighting System (F&I)	8430				
	62	120 volt, fluorescent NEMA type 4 fixtures for		1	LS	$ 4,300.00	$ 4,300.00
		tower/gate chamber					
		Assumptions:					
		Bringing power to dam is part of unlisted items					
		Sheet Subtotal =					**$ 25,300.00**

QUANTITIES		PRICES	
BY Mike Schuh	**CHECKED** Lisa Gamuciello	**BY** Dan Mar	**CHECKED**
DATE PREPARED April 25, 2007	**PEER REVIEW** George Girgis	**DATE PREPARED** August 8, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Dam and Dike
Concrete-Faced Rockfill Dam

Dam Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP | **ESTIMATE LEVEL:** Appraisal
REGION PN | **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		GENERAL SITEWORK	8312				
		Assume no clearing and grubbing required					
		Assume road improvements and haul roads are part of unlisted items					
		DIVERSION & DEWATERING	8312				
		Given shallow alluvium & narrow valley, dewatering assumed to be minor (part of unlisted items)					
		FOUNDATION EXCAVATION					
		Assume common material stockpiled for reuse in misc. fill, haul roads, and similar					
		Assume rock material stockpiled for use (zone 4)					
		Stockpiles will be located within 1/2 mile of dam					
	1	Excavation, stripping, of dam foundation	8312	110,000	CY	$ 2.00	$ 220,000.00
		Assume depth of stripping 12 inches or less					
		Assume stripping will be stockpiled for topsoil use					
	2	Excavation, common, for dam foundation	8312	1,900,000	CY	$ 4.00	$ 7,600,000.00
		Assume about 25% of volume requires ripping					
		Assume suitable materials will be stockpiled for use as miscellaneous fill					
	3	Excavation, rock, for dam foundation	8312	16,000	CY	$ 21.00	$ 336,000.00
		Assume drill and blast in areas along plinth					
		FOUNDATION TREATMENT					
		Includes misc. surface foundation treatment, consolidation grouting, and curtain grouting					
	4	Slush grouting of foundation surface	8312	15,000	SF	$ 5.00	$ 75,000.00
		Over assumed 25% of plinth area					
	5	Dental concrete	8312	2,000	CY	$ 170.00	$ 340,000.00
	6	Furnish/place zone 2 sand filter on foundation	8312	20,000	CY	$ 43.00	$ 860,000.00
		Over assumed 10% of area between u/s toe and axis					
		Assume a 3-ft thickness above & below zone 3					
	7	Furnish/place zone 3 gravel drain on foundation	8312	20,000	CY	$ 34.00	$ 680,000.00
		Between the zone 2 filters in a 3-ft thickness					
		Sheet Subtotal =					**$ 10,111,000.00**

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED**
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 8, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Dam and Dike
Concrete-Faced Rockfill Dam

Dam Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		FOUNDATION TREATMENT (continued)					
		Consolidation Grouting of Foundation					
		Generally limited to area beneath plinth					
	8	Setups for drilling grout holes	8312	1,200	EA	$ 90.00	$ 108,000.00
		Assume 2-inch dia. drilled on 10-foot centers					
	9	Drill grout holes	8312	36,000	LF	$ 27.00	$ 972,000.00
		Assume 2-inch dia. w/length= 30 feet					
	10	Hookups to grout holes	8312	1,200	EA	$ 51.00	$ 61,200.00
	11	Pressure grout	8312	72,000	CF	$ 9.00	$ 648,000.00
		Assume grouting process only minus cement					
		Assume 2 CF per 1 LF of hole					
	12	Furnish and handle cement for pressure grouting	8312	72,000	BAGS	$ 9.00	$ 648,000.00
		Assume 1 bag per CF					
		Curtain Grouting of Foundation					
		Three-row curtain beneath plinth					
	13	Setups for drilling grout holes	8312	1,200	EA	$ 90.00	$ 108,000.00
		Assume 3 rows of 2-inch dia.on 10-ft centers					
	14	Drill grout holes	8312	180,000	LF	$ 27.00	$ 4,860,000.00
		Assume 2-inch dia. w/length from 75 to 225 feet,					
		with average of 150 feet					
	15	Hookups to grout holes	8312	1,200	EA	$ 54.00	$ 64,800.00
	16	Pressure grout	8312	360,000	CF	$ 9.00	$ 3,240,000.00
		Assume grouting process only minus cement					
		Assume 2 CF per 1 LF of hole					
	17	Furnish and handle cement for pressure grouting	8312	360,000	BAGS	$ 9.00	$ 3,240,000.00
		Sheet Subtotal =					**$ 13,950,000.00**

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED**
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 8, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Dam and Dike
Concrete-Faced Rockfill Dam

Dam Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		EMBANKMENT CONSTRUCTION					
		Items are set up as furnish and place, which would include purchasing from commercial sites, processing onsite, development of quarry, or transporting from stockpiles of required excavation					
	18	Furnish and place zone 1	8312	250,000	CY	$ 9.00	$ 2,250,000.00
		Consists of selected impervious soils stockpiled from reqd exc within 1/2 mile of dam					
		Compaction to 6-inch lifts by tamping roller					
	19	Furnish and place zone 2 filter	8312	325,000	CY	$ 34.00	$ 11,050,000.00
		Sand/gravel material processed commercially or developed onsite					
		If commercial, assume 17 mile one-way haul					
		Compacted to 12-inch layers by vibratory steel drum					
		Assume 12-foot horizontal width					
	20	Furnish and place zone 3 drain	8312	330,000	CY	$ 33.00	$ 10,890,000.00
		Gravel/cobble material processed commercially or developed onsite					
		If commercial, assume 17 mile one-way haul					
		Compacted to 12-inch layers by vibratory steel drum					
		Assume 12-foot horizontal width					
	21	Furnish and place zone 4 rockfill	8312	10,725,000	CY	$ 8.00	$ 85,800,000.00
		Developed from basalt ridges surrounding reservoir					
		Assume average 2-mile haul to dam					
		Rock sizes up to 3-foot					
		Compacted in 3-ft layers by vibratory steel drum					
	22	Furnish and place miscellaneous fill	8312	1,600,000	CY	$ 5.60	$ 8,960,000.00
		Comes from stockpiles of required excavation within 1/2 mile of dam					
		Generally consists of gravelly soils					
		Compacted in 2-ft layers by vibratory steel drum					
		Sheet Subtotal =					**$ 118,950,000.00**

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED**
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 8, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Dam and Dike
Concrete-Faced Rockfill Dam

Dam Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total Est - 2008\[081108 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		CONCRETE FACE & PLINTH CONSTRUCTION					
		Plinth					
		Typical thickness will be 1.5 feet					
		Width will range from 10 to 45 feet, assume 15 ft					
		Grouted anchors may be needed in poor rock areas					
	23	Furnish and place reinforced concrete in plinth	8312	3,400	CY	$ 440.00	$ 1,496,000.00
	24	Furnish and place concrete reinforcement (100#/CY)	8312	340,000	LBS	$ 1.60	$ 544,000.00
	25	Furnish and handle cement for concrete (.282T/CY)	8312	1,000	TONS	$ 110.00	$ 110,000.00
	26	Furnish and install grouted anchors	8312	86,000	LF	$ 23.00	$ 1,978,000.00
		Assume 1-inch diameter rebar grouted into rock					
		Assume 15-foot lengths					
		Concrete Deck					
		Thickness will average 1.5 feet					
		Adjacent panels will have waterstops and dowels					
		Concrete paved on 1.5:1 upstream face of dam					
	27	Furnish and place reinforced concrete in deck	8312	100,000	CY	$ 400.00	$ 40,000,000.00
	28	Furnish and place concrete reinforcement (100#/CY)	8312	10,000,000	LBS	$ 1.60	$ 16,000,000.00
	29	Furnish and handle cement for concrete (.282T/CY)	8312	28,000	TONS	$ 110.00	$ 3,080,000.00
		MISCELLANEOUS					
		Instrumentation					
		Assume part of unlisted items					
		Toe Drains					
		Assume part of unlisted items					
		Site cleanup and relandscaping					
		Assume part of unlisted items					
		Sheet Subtotal =					**$ 63,208,000.00**

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** JZ Jerry Zander	**CHECKED**
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 11, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Dam and Dike
Central Core Rockfill Dike

Dike Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total Est - 2008\[081108 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		GENERAL SITEWORK					
		Assume no clearing and grubbing required					
		Assume road improvements and haul roads are					
		part of unlisted items					
		DIVERSION & DEWATERING					
		Assume groundwater is below excavation					
		Assume natural stream beds in area are dry					
		FOUNDATION EXCAVATION					
		Assume common material stockpiled for reuse					
		Assume rock material stockpiled for reuse					
		Stockpiles will be located within 1/2 mile of dam					
	30	Excavation, stripping, of dam foundation	8312	45,000	CY	$ 3.60	$ 162,000.00
		Assume depth of stripping 12 inches or less					
		Assume stripping will be stockpiled for topsoil use					
	31	Excavation, common, for dam foundation	8312	580,000	CY	$ 4.30	$ 2,494,000.00
		Assume about 25% of volume requires ripping					
		Assume suitable materials will be stockpiled					
		for use as miscellaneous fill					
	32	Excavation, rock, for dam foundation	8312	2,000	CY	$ 43.00	$ 86,000.00
		Assume drill and blast in random locations					
		FOUNDATION TREATMENT					
		Includes misc. foundation surface treatment,					
		consolidation grouting, and curtain grouting					
		Miscellaneous Foundation Areas					
		Applied in areas of poor quality rock					
	33	Slush grouting of foundation surface	8312	24,000	SF	$ 5.00	$ 120,000.00
		Over assumed 20% of area beneath zone 1					
	34	Dental concrete	8312	2,000	CY	$ 180.00	$ 360,000.00
	35	Furnish/place zone 2 sand filter on foundation	8312	8,000	CY	$ 45.00	$ 360,000.00
		Over 10% of area between zone 1 and d/s toe					
		Assume a 3-ft thickness above and below zone 3					
	36	Furnish/place zone 3 gravel drain on foundation	8312	8,000	CY	$ 34.00	$ 272,000.00
		Between the zone 2 filters in a 3-ft thickness					
		Sheet Subtotal =					**$ 3,854,000.00**

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED**
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 11, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Dam and Dike
Central Core Rockfill Dike

Dike Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total Est - 2008\[082508 - Wymer - MPL Total Est .xls]Dam and Dike (34-41)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		FOUNDATION TREATMENT (continued)					
		Consolidation Grouting of Foundation					
		Generally limited to area beneath zone 1					
	37	Setups for drilling grout holes	8312	1,600	EA	$ 90.00	$ 144,000.00
		Assume 2-inch dia. drilled on 10-foot centers					
	38	Drill grout holes	8312	48,000	LF	$ 27.00	$ 1,296,000.00
		Assume 2-inch dia. w/length= 30 feet					
	39	Hookups to grout holes	8312	1,600	EA	$ 50.00	$ 80,000.00
	40	Pressure grout	8312	96,000	CF	$ 9.00	$ 864,000.00
		Assume grouting process only minus cement					
		Assume 2 CF per 1 LF of hole					
	41	Furnish and handle cement for pressure grouting	8312	96,000	BAGS	$ 9.00	$ 864,000.00
		Assume 1 bag per CF					
		Curtain Grouting of Foundation					
		Three-row curtain beneath zone 1					
	42	Setups for drilling grout holes	8312	540	EA	$ 85.00	$ 45,900.00
		Assume 2-rows of 2-inch dia.on 10-ft centers					
	43	Drill grout holes	8312	50,000	LF	$ 27.00	$ 1,350,000.00
		Assume 2-inch dia. w/length from 60 to 200 feet,					
		with an average of 90 feet					
	44	Hookups to grout holes	8312	540	EA	$ 51.00	$ 27,540.00
	45	Pressure grout	8312	100,000	CF	$ 9.00	$ 900,000.00
		Assume grouting process only minus cement					
		Assume 2 CF per 1 LF of hole					
	46	Furnish and handle cement for pressure grouting	8312	100,000	BAGS	$ 9.00	$ 900,000.00
		Assume 1 bag per CF					
		Sheet Subtotal =					**$ 6,471,440.00**

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** JZ Jerry Zander	**CHECKED** 8/25/08
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 25, 2008	**PEER REVIEW** DCD for DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Dam and Dike
Central Core Rockfill Dike

Dike Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		EMBANKMENT CONSTRUCTION					
		Items are set up as furnish and place, which would include purchasing from commercial sites, processing onsite, development of quarry, or transporting from stockpiles of required excavation					
	47	Furnish and place zone 1 core	8312	285,000	CY	$ 12.00	$ 3,420,000.00
		Acquired from source 3 miles from dam					
		Compacted to 6-inch lifts by tamping roller					
	48	Furnish and place zone 2 filter	8312	210,000	CY	$ 37.00	$ 7,770,000.00
		Sand/gravel material processed commercially or developed onsite					
		If commercial, assume 18 mile one-way haul					
		Compacted to 12-inch layers by vibratory steel drum					
		Assume 12-ft horizontal width					
		Includes both an upstream and downstream zone					
	49	Furnish and place zone 3 drain	8312	105,000	CY	$ 36.00	$ 3,780,000.00
		Gravel/cobble material processed commercially or developed onsite					
		If commercial, assume 18 mile one-way haul					
		Compacted to 12-inch layers by vibratory steel drum					
		Assume 12-ft horizontal width					
	50	Furnish and place zone 4 rockfill	8312	1,300,000	CY	$ 10.00	$ 13,000,000.00
		Developed from basalt ridges surrounding reservoir					
		Assume average 2-mile haul to dam					
		Rock sizes up to 3-foot					
		Compacted in 3-ft layers by vibratory steel drum					
	51	Furnish and place miscellaneous fill	8312	490,000	CY	$ 6.00	$ 2,940,000.00
		Comes from stockpiles of required excavation within 1/2 mile of dam					
		Generally consists of gravelly soils					
		Compacted in 2-ft layers by vibratory steel drum					
		Sheet Subtotal =					**$ 30,910,000.00**

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED**
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 8, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Dam and Dike
Central Core Rockfill Dike

Dike Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		MISCELLANEOUS					
		Instrumentation					
		Assume part of unlisted items					
		Toe Drains					
		Assume part of unlisted items					
		Site cleanup and relandscaping					
		Assume part of unlisted items					
		Sheet Subtotal =					$ -

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED**
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 8, 2008	**PEER REVIEW** DLA

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Spillway and Outlet Works
Spillway

Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total Est - 2008\[082508 - Wymer - MPL Total Est .xls]Spillway & Outlet Wks (42-52)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Uncontrolled Spillway (no gates)					
		Located on left abutment with crest at El. 1730					
		Earthwork	8130				
	1	Common excavation		364,000	CY	$ 5.00	$ 1,820,000.00
	2	Rock excavation (drill and blast)		94,250	CY	$ 20.00	$ 1,885,000.00
	3	Pervious backfill behind chute walls		2,600	CY	$ 17.00	$ 44,200.00
	4	Misc backfill behind chute walls		9,800	CY	$ 13.00	$ 127,400.00
	5	Riprap inlet structure		2,600	CY	$ 45.00	$ 117,000.00
	6	Bedding for riprap inlet structure		1,400	CY	$ 36.00	$ 50,400.00
	7	Riprap for stilling basin		1,700	CY	$ 45.00	$ 76,500.00
	8	Bedding for riprap stilling basin		1,000	CY	$ 36.00	$ 36,000.00
		Concrete	8130				
	9	Concrete in Inlet structure		1,100	CY	$ 800.00	$ 880,000.00
	10	Concrete in Crest structure		1,500	CY	$ 800.00	$ 1,200,000.00
	11	Concrete in Chute		9,500	CY	$ 600.00	$ 5,700,000.00
	12	Concrete in Stilling Basin structure		1,900	CY	$ 700.00	$ 1,330,000.00
	13	Furnish and place concrete reinforcement.		2,100,000	LBS	$ 1.60	$ 3,360,000.00
		Assume 150 #/CY					
	14	Furnish and handle cement (.282T/CY)		3,900	TONS	$ 110.00	$ 429,000.00
		Drains - Furnish and install	8130				
	15	6-inch dia PVC perf. And non perf. (90% perf.)		10,400	LF	$ 6.00	$ 62,400.00
	16	Furnish and install sand for drains		3,000	CY	$ 26.00	$ 78,000.00
	17	Furnish and install gravel for drains		2,600	CY	$ 26.00	$ 67,600.00
	18	Furnish and install 2-inch rigid insulation		84,500	SF	$ 2.00	$ 169,000.00
	19	Furnish and install 9-inch waterstops - spillway joints	8130	9,800	LF	$ 8.00	$ 78,400.00
	20	Drill and grout anchor bars	8130	240	EA	$ 150.00	$ 36,000.00
		(Total length of rock drilling= 1,200 feet)					
	21	Reinforcement for anchor bars	8130	6,100	LBS	$ 1.50	$ 9,150.00
	22	Furnish and install 48-inch chain link fencing	8130	4,100	LF	$ 18.00	$ 73,800.00
		for spillway					
		Sheet Subtotal =					**$ 17,629,850.00**

QUANTITIES		PRICES	
BY Doug Stanton	**CHECKED** Jason Schneider	**BY** Jerry Zander	**CHECKED** 8/25/08
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED** August 25, 2008	**PEER REVIEW** DCA for TLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Spillway and Outlet Works
Access Bridge across Spillway (upstream)

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total Est - 2008\[081208 - Wymer - MPL Total Est .xls]Spillway & Outlet Wks (42-52)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Access Bridge across Spillway (upstream)	86-8140				
	23	Furnish and install WSDOT W42G prestressed, concrete girders, L = 65 feet		5	Each	$ 6,500.00	$ 32,500.00
	24	Furnish and place reinforced concrete for deck, F-shape barriers & diaphragms, f'c = 4,000 psi (deck slab is 7.5 inch thick)		60	CY	$ 1,600.00	$ 96,000.00
	25	Furnish and handle cement material		17	Tons	$ 110.00	$ 1,870.00
	26	Furnish and install epoxy coated reinforcing steel Fy = 60,000 psi		15,000	LBS	$ 1.60	$ 24,000.00
	27	Furnish and install elastomeric bearing pads, (3" x 1'-6" x 2'-0"), total # = 10		30	SF	$ 240.00	$ 7,200.00
	28	Furnish and install compression seals, DS Brown CV-35 or Watson Bowman WA-350 elastomeric joint seals at ends of bridge		54	LF	$ 45.00	$ 2,430.00
		Deck drains (2 per side)					
	29	R-4005-A2 as manufactured by NEENAH Foundry or equal. Each one weighs~ 105 lbs		4	EA	$ 470.00	$ 1,880.00
	30	8-inch diameter black steel pipe, each L = 4'		16	LF	$ 140.00	$ 2,240.00
		Bridge is 65 feet long, with a 24-foot clear width. The bridge spans the spillway walls, which are 60-feet apart. The bridge superstructure will be supported on bearing seats, formed onto the spillway walls. Therefore, no foundation elements are included in this estimate worksheet. The bridge is located near the left abutment. The dam crest will be gravel surfaced. Chain link fence is required along the length of the spillway, so it is not included here. No approach guardrail is included in this estimate (see roadwork estimate). Water treatment for deck drainage is not included in this estimate.					
		Sheet Subtotal =					**$ 168,120.00**

QUANTITIES		**PRICES**	
BY Jesus G. Romero, PE	**CHECKED** Anne C. Pavol, PE	**BY** Jerry Zander	**CHECKED**
DATE PREPARED June 17, 2008	**PEER REVIEW** Tedd Calhoun, PE	**DATE PREPARED** August 12, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Spillway and Outlet Works
Access Bridge across Spillway (to access outlet works control house)
Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total Est - 2008\[082508 - Wymer - MPL Total Est .xls]Spillway & Outlet Wks (42-52)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Access Bridge across spillway (to access outlet	86-8140				
		works control house)					
	31	Furnish and install WSDOT W42G prestressed,					
		concrete girders, L = 65 feet		5	Each	$ 6,900.00	$ 34,500.00
	32	Furnish and place reinforced concrete for deck,					
		F-shape barriers & diaphragms, f'c = 4,000 psi		60	CY	$ 1,600.00	$ 96,000.00
		(deck slab is 7.5 inch thick)					
	33	Furnish and handle cement material		17	Tons	$ 110.00	$ 1,870.00
	34	Furnish and install epoxy coated reinforcing steel					
		Fy = 60,000 psi		15,000	LBS	$ 1.60	$ 24,000.00
	35	Furnish and install elastomeric bearing pads,					
		(3" x 1'-6" x 2'-0"), total # = 10		30	SF	$ 240.00	$ 7,200.00
	36	Furnish and install compression seals, DS Brown					
		CV-35 or Watson Bowman WA-350 elastomeric		54	LF	$ 45.00	$ 2,430.00
		joint seals at ends of bridge					
		Deck drains (2 per side)					
		R-4005-A2 as manufactured by NEENAH					
	37	Foundry or equal. Each one weighs~ 105 lbs		4	EA	$ 470.00	$ 1,880.00
	38	8-inch diameter black steel pipe, each L = 4'		16	LF	$ 140.00	$ 2,240.00
	38b	Approach guardrail		0	LF	$ -	$ -
		Bridge is 65 feet long, with a 24-foot clear width. The					
		bridge spans the spillway walls, which are 60-feet					
		apart. The bridge superstructure will be supported					
		on bearing seats, formed onto the spillway walls.					
		Therefore, no foundation elements are included in					
		this estimate worksheet.					
		The bridge is located near the left abutment. The					
		dam crest will be gravel surfaced. Chain link fence					
		is required along the length of the spillway, so it is					
		not included here. No approach guardrail is					
		included in this estimate (see roadwork estimate).					
		Water treatment for deck drainage is not included					
		in this estimate.					
		Sheet Subtotal =					**$ 170,120.00**

QUANTITIES		PRICES	
BY Jesus G. Romero, PE	CHECKED Anne C. Pavol, PE	BY Jerry Zander	CHECKED 8/25/08
DATE PREPARED June 17, 2008	PEER REVIEW Tedd Calhoun, PE	DATE PREPARED August 25, 2008	PEER REVIEW DCD for DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Spillway and Outlet Works
Outlet Works

Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total Est - 2008\[081108 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Earthwork U/S - channel, intake, conduit, portal	8130				
	39	Excavate common materials for structures		500	CY	$ 20.00	$ 10,000.00
	40	Excavate rock materials for structures (drill & shoot)		1,500	CY	$ 35.00	$ 52,500.00
	41	F & P bedding for riprap (processed on-site)		70	CY	$ 32.00	$ 2,240.00
	42	F & P rockfill from dam excavation (riprap)		140	CY	$ 38.00	$ 5,320.00
	43	Furnish and install chain link fabric around portal		1,750	SF	$ 2.70	$ 4,725.00
	44	F&I 18-inch x 1/2 in. dia resin anchors for fabric support		24	EA	$ 40.00	$ 960.00
		Earthwork D/S - portal, conduit, house, stilling basin	8130				
	45	Excavate common materials for structures		1,000	CY	$ 20.00	$ 20,000.00
	46	Excavate rock materials for structures (drill & shoot)		3,000	CY	$ 35.00	$ 105,000.00
	47	Excavate common materials for basin		12,000	CY	$ 6.00	$ 72,000.00
	48	Excavate rock materials for basin (drill & shoot)		4,000	CY	$ 35.00	$ 140,000.00
	49	F & P bedding for riprap (processed on-site)		4,500	CY	$ 21.00	$ 94,500.00
	50	F & P rockfill from dam excavation (riprap)		2,250	CY	$ 36.00	$ 81,000.00
	51	Furnish and install chain link fabric around portal		2,000	SF	$ 2.00	$ 4,000.00
	52	F&I 18-inch x 1/2 in. dia resin anchors for fabric support		30	EA	$ 40.00	$ 1,200.00
		Construct ROW tunnel u/s of gate chamber	8130				
	53	Drill and shoot 13.5-ft O.D.circular shaped u/s tunnel		850	LF	$ 1,800.00	$ 1,530,000.00
	54	Remove and stockpile rock (assume local stockpile)		4,500	CY	$ 15.00	$ 67,500.00
		Furnish, drill and install 750-10-ft long x 1-inch dia.					
	55	A307, 20K rockbolts		5,200	LF	$ 58.00	$ 301,600.00
	56	Furnish and install 6 steel sets (W8 x 40) (full circle)		11,400	LBS	$ 5.00	$ 57,000.00
		Construct ROW tunnel d/s of gate chamber	8130				
	57	Drill and shoot 19-ft OD circular shaped d/s tunnel		1,200	LF	$ 2,200.00	$ 2,640,000.00
	58	Remove and stockpile rock (assume local stockpile)		13,000	CY	$ 15.00	$ 195,000.00
		Furnish, drill and install 1250-10-ft long x 1-inch dia.					
	59	A307, 20K rockbolts		8,800	LF	$ 58.00	$ 510,400.00
	60	Furnish and install 6 steel sets (W10 x 40) in crown		20,000	LBS	$ 5.00	$ 100,000.00
		Construct Gate chamber					
	61	Drill and shoot 20-ft OD spherical shaped chamber		20	LF	$ 2,400.00	$ 48,000.00
	62	Remove and stockpile rock (assume local stockpile)		340	CY	$ 18.00	$ 6,120.00
		Furnish, drill and install 30-10-ft long x 1-inch dia.					
	63	A307, 20K rockbolts		300	LF	$ 110.00	$ 33,000.00
		Sheet Subtotal =					**$ 6,082,065.00**

QUANTITIES

BY	CHECKED
Doug Stanton	Jason Schneider
DATE PREPARED	**PEER REVIEW**
June 13, 2008	

PRICES

BY	CHECKED
Jerry Zander	
DATE PREPARED	**PEER REVIEW**
August 11, 2008	DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Spillway and Outlet Works
Outlet Works

Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		DELETED UPPER INTAKE BID ITEMS					
		Construct Upper Intake Structure					
	56	FFP reinf. Conc Upper Intake structure	8130				
	57	Furnish and place reinforcement (est 200#/CY)					
	58	Furnish and handle cement (.282T/CY)					
	59	FFP reinf. Conc (Steel lined) upper intake shaft (L=30')	8130				
	60	Furnish and place reinforcement (est 150#/CY)					
	61	Furnish and handle cement (.282T/CY)					
		Construct Intake Shaft	8130				
	62	Drill and shoot 13.5-ft OD vertical shaft					
	63	Remove and stockpile rock (assume local stockpile)					
		Furnish, drill and install 12-10-ft long x 1-inch dia.					
	64	A307, 20K rockbolts					
		Ring Grout Upper Intake Shaft	8130				
	65	Setups for drilling grout holes (2-in dia holes, 1 ring					
		with 6 holes per ring					
	66	Drill grout holes (2-in dia and L=25 ft)					
	67	Hookups to grout holes					
	68	Pressure grout (grouting process only minus cement)					
		Assume 2 CF per 1 LF of hole					
	69	Furnish and handle cement for pressure grouting					
		Assume 1 bag per CF					
		Sheet Subtotal =					$ -

QUANTITIES		PRICES	
BY Doug Stanton	**CHECKED** Jason Schneider	**BY** Jerry Zander	**CHECKED**
DATE PREPARED June 13, 2008	**PEER REVIEW**	**DATE PREPARED** August 8, 2008	**PEER REVIEW** DLA

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Spillway and Outlet Works
Outlet Works

Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Ring Grout Upstream Conduit	8130				
	64	Setups for drilling grout holes (2-in dia holes, 20 ft ctrs,		43	EA	$ 200.00	$ 8,600.00
		and 6 holes per ring)					
	65	Drill grout holes (2-in dia and L=25 ft)		6,450	LF	$ 36.00	$ 232,200.00
	66	Hookups to grout holes		260	EA	$ 40.00	$ 10,400.00
	67	Pressure grout (grouting process only minus cement)		13,000	CF	$ 12.00	$ 156,000.00
		Assume 2 CF per 1 LF of hole					
	68	Furnish and handle cement for pressure grouting		13,000	BAGS	$ 9.00	$ 117,000.00
		Assume 1 bag per CF					
		Ring Grout Gate Chamber	8130				
	69	Setups for drilling grout holes (2-in dia holes, low, mid		3	EA	$ 360.00	$ 1,080.00
		and high rings and 6 holes per ring					
	70	Drill grout holes (2-in dia and L=25 ft)		450	LF	$ 36.00	$ 16,200.00
	71	Hookups to grout holes		18	EA	$ 45.00	$ 810.00
	72	Pressure grout (grouting process only minus cement)		900	CF	$ 14.00	$ 12,600.00
		Assume 2 CF per 1 LF of hole					
	73	Furnish and handle cement for pressure grouting		900	BAGS	$ 14.00	$ 12,600.00
		Assume 1 bag per CF					
		Sheet Subtotal =					**$ 567,490.00**

QUANTITIES		PRICES	
BY Doug Stanton	**CHECKED** Jason Schneider	**BY** Jerry Zander	**CHECKED**
DATE PREPARED June 13, 2008	**PEER REVIEW**	**DATE PREPARED** August 8, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Spillway and Outlet Works
Outlet Works

Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct ROW cast in place (CIP) concrete	8130				
	74	Furnish, form, and place reinf. Conc - Intake structure		250	CY	$ 800.00	$ 200,000.00
	75	Furnish and place reinforcement (est 200#/CY)		50,000	LBS	$ 1.60	$ 80,000.00
	76	Furnish and handle cement (.282T/CY)		71	TONS	$ 110.00	$ 7,810.00
	77	FFP reinf. Conc - Steel lined U/S conduit (L=50' u/s of tunnel)		375	CY	$ 800.00	$ 300,000.00
	78	Furnish and place reinforcement (est 150#/CY)		56,250	LBS	$ 1.60	$ 90,000.00
	79	Furnish and handle cement (.282T/CY)		106	TONS	$ 110.00	$ 11,660.00
	80	FFP reinf. Conc - Steel lined U/S tunnel (L=850')		2,300	CY	$ 700.00	$ 1,610,000.00
	81	Furnish and place reinforcement (est 150#/CY)		350,000	LBS	$ 1.60	$ 560,000.00
	82	Furnish and handle cement (.282T/CY)		650	TONS	$ 110.00	$ 71,500.00
	83	FFP reinf. Concrete in gate chamber		180	CY	$ 900.00	$ 162,000.00
	84	Furnish and place reinforcement (160#/CY)		29,000	LBS	$ 1.60	$ 46,400.00
	85	Furnish and handle cement (.282T/CY)		51	TONS	$ 110.00	$ 5,610.00
	86	FFP reinf. Concrete - D/S tunnel (L=1200')		5,200	CY	$ 675.00	$ 3,510,000.00
		includes walkway and saddles					
	87	Furnish and place reinforcement (est 150#/CY)		780,000	LBS	$ 1.60	$ 1,248,000.00
	88	Furnish and handle cement (.282T/CY)		1,500	TONS	$ 110.00	$ 165,000.00
	89	FFP reinf. concrete - D/S conduit (L=130 ft d/s of tunnel)		290	CY	$ 900.00	$ 261,000.00
		includes walkway and saddles					
	90	Furnish and place reinforcement (est 150#/CY)		43,500	LBS	$ 1.60	$ 69,600.00
	91	Furnish and handle cement (.282T/CY)		82	TONS	$ 110.00	$ 9,020.00
	92	FFP reinf. concrete - D/S access house (30' x 30' x 12' tall)		580	CY	$ 800.00	$ 464,000.00
		includes wingwalls					
	93	Furnish and place reinforcement (est 150#/CY)		87,000	LBS	$ 1.60	$ 139,200.00
	94	Furnish and handle cement (.282T/CY)		164	TONS	$ 110.00	$ 18,040.00
	95	Furnish and install 48-inch chain link fencing	8130				
		on wingwalls @ Control House		80	LF	$ 39.00	$ 3,120.00
		Sheet Subtotal =					**$ 9,031,960.00**

QUANTITIES		PRICES	
BY Doug Stanton	**CHECKED** Jason Schneider	**BY** Jerry Zander	**CHECKED**
DATE PREPARED June 13, 2008	**PEER REVIEW**	**DATE PREPARED** August 8, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Spillway and Outlet Works
Outlet Works

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical	8410				
	96	Heating and Ventilating Systems for Outlet Works	8410	1	L.S.	$ 140,000.00	$ 140,000.00
		Access Tunnel and Control House:					
		Consists of:					
		2 - Electric unit heater; 7.5 kw					
		1 - Centrifugal fan; 750 cfm					
		1 - Propeller fan; 2400 cfm					
		1 - Axial fan: 6,000 cfm					
		1,900 ft. Oval steel duct; 38-inch x 16-inch, galvanized					
		2 - Control damper; 60-inch by 60-inch; motor-operated					
		2 - Control damper; 32-inch by 32-inch; motor-operated					
		2 - 60-inch by 60-inch stationary louver					
		2 - 32-inch by 32-inch stationary louver					
		Lower Intake					
	97	Trashracks (steel)	8410	32,400	LBS	$ 6.80	$ 220,320.00
	98	Bulkhead gate (13' x 13'), bulkhead gate frame	8410	93,800	LBS	$ 5.50	$ 515,900.00
		and guides above frame (steel)					
		Upper Intake (Not used in most probable estimate)					
	99	Trashracks (steel)	8410	0	LBS	N.A.	N.A.
	100	Bulkhead gate (13' x 13'), bulkhead gate frame	8410	0	LBS	N.A.	N.A.
		and guides above frame (steel)					
	101	Ultrasonic flowmeter, 2-path	8410	1	L.S.	$ 90,000.00	$ 90,000.00
	102	50 Kw Diesel engine-generator set with 125 gallon	8410	1	L.S.	$ 54,000.00	$ 54,000.00
		fuel tank (assume ConVault)					
		Sheet Subtotal =					**$ 1,020,220.00**

QUANTITIES		PRICES	
BY John Grass Paul Schlein, Rick Christensen	**CHECKED** Rick Christensen / R. Egan	**BY** Jerry Zander, Dan Mar	**CHECKED**
DATE PREPARED 4/28/07, 6/16/08	**PEER REVIEW**	**DATE PREPARED** August 8, 2008	**PEER REVIEW**

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Spillway and Outlet Works
Outlet Works

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Steel Pipe	8420				
	103	114-inch ID steel liner		900	LF	$ 2,300.00	$ 2,070,000.00
		(7/8-inch wall, 1074 lb per lin. ft.)					
	104	102-inch ID steel pipe, Supported on concrete saddles		1,330	LF	$ 1,200.00	$ 1,596,000.00
		(1/2-inch wall, 547 lb per lin. ft.)					
	105	72-inch ID steel pipe, encased in concrete		60	LF	$ 3,300.00	$ 198,000.00
		(3/8-inch wall, 290 lb per lin. ft.)					
	106	30-inch ID steel pipe					
		(1/4-inch wall, 80 lb per lin. ft.)		30	LF	$ 170.00	$ 5,100.00
	107	24-inch ID steel pipe for air vent					
		(1/4-inch wall, 64 lb per lin. ft.)		20	LF	$ 140.00	$ 2,800.00
	108	14-inch ID steel pipe for filling line					
		(1/4-inch wall, 38 lb per lin. ft.)		20	LF	$ 80.00	$ 1,600.00
		Valves					
	109	AWWA Class 250, manually operated butterfly valve (for air vent):					
		1 -24" Diameter valve, 1350 lbs. per valve.		1,350	LBS	$ 6.80	$ 9,180.00
	110	Combination air valve (for air vent to prevent vacuum)					
		1 -24" Diameter valve, 2600 lbs. per valve.		2,600	LBS	$ 8.50	$ 22,100.00
	111	AWWA Class 300, hydraulically operated ball valve:					
		1 -30" Diameter valve, 5900 lbs. per valve.		5,900	LBS	$ 12.00	$ 70,800.00
	112	AWWA Class 250, manually operated (filling line)butterfly valves:					
		2 -14" Diameter valves, 450 lbs. per valve.		900	LBS	$ 8.50	$ 7,650.00
		Sheet Subtotal =					**$ 3,983,230.00**

QUANTITIES		PRICES	
BY R. Frisz	CHECKED R. Zelenka 6/5/08	BY Jerry Zander	CHECKED
DATE PREPARED 6-5-08	PEER REVIEW R. Zelenka 6/5/08	DATE PREPARED August 8, 2008	PEER REVIEW DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Spillway and Outlet Works
Outlet Works

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Gates and Gate Controls					
		Furnish and Install					
		7'x9' Hydraulically-actuated outlet gate					
	113	Head = 367 feet	8420	102,000	LBS	$ 6.80	$ 693,600.00
		Two tandem sets 4'x6' hydraulically-actuated outlet gates					
	114	Head = 367 feet	8420	130,000	LBS	$ 7.70	$ 1,001,000.00
		30" Hydraulically-actuated jet-flow gate and stand					
	115	Head = 367 feet	8420	10,000	LBS	$ 8.50	$ 85,000.00
		Hydraulic controls for 7'x9' emergency outlet gate, and					
	116	four 4'x6' outlet gates	8420	3,200	LBS	$ 9.40	$ 30,080.00
	117	Hydraulic controls for 30" jet-flow gate	8420	800	LBS	$ 10.00	$ 8,000.00
		Sheet Subtotal =					**$ 1,817,680.00**

QUANTITIES		PRICES	
BY R. Frisz	**CHECKED** R. Zelenka 6/5/08	**BY** Jerry Zander	**CHECKED**
DATE PREPARED June 5, 2008	**PEER REVIEW** R. Zelenka 6/5/08	**DATE PREPARED** August 8, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Spillway and Outlet Works
Outlet Works

Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Electrical					
		Bldg Electrical Service Equipment (F&I)	8430				
	118	600 volt motor control center, 3-phase, 800 amp bus		1	EA	$ 36,000.00	$ 36,000.00
		Four 20 inch wide sections					
		5 NEMA size 1 FVR contactors *					
		Three 100 A, 3-pole molded-case circuit breakers					
	119	Transformer load center	8430	1	EA	$ 17,000.00	$ 17,000.00
		30 kVA, 3-phase, 480-208Y/120 volt					
		Lighting System (F&I)	8430				
	120	120 volt, fluorescent NEMA Type 4 fixtures for control		1	LS	$ 58,500.00	$ 58,500.00
		house, 1900 foot long tunnel, & gate chamber					
		* FVR - Full-voltage reversing					
		Assumptions:					
		Bringing power to dam is part of unlisted items					
		Sheet Subtotal =					$ 111,500.00

QUANTITIES		PRICES	
BY Mike Schuh	**CHECKED** Lisa Gamuciello	**BY** Dan Mar	**CHECKED**
DATE PREPARED May 28, 2008	**PEER REVIEW** George Girgis	**DATE PREPARED** August 8, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Diversion During Dam Construction

Geotechnical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP | **ESTIMATE LEVEL:** Appraisal
REGION PN | **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Excavation					
		For Cofferdam					
	1	Common		4,400	CY	$ 18.00	$ 79,200.00
		(assume alluvial soils; no dewatering)					
		Cofferdam					
	2	Embankment fill		171,000	CY	$ 13.00	$ 2,223,000.00
		(assume overburden from dam excavation					
		is used; probably of mix of silts to gravels,					
		placed and compacted in 9-inch lifts)					
	3	Geomembrane		13,000	SY	$ 13.00	$ 169,000.00
		(assume 40-mil HDPE)					
	4	Geotextile		26,000	SY	$ 2.60	$ 67,600.00
		(assume 16-ounce non-woven fabric)					
		Sheet Subtotal =					**$ 2,538,800.00**

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED**
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 8, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Diversion During Dam Construction

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total Est - 2008\[082508 - Wymer - MPL Total Est .xls]Diversion (53-56)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Excavation					
		For 6-foot pipe and saddles	8130				
	5	Common		4,000	CY	$ 13.00	$ 52,000.00
		(Assume alluvial soil and weathered rock; no dewatering)					
	6	Rock		2,000	CY	$ 34.00	$ 68,000.00
		(Assume drill and blast; no dewatering)					
	7	Furnish and place reinforced concrete for pipe supports spaced @ 40 feet (16 required)	8130	20	CY	$ 1,000.00	$ 20,000.00
	8	Furnish and place unreinforced concrete thrust blocks Assume 2 blocks 10 x 10 x 10 @ 3000 psi	8130	75	CY	$ 640.00	$ 48,000.00
	9	Furnish and handle cement (0.212 T/ CY)	8130	22	TONS	$ 100.00	$ 2,200.00
	10	Furnish and place concrete reinforcement. Assume 150 #/CY	8130	3,000	LBS	$ 1.00	$ 3,000.00
		Sheet Subtotal =					**$ 193,200.00**

QUANTITIES		PRICES	
BY Doug Stanton	**CHECKED** Jason Schneider	**BY** Jerry Zander	**CHECKED** 8/25/08
DATE PREPARED June 16, 2008	**PEER REVIEW**	**DATE PREPARED** August 25, 2008	**PEER REVIEW** DCA for DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Diversion During Dam Construction

Mechanical/Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Diverting Stream into Diversion pipe					
		Dewatering Pumps:	8420				
	11	Two - 10 cfs (4500 gpm) Flygt C 3300 Wastewater		4,600	lbs	$ 18.00	$ 82,800.00
		Submersible Pumps, low head (LT), Curve/					
		Impeller No. 809, S-installation, 20' TDH, 900 rpm,					
		50 hp (34 kW), ~12" disch., 3 ph/60 Hz/460 V					
		(2300 lbs. ea.)					
		Submersible electrical cable	8430				
	12	3 - power conductor, 600 V, #4 AWG		500	LF	$ 18.00	$ 9,000.00
	13	2 - thermal sensor cables, #10 AWG		500	LF	$ 1.40	$ 700.00
	14	1 - ground cable, #6 AWG		500	LF	$ 1.80	$ 900.00
	15	Combination pump motor starters, 600 volt, NEMA 4	8430	2	each	$ 4,950.00	$ 9,900.00
		enclosure, Size 3, non-reversing contactor					
	16	Pump sump level controls	8430				
		2 floats, control relay in a NEMA 4 enclosure		1	each	$ 1,400.00	$ 1,400.00
	17	Pumping Costs					
		Estimate pumping 6 hours per day for 2 years		4,400	HRS	$ 90.00	$ 396,000.00
		Sheet Subtotal =					**$ 500,700.00**

QUANTITIES

BY	CHECKED	DATE PREPARED	PEER REVIEW
R. Zelenka	T. Hummel 6/5/08	June 4, 2008	T. Hummel 6/5/08

PRICES

BY	CHECKED	DATE PREPARED	PEER REVIEW
Dan Mar		August 8, 2008	

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Diversion During Construction

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total est\[080808 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Diverting Stream into Diversion pipe					
		Steel Pipe	8420				
	18	72-inch dia. Steel pipe, 5/16-in thick wall, 241 lb/ft		600	LF	$ 700.00	$ 420,000.00
	19	20-inch dia. Sch. 10, 1/4-in thick wall, 53 lb/ft		250	LF	$ 150.00	$ 37,500.00
	20	12-inch dia. Sch. 20, 1/4-in thick wall, 34 lb/ft		50	LF	$ 100.00	$ 5,000.00
		Valves	8420				
	21	2 - 12-inch, Class 125 Double door check valves					
		(150 lbs. each)		300	lbs	$ 9.90	$ 2,970.00
	22	2 - 12-inch, Class 150 AWWA Butterfly Valves					
		(250 lbs. each)		500	lbs	$ 9.90	$ 4,950.00
		Sheet Subtotal =					**$ 470,420.00**

QUANTITIES		PRICES	
BY R. Frisz 6/5/08	CHECKED R. Zelenka 6/5/08	BY Jerry Zander	CHECKED
DATE PREPARED June 4, 2008	PEER REVIEW R. Zelenka 6/5/08	DATE PREPARED August 8, 2008	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Road and Creek Improvements
Dam and Dike Access Roads

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total Est - 2008\[082508 - Wymer - MPL Total Est .xls]Road&Creek,Dam&Dike (57-59)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		CIVIL - ROAD					
		All roadway sections assume two 12' lanes w/o shoulders, 3:1 sloped ditches to 1' depth, and cut slopes of 2:1. A slope greater than 12% was utilized in several areas. Upon final design, alignment will be modified to better suit existing earthwork conditions and eliminate slopes greater than 12%.					
		Road from SH821 to left abutment and across dam to right abutment					
		8,200 LF of roadway					
	1	Excavation		25,000	CY	$ 5.00	$ 125,000.00
	2	Compacted Embankment		52,000	CY	$ 6.00	$ 312,000.00
	3	Gravel Surfacing (6" Depth)		7,000	TON	$ 41.00	$ 287,000.00
	4	24" CMP Culvert (assume 17 culverts, 35LF EA)		595	LF	$ 54.00	$ 32,130.00
	5	Metal Beam Guard Railing with Wooden Post		6,400	LF	$ 34.00	$ 217,600.00
		to be installed across dam					
		Road from access house to other side of dike					
		2600 LF of roadway					
	6	Excavation		5,700	CY	$ 10.00	$ 57,000.00
	7	Compacted Embankment		13,000	CY	$ 10.00	$ 130,000.00
	8	Gravel Surfacing (6" Depth)		4,300	TON	$ 50.00	$ 215,000.00
	9	24" CMP Culvert (assume 5 culverts 35LF EA)		175	LF	$ 54.00	$ 9,450.00
	10	Metal Beam Guard Railing with Wooden Post		5,200	LF	$ 34.00	$ 176,800.00
		to be installed across dike					
		Road from SH821 to outlet works					
		3600 LF of roadway					
	11	Excavation		100	CY	$ 45.00	$ 4,500.00
	12	Compacted Embankment		330	CY	$ 20.00	$ 6,600.00
	13	Gravel Surfacing (6" Depth)		3,000	TON	$ 45.00	$ 135,000.00
	14	24" CMP Culvert (assume 7 culverts 35LF EA)		245	LF	$ 54.00	$ 13,230.00
		Sheet Subtotal =					**$ 1,721,310.00**

QUANTITIES		PRICES	
BY Anne Pavol	**CHECKED** Chris Duke	**BY** Jerry Zander	**CHECKED** 8/25/08
DATE PREPARED 6/11/2008	**PEER REVIEW** Dave Edwards	**DATE PREPARED** August 25, 2008	**PEER REVIEW** DCA for DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Road and Creek Improvements
Improvements to Existing Lmuma Creek

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total Est - 2008\[081108 - Wymer - MPL Total Est .xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Earthwork (Lmuma Creek)					
	15	Common excavation of outlet channel	8140	86,000	CY	$ 4.50	$ 387,000.00
	16	Embankment	8140	11,500	CY	$ 9.00	$ 103,500.00
	17	Compacted Embankment	8140	11,500	CY	$ 6.00	$ 69,000.00
	18	Furnish/place rock riprap (d50 6", d100 12"), 120lb/cf	8140	24,000	TONS	$ 27.00	$ 648,000.00
	19	Furnish/place geotextile	8140	45,000	SY	$ 2.70	$ 121,500.00
	20	Furnish 9 steel sheet pile control structures	8140	22,000	SF	$ 18.00	$ 396,000.00
		using AZ13 sheet piles					
	21	Excavation for sheet piles	8140	1,700	CY	$ 23.00	$ 39,100.00
	22	Furnish and place cement bentonite slurry	8140	1,700	CY	$ 110.00	$ 187,000.00
	23	Furnish and handle cement in cement bentonite slurry	8140	230	TONS	$ 110.00	$ 25,300.00
		Sheet Subtotal =					**$ 1,976,400.00**

QUANTITIES		PRICES	
BY Anne Pavol	**CHECKED** K. A. Sayer	**BY** Jerry Zander	**CHECKED**
DATE PREPARED 6/12/2008	**PEER REVIEW** David K. Edwards	**DATE PREPARED** August 11, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Low Cost Estimate
Road and Creek Improvements
I-82 Bridge Protection

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPL Total Est - 2008\[081208 - Wymer - MPL Total Est .xls]Spillway & Outlet Wks (42-52)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		I-82 Bridges					
		Protect existing 2:1 slope bridge embankments					
		Apply waterproof membrane to existing bridge piers					
		that will be submerged					
		Embankment Protection					
	24	Furnish and place riprap on embankments, (D50 = 24")	8140	34,000	TONS	$ 27.00	$ 918,000.00
	25	Furnish and place riprap bedding	8140	16,000	TONS	$ 18.00	$ 288,000.00
	26	Excavate existing protection (18" deep)	8140	10,500	CY	$ 14.00	$ 147,000.00
		Bridge Pier Protection					
		Apply membrane to Bridge piers					
	27	Water jet face of piers	8140	490	SY	$ 18.00	$ 8,820.00
	27b	Remove concrete cover to expose vertical #11 reinf		0	CY	$ -	$ -
	27c	Clean entire length of exposed #11 bars by sandblasting		0	LF	$ -	$ -
	27d	Concrete jacket placed around exposed column		0	CY	$ -	$ -
	28	Remove spalling concrete (5% total area)	8140	25	SY	$ 45.00	$ 1,125.00
	29	Furnish and install liquid applied CIM 1000 urethane	8140	490	SY	$ 10.00	$ 4,900.00
		(spray application)					
	30	Furnish and install liquid applied CIM 61 primer	8140	490	SY	$ 12.00	$ 5,880.00
		(spray application)					
		coating on piers manufactured by					
		Permabond, Inc. Telephone (801) 465-2890.					
		Contact: Stan Terry 720-368-1357					
	31	Waste Excess Material from I-82 Modifications					
		Assume local waste.					
		Waste common material	8120	10,500	CY	$ 14.00	$ 147,000.00
	32	Borrow Material for I-82 Modifications					
		Assume 1 way haul of 5 miles.					
		Borrow Riprap	8120	30,000	CY	$ 20.00	$ 600,000.00
		Sheet Subtotal =					**$ 2,120,725.00**

QUANTITIES		PRICES	
BY Joe Gemperline (8140), Dick LaFond (8120)	**CHECKED** Anne Pavol (8140), Brian Goplen (8120)	**BY** Jerry Zander	**CHECKED**
DATE PREPARED June 17, 2007	**PEER REVIEW** Tedd R. Calhoun, PE	**DATE PREPARED** August 12, 2008	**PEER REVIEW**

Wymer Alternative

Most Probable (MP) Field Cost Estimate

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Summary
Yakima River Intake, Pumping Plant,
Switchyard and Transmission Line
Summary Sheet 1 A of 59

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est - 2008\[082508 - Wymer PP & R - MP Total Est.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Wymer Offstream Storage Facility consists of:					
		Fish-screened Intake on Yakima River, 400 cfs Pumping Plant and Switchyard,					
		Concrete-Faced Rockfill Dam, Crest El. 1750. Central Core Rockfill Dike, Crest EL. 1750.					
		Spillway and Outlet Works, Road (Access and I82) and Lmuma Creek Improvements					
		Yakima River Intake - Sheets 2 - 13					$ 16,991,032.00
		Pumping Plant - Sheets 14 - 25					$ 48,718,223.00
		Switchyard and Transmission Line - Sheets 26 - 27					$ 6,038,633.00
		Subtotal					$ 71,747,888.00
		Mobilization		5%	(+/-)		$ 3,600,000.00
		Subtotal with mobilization					**$ 75,347,888.00**
		Escalation during construction		0%	(+/-)		$ -
		Subtotal					$ 75,347,888.00
		Design Contingencies		15%	(+/-)		$ 11,652,112.00
		CONTRACT COST					**$ 87,000,000.00**
		Construction Contingencies		20%	(+/-)		$ 18,000,000.00
		FIELD COST					**$ 105,000,000.00**
		Non-Contract Costs **		30%	(+/-)		$ 30,000,000.00
		CONSTRUCTION COST					**$ 135,000,000.00**
		Escalation to notice to proceed , allowance for procurement strategies and utility relocations are not included					
		** Land Acquisition Cost of $7,000.00 associated with these features, are included in the Non-Contract Costs.					

QUANTITIES		PRICES	
BY Design Team	CHECKED	BY Jerry Zander JZ	CHECKED MATH NH 8/25/08.
DATE PREPARED June 27, 2008	PEER REVIEW	DATE PREPARED August 25, 2008	PEER REVIEW DCA for DLH

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Summary

Discharge Line
Summary Sheet 1B of 59

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est - 2008\[082508 - Wymer PP & R - MP Total Est.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Wymer Offstream Storage Facility consists of:					
		Fish-screened Intake on Yakima River, 400 cfs Pumping Plant and Switchyard,					
		Concrete-Faced Rockfill Dam, Crest El. 1750. Central Core Rockfill Dike, Crest EL. 1750.					
		Spillway and Outlet Works, Road (Access and I82) and Lmuma Creek Improvements					
		Discharge Line - Sheets 28 - 33					$ 44,158,980.00
		Subtotal					$ 44,158,980.00
		Mobilization		5%	(+/-)		$ 2,200,000.00
		Subtotal with mobilization					**$ 46,358,980.00**
		Escalation during construction		0%	(+/-)		$ -
		Subtotal					$ 46,358,980.00
		Design Contingencies		10%	(+/-)		$ 4,641,020.00
		CONTRACT COST					**$ 51,000,000.00**
		Construction Contingencies		20%	(+/-)		$ 10,000,000.00
		FIELD COST					**$ 61,000,000.00**
		Non-Contract Costs **		30%	(+/-)		$ 18,000,000.00
		CONSTRUCTION COST					**$ 79,000,000.00**
		Escalation to notice to proceed , allowance for procurement strategies and utility relocations are not included					
		** Land Acquisition Cost of $0.00 associated with these features, are included in the Non-Contract Costs.					

QUANTITIES		PRICES	
BY Design Team	**CHECKED**	**BY** JZ Jerry Zander	**CHECKED** MATH J 8/25/08
DATE PREPARED June 27, 2008	**PEER REVIEW**	**DATE PREPARED** August 25, 2008	**PEER REVIEW** DCR for DLM

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Summary
Concrete-Face Rockfill Dam, Cental Core Rockfill Dike,
Spillway, Outlet Works, Diversion, and Roadwork
Summary Sheet 1C of 59

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[082008 - Wymer PP & R - MP Total Est.xls]Summary 1B - Discharge Ln

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Wymer Offstream Storage Facility consists of:					
		Fish-screened Intake on Yakima River, 400 cfs Pumping Plant and Switchyard,					
		Concrete-Faced Rockfill Dam, Crest El. 1750. Central Core Rockfill Dike, Crest EL. 1750.					
		Spillway and Outlet Works, Road (Access and I82) and Lmuma Creek Improvements					
		Concrete Face Rockfill Dam - Sheets 34 - 37					$ 305,748,500.00
		Central Core Rockfill Dike - Sheets 38 - 41					$ 64,527,800.00
		Spillway & Outlet Works - Sheets 42 - 52					$ 47,510,670.00
		Diversion During Construction - Sheets 53 - 56					$ 4,398,660.00
		Roadwork & Bridge - Sheets 57 - 59					$ 6,638,320.00
		Subtotal					$ 428,823,950.00
		Mobilization		5%	(+/-)		$ 21,000,000.00
		Subtotal with mobilization					**$ 449,823,950.00** ✓
		Escalation during construction		0%	(+/-)		$ -
		Subtotal					$ 449,823,950.00
		Design Contingencies		10%	(+/-)		$ 40,176,050.00 ✓
		CONTRACT COST					**$ 490,000,000.00** ✓
		Construction Contingencies		25%	(+/-)		$ 130,000,000.00 ✓
		FIELD COST					**$ 620,000,000.00** ✓
		Non-Contract Costs **		30%	(+/-)		$ 190,000,000.00 ✓
		CONSTRUCTION COST					**$ 810,000,000.00** ✓
		Escalation to notice to proceed , allowance for procurement strategies and utility relocations are not included					
		** Land Acquisition Cost of $1,407,000.00 associated with these features, are included in the Non-Contract Costs.					

QUANTITIES		PRICES	
BY Design Team	CHECKED	BY JZ Jerry Zander	CHECKED MATH ✓
DATE PREPARED June 27, 2008	PEER REVIEW	DATE PREPARED August 20, 2008	PEER REVIEW DLM 8/20/08

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Intake
Dewatering/Unwatering and Cofferdam

Geotechnical/Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct/Remove Cofferdam around Intake					
		Max River WS: El. 1284					
		Bottom of River: El. 1272					
		Assumed Construction WS: El. 1280					
		Assumed top of Rock: ±El. 1260					
	1	Furnish, fill, install, and remove "Super Sacks"		1	LS	$ 82,000.00	$ 82,000.00
		- Use 540 sacks @ 3'x3'x3' = 540 cy of fill					
		- Place sacks with crane - 8 tons at 35ft reach					
		- Use fill from Intake excavation to fill sacks with minor processing for 3"minus (run through "grizzly")					
	2	Furnish, install, and remove 40 mil PVC Geomembrane		600	SY	$ 15.00	$ 9,000.00
		- Use 20 ft long roll					
	3	Furnish, fill, and place Sand Bags		300	CF	$ 27.00	$ 8,100.00
		Placed by hand					
		Unwatering behind cofferdam					
		Furnish and install "french drains"					
	4	Gravel - (sand and/or gravel w/ less then 5% fines)		20	CY	$ 90.00	$ 1,800.00
	5	Slotted 6-in dia. PVC or HDPE		270	LF	$ 12.00	$ 3,240.00
		Sheet Subtotal =					**$ 104,140.00**

QUANTITIES		PRICES	
BY Bob Davis	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED April 30, 2007	**PEER REVIEW** Al Kiene	**DATE PREPARED** August 4, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Intake
Dewatering/Unwatering and Cofferdam

Geotechnical/Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]River Intake (2-13)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct/Remove Cofferdam around Intake Fish Return Structure					
		Max River WS: El. 1284					
		Bottom of River: El. 1272					
		Assumed Construction WS: El. 1280 (Q= cfs)					
		Assumed top of Rock: ±El. 1260					
	6	Furnish, fill, install, and remove "Super Sacks"		1	LS	$ 30,000.00	$ 30,000.00
		- Use 200 sacks @ 3'x3'x3' = 200 cy of fill					
		- Place sacks with crane - 8 tons at 35ft reach					
		- Use fill from pipeline excavation to fill sacks with minor processing for 3"minus (run through "grizzly")					
	7	Furnish, install, and remove 40 mil PVC Geomembrane		225	SY	$ 15.00	$ 3,375.00
		- Use 20 ft long roll					
	8	Furnish, fill, and place Sand Bags		115	CF	$ 27.00	$ 3,105.00
		Unwatering behind cofferdam					
		Furnish and install "french drains"					
	9	Gravel - (sand and/or gravel w/ less then 5% fines)		8	CY	$ 90.00	$ 720.00
	10	Slotted 6-in dia. PVC or HDPE		100	LF	$ 12.00	$ 1,200.00
		Sheet Subtotal =					**$ 38,400.00**

QUANTITIES		PRICES	
BY Bob Davis	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED April 30, 2007	**PEER REVIEW** Al Kiene	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:	PROJECT:	
Wymer Pumping Plant and Reservoir Most Probable Cost Estimate Yakima River Intake Dewatering/Unwatering and Cofferdam Geotechnical/Civil	Yakima River Basin Water Storage Study	
	WOID: YAKAP	ESTIMATE LEVEL: Appraisal
	REGION PN	PRICE LEVEL: Apr-07
	FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River	

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Dewatering Intake and Pumping Plant					
		Max River WS: El. 1284					
		Bottom of River: El. 1272					
		Assumed Construction WS: El. 1280 (Q= cfs)					
		Assumed top of Rock: ±El. 1260					
		Assumed Ground WS: El. 1280 (same as river)					
	11	Wellpoints about Intake and PP structures		1	LS	$ 3,600,000.00	$ 3,600,000.00
		- Install and remove 340 wellpoints					
		- Operate well points approximately 9 months					
		- Do **not** assume well points are jetted.					
		- Each wellpoint installed by:					
		- Drilling borehole, 8" diameter 20-ft deep					
		- Backfill borehole with sand (place with sand casing)					
		- Install wellpoint using 1.5" steel riser pipe w/ self jetting wellpoint screen (2" dia typ)					
		- Wellpoints are placed at 6 ft centers 20 ft deep					
		- Assume excavation to El. 1280 before placement of wellpoints					
	12	Wellpoints behind cofferdam		1	LS	$ 700,000.00	$ 700,000.00
		- Install and remove 40 wellpoints					
		- Operate well points approximately 3 months					
		- Do **not** assume well points are jetted.					
		- Each wellpoint installed by:					
		- Drilling borehole, 8" diameter 12-ft deep					
		- Backfill borehole with sand (place with sand casing)					
		- Install wellpoint using 1.5" steel riser pipe w/ self jetting wellpoint screen (2" dia typ)					
		- Wellpoints are placed at 6 ft centers 12 ft deep					
		- Assume installation of cofferdam before placement of wellpoints					
		Sheet Subtotal =					**$ 4,300,000.00**

QUANTITIES		PRICES	
BY Bob Davis	CHECKED Bill Engemoen	BY Jerry Zander	CHECKED 8/4/08
DATE PREPARED April 30, 2007	PEER REVIEW Al Kiene	DATE PREPARED August 4, 2008	PEER REVIEW DCM

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Intake
Dewatering/Unwatering and Cofferdam

Geotechnical/Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Unwatering Intake and Pumping Plant					
		Max River WS: El. 1284					
		Bottom of River: El. 1272					
		Assumed Construction WS: El. 1280 (Q= cfs)					
		Assumed top of Rock: ±El. 1260					
		Assumed Ground WS: El. 1280 (same as river)					
		Unwatering at base of soil excavation					
		- Furnish, install, and remove (filter toe drain):					
	13	Sand/gravel filter material		715	CY	$ 71.00	$ 50,765.00
	14	Slotted pipe 6-in dia. PVC or HDPE		2,150	LF	$ 12.00	$ 25,800.00
	15	Wrap slotted pipe in non-woven filter fabric		475	SY	$ 6.00	$ 2,850.00
	16	- Furnish and operate sump pumps					
		- Operate 11 sump pumps for 9 months		1	LS	$ 750,000.00	$ 750,000.00
		- Each pump should have a 30 ft lift					
		and have a flow of about 4 gpm					
	17	Unwatering at base of rock excavation					
		- Furnish and operate sump pumps					
		- Operate 10 sump pumps for 9 months		1	LS	$ 820,000.00	$ 820,000.00
		- Each pump should have a 45 ft lift					
		and have a flow of about 5 gpm					
		- Operate 3 sump pumps for 9 months					
		- Each pump should have a 55 ft lift					
		and have a flow of about 5 gpm					
	18	Unwatering about fish return pipeline					
		- Furnish and operate sump pumps					
		- Operate 3 sump pumps for 2 months		1	LS	$ 110,000.00	$ 110,000.00
		- Each pump should have a 12 ft lift					
		and have a flow of about 5 gpm					
		Sheet Subtotal =					**$ 1,759,415.00**

QUANTITIES

BY	CHECKED
Bob Davis	Bill Engemoen
DATE PREPARED	**PEER REVIEW**
April 30, 2007	Al Kiene

PRICES

BY	CHECKED
Jerry Zander	8/4/08
DATE PREPARED	**PEER REVIEW**
August 4, 2008	DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Intake

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Structural Excavation and Backfill					
		Excavation and backfill quantities are to existing ground level.					
		Excavation and backfill above existing ground level covered under PP yard.					
		Assume top of rock is at El. 1262					
	19	Excavation of common materials for structures (2:1)	8140	24,400	CY	$ 9.00	$ 219,600.00
	20	Excavation of rock for structures (drill & shoot) (1/2:1)	8140	2,060	CY	$ 60.00	$ 123,600.00
	21	Furnish backfill for structures (assume local borrow)	8140	13,715	CY	$0.00	$ -
	22	Place backfill around structures	8140	13,715	CY	$ 15.00	$ 205,725.00
	23	Compact backfill around structures	8140	13,715	CY	$ 17.00	$ 233,155.00
		STRUCTURAL					
		Construct Gated Intake and Fishscreen Structure					
	24	Furnish, form, and place reinforced concrete (f'c=4ksi)	8140	2,950	CY	$ 800.00	$ 2,360,000.00
	25	Furnish and place concrete reinforcement.	8140	353,860	LBS	$ 1.80	$ 636,948.00
	26	Furnish and handle cement	8140	840	TONS	$ 150.00	$ 126,000.00
	27	W-Beam guardrails	8140	40	LF	$ 80.00	$ 3,200.00
		Construct Intake Structure Retaining Walls					
	28	Furnish, form, and place reinforced concrete (f'c=4ksi)	8140	203	CY	$ 1,075.00	$ 218,225.00
	29	Furnish and place concrete reinforcement.	8140	24,300	LBS	$ 1.80	$ 43,740.00
	30	Furnish and handle cement	8140	58	TONS	$ 150.00	$ 8,700.00
		Construct Sump for Fish Pumps and Bypass					
	31	Furnish, form, and place reinforced concrete (f'c=4ksi)	8140	1,040	CY	$ 900.00	$ 936,000.00
	32	Furnish and place concrete reinforcement.	8140	124,620	LBS	$ 1.80	$ 224,316.00
	33	Furnish and handle cement	8140	295	TONS	$ 150.00	$ 44,250.00
		Sheet Subtotal =					**$ 5,383,459.00**

QUANTITIES		PRICES	
BY Joe Gemperline	**CHECKED** Chou Cha / Dave Gesundheit	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED 5/1/2007	**PEER REVIEW** David K. Edwards	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Intake

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Earthwork for Fish Bypass Pipe					
		Price Alternative 2. Alternative 1 for reference only.					
		Alternative 1 Prices not included in sheet total					
		Alternative 1 - Payline Quantities - Vertical Trench Walls					
		Bypass pipe common excavation	8140	580	CY		
		Bypass pipe backfill	8140	310	CY		
		Bypass pipe soil cement bedding (100 psi)	8140	175	CY		
		(Soil Cement Slurry CLSM)					
		Alternative 2 - Takeoff Quantities - 2:1 Trench Walls					
	34	Bypass pipe common excavation	8140	1,600	CY	$ 13.00	$ 20,800.00
	35	Bypass pipe backfill	8140	1,180	CY	$ 18.00	$ 21,240.00
	36	Bypass pipe soil cement bedding (100 psi)	8140	330	CY	$ 190.00	$ 62,700.00
		(Soil Cement Slurry CLSM)					
		Notes:					
		Clearing and grubbing by other group	8120				
		Fencing by other group	8120				
		People guardrail by other group	8120				
		Gravel surfacing by other group	8120				
		Yard earthwork by other group	8120				
		Coffer Dam and Dewatering by other group	8312				
		Waste and borrow included under PP	8120				
		Sheet Subtotal =					**$ 104,740.00**

QUANTITIES		PRICES	
BY Joe Gemperline	**CHECKED** Chou Cha / Dave Gesundheit	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED 5/1/2007	**PEER REVIEW** David K. Edwards	**DATE PREPARED** August 4, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Intake

Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Structural Steel					
	37	Furnish and install structural steel (painted):	8120	2,000	LBS	$ 5.00	$ 10,000.00
		3-Ton Hoist monorail beam and frames					
	38	**Miscellaneous Metalwork**	8120	8,000	LBS	$ 10.00	$ 80,000.00
		3' wide walkway, steel, safety grating along fish screens					
		75-ft ea side with support frames at 11-ft centers					
		Gripstrut panels @ 23.5 lbs/ft					
		Guardrail					
		Ladders and landings into Intake					
		Control Building					
	39	Pre-engineered metal building - 15 ft. eave height	8120	1	EA	$ 62,000.00	$ 62,000.00
		3:12 roof pitch, 20' long x 20' wide					
	40	Furnish, form, and place reinforced concrete (f'c=4ksi)	8120	18	CY	$ 1,300.00	$ 23,400.00
		Assume 1-ft x 22-ft x 22-ft base slab					
	41	Furnish and place concrete reinforcement. (135 lbs/CY)	8120	2,500	LBS	$ 1.80	$ 4,500.00
	42	Furnish and handle cement (.282T/CY)	8120	5	TONS	$ 150.00	$ 750.00
		Sheet Subtotal =					**$ 180,650.00**

QUANTITIES		PRICES	
BY Dick LaFond	**CHECKED** Brian Goplen	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED May 1, 2007	**PEER REVIEW** Brian Goplen	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Intake

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
	43	Ventilating System for Fish Pump	8410	1	L.S.	$ 3,000.00	$ 3,000.00
		Electrical Equipment Control Building:					
		Consists of:					
		1 - Centrifugal fan; 500 cfm					
		1 - Backdraft damper; 24-inch by 24-inch					
		1 - Intake counterbalance damper; 24-inch by 24-inch					
		2 - 24-inch by 24-inch stationary louver					
	44	One (3) ton capacity, electric, wirerope, monorail hoist	8410	1	L.S.	$ 6,000.00	$ 6,000.00
		with manual trolley for intake structure stop logs					
		(hoist only; hoist beam provided by 8120)					
	45	Stoplog guides and seats (steel)	8410	2,800	LBS	$ 11.00	$ 30,800.00
	46	Stoplog lifting beam (steel)	8410	1,000	LBS	$ 4.50	$ 4,500.00
	47	Stoplogs (steel)	8410	13,600	LBS	$ 4.00	$ 54,400.00
	48	Trashracks and seats (steel)	8410	20,400	LBS	$ 8.00	$ 163,200.00
	49	One trash rake, rails, supports	8410	11,000	LBS	$ 10.00	$ 110,000.00
		(assume Atlas Polar DT8300 rake)					
	50	One conveyor (steel)	8410	5,000	LBS	$ 10.50	$ 52,500.00
	51	Fish screen guides, support structure, braces	8410				
		embedded seats, blank panel, and bypass walls					
		Structural steel		105,000	LBS	$ 8.00	$ 840,000.00
		(Does not include walkway, see 8120)					
		Sheet Subtotal =					**$ 1,264,400.00**

QUANTITIES		PRICES	
BY: J. Grass / P. Schlein / A. Ritt R. Christensen	**CHECKED** Rick Christensen / R. Egan	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED: 4/28/07, 6/16/08	**PEER REVIEW**	**DATE PREPARED** August 4, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Intake

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
	52	Fish screens 11' W x11' H panels, 10 + 2 spares	8410				
		Stainless steel		14,600	LBS	$ 25.00	$ 365,000.00
		Structural steel		14,600	LBS	$ 8.00	$ 116,800.00
	53	Barrier panels above fish screens, 11' W x 11' H	8410				
		10 + 2 spares					
		Structural steel		36,300	LBS	$ 5.00	$ 181,500.00
	54	Adjustable baffle panels, 10 bays	8410				
		Structural steel		60,500	LBS	$ 5.00	$ 302,500.00
	55	Fish screen cleaner with travel rail, 2 systems with	8410				
		one brush cleaner arm per system					
		a. Structural steel		8,200	LBS	$ 6.00	$ 49,200.00
		b. Stainless steel		1,000	LBS	$ 25.00	$ 25,000.00
		c. 2 Hp motors/gear reducers, with adj. speed		2	UNITS	$ 10,000.00	$ 20,000.00
		controllers and limit switches					
	56	Water level measuring systems	8410				
		Sensors/transducers		6	UNITS	$ 5,000.00	$ 30,000.00
		Receivers/transmitters		2	UNITS	$ 10,000.00	$ 20,000.00
		6" Dia. FRP pipe stilling wells		120	FT	$ 40.00	$ 4,800.00
		Sheet Subtotal =					**$ 1,114,800.00**

QUANTITIES		PRICES	
BY: R. Christensen	**CHECKED** John Grass, R. Egan	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED: 4/28/07, 6/16/08	**PEER REVIEW**	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Intake

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Pumping Units for Fish Bypass	8420				
		Furnish and Install:					
		Two - Wemco Hidrostal Model N36A screw centrifugal fish pumps w/ shrouded s.st. impellers, s.st. casings and s.st. pump shafts, right-angle gear drives, 60 cfs @ 14' TDH, 150 hp, TEFC, vertical induction motors, and vertical shafting with couplings					
		- Government to witness pump shop test					
		- Field testing with on-site pump mfr's rep.					
	57	a. stainless steel shrouded pump impellers, casings, and shafts		22,000	LBS	$ 80.00	$ 1,760,000.00
	58	b. right-angle gear reducers (4:1)		2,200	LBS	$ 57.00	$ 125,400.00
	59	c. "Premium Efficiency" vertical induction motors, inverter-duty rated, TEFC, hollow shaft, 150 hp, 1200 rpm, 3Ph/60Hz/460 V		6,300	LBS	$ 21.00	$ 132,300.00
	60	d. vertical shafting (30') and couplings		2,800	LBS	$ 16.00	$ 44,800.00
	61	e. common pump/gear reducer baseplate (11.25 ft x 9.25 ft)		14,300	LBS	$ 5.00	$ 71,500.00
		Variable Frequency Drives (on 8430 qty. est. worksheet)					
		Sheet Subtotal =					**$ 2,134,000.00**

QUANTITIES		PRICES	
BY R. Zelenka	**CHECKED** T. Hummel 6/5/08	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED June 4, 2008	**PEER REVIEW** T. Hummel 6/5/08	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Intake

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
		Steel Pipe for Fish Bypass	8420				
	62	36" ID X 1/4" wall steel pipe					
		233 lin. Ft. @ 96 lbs. per lin. Ft. (22368 lbs.)		233	LF	$ 384.00	$ 89,472.00
	63	30" ID X 1/4" wall steel pipe					
		524 lin. Ft. @ 80 lbs. per lin. Ft. (41920 lbs.)		524	LF	$ 320.00	$ 167,680.00
		Flanges					
	64	8 - 36" AWWA Class D flanges		2,144	lbs	$ 4.00	$ 8,576.00
		Rectangular Pipe and Transition (Bypass Inlet)	8420				
	65	All welded steel plates		35,000	lbs	$ 4.00	$ 140,000.00
		Valves for Fish Bypass	8420				
	66	2 - 36" Manually Operated Knifegate Valves					
		2500 lbs per valve		5,000	lbs	$ 11.00	$ 55,000.00
		Sheet Subtotal =					**$ 460,728.00**

QUANTITIES		PRICES	
BY R. Frisz 6/5/08	**CHECKED** R. Zelenka 6/5/08	**BY** Jerry Zandel	**CHECKED** 8/4/08
DATE PREPARED 5-4-08	**PEER REVIEW** R. Zelenka 6/5/08	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Intake

Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		ELECTRICAL					
		Service Equipment (F&I)	8430				
	67	Distribution panelboard, indoor type		1	EA	$ 11,000.00	$ 11,000.00
		480 volts, 3-phase with 225 ampere bus					
	68	Transformer load center		1	EA	$ 8,300.00	$ 8,300.00
		15 kVA, 1-phase, 480-240/120 volt					
		Combination Motor Starters (F&I)	8430				
	69	NEMA size 2 reversing contactor, 480V, 3-phase		2	EA	$ 5,000.00	$ 10,000.00
		480-120 volt control transformer					
		NEMA type 4 enclosure					
		Adjustable Speed Drives (F&I)	8430				
	70	480 volt, 3-phase, 200 ampere		2	EA	$ 55,000.00	$ 110,000.00
		Lighting System (F&I)	8430				
	71	120 volt, fluorescent fixtures for 10' x 10' bldg		1	LS	$ 7,000.00	$ 7,000.00
		Sheet Subtotal =					**$ 146,300.00**

QUANTITIES		PRICES	
BY Mike Schuh	**CHECKED** Lisa Gamuciello	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED May 28, 2008	**PEER REVIEW** George Girgis	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Pumping Plant

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07

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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		CIVIL	8120				
		HP Pumping Plant Yard= El. 1287					
		Site excavation for intake structure included in yard quantity.					
		Service Yard and Access Road					
	1	Stripping (remove and dispose 6" of topsoil)		34,500	SY	$ 5.00	$ 172,500.00
	2	Common excavation to Service Yard El. 1287		16,530	CY	$ 7.00	$ 115,710.00
	3	Place and compact embankment for service yard		18,500	CY	$ 10.00	$ 185,000.00
	4	Furnish and place 6-inch thick gravel surfacing		19,000	SY	$ 8.00	$ 152,000.00
	5	Furnish and place base course material - 6" thick		1,930	TONS	$ 30.00	$ 57,900.00
	6	Furnish and place bituminous Pavement - 3" thick		1,035	TONS	$ 95.00	$ 98,325.00
	7	Furnish and install 7-foot chain link fence for service yard		2,145	LF	$ 25.00	$ 53,625.00
	8	Furnish and install 7-foot x 24-foot access gate		1	EA	$ 4,400.00	$ 4,400.00
		Dewatering During Construction:					
		Included in quantities under River Intake.					
		Structural Excavation and Backfill					
		Assume top of rock= El. 1262.0					
	9	Excavation of common materials for structures		79,900	CY	$ 7.00	$ 559,300.00
	10	Excavation of rock for structures (drill & shoot)		23,800	CY	$ 30.00	$ 714,000.00
	11	Furnish backfill for structures (assume local borrow)		63,200	CY	$ -	$ -
	12	Place backfill around structures		63,200	CY	$ 4.00	$ 252,800.00
	13	Compact backfill around structures		63,200	CY	$ 3.60	$ 227,520.00
	14a	Furnish & place embedment material for manifold		485	CY	$ 100.00	$ 48,500.00
		pipe trench (CLSM)					
	14b	Waste Excess Material from River Excavations					
		Assume waste material within 1 mile at dam.					
		Quantities include intake, plant, swtchd, & 1/2 discharge.					
	i	Waste rock excavation	8120	72,000	CY	$ 8.50	$ 612,000.00
	ii	Waste common material	8120	115,000	CY	$ 7.00	$ 805,000.00
		Sheet Subtotal =					**$ 4,058,580.00**

QUANTITIES		PRICES	
BY Brian Goplen	**CHECKED** John Pattie	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED April 26, 2007	**PEER REVIEW** Dick LaFond	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Pumping Plant

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\|080408a - Wymer PP & R - MP Total Est -2008.xls|Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		STRUCTURAL	8120				
		Concrete for Structures					
		Includes: Pumping Plant Structure = 13,000 CY					
		Air Chamber Foundation = 1800 CY					
		Flow Meter Vault = 240 CY					
		Miscellaneous Slabs = 10 CY					
	15	Furnish, form, and place reinforced concrete		15,050	CY	$ 670.00	$ 10,083,500.00
	16	Furnish and place concrete reinforcement.		1,956,500	LBS	$ 1.80	$ 3,521,700.00
		Assume 130 #/CY					
	17	Furnish and handle cement (.282T/CY)		4,244	TONS	$ 150.00	$ 636,600.00
	18	Furnish and install 6" PVC Waterstop		8,000	LF	$ 9.00	$ 72,000.00
		Structural Steel					
	19	Furnish and install structural steel (painted):					
		Superstructure roof trusses and crane girders		328,000	LBS	$ 5.00	$ 1,640,000.00
		Miscellaneous Metalwork					
	20	Furnish and install miscellaneous metalwork		73,000	LBS	$ 10.00	$ 730,000.00
	21	Pre-engineered metal stairs		26,000	LBS	$ 9.00	$ 234,000.00
	22	Roof Hatches: Bilco Type 8'x14' Type D Double leaf insul alum.		1	EA	$ 17,000.00	$ 17,000.00
	23	Floor Hatches: 3'x3' Type J alum floor hatch		3	EA	$ 9,000.00	$ 27,000.00
		Metal decking for roof system					
	24	1.5B20		15,820	SF	$ 5.50	$ 87,010.00
	25	1.5VL22		780	SF	$ 10.00	$ 7,800.00
	26	Air chamber cover (Deleted)					
		Sheet Subtotal =					**$ 17,056,610.00**

QUANTITIES		PRICES	
BY Brian Goplen	**CHECKED** Dick LaFond	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED April 26, 2007, June 25, 2008	**PEER REVIEW** Dick LaFond	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Pumping Plant

Architectural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		ARCHITECTURAL	8120				
	27	**Standing Seam Roofing System**		15,820	SF	$ 8.80	$ 139,216.00
		Service Bay - 1" high rib @ 18" o.c., 24ga.,					
		G-90 hot-dipped galvanized steel, UL 90 rated					
		Large roof - 3/12 hipped - 3,460 s.f.					
		Small roof - 3/12 hipped - 560 s.f.					
		Unit Bay - 1" high rib @ 18" o.c., 24ga., G-90,					
		hot-dipped galvanized steel, UL 90 rated					
		Gabled with 3/12 pitch each side - 11,800 s.f.					
		Roofing Felt					
	28	2-layers 15# - 31,640 s.f.	8120	31,640	SF	$ 0.60	$ 18,984.00
		Roof Insulation					
	29	4" thick, rigid	8120	4,020	SF	$ 4.20	$ 16,884.00
	30	2" thick, rigid	8120	11,800	SF	$ 2.20	$ 25,960.00
		Roll-up Doors (complete with hardware)					
		Exterior					
	31	4'-0" x 7'-0", manual operated, insulated roll-up door		1	EA.	$ 6,400.00	$ 6,400.00
	32	14'-0" x 14'-0", manual operated, insulated roll-up door		1	EA.	$ 9,000.00	$ 9,000.00
		Steel Doors & Frames (complete with hardware)					
		Interior					
	33	3'-0" x 7'-0" x 1 3/4", single, 90 min.		18	EA.	$ 1,100.00	$ 19,800.00
	34	3'-0" x 7'-0" x 1 3/4", double, 90 min.		5	EA.	$ 1,700.00	$ 8,500.00
		Sheet Subtotal =					**$ 244,744.00**

QUANTITIES		PRICES	
BY Brian Goplen	**CHECKED** Dick LaFond	**BY** Jerry Zander	**CHECKED** M.C. Greg Allen
DATE PREPARED April 26, 2007	**PEER REVIEW** Dick LaFond	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Pumping Plant

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary IA - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Major Mechanical Equipment:					
		Furnish and Install:					
	35	Seven 60 cfs Pumps	8420	161,000	LBS	$ 22.00	$ 3,542,000.00
		Double suction, horizontal split-case pumps, coupling, 890 rpm, rated 468 feet TDH, ductile iron casing, s.st. impeller w/ s.st. casing/impeller wearing rings, and common steel base plate for pump and motor (23,000 lbs. ea.) - Government to witness pump shop test - pump shop testing with job motor					
	36	Seven 4,000 hp Motors	8430	210,000	LBS	$ 26.00	$ 5,460,000.00
		Horizontal synchronous, 6600 volt, 900 rpm, TEWAC motor enclosure, brushless exciter (30,000 lbs. ea.)					
		Sheet Subtotal =					**$ 9,002,000.00**

QUANTITIES		PRICES	
BY R. Zelenka	**CHECKED** T. Hummel 6/5/08	**BY** Jerry Zander	**CHECKED** M.C. Greg Klein
DATE PREPARED June 4, 2008	**PEER REVIEW** T. Hummel 6/5/08	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Pumping Plant

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Major Mechanical Equipment					
		Valves	8420				
	37	AWWA Class 150, Motor operated butterfly valves:					
		7 -48" Diameter valves, 7725 lbs. per valve.		54,075	LBS	$ 5.00	$ 270,375.00
	38	ANSI Class 300, Motor operated butterfly valves:					
		7 -42" Diameter valves, 6000 lbs. per valve.		42,000	LBS	$ 27.00	$ 1,134,000.00
	39	ANSI Class 300, Tilting disk check valves:					
		7 -42" Diameter valves, 8300 lbs. per valve.		58,100	LBS	$ 24.00	$ 1,394,400.00
	40	ANSI Class 300, Manually operated butterfly valves:					
		4 -24" Diameter valves, 1350 lbs. per valve.		5,400	LBS	$ 22.00	$ 118,800.00
	41	ANSI Class 300, Manually operated butterfly valves:					
		2 -16" Diameter valves, 550 lbs. per valve.		1,100	LBS	$ 27.00	$ 29,700.00
	42	2" Combination Air Valves					
		22 - 300 psi valves, 75 lbs. per valve		1,650	LBS	$ 11.00	$ 18,150.00
	43	2" Ball Valves					
		22 - 300 psi valves, 3 lbs. per valve		66	LBS	$ 100.00	$ 6,600.00
		Sheet Subtotal =					**$ 2,972,025.00**

QUANTITIES		PRICES	
BY R. Frisz 6/5/08	**CHECKED** R. Zelenka 6/5/08	**BY** Jerry Zander	**CHECKED** MC. gregathin
DATE PREPARED 5-4-08	**PEER REVIEW** R. Zelenka 6/5/08	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Pumping Plant

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est - 2008\[082508 - Wymer PP & R - MP Total Est.xls]Est Notes - A2

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Steel Manifold (Suction and Discharge Manifolds)	8420				
		Steel plate used for pipe fabrication:					
		ASTM A36: Sy = 36 kpsi					
		(All pipe sizes are inside diameters)					
	44	120" ID, 3/4" wall, L= 321 ft., 968 lbs/ft (310728 lbs)		321	Lin. Ft.	$ 2,900.00	$ 930,900.00
	45	120" ID, 1" wall, L= 400 ft., 1,300 lbs/ft (520,000 lbs)		400	Lin. Ft.	$ 3,900.00	$ 1,560,000.00
	46	48" ID, 1/4" wall, L= 210 ft., 128 lbs/ft (26880 lbs)		210	Lin. Ft.	$ 380.00	$ 79,800.00
	47	42" ID., 7/16" wall, L= 210 ft., 198 lbs/ft (41580 lbs)		210	Lin. Ft.	$ 590.00	$ 123,900.00
	48	24" ID, 1/4" wall, L= 40 ft., 64 lbs/ft (2560 lbs)		40	Lin. Ft.	$ 190.00	$ 7,600.00
	49	16" ID, 1/4" wall, L= 90 ft., 43 lbs/ft (3870 lbs)		90	Lin. Ft.	$ 130.00	$ 11,700.00
		Flanges					
	50	2 - 96" AWWA Class E (3625 lb. ea.)		7,250	LBS	$ 3.70	$ 26,825.00
	51	14 - 48" AWWA Class D (440 lb. ea.)		6,160	LBS	$ 5.20	$ 32,032.00
	52	28 - 42" AWWA Class F (992 lb. ea.)		27,780	LBS	$ 5.00	$ 138,900.00
	53	21 - 36" AWWA Class D (268 lb. ea.)		5,630	LBS	$ 5.20	$ 29,276.00
	54	21 - 30" AWWA Class F (545 lb. ea.)		11,450	LBS	$ 5.10	$ 58,395.00
	55	20 - 24" AWWA Class F (384 lb. ea.)		7,680	LBS	$ 4.90	$ 37,632.00
	56	10 - 16" AWWA Class F (174 lb. ea.)		1,740	LBS	$ 5.40	$ 9,396.00
	57	2 - 120" AWWA Class D (3558 lb. ea.)		7,120	LBS	$ 3.90	$ 27,768.00
		Steel Air Chamber	8420				
	58	46 ft. ID, Spherical air chamber		705,000	LBS	$ 5.00	$ 3,525,000.00
		ASTM A 516 Grade 70 steel					
	59	200 horsepower, 750 cfm air compressor, 230 psig		1	LS	$ 220,000.00	$ 220,000.00
		Sheet Subtotal =					**$ 6,819,124.00**

QUANTITIES

BY	CHECKED
R. Frisz 6/5/08	R. Zelenka 6/5/08
DATE PREPARED	**PEER REVIEW**
5-4-08	R. Zelenka 6/5/08

PRICES

BY	CHECKED
Jerry Zander	8/25/08
DATE PREPARED	**PEER REVIEW**
August 25, 2008	For DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Pumping Plant

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP
ESTIMATE LEVEL: Appraisal
REGION PN
PRICE LEVEL: Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
	60	Fire Suppression System: Consists of	8410	1	L.S.	$ 210,000.00	$ 210,000.00
		10 - Fire hose reels w/ 100 feet of hose					
		20 - Portable hand-held 20 lb. extinguishers					
		3 - Wheeled portable 125 lb. extinguishers					
		55 - Sprinkler system discharge heads					
		1 - 4-inch deluge valve, electric actuated					
		1 - Fire hydrant, dry type					
		1 - Fire department siamese connection					
		1 - Fire pump, horz. split-case, 500 gpm @ 300 ft of hd					
		10,000 lbs. of sch. 40 carbon steel pipe and fittings					
		1 - Clean agent gas fire suppression system for					
		4,500 ft^3 control room					
	61	Unit Cooling Water System: Consists of	8410	1	L.S.	$ 310,000.00	$ 310,000.00
		7 - Supply pumps, end-suction type, 150 gpm at 60 ft hd.					
		2 - 8-inch automatic, self cleaning strainers					
		4,000 lbs. of type K copper tubing & fittings					
		5,000 lbs. of ductile iron, mechanical joint pipe & fittings					
		4,000 lbs. of cast iron valving					
		2 - Mechanical seal end-suction pumping units; 25 gpm					
		at 100 ft hd.					
		2 - 4-inch self-cleaning filters, 25 micron					
	62	Compressed Air System: Consists of	8410	1	L.S.	$ 40,000.00	$ 40,000.00
		2 - 40 cfm @ 125 psi rotary screw air compressors					
		1 - 300 gal. carbon steel air receiver					
		1 - 80 cfm air dryer					
		3,000 lbs. of sch. 40 carbon steel pipe, valves & fittings					
	63	Service Water System: Consists of	8410	1	L.S.	$ 47,000.00	$ 47,000.00
		1 - Service water pump, 75 gpm @ 200 ft. of hd.					
		1 - Hydropneumatic steel tank, 300 gal.					
		1,500 lbs. of type K copper tubing, valves & fittings					
		10 - Service water rubber hose; 1-inch dia., 50 ft lengths					
		Sheet Subtotal =					**$ 607,000.00**

QUANTITIES		PRICES	
BY: J. Grass / R. Egan	**CHECKED** Rick Christensen	**BY** Jerry Zander	**CHECKED** MC gug Ahn
DATE PREPARED: 4/27/07, 6/16/08	**PEER REVIEW**	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Pumping Plant

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont)					
	64	Gravity Drainage System: Consists of	8410	1	L.S.	$ 150,000.00	$ 150,000.00
		50 - Floor drains, cast iron, 4-inch					
		25,000 lbs. of cast iron hub & spigot, service weight					
		soil pipe					
	65	Plant Unwatering System: Consists of	8410	1	L.S.	$ 210,000.00	$ 210,000.00
		2 - Vertical turbine type sump pump, 1000 gpm @ 50 ft hd					
		1 - Drainage jet type drainage pump					
		1,500 lbs. of type K copper tube, valves & fittings					
		4,000 lbs. of ductile iron, mechanical joint pipe & fittings					
	66	Domestic Water and Sanitary Waste and Vent System:	8410	1	L.S.	$ 71,000.00	$ 71,000.00
		Consists of:					
		4 - Water Closets					
		2 - Urinal					
		4 - Lavatories w/ faucets & accessories					
		1 - Duplex sewage ejector assembly					
		2 - Drench shower and eye wash					
		1 - Water heater, 20 gallons, electric					
		1 - Janitor's service sink, 36" x 36" molded stone					
		2,000 lbs. of cast iron hub & spigot service weight					
		sewer and vent pipe					
		800 lbs. of type K copper tubing, valves & fittings					
	67	20-ton Electric overhead traveling unit bay bridge crane,	8410	1	L.S.	$ 330,000.00	$ 330,000.00
		remote control, 56'-0" span; 30 ft. lift					
	68	20-ton Electric overhead traveling service bay bridge	8410	1	L.S.	$ 280,000.00	$ 280,000.00
		crane, remote control, 55'-0" span; 25 ft. lift					
	69	Electric passenger elevator:	8410	1	L.S.	$ 170,000.00	$ 170,000.00
		Overhead, Geared traction type, Capacity =3500 pounds,					
		Travel = 43 feet, Landings = 4, Speed = 200 ft/min.					
	70	Sump waste oil skimmer assembly, electric operated,	8410	1	L.S.	$ 17,000.00	$ 17,000.00
		w/ 55 gallon collection drum					
		Sheet Subtotal =					**$ 1,228,000.00**

QUANTITIES		PRICES	
BY: J. Grass / A. Ritt / R. Egan	**CHECKED** Rick Christensen	**BY** Jerry Zander	**CHECKED** MC gug Atkin
DATE PREPARED: 4/27/07, 6/16/08	**PEER REVIEW**	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Pumping Plant

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont)					
	71	Heating, Ventilating, and Air Conditioning System (HVAC)	8410	1	L.S.	$ 1,000,000.00	$ 1,000,000.00
		for pumping plant building interior consisting of					
		197-ft long by 57-ft wide by 50-ft high unit bay,					
		55-ft long by 57-ft wide by 82-ft high service bay and					
		250-ft long by 25-ft wide by 12-ft high equipment gallery					
		for a total pumping plant volume of 893,520 ft^3					
		HVAC system designed for:					
		Outdoor summer design conditions: 100 degrees F					
		dry bulb and 86 degrees F wet bulb					
		Outdoor winter design conditions: minus 3.8 degree					
		dry bulb					
		Indoor plant summer design conditions: 90 degrees F					
		Indoor plant winter freeze protection: 45 degrees F dry bulb					
		Indoor control room, communication room and					
		office : 74 degrees F cooling and 68 degrees F heating					
		HVAC equipment consists of:					
		Central air handling units w/ hot water heating coils					
		Hot water boilers, circulating pumps and appurtenances					
		Office, control and communicating rooms air conditioning units					
		Unit heaters - hot water type					
		Electric fan forced wall heaters					
		Stairwell ventilation fans					
		Ducts - galvanized steel					
		Fire and smoke dampers					
		Backdraft dampers					
		Centrifugal fans					
		Propeller fans					
		Register/grills/louvers					
		Panel filters					
		Control system					
		Copper tubing					
		5,000 gallon propane tank and appurtenances					
		Carbon steel gas piping components					
		Sheet Subtotal =					**$ 1,000,000.00**

QUANTITIES		PRICES	
BY: J. Grass / P. Schlein	**CHECKED** Rick Christensen	**BY** Jerry Zander	**CHECKED** M.L. Grigsthen
DATE PREPARED: 4/27/07, 6/16,08	**PEER REVIEW**	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Pumping Plant

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont)					
	72	200 Kw diesel engine generator set with 500 gallon fuel tank (assume ConVault tank)	8410	1	L.S.	$ 120,000.00	$ 120,000.00
		Sheet Subtotal =					**$ 120,000.00**

QUANTITIES		PRICES	
BY: R. Christensen	**CHECKED** John Grass/ R. Egan	**BY** Jerry Zander	**CHECKED** M.C. Gagliardi
DATE PREPARED: 4/28/07, 6/16/08	**PEER REVIEW**	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Pumping Plant

Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		15 kV Non-Segregated-Phase Bus (F&I)	8430				
	73	15 kV, 3,000 amperes, outdoor type		300	FT	$ 6,500.00	$ 1,950,000.00
		15 kV Metal-Clad Switchgear (F&I)	8430				
	74	Indoor metal-clad switchgear with following features:		1	EA	$ 400,000.00	$ 400,000.00
		15 kV, 3,000 ampere bus					
		three 3,000 ampere vacuum power circuit breakers*					
		two 1,200 ampere vacuum power circuit breakers*					
		Plant Station-Service Equipment (F&I)	8430				
	75	Indoor double-ended secondary unit substation with		1	EA	$ 220,000.00	$ 220,000.00
		following features:					
		600 volts, 2,000 ampere main bus					
		Two dry-type transformers 6.9 kV-480Y/277 V, 1,500 KVA					
		Two 480 V power-circuit breakers, 2,000 amperes					
		Six 480 V power-circuit breakers, 800 amperes					
		7.2 kV Motor Control Equipment (F&I)	8430				
	76	NEMA 1 enclosure with following features:		1	EA	$ 2,800,000.00	$ 2,800,000.00
		7.2 kV, 3,000 ampere bus					
		Seven 400 ampere, class E2 full-voltage vacuum					
		contactors					
		Excitation equipment for 7 synchronous motors					
		Motor Control Centers (F&I)	8430				
	77	480 volts, 3-phase with 800 ampere bus		2	EA	$ 50,000.00	$ 100,000.00
		Five 20 inch wide sections w/ following equipment:					
		7 NEMA size 0 FVR contactors **					
		2 NEMA size 2 FVNR contactors ***					
		Three 100 A, 3-pole molded-case circuit breakers					
		* Continuous current rating					
		** FVR - Full-voltage reversing					
		*** FVNR - Full-voltage non-reversing					
		Sheet Subtotal =					**$ 5,470,000.00**

QUANTITIES		PRICES	
BY Mike Schuh	**CHECKED** Lisa Gamuciello	**BY** JZ J.erry Zander	**CHECKED** MC. gmg Alm
DATE PREPARED May 28, 2008	**PEER REVIEW** George Girgis	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Yakima River Pumping Plant

Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP
ESTIMATE LEVEL: Appraisal
REGION PN
PRICE LEVEL: Apr-07
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	78	**Distribution Panelboards (F&I)**	8430				
	a	480 volts, 3-phase with 800 ampere bus &		4	EA	$ 8,000.00	$ 32,000.00
		main circuit breaker					
	b	208Y/120, 3-phase with 225 ampere bus &		3	EA	$ 3,500.00	$ 10,500.00
		main circuit breaker					
	79	**Lighting & Distribution Transformer (F&I)**	8430				
		75 kVA, 480-208Y/120 volt, dry type		3	EA	$ 20,000.00	$ 60,000.00
		Building Lighting System (F&I)	8430				
		Interior luminaires:					
	80	High bay, high-pressure sodium, 400 W, 208 V		14	EA	$ 1,600.00	$ 22,400.00
	81	4 foot, 2 lamp, 120 V fluorescent fixtures		40	EA	$ 240.00	$ 9,600.00
	82	Exterior luminaires:					
		High-pressure sodium, wall mounted, outdoor		12	EA	$ 470.00	$ 5,640.00
		70 watt, 120 volt					
		Assumptions:					
		Redundant power transformers in switchyard					
		Split motor bus with tie breaker					
		Sheet Subtotal =					**$ 140,140.00**

QUANTITIES		PRICES	
BY Mike Schuh	**CHECKED** Lisa Gamuciello	**BY** Jerry Zander	**CHECKED** Mc. Greg Alm
DATE PREPARED May 28, 2008	**PEER REVIEW** George Girgis	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Switchyard and Transmission Line

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		CIVIL/STRUCTURAL	8120				
	1	**Excavation** (Common)		1,005	CY	$ 21.00	$ 21,105.00
	2	**Structural Concrete**		120	CY	$ 1,125.00	$ 135,000.00
		(Switchyard foundations and pullboxes)					
	3	**Concrete Reinforcement**		15,310	LBS	$ 1.80	$ 27,558.00
	4	**Compacting Backfill about Structures**		790	CY	$ 14.00	$ 11,060.00
	5	**Switchyard Steel Structures**		35,800	LBS	$ 5.50	$ 196,900.00
	6	**Gravel Surfacing - 6-inch thick**		2,045	SY	$ 13.00	$ 26,585.00
	7	**Oil-Spill Containment System**		1	LS	$ 38,000.00	$ 38,000.00
		Geotextile fabric 4,255 SF (12 oz per sq yard, 110 mils non-woven)					
		Geomembrane liner: 2,130 SF (30 Mils XR-5 Seaman Corporation)					
		Geocel: 1,635 SF (8" deep "enviro grid" polymeric cellular confinement system)					
		Piping: 140 LF (6" Dia. Schedule 80 PVC pipe perforated)					
		Piping: 3 EA (6" Dia. Schedule 80 PVC "L")					
		Piping: 1 EA (12" Dia. 3'-2" long Schedule 80 PVC Cap)					
		Piping: 3 LF (12" Dia. Schedule 80 PVC perforated pipe)					
		Preservative-Treated Lumber: 75 LF (2"x4")					
		Expansion Anchors (Stainless steel 3/8" x 5" drilled in conc): 84 EA					
		Excavation: Included in excavation for structures					
		Uncompacted crushed aggregate: 135 CY (ASTM C33 Size No 4, 1 1/2" to 3/4")					
	8	**Gravelfill for Switchyard Foundations** (Compacted)		65	CY	$ 55.00	$ 3,575.00
	9	**5-Inch PVC Schedule 80 Conduit** (CIP Power Duct Bank)		115	LF	$ 270.00	$ 31,050.00
		Includes:					
		115 LF of 1.5' tall x 2.33' wide concrete CIP					
		15 CY of concrete					
		1970 lbs of reinforcement					
	10	**7-foot Chain link fence**		400	LF	$ 37.00	$ 14,800.00
		Sheet Subtotal =					**$ 505,633.00**

QUANTITIES		PRICES	
BY Brian Goplen	**CHECKED** Dick LaFond	**BY** JZ Jerry Zander	**CHECKED** Mr. Greg Thin
DATE PREPARED April 26, 2007	**PEER REVIEW** Dick LaFond	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Switchyard and Transmission Line

Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		ELECTRICAL					
		Switchyard					
		Furnish and Install:					
	11	Oil-filled, conservator-type power transformer	-68440	2	EA	$ 1,100,000.00	$ 2,200,000.00
		20/26.66/33.33 MVA OA/FA/FA; 115-6.9kV, 3-phase					
	12	115-kV disconnect switches, 1200 amp, 3-phase	-68440	4	EA	$ 35,000.00	$ 140,000.00
	13	115-kV circuit breakers, 1200 amp, 31.5-kA Int,	-68440	2	EA	$ 160,000.00	$ 320,000.00
		3-phase, dead-tank, SF6 type					
	14	115-kV oil-filled voltage transformers	-68440	3	EA	$ 21,000.00	$ 63,000.00
	15	115-kV oil-filled 1200:5 MR current transformers	-68440	3	EA	$ 20,000.00	$ 60,000.00
	16	**Construct Transmission Line**	-68440	5	MILES	$ 550,000.00	$ 2,750,000.00
		115-kV, steel single-pole towers, 556.5 AWG,					
		26/7 ACSR conductor					
		Sheet Subtotal =					**$ 5,533,000.00**

QUANTITIES		PRICES	
BY Doug Crawford	**CHECKED** Lisa Gamuciello	**BY** Dan Mar	**CHECKED** mc gugthin
DATE PREPARED May 28, 2008	**PEER REVIEW** George Girgis	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Discharge Line to Reservoir

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Discharge (28-33)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Discharge Line					
		Discharge line quantities are from PP yard to outlet.					
		Discharge line piping through dam covered by 8410					
		Discharge line outlet: El. 1610, right abutment					
		Earthwork					
	1	Clearing and Grubbing (150 ft wide along discharge line)	8140	76,000	SY	$ 1.00	$ 76,000.00
		(150 ft wide along discharge line, includes under dam)					
		Earthwork for Discharge Pipe					
		Price Alternative 2. Alternative 1 for reference only.					
		Alternative 1 - Payline Quantities - Vertical Trench Walls					
		Common Excavation for pipe	8140	12,000	CY		
		Rock Excavation for pipe - (drill and shoot)	8140	37,000	CY		
		Backfill for pipe	8140	26,000	CY		
		Soil Cement Slurry (CLSM)	8140	7,000	CY		
		Alternative 2 - Takeoff Quantities - 1-1/2:1 Trench Walls					
	2	Common Excavation for pipe	8140	45,000	CY	$ 5.00	$ 225,000.00
	3	Rock Excavation for pipe - (drill and shoot)	8140	135,000	CY	$ 21.00	$ 2,835,000.00
	4	Backfill for pipe	8140	149,000	CY	$ 5.00	$ 745,000.00
	5	Soil Cement Slurry (CLSM)	8140	19,000	CY	$ 100.00	$ 1,900,000.00
		Earthwork for Conduit under dam - 1/2:1 Trench Walls					
	6	Common Excavation for conduit	8140	4,000	CY	$ 12.00	$ 48,000.00
	7	Rock Excavation for conduit - (drill and shoot)	8140	38,000	CY	$ 28.00	$ 1,064,000.00
	8	Mass Concrete	8140	31,000	CY	$ 600.00	$ 18,600,000.00
		(See Access Conduit for conduit lining)					
		120-inch Diameter Steel Pipe - ASTM A139 Gr C					
		(Mortar lined w/ flexible coating)					
	9	120 pipe thickness = 0.5000 (644 lb/ft steel weight)	8140	1,680	LF	$ 1,610.00	$ 2,704,800.00
	10	120 pipe thickness = 0.5625 (724 lb/ft steel weight)	8140	600	LF	$ 1,810.00	$ 1,086,000.00
	11	120 pipe thickness = 0.625 (805 lb/ft steel weight)	8140	500	LF	$ 2,010.00	$ 1,005,000.00
	12	120 pipe thickness = 0.6875 (886 lb/ft steel weight)	8140	300	LF	$ 2,220.00	$ 666,000.00
	13	120 pipe thickness = 0.75 (967 lb/ft steel weight)	8140	300	LF	$ 2,420.00	$ 726,000.00
	14	120 pipe thickness = 0.8125 (1048 lb/ft steel weight)	8140	400	LF	$ 2,620.00	$ 1,048,000.00
	15	120 pipe thickness = 0.875 (1130 lb/ft steel weight)	8140	400	LF	$ 2,830.00	$ 1,132,000.00
	16a	**Cathodic protection for pipeline**	8140	1	LS	$ 63,000.00	$ 63,000.00
	16b	**120"x120"x120" Tee for buried manhole**	8140	1	EA	$ 110,000.00	$ 110,000.00
		Sheet Subtotal =					**$ 34,033,800.00**

QUANTITIES		PRICES	
BY Anne Pavol	**CHECKED** Kevin Atwater	**BY** Jerry Zander	**CHECKED** M.C. Gregstein
DATE PREPARED June 16, 2008	**PEER REVIEW** Tedd Calhoun	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DCA

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Discharge Line to Reservoir

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		SH821 Detour for open cut discharge line					
	17	Remove and Replace Concrete Asphalt on SH821	8140	135	ton	$ 110.00	$ 14,850.00
	18	Remove and Replace Aggregate base on SH821	8140	250	ton	$ 50.00	$ 12,500.00
	19	Compacted Embankment	8140	6,900	CY	$ 18.00	$ 124,200.00
	20	Concrete Asphalt for detour	8140	630	ton	$ 100.00	$ 63,000.00
	21	Aggregate base for detour	8140	1,150	ton	$ 50.00	$ 57,500.00
	22	Concrete Jersey Barriers	8140	200	LF	$ 100.00	$ 20,000.00
	23	Detour signage	8140	1	LS	$ 70,000.00	$ 70,000.00
	24	Detour removal	8140	1	LS	$ 40,000.00	$ 40,000.00
		Discharge Line Outlet Structure					
	25	Excavation of common materials for structures (2:1)	8140	960	CY	$ 15.00	$ 14,400.00
	26	Backfill (2:1)	8140	700	CY	$ 14.00	$ 9,800.00
	27	Compacted Backfill (2:1)	8140	700	CY	$ 10.00	$ 7,000.00
	28	Embankment	8140	790	CY	$ 15.00	$ 11,850.00
	29	Compacted Embankment	8140	790	CY	$ 7.00	$ 5,530.00
	30	Riprap (d50=24") (120 lb/cf)	8140	1,100	TONS	$ 70.00	$ 77,000.00
	31	Riprap Bedding (130 lb/cf)	8140	450	TONS	$ 50.00	$ 22,500.00
	32	Furnish, form, and place reinforced concrete	8140	240	CY	$ 1,050.00	$ 252,000.00
	33	Furnish and place concrete reinforcement.	8140	29,000	LBS	$ 1.80	$ 52,200.00
		Assume 120 #/CY					
	34	Furnish and handle cement (.282T/CY)	8140	60	TONS	$ 200.00	$ 12,000.00
		Discharge Line Outlet Chute					
	35	Excavation of common materials for structures (2:1)	8140	16,000	CY	$ 8.00	$ 128,000.00
	36	Backfill (2:1)	8140	3,600	CY	$ 13.00	$ 46,800.00
	37	Compacted Backfill (2:1)	8140	3,600	CY	$ 8.00	$ 28,800.00
	38	Embankment (chute crosses swale)	8140	44,000	CY	$ 8.70	$ 382,800.00
	39	Compacted Embankment (chute crosses swale)	8140	44,000	CY	$ 3.50	$ 154,000.00
	40	Riprap (d50=24") (120 lb/cf)	8140	8,300	TONS	$ 63.00	$ 522,900.00
	41	Riprap Bedding (130 lb/cf)	8140	3,700	TONS	$ 45.00	$ 166,500.00
	42	Furnish, form, and place reinforced concrete	8140	1,550	CY	$ 850.00	$ 1,317,500.00
	43	Furnish and place concrete reinforcement.	8140	185,000	LBS	$ 1.80	$ 333,000.00
		Assume 120 #/CY					
	44	Furnish and handle cement (.282T/CY)	8140	430	TONS	$ 170.00	$ 73,100.00
		Sheet Subtotal =					**$ 4,019,730.00**

QUANTITIES

BY	CHECKED
Anne Pavol	Joe Gemperline/ K. A. Sayer
DATE PREPARED	**PEER REVIEW**
May 1, 2007	David K. Edwards

PRICES

BY	CHECKED
Jerry Zander	MC Gingerich
DATE PREPARED	**PEER REVIEW**
August 4, 2008	DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Discharge Line
Access conduit

Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	45	**Concrete**	8130				
		Concrete in access house (18 x 18 x 1 foot walls)		60	CY	$ 1,200.00	$ 72,000.00
		Concrete in access shaft (H = 20')		100	CY	$ 1,150.00	$ 115,000.00
		Concrete in Gate Chamber (20 ft dia.)		210	CY	$ 1,050.00	$ 220,500.00
		Concrete in access conduit (L =440)		1,980	CY	$ 850.00	$ 1,683,000.00
		Concrete in pipe saddles		35	CY	$ 1,250.00	$ 43,750.00
		(concrete total)		2,385			
	46	Furnish and place concrete reinforcement.					
		Assume 160 #/CY		382,000	LBS	$ 1.80	$ 687,600.00
	47	Furnish and handle cement (.282T/CY)		670	TONS	$ 170.00	$ 113,900.00
	48	Waste Excess Material from Discharge & Road Exc near Dam					
		Assume local waste at dam.					
		Quantities include 1/2 discharge, Outlet Chute, Access Roads.					
		Waste rock excavation	8120	116,000	CY	$ 9.00	$ 1,044,000.00
		Waste common material	8120	0	CY		
	49	Borrow Material for Discharge & Access Roads near Dam					
		Assume 1 way haul of 2 miles.					
		Quantities include 1/2 discharge, Outlet Chute, Access Roads.					
		Borrow Riprap	8120	0	CY		
		Borrow Common	8120	93,000	CY	$ 8.00	$ 744,000.00
		Sheet Subtotal =					**$ 4,723,750.00**

QUANTITIES		**PRICES**	
BY	**CHECKED**	**BY**	**CHECKED**
Doug Stanton (8130), Dick LaFond (8120)	Jason Schneider (8130), Brian Goplen (8120)	Jerry Zander	M.C. Griffin
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
June 16, 2008		August 4, 2008	DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Discharge Line to Reservoir

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP | **ESTIMATE LEVEL:** Appraisal
REGION PN | **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
	50	Heating and Ventilating System for Discharge	8410	1	L.S.	$ 75,000.00	$ 75,000.00
		Line Valve Access Tunnel:					
		Consists of:					
		2 - Electric unit heater; 7.5 kw					
		1 - Centrifugal fan; 750 cfm					
		1 - Propeller fan; 2400 cfm					
		1 - Axial fan: 5,000 cfm					
		550 ft. Oval steel duct; 38-inch x 16-inch; galvanized					
		2 - Control damper; 60-inch by 60-inch; motor-operated					
		2 - Control damper; 32-inch by 32-inch; motor-operated					
		2 - 60-inch by 60-inch stationary louver					
		2 - 32-inch by 32-inch stationary louver					
	51	Ventilating System for Flowmeter Vault:	8410	1	L.S.	$ 6,000.00	$ 6,000.00
		Consists of:					
		1 - Centrifugal fan, 450 cfm					
		25 ft. carbon steel pipe and fittings, 8-inch dia., galv.					
	52	Ventilating System for Air Chamber	8410	1	L.S.	$ 25,000.00	$ 25,000.00
		Structure:					
		Consists of:					
		1 - Centrifugal fan, 4000 cfm					
		50 ft. carbon steel pipe and fittings, 18-inch dia., galv.					
	53	Ultrasonic flowmeter, 2-path	8410	1	L.S.	$ 95,000.00	$ 95,000.00
	54	Bulkhead gate (13' x 13'), bulkhead gate frame	8410	39,000	LBS	$ 6.00	$ 234,000.00
		and guides above frame (steel)					
		Sheet Subtotal =					**$ 435,000.00**

QUANTITIES		PRICES	
BY: J. Grass / P. Schlein R. Christensen	CHECKED Rick Christensen	BY Dan Mar	CHECKED Mc. Gg Thin
DATE PREPARED: 4/28/07, 6/16/08	PEER REVIEW	DATE PREPARED August 4, 2008	PEER REVIEW DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Discharge Line to Reservoir

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est - 2008\[082508 - Wymer PP & R - MP Total Est.xls]Est Notes - A2

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
		Discharge/Isolation Valve					
	55	96-inch dia. Motor-operated Slide gate					
		(for Discharge manifold outlet into the					
		reservoir. Pressure on downstream side of gate)					
		Differential head = 132 feet					
		Slide gate frame, slide, and stem: 25,000 #					
		Motor operator: 1,800 #	8420	26,800	LBS	$ 9.00	$ 241,200.00
		Steel Pipe: Sta. 49+00 to Sta. 53+70 (End of Discharge Pipe)					
	56	120-inch ID, 7/16-inch wall, 564 lb/ft	8420	470	LF	$ 1,410.00	$ 662,700.00
	57	14-inch OD steel pipe for filling line					
		(1/4-inch wall, 38 lb per lin. ft.)	8420	20	LF	$ 100.00	$ 2,000.00
		Valves					
	58	AWWA Class 150, manually operated butterfly valves (for filling line):					
		2 -14" Diameter valves, 400 lbs. per valve.	8420	800	LBS	$ 15.00	$ 12,000.00
		Sheet Subtotal =					**$ 917,900.00**

QUANTITIES

BY	CHECKED
R. Frisz 6/5/08	R. Zelenka 6/5/08
DATE PREPARED	**PEER REVIEW**
June 4, 2008	R. Zelenka 6/5/08

PRICES

BY	CHECKED
Jerry Zander	MATH ✓ 8/25/08.
DATE PREPARED	**PEER REVIEW**
August 25, 2008	DLH for DLH

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Discharge Line to Reservoir

Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		ELECTRICAL					
		Access Shaft/Gate Chamber Structure					
		Bldg Electrical Service Equipment (F&I)	8430				
	59	Distribution panelboard, indoor type		1	EA	$ 10,500.00	$ 10,500.00
		480 volts, 3-phase with 225 ampere bus					
	60	Transformer load center		1	EA	$ 8,300.00	$ 8,300.00
		15 kVA, 1-phase, 480-240/120 volt					
		Combination Motor Starters (F&I)	8430				
	61	NEMA size 2 reversing contactor, 480V, 3-phase		1	EA	$ 5,000.00	$ 5,000.00
		480-120 volt control transformer					
		NEMA type 4 enclosure					
		Lighting System (F&I)	8430				
	62	120 volt, fluorescent NEMA type 4 fixtures for		1	LS	$ 5,000.00	$ 5,000.00
		tower/gate chamber					
		Assumptions:					
		Bringing power to dam is part of unlisted items					
		Sheet Subtotal =					**$ 28,800.00**

QUANTITIES		PRICES	
BY Mike Schuh	**CHECKED** Lisa Gamuciello	**BY** Dan Mar	**CHECKED** 8/4/08
DATE PREPARED April 25, 2007	**PEER REVIEW** George Girgis	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Dam and Dike
Concrete-Faced Rockfill Dam

Dam Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		GENERAL SITEWORK	8312				
		Assume no clearing and grubbing required					
		Assume road improvements and haul roads are part of unlisted items					
		DIVERSION & DEWATERING	8312				
		Given shallow alluvium & narrow valley, dewatering assumed to be minor (part of unlisted items)					
		FOUNDATION EXCAVATION					
		Assume common material stockpiled for reuse in misc. fill, haul roads, and similar					
		Assume rock material stockpiled for use (zone 4)					
		Stockpiles will be located within 1/2 mile of dam					
	1	Excavation, stripping, of dam foundation	8312	**110,000**	CY	$ 2.50	$ 275,000.00
		Assume depth of stripping 12 inches or less					
		Assume stripping will be stockpiled for topsoil use					
	2	Excavation, common, for dam foundation	8312	**2,500,000**	CY	$ 5.00	$ 12,500,000.00
		Assume about 35% of volume requires ripping					
		Assume suitable materials will be stockpiled for use as miscellaneous fill					
	3	Excavation, rock, for dam foundation	8312	**35,000**	CY	$ 25.00	$ 875,000.00
		Assume drill and blast in areas along plinth					
		FOUNDATION TREATMENT					
		Includes misc. surface foundation treatment, consolidation grouting, and curtain grouting					
	4	Slush grouting of foundation surface	8312	**32,000**	SF	$ 6.00	$ 192,000.00
		Over assumed 40% of plinth area					
	5	Dental concrete	8312	**2,000**	CY	$ 200.00	$ 400,000.00
	6	Furnish/place zone 2 sand filter on foundation	8312	**25,000**	CY	$ 50.00	$ 1,250,000.00
		Over assumed 15% of area between u/s toe and axis					
		Assume a 3-ft thickness above & below zone 3					
	7	Furnish/place zone 3 gravel drain on foundation	8312	**25,000**	CY	$ 40.00	$ 1,000,000.00
		Between the zone 2 filters in a 3-ft thickness					
		Sheet Subtotal =					**$ 16,492,000.00**

QUANTITIES		PRICES	
BY Chris Strickland	CHECKED Bill Engemoen	BY JZ Jerry Zander	CHECKED JM 8/4/08
DATE PREPARED June 12, 2008	PEER REVIEW Bill Engemoen	DATE PREPARED August 4, 2008	PEER REVIEW DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Dam and Dike
Concrete-Faced Rockfill Dam

Dam Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		FOUNDATION TREATMENT (continued)					
		Consolidation Grouting of Foundation					
		Generally limited to area beneath plinth					
	8	Setups for drilling grout holes	8312	**1,600**	EA	$ 100.00	$ 160,000.00
		Assume 2-inch dia. drilled on 7.5 to 10-foot centers					
	9	Drill grout holes	8312	**72,000**	LF	$ 30.00	$ 2,160,000.00
		Assume 2-inch dia. w/length= 45 feet					
	10	Hookups to grout holes	8312	**1,600**	EA	$ 60.00	$ 96,000.00
	11	Pressure grout	8312	**180,000**	CF	$ 10.00	$ 1,800,000.00
		Assume grouting process only minus cement					
		Assume 2.5 CF per 1 LF of hole					
	12	Furnish and handle cement for pressure grouting	8312	**180,000**	BAGS	$ 10.00	$ 1,800,000.00
		Assume 1 bag per CF					
		Curtain Grouting of Foundation					
		Three-row curtain beneath plinth					
	13	Setups for drilling grout holes	8312	**1,200**	EA	$ 100.00	$ 120,000.00
		Assume 3 rows of 2-inch dia.on 10-ft centers					
	14	Drill grout holes	8312	**240,000**	LF	$ 30.00	$ 7,200,000.00
		Assume 2-inch dia. w/length from 75 to 250 feet,					
		with average of 200 feet					
	15	Hookups to grout holes	8312	**1,200**	EA	$ 60.00	$ 72,000.00
	16	Pressure grout	8312	**600,000**	CF	$ 10.00	$ 6,000,000.00
		Assume grouting process only minus cement					
		Assume 2.5 CF per 1 LF of hole					
	17	Furnish and handle cement for pressure grouting	8312	**600,000**	BAGS	$ 10.00	$ 6,000,000.00
		Sheet Subtotal =					**$ 25,408,000.00**

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Dam and Dike
Concrete-Faced Rockfill Dam

Dam Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		EMBANKMENT CONSTRUCTION					
		Items are set up as furnish and place, which would include purchasing from commercial sites, processing onsite, development of quarry, or transporting from stockpiles of required excavation					
	18	Furnish and place zone 1	8312	**285,000**	CY	$ 10.00	$ 2,850,000.00
		Consists of selected impervious soils stockpiled from reqd exc within 1 mile of dam					
		Compaction to 6-inch lifts by tamping roller					
	19	Furnish and place zone 2 filter	8312	**440,000**	CY	$ 40.00	$ 17,600,000.00
		Sand/gravel material processed commercially or developed onsite					
		If commercial, assume 17 mile one-way haul					
		Compacted to 12-inch layers by vibratory steel drum					
		Assume horizontal width of 15 ft					
	20	Furnish and place zone 3 drain	8312	**435,000**	CY	$ 39.00	$ 16,965,000.00
		Gravel/cobble material processed commercially or developed onsite					
		If commercial, assume 17 mile one-way haul					
		Compacted to 12-inch layers by vibratory steel drum					
		Assume horizontal width of 15 ft					
	21	Furnish and place zone 4 rockfill	8312	**10,950,000**	CY	$ 10.00	$ 109,500,000.00
		Developed from basalt ridges surrounding reservoir					
		Assume average 2-mile haul to dam					
		Rock sizes up to 3-foot					
		Compacted in 3-ft layers by vibratory steel drum					
	22	Furnish and place miscellaneous fill	8312	**2,100,000**	CY	$ 7.00	$ 14,700,000.00
		Comes from stockpiles of required excavation within 1/2 mile of dam					
		Generally consists of gravelly soils					
		Compacted in 2-ft layers by vibratory steel drum					
		Sheet Subtotal =					**$ 161,615,000.00**

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED** VA 8/04/08
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Dam and Dike
Concrete-Faced Rockfill Dam

Dam Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JW2 Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		CONCRETE FACE & PLINTH CONSTRUCTION					
		Plinth					
		Typical thickness will be 1.5 feet					
		Width will range from 10 to 45 feet, avg=20 ft					
		Grouted anchors may be needed in poor rock areas					
	23	Furnish and place reinforced concrete in plinth	8312	**4,500**	CY	$ 550.00	$ 2,475,000.00
	24	Furnish and place concrete reinforcement (100#/CY)	8312	**450,000**	LBS	$ 1.80	$ 810,000.00
	25	Furnish and handle cement for concrete (.282T/CY)	8312	**1,300**	TONS	$ 125.00	$ 162,500.00
	26	Furnish and install grouted anchors	8312	**86,000**	LF	$ 26.00	$ 2,236,000.00
		Assume 1-inch diameter rebar grouted into rock					
		Assume 15-foot lengths					
		Concrete Deck					
		Thickness will average 2 feet					
		Adjacent panels will have waterstops and dowels					
		Concrete paved on 1.5:1 upstream face of dam					
	27	Furnish and place reinforced concrete in deck	8312	**135,000**	CY	$ 500.00	$ 67,500,000.00
	28	Furnish and place concrete reinforcement (100#/CY)	8312	**13,500,000**	LBS	$ 1.80	$ 24,300,000.00
	29	Furnish and handle cement for concrete (.282T/CY)	8312	**38,000**	TONS	$ 125.00	$ 4,750,000.00
		MISCELLANEOUS					
		Instrumentation					
		Assume part of unlisted items					
		Toe Drains					
		Assume part of unlisted items					
		Site cleanup and relandscaping					
		Assume part of unlisted items					
		Sheet Subtotal =					**$ 102,233,500.00**

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Dam and Dike
Central Core Rockfill Dike

Dike Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		GENERAL SITEWORK					
		Assume no clearing and grubbing required					
		Assume road improvements and haul roads are					
		part of unlisted items					
		DIVERSION & DEWATERING					
		Assume groundwater is below excavation					
		Assume natural stream beds in area are dry					
		FOUNDATION EXCAVATION					
		Assume common material stockpiled for reuse					
		Assume rock material stockpiled for reuse					
		Stockpiles will be located within 1/2 mile of dam					
	30	Excavation, stripping, of dam foundation	8312	**45,000**	CY	$ 4.00	$ 180,000.00
		Assume depth of stripping 12 inches or less					
		Assume stripping will be stockpiled for topsoil use					
	31	Excavation, common, for dam foundation	8312	**825,000**	CY	$ 5.00	$ 4,125,000.00
		Assume about 35% of volume requires ripping					
		Assume suitable materials will be stockpiled					
		for use as miscellaneous fill					
	32	Excavation, rock, for dam foundation	8312	**2,000**	CY	$ 48.00	$ 96,000.00
		Assume drill and blast in random locations					
		FOUNDATION TREATMENT					
		Includes misc. foundation surface treatment,					
		consolidation grouting, and curtain grouting					
		Miscellaneous Foundation Areas					
		Applied in areas of poor quality rock					
	33	Slush grouting of foundation surface	8312	**36,000**	SF	$ 6.00	$ 216,000.00
		Over assumed 30% of area beneath zone 1					
	34	Dental concrete	8312	**2,000**	CY	$ 200.00	$ 400,000.00
	35	Furnish/place zone 2 sand filter on foundation	8312	**20,000**	CY	$ 50.00	$ 1,000,000.00
		Over 25% of area between zone 1 and d/s toe					
		Assume a 3-ft thickness above and below zone 3					
	36	Furnish/place zone 3 gravel drain on foundation	8312	**20,000**	CY	$ 40.00	$ 800,000.00
		Between the zone 2 filters in a 3-ft thickness					
		Sheet Subtotal =					**$ 6,817,000.00**

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Dam and Dike
Central Core Rockfill Dike

Dike Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		FOUNDATION TREATMENT (continued)					
		Consolidation Grouting of Foundation					
		Generally limited to area beneath zone 1					
	37	Setups for drilling grout holes	8312	**2,200**	EA	$ 100.00	$ 220,000.00
		Assume 2-inch dia. drilled on 7.5 to 10-foot centers					
	38	Drill grout holes	8312	**88,000**	LF	$ 30.00	$ 2,640,000.00
		Assume 2-inch dia. w/length= 40 feet					
	39	Hookups to grout holes	8312	**2,200**	EA	$ 60.00	$ 132,000.00
	40	Pressure grout	8312	**220,000**	CF	$ 10.00	$ 2,200,000.00
		Assume grouting process only minus cement					
		Assume 2.5 CF per 1 LF of hole					
	41	Furnish and handle cement for pressure grouting	8312	**220,000**	BAGS	$ 10.00	$ 2,200,000.00
		Assume 1 bag per CF					
		Curtain Grouting of Foundation					
		Two- to three-row curtain beneath zone 1					
	42	Setups for drilling grout holes	8312	**680**	EA	$ 100.00	$ 68,000.00
		Assume 2.5-rows of 2-inch dia.on 10-ft centers					
	43	Drill grout holes	8312	**82,000**	LF	$ 30.00	$ 2,460,000.00
		Assume 2-inch dia. w/length from 60 to 150 feet,					
		with an average of 120 feet					
	44	Hookups to grout holes	8312	**680**	EA	$ 60.00	$ 40,800.00
	45	Pressure grout	8312	**200,000**	CF	$ 10.00	$ 2,000,000.00
		Assume grouting process only minus cement					
		Assume 2.5 CF per 1 LF of hole					
	46	Furnish and handle cement for pressure grouting	8312	**200,000**	BAGS	$ 10.00	$ 2,000,000.00
		Assume 1 bag per CF					
		Sheet Subtotal =					**$ 13,960,800.00**

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Dam and Dike
Central Core Rockfill Dike

Dike Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		EMBANKMENT CONSTRUCTION					
		Items are set up as furnish and place, which would include purchasing from commercial sites, processing onsite, development of quarry, or transporting from stockpiles of required excavation					
	47	Furnish and place zone 1 core	8312	**340,000**	CY	$ 14.00	$ 4,760,000.00
		Acquired from source 5 miles from dam					
		Compacted to 6-inch lifts by tamping roller					
	48	Furnish and place zone 2 filter	8312	**290,000**	CY	$ 41.00	$ 11,890,000.00
		Sand/gravel material processed commercially or developed onsite					
		If commercial, assume 18 mile one-way haul					
		Compacted to 12-inch layers by vibratory steel drum					
		Assume horizontal width of 15 ft					
		Includes both an upstream and downstream zone					
	49	Furnish and place zone 3 drain	8312	**140,000**	CY	$ 40.00	$ 5,600,000.00
		Gravel/cobble material processed commercially or developed onsite					
		If commercial, assume 18 mile one-way haul					
		Compacted to 12-inch layers by vibratory steel drum					
		Assume horizontal width of 15 ft					
	50	Furnish and place zone 4 rockfill	8312	**1,500,000**	CY	$ 12.00	$ 18,000,000.00
		Developed from basalt ridges surrounding reservoir					
		Assume average 3-mile haul to dam					
		Rock sizes up to 3-foot					
		Compacted in 3-ft layers by vibratory steel drum					
	51	Furnish and place miscellaneous fill	8312	**500,000**	CY	$ 7.00	$ 3,500,000.00
		Comes from stockpiles of required excavation within 1/2 mile of dam					
		Generally consists of gravelly soils					
		Compacted in 2-ft layers by vibratory steel drum					
		Sheet Subtotal =					**$ 43,750,000.00**

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Dam and Dike
Central Core Rockfill Dike

Dike Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP | **ESTIMATE LEVEL:** Appraisal
REGION PN | **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		MISCELLANEOUS					
		Instrumentation					
		Assume part of unlisted items					
		Toe Drains					
		Assume part of unlisted items					
		Site cleanup and relandscaping					
		Assume part of unlisted items					
		Sheet Subtotal =					$ -

QUANTITIES

BY	CHECKED
Chris Strickland	Bill Engemoen
DATE PREPARED	**PEER REVIEW**
June 12, 2008	Bill Engemoen

PRICES

BY	CHECKED
Jerry Zander	8/4/08
DATE PREPARED	**PEER REVIEW**
August 4, 2008	DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Spillway and Outlet Works
Spillway

Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\|080408a - Wymer - MPH Total Est 7-2008.xls|Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Uncontrolled Spillway (no gates)					
		Located on left abutment with crest at El. 1730					
		Earthwork	8130				
	1	Common excavation		364,000	CY	$ 6.00	$ 2,184,000.00
	2	Rock excavation (drill and blast)		94,250	CY	$ 23.00	$ 2,167,750.00
	3	Pervious backfill behind chute walls		2,600	CY	$ 20.00	$ 52,000.00
	4	Misc backfill behind chute walls		9,800	CY	$ 14.00	$ 137,200.00
	5	Riprap inlet structure		2,600	CY	$ 50.00	$ 130,000.00
	6	Bedding for riprap inlet structure		1,400	CY	$ 40.00	$ 56,000.00
	7	Riprap for stilling basin		1,700	CY	$ 50.00	$ 85,000.00
	8	Bedding for riprap stilling basin		1,000	CY	$ 40.00	$ 40,000.00
		Concrete	8130				
	9	Concrete in Inlet structure		1,100	CY	$ 930.00	$ 1,023,000.00
	10	Concrete in Crest structure		1,500	CY	$ 900.00	$ 1,350,000.00
	11	Concrete in Chute		9,500	CY	$ 710.00	$ 6,745,000.00
	12	Concrete in Stilling Basin structure		1,900	CY	$ 875.00	$ 1,662,500.00
	13	Furnish and place concrete reinforcement.		2,100,000	LBS	$ 1.80	$ 3,780,000.00
		Assume 150 #/CY					
	14	Furnish and handle cement (.282T/CY)		3,900	TONS	$ 125.00	$ 487,500.00
		Drains - Furnish and install	8130				
	15	6-inch dia PVC perf. And non perf. (90% perf.)		10,400	LF	$ 7.00	$ 72,800.00
	16	Furnish and install sand for drains		3,000	CY	$ 31.00	$ 93,000.00
	17	Furnish and install gravel for drains		2,600	CY	$ 31.00	$ 80,600.00
	18	Furnish and install 2-inch rigid insulation		84,500	SF	$ 2.10	$ 177,450.00
	19	Furnish and install 9-inch waterstops - spillway joints	8130	9,800	LF	$ 9.00	$ 88,200.00
	20	Drill and grout anchor bars	8130	240	EA	$ 180.00	$ 43,200.00
		(Total length of rock drilling= 1,850 feet)					
	21	Reinforcement for anchor bars	8130	6,100	LBS	$ 1.80	$ 10,980.00
	22	Furnish and install 48-inch chain link fencing	8130	4,100	LF	$ 20.00	$ 82,000.00
		for spillway					
		Sheet Subtotal =					**$ 20,548,180.00**

QUANTITIES		PRICES	
BY Doug Stanton	**CHECKED** Jason Schneider	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimates
Spillway and Outlet Works
Access Bridge across Spillway (upstream)

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est - 2008\[081208 - Wymer PP & R - MP Total Est.xls]Road&Creek,Dam&Dike (57-59)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Access Bridge across Spillway (upstream)	86-8140				
	23	Furnish and install WSDOT W42G prestressed, concrete girders, L = 65 feet		5	Each	$ 8,100.00	$ 40,500.00
	24	Furnish and place reinforced concrete for deck, F-shape barriers & diaphragms, f'c = 4,000 psi (deck slab is 7.5 inch thick)		60	CY	$ 1,850.00	$ 111,000.00
	25	Furnish and handle cement material		17	Tons	$ 125.00	$ 2,125.00
	26	Furnish and install epoxy coated reinforcing steel Fy = 60,000 psi		15,000	LBS	$ 1.80	$ 27,000.00
	27	Furnish and install elastomeric bearing pads, (3" x 1'-6" x 2'-0"), total # = 10		30	SF	$ 280.00	$ 8,400.00
	28	Furnish and install compression seals, DS Brown CV-35 or Watson Bowman WA-350 elastomeric joint seals at ends of bridge		54	LF	$ 50.00	$ 2,700.00
		Deck drains (2 per side)					
	29	R-4005-A2 as manufactured by NEENAH Foundry or equal. Each one weighs~ 105 lbs		4	EA	$ 525.00	$ 2,100.00
	30	8-inch diameter black steel pipe, each L = 4'		16	LF	$ 150.00	$ 2,400.00
		Bridge is 65 feet long, with a 24-foot clear width. The bridge spans the spillway walls, which are 60-feet apart. The bridge superstructure will be supported on bearing seats, formed onto the spillway walls. Therefore, no foundation elements are included in this estimate worksheet. The bridge is located near the left abutment. The dam crest will be gravel surfaced. Chain link fence is required along the length of the spillway, so it is not included here. No approach guardrail is included in this estimate (see roadwork estimate). Water treatment for deck drainage is not included in this estimate.					
		Sheet Subtotal =					**$ 196,225.00**

QUANTITIES		**PRICES**	
BY Jesus G. Romero, PE	**CHECKED** Anne C. Pavol, PE	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED June 17, 2008	**PEER REVIEW** Tedd Calhoun, PE	**DATE PREPARED** August 12, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimates
Spillway and Outlet Works
Access Bridge across Spillway (to access outlet works control house)
Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est - 2008\[081208 - Wymer PP & R - MP Total Est.xls]Road&Creek,Dam&Dike (57-59)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Access Bridge across Spillway (to access outlet	86-8140				
		works control house)					
	31	Furnish and install WSDOT W42G prestressed,					
		concrete girders, L = 65 feet		5	Each	$ 8,100.00	$ 40,500.00
	32	Furnish and place reinforced concrete for deck,					
		F-shape barriers & diaphragms, f'c = 4,000 psi		60	CY	$ 1,850.00	$ 111,000.00
		(deck slab is 7.5 inch thick)					
	33	Furnish and handle cement material		17	Tons	$ 125.00	$ 2,125.00
	34	Furnish and install epoxy coated reinforcing steel					
		Fy = 60,000 psi		15,000	LBS	$ 1.80	$ 27,000.00
	35	Furnish and install elastomeric bearing pads,					
		(3" x 1'-6" x 2'-0"), total # = 10		30	SF	$ 280.00	$ 8,400.00
	36	Furnish and install compression seals, DS Brown					
		CV-35 or Watson Bowman WA-350 elastomeric		54	LF	$ 50.00	$ 2,700.00
		joint seals at ends of bridge					
		Deck drains (2 per side)					
		R-4005-A2 as manufactured by NEENAH					
	37	Foundry or equal. Each one weighs~ 105 lbs		4	EA	$ 525.00	$ 2,100.00
	38	8-inch diameter black steel pipe, each L = 4'		16	LF	$ 150.00	$ 2,400.00
	38b	Approach guardrail		0	LF	$ -	$ -
		Bridge is 65 feet long, with a 24-foot clear width. The bridge spans the spillway walls, which are 60-feet apart. The bridge superstructure will be supported on bearing seats, formed onto the spillway walls. Therefore, no foundation elements are included in this estimate worksheet. The bridge is located near the left abutment. The dam crest will be gravel surfaced. Chain link fence is required along the length of the spillway, so it is not included here. No approach guardrail is included in this estimate (see roadwork estimate). Water treatment for deck drainage is not included in this estimate.					
		Sheet Subtotal =					**$ 196,225.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Jesus G. Romero, PE	Anne C. Pavol, PE	Jerry Zander	8/13/08
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
June 17, 2008	Tedd Calhoun, PE	August 12, 2008	DCA

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Spillway and Outlet Works
Outlet Works

Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Earthwork U/S - channel, intake, conduit, portal	8130				
	39	Excavate common materials for structures		500	CY	$ 25.00	$ 12,500.00
	40	Excavate rock materials for structures (drill & shoot)		1,500	CY	$ 44.00	$ 66,000.00
	41	F & P bedding for riprap (processed on-site)		70	CY	$ 40.00	$ 2,800.00
	42	F & P rockfill from dam excavation (riprap)		140	CY	$ 47.00	$ 6,580.00
	43	Furnish and install chain link fabric around portal		1,750	SF	$ 3.00	$ 5,250.00
	44	F&I 18-inch x 1/2 in. dia resin anchors for fabric support		24	EA	$ 50.00	$ 1,200.00
		Earthwork D/S - portal, conduit, house, stilling basin	8130				
	45	Excavate common materials for structures		1,000	CY	$ 25.00	$ 25,000.00
	46	Excavate rock materials for structures (drill & shoot)		3,000	CY	$ 44.00	$ 132,000.00
	47	Excavate common materials for basin		12,000	CY	$ 8.00	$ 96,000.00
	48	Excavate rock materials for basin (drill & shoot)		4,000	CY	$ 44.00	$ 176,000.00
	49	F & P bedding for riprap (processed on-site)		4,500	CY	$ 26.00	$ 117,000.00
	50	F & P rockfill from dam excavation (riprap)		2,250	CY	$ 45.00	$ 101,250.00
	51	Furnish and install chain link fabric around portal		2,000	SF	$ 3.00	$ 6,000.00
	52	F&I 18-inch x 1/2 in. dia resin anchors for fabric support		30	EA	$ 50.00	$ 1,500.00
		Construct ROW tunnel u/s of gate chamber	8130				
	53	Drill and shoot 13.5-ft O.D.circular shaped u/s tunnel		850	LF	$ 2,000.00	$ 1,700,000.00
	54	Remove and stockpile rock (assume local stockpile)		4,500	CY	$ 19.00	$ 85,500.00
		Furnish, drill and install 750-10-ft long x 1-inch dia.					
	55	A307, 20K rockbolts		5,200	LF	$ 72.00	$ 374,400.00
	56	Furnish and install 6 steel sets (W8 x 40) (full circle)		11,400	LBS	$ 6.00	$ 68,400.00
		Construct ROW tunnel d/s of gate chamber	8130				
	57	Drill and shoot 19-ft OD circular shaped d/s tunnel		1,200	LF	$ 2,800.00	$ 3,360,000.00
	58	Remove and stockpile rock (assume local stockpile)		13,000	CY	$ 19.00	$ 247,000.00
		Furnish, drill and install 1250-10-ft long x 1-inch dia.					
	59	A307, 20K rockbolts		8,800	LF	$ 72.00	$ 633,600.00
	60	Furnish and install 6 steel sets (W10 x 40) in crown		20,000	LBS	$ 6.00	$ 120,000.00
		Construct Gate chamber					
	61	Drill and shoot 20-ft OD spherical shaped chamber		20	LF	$ 3,000.00	$ 60,000.00
	62	Remove and stockpile rock (assume local stockpile)		340	CY	$ 23.00	$ 7,820.00
		Furnish, drill and install 30-10-ft long x 1-inch dia.					
	63	A307, 20K rockbolts		300	LF	$ 140.00	$ 42,000.00
		Sheet Subtotal =					**$ 7,447,800.00**

QUANTITIES		PRICES	
BY Doug Stanton	**CHECKED** Jason Schneider	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Spillway and Outlet Works
Outlet Works

Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		DELETED UPPER INTAKE BID ITEMS					
		Construct Upper Intake Structure					
	56	FFP reinf. Conc - Upper Intake structure	8130				
	57	Furnish and place reinforcement (est 200#/CY)					
	58	Furnish and handle cement (.282T/CY)					
	59	FFP reinf. Conc (Steel lined) upper intake shaft (L=30')	8130				
	60	Furnish and place reinforcement (est 150#/CY)					
	61	Furnish and handle cement (.282T/CY)					
		Construct Intake Shaft	8130				
	62	Drill and shoot 13.5-ft OD vertical shaft					
	63	Remove and stockpile rock (assume local stockpile)					
		Furnish, drill and install 12-10-ft long x 1-inch dia.					
	64	A307, 20K rockbolts					
		Ring Grout Upper Intake Shaft	8130				
	65	Setups for drilling grout holes (2-in dia holes, 1 ring					
		with 6 holes per ring					
	66	Drill grout holes (2-in dia and L=25 ft)					
	67	Hookups to grout holes					
	68	Pressure grout (grouting process only minus cement)					
		Assume 2 CF per 1 LF of hole					
	69	Furnish and handle cement for pressure grouting					
		Assume 1 bag per CF					
		Sheet Subtotal =					$ -

QUANTITIES		PRICES	
BY Doug Stanton	**CHECKED** Jason Schneider	**BY** JWZ Jerry Zander	**CHECKED** JWZ 8/4/08
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Spillway and Outlet Works
Outlet Works

Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Ring Grout Upstream Conduit	8130				
	64	Setups for drilling grout holes (2-in dia holes, 20 ft ctrs, and 6 holes per ring)		43	EA	$ 250.00	$ 10,750.00
	65	Drill grout holes (2-in dia and L=25 ft)		6,450	LF	$ 40.00	$ 258,000.00
	66	Hookups to grout holes		260	EA	$ 50.00	$ 13,000.00
	67	Pressure grout (grouting process only minus cement)		13,000	CF	$ 13.00	$ 169,000.00
		Assume 2 CF per 1 LF of hole					
	68	Furnish and handle cement for pressure grouting		13,000	BAGS	$ 10.00	$ 130,000.00
		Assume 1 bag per CF					
		Ring Grout Gate Chamber	8130				
	69	Setups for drilling grout holes (2-in dia holes, low, mid and high rings and 6 holes per ring		3	EA	$ 400.00	$ 1,200.00
	70	Drill grout holes (2-in dia and L=25 ft)		450	LF	$ 40.00	$ 18,000.00
	71	Hookups to grout holes		18	EA	$ 50.00	$ 900.00
	72	Pressure grout (grouting process only minus cement)		900	CF	$ 15.00	$ 13,500.00
		Assume 2 CF per 1 LF of hole					
	73	Furnish and handle cement for pressure grouting		900	BAGS	$ 16.00	$ 14,400.00
		Assume 1 bag per CF					
		Sheet Subtotal =					**$ 628,750.00**

QUANTITIES		PRICES	
BY Doug Stanton	**CHECKED** Jason Schneider	**BY** Jerry Zander	**CHECKED** MA 8/4/08
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Spillway and Outlet Works
Outlet Works

Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct ROW cast in place (CIP) concrete	8130				
	74	Furnish, form, and place reinf. Conc - Intake structure		250	CY	$ 1,050.00	$ 262,500.00
	75	Furnish and place reinforcement (est 200#/CY)		50,000	LBS	$ 1.80	$ 90,000.00
	76	Furnish and handle cement (.282T/CY)		71	TONS	$ 125.00	$ 8,875.00
	77	FFP reinf. Conc - Steel lined U/S conduit (L=50' u/s of tunnel)		375	CY	$ 1,000.00	$ 375,000.00
	78	Furnish and place reinforcement (est 150#/CY)		56,250	LBS	$ 1.80	$ 101,250.00
	79	Furnish and handle cement (.282T/CY)		106	TONS	$ 125.00	$ 13,250.00
	80	FFP reinf. Conc - Steel lined U/S tunnel (L=850')		2,300	CY	$ 850.00	$ 1,955,000.00
	81	Furnish and place reinforcement (est 150#/CY)		350,000	LBS	$ 1.80	$ 630,000.00
	82	Furnish and handle cement (.282T/CY)		650	TONS	$ 125.00	$ 81,250.00
	83	FFP reinf. Concrete in gate chamber		180	CY	$ 1,100.00	$ 198,000.00
	84	Furnish and place reinforcement (160#/CY)		29,000	LBS	$ 1.80	$ 52,200.00
	85	Furnish and handle cement (.282T/CY)		51	TONS	$ 125.00	$ 6,375.00
	86	FFP reinf. Concrete - D/S tunnel (L=1200')		5,200	CY	$ 750.00	$ 3,900,000.00
		includes walkway and saddles					
	87	Furnish and place reinforcement (est 150#/CY)		780,000	LBS	$ 1.80	$ 1,404,000.00
	88	Furnish and handle cement (.282T/CY)		1,500	TONS	$ 125.00	$ 187,500.00
	89	FFP reinf. concrete - D/S conduit (L=130 ft d/s of tunnel)		290	CY	$ 1,050.00	$ 304,500.00
		includes walkway and saddles					
	90	Furnish and place reinforcement (est 150#/CY)		43,500	LBS	$ 1.80	$ 78,300.00
	91	Furnish and handle cement (.282T/CY)		82	TONS	$ 125.00	$ 10,250.00
	92	FFP reinf. concrete - D/S access house (30' x 30' x 12' tall)		580	CY	$ 950.00	$ 551,000.00
		includes wingwalls					
	93	Furnish and place reinforcement (est 150#/CY)		87,000	LBS	$ 1.80	$ 156,600.00
	94	Furnish and handle cement (.282T/CY)		164	TONS	$ 125.00	$ 20,500.00
	95	Furnish and install 48-inch chain link fencing	8130				
		on wingwalls @ Control House		80	LF	$ 43.00	$ 3,440.00
		Sheet Subtotal =					**$ 10,389,790.00**

QUANTITIES		PRICES	
BY Doug Stanton	**CHECKED** Jason Schneider	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED June 16, 2008	**PEER REVIEW**	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Spillway and Outlet Works
Outlet Works

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical	8410				
	96	Heating and Ventilating Systems for Outlet Works	8410	1	L.S.	$ 160,000.00	$ 160,000.00
		Access Tunnel and Control House:					
		Consists of:					
		2 - Electric unit heater; 7.5 kw					
		1 - Centrifugal fan; 750 cfm					
		1 - Propeller fan; 2400 cfm					
		1 - Axial fan: 6,000 cfm					
		1,900 ft. Oval steel duct; 38-inch x 16-inch, galvanized					
		2 - Control damper; 60-inch by 60-inch; motor-operated					
		2 - Control damper; 32-inch by 32-inch; motor-operated					
		2 - 60-inch by 60-inch stationary louver					
		2 - 32-inch by 32-inch stationary louver					
		Lower Intake					
	97	Trashracks (steel)	8410	32,400	LBS	$ 8.00	$ 259,200.00
	98	Bulkhead gate (13' x 13'), bulkhead gate frame	8410	93,800	LBS	$ 6.50	$ 609,700.00
		and guides above frame (steel)					
		Upper Intake (Not used in most probable estimate)					
	99	Trashracks (steel)	8410	0	LBS	N.A.	N.A.
	100	Bulkhead gate (13' x 13'), bulkhead gate frame	8410	0	LBS	N.A.	N.A.
		and guides above frame (steel)					
	101	Ultrasonic flowmeter, 2-path	8410	1	L.S.	$ 95,000.00	$ 95,000.00
	102	50 Kw Diesel engine-generator set with 125 gallon	8410	1	L.S.	$ 60,000.00	$ 60,000.00
		fuel tank (assume ConVault)					
		Sheet Subtotal =					**$ 1,183,900.00**

QUANTITIES		PRICES	
BY John Grass Paul Schlein, Rick Christensen	**CHECKED** Rick Christensen / R. Egan	**BY** Jerry Zander, Dan Mar	**CHECKED** 9/4/08
DATE PREPARED 4/28/07, 6/16/08	**PEER REVIEW**	**DATE PREPARED** August 4, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Spillway and Outlet Works
Outlet Works

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
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PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Steel Pipe	8420				
	103	114-inch ID steel liner		900	LF	$ 2,700.00	$ 2,430,000.00
		(7/8-inch wall, 1074 lb per lin. ft.)					
	104	102-inch ID steel pipe, Supported on concrete saddles		1,330	LF	$ 1,400.00	$ 1,862,000.00
		(1/2-inch wall, 547 lb per lin. ft.)					
	105	72-inch ID steel pipe, encased in concrete		60	LF	$ 3,900.00	$ 234,000.00
		(3/8-inch wall, 290 lb per lin. ft.)					
	106	30-inch ID steel pipe					
		(1/4-inch wall, 80 lb per lin. ft.)		30	LF	$ 200.00	$ 6,000.00
	107	24-inch ID steel pipe for air vent					
		(1/4-inch wall, 64 lb per lin. ft.)		20	LF	$ 160.00	$ 3,200.00
	108	14-inch ID steel pipe for filling line					
		(1/4-inch wall, 38 lb per lin. ft.)		20	LF	$ 95.00	$ 1,900.00
		Valves					
	109	AWWA Class 250, manually operated butterfly valve (for air vent):					
		1 -24" Diameter valve, 1350 lbs. per valve.		1,350	LBS	$ 8.00	$ 10,800.00
	110	Combination air valve (for air vent to prevent vacuum)					
		1 -24" Diameter valve, 2600 lbs. per valve.		2,600	LBS	$ 10.00	$ 26,000.00
	111	AWWA Class 300, hydraulically operated ball valve:					
		1 -30" Diameter valve, 5900 lbs. per valve.		5,900	LBS	$ 14.00	$ 82,600.00
	112	AWWA Class 250, manually operated (filling line)butterfly valves:					
		2 -14" Diameter valves, 450 lbs. per valve.		900	LBS	$ 10.00	$ 9,000.00
		Sheet Subtotal =					**$ 4,665,500.00**

QUANTITIES		PRICES	
BY R. Frisz 6/5/08	CHECKED R. Zelenka 6/5/08	BY Jerry Zander	CHECKED 8/4/08
DATE PREPARED 6-4-08	PEER REVIEW R. Zelenka 6/5/08	DATE PREPARED August 4, 2008	PEER REVIEW DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Spillway and Outlet Works
Outlet Works

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Gates and Gate Controls					
		Furnish and Install					
		7'x9' Hydraulically-actuated outlet gate					
	113	Head = 367 feet	8420	102,000	LBS	$ 8.00	$ 816,000.00
		Two tandem sets 4'x6' hydraulically-actuated outlet gates					
	114	Head = 367 feet	8420	130,000	LBS	$ 9.00	$ 1,170,000.00
		30" Hydraulically-actuated jet-flow gate and stand					
	115	Head = 367 feet	8420	10,000	LBS	$ 10.00	$ 100,000.00
		Hydraulic controls for 7'x9' emergency outlet gate, and					
	116	four 4'x6' outlet gates	8420	3,200	LBS	$ 11.00	$ 35,200.00
	117	Hydraulic controls for 30" jet-flow gate	8420	800	LBS	$ 12.00	$ 9,600.00
		Sheet Subtotal =					**$ 2,130,800.00**

QUANTITIES		PRICES	
BY R. Frisz 6/5/08	**CHECKED** R. Zelenka 6/5/08	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED June 4, 2008	**PEER REVIEW** R. Zelenka 6/5/08	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Spillway and Outlet Works
Outlet Works

Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Electrical					
		Bldg Electrical Service Equipment (F&I)	8430				
	118	600 volt motor control center, 3-phase, 800 amp bus		1	EA	$ 40,000.00	$ 40,000.00
		Four 20 inch wide sections					
		5 NEMA size 1 FVR contactors *					
		Three 100 A, 3-pole molded-case circuit breakers					
	119	Transformer load center	8430	1	EA	$ 18,500.00	$ 18,500.00
		30 kVA, 3-phase, 480-208Y/120 volt					
		Lighting System (F&I)	8430				
	120	120 volt, fluorescent NEMA Type 4 fixtures for control		1	LS	$ 65,000.00	$ 65,000.00
		house, 1900 foot long tunnel, & gate chamber					
		* FVR - Full-voltage reversing					
		Assumptions:					
		Bringing power to dam is part of unlisted items					
		Sheet Subtotal =					**$ 123,500.00**

QUANTITIES		PRICES	
BY Mike Schuh	**CHECKED** Lisa Gamuciello	**BY** Dan Mar	**CHECKED** 8/4/08
DATE PREPARED May 28, 2008	**PEER REVIEW** George Girgis	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Diversion During Dam Construction

Geotechnical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Excavation					
		For Cofferdam					
	1	Common		4,400	CY	$ 20.00	$ 88,000.00
		(assume alluvial soils; no dewatering)					
		Cofferdam					
	2	Embankment fill		171,000	CY	$ 16.00	$ 2,736,000.00
		(assume overburden from dam excavation					
		is used; probably of mix of silts to gravels,					
		placed and compacted in 9-inch lifts)					
	3	Geomembrane		13,000	SY	$ 15.00	$ 195,000.00
		(assume 40-mil HDPE)					
	4	Geotextile		26,000	SY	$ 3.00	$ 78,000.00
		(assume 16-ounce non-woven fabric)					
		Sheet Subtotal =					**$ 3,097,000.00**

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 4, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Diversion During Dam Construction

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est - 2008.xls]Road&Creek,Dam&Dike (57-59)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Excavation					
		For 6-foot pipe and saddles	8130				
	5	Common		4,000	CY	$ 16.00	$ 64,000.00
		(Assume alluvial soil and weathered rock; no dewatering)					
	6	Rock		2,000	CY	$ 42.00	$ 84,000.00
		(Assume drill and blast; no dewatering)					
	7	Furnish and place reinforced concrete for pipe supports	8130	20	CY	$ 1,300.00	$ 26,000.00
		spaced @ 40 feet (16 required)					
	8	Furnish and place unreinforced concrete thrust blocks	8130	75	CY	$ 800.00	$ 60,000.00
		Assume 2 blocks 10 x 10 x 10 @ 3000 psi					
	9	Furnish and handle cement	8130	22	TONS	$ 125.00	$ 2,750.00
		Assume .212 T/CY thrust & .282T/CY supports)					
	10	Furnish and place concrete reinforcement.	8130	3,200	LBS	$ 1.80	$ 5,760.00
		Assume 160 #/CY					
		Sheet Subtotal =					**$ 242,510.00**

QUANTITIES		PRICES	
BY Doug Stanton	**CHECKED** Jason Schneider	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED June 16, 2008	**PEER REVIEW**	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Diversion During Dam Construction

Mechanical/Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Diverting Stream into Diversion pipe					
		Dewatering Pumps:	8420				
	11	Two - 10 cfs (4500 gpm) Flygt C 3300 Wastewater		4,600	lbs	$ 20.00	$ 92,000.00
		Submersible Pumps, low head (LT), Curve/					
		Impeller No. 809, S-installation, 20' TDH, 900 rpm,					
		50 hp (34 kW), ~12" disch., 3 ph/60 Hz/460 V					
		(2300 lbs. ea.)					
		Submersible electrical cable	8430				
	12	3 - power conductor, 600 V, #4 AWG		500	LF	$ 20.00	$ 10,000.00
	13	2 - thermal sensor cables, #10 AWG		500	LF	$ 1.50	$ 750.00
	14	1 - ground cable, #6 AWG		500	LF	$ 2.00	$ 1,000.00
	15	Combination pump motor starters, 600 volt, NEMA 4	8430	2	each	$ 5,500.00	$ 11,000.00
		enclosure, Size 3, non-reversing contactor					
	16	Pump sump level controls	8430				
		2 floats, control relay in a NEMA 4 enclosure		1	each	$ 1,600.00	$ 1,600.00
	17	Pumping Costs					
		Estimate pumping 6 hours per day for 2 years		4,400	HRS	$ 95.00	$ 418,000.00
		Sheet Subtotal =					**$ 534,350.00**

QUANTITIES		PRICES	
BY R. Zelenka	**CHECKED** T. Hummel 6/5/08	**BY** Dan Mar	**CHECKED** 8/4/08
DATE PREPARED June 4, 2008	**PEER REVIEW** T. Hummel 6/5/08	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Diversion During Construction

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Diverting Stream into Diversion pipe					
		Steel Pipe	8420				
	18	72-inch dia. Steel pipe, 5/16-in thick wall, 241 lb/ft		600	LF	$ 780.00	$ 468,000.00
	19	20-inch dia. Sch. 10, 1/4-in thick wall, 53 lb/ft		250	LF	$ 170.00	$ 42,500.00
	20	12-inch dia. Sch. 20, 1/4-in thick wall, 34 lb/ft		50	LF	$ 110.00	$ 5,500.00
		Valves	8420				
	21	2 - 12-inch, Class 125 Double door check valves (150 lbs. each)		300	lbs	$ 11.00	$ 3,300.00
	22	2 - 12-inch, Class 150 AWWA Butterfly Valves (250 lbs. each)		500	lbs	$ 11.00	$ 5,500.00
		Sheet Subtotal =					**$ 524,800.00**

QUANTITIES		PRICES	
BY R. Frisz 6/5/08	**CHECKED** R. Zelenka 6/5/08	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED June 4, 2008	**PEER REVIEW** R. Zelenka 6/5/08	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DLM

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Road and Creek Improvements
Dam and Dike Access Roads

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1C - Dam,Spill&Misc

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		CIVIL - ROAD					
		All roadway sections assume two 12' lanes w/o shoulders, 3:1 sloped ditches to 1' depth, and cut slopes of 2:1. A slope greater than 12% was utilized in several areas. Upon final design, alignment will be modified to better suit existing earthwork conditions and eliminate slopes greater than 12%.					
		Road from SH821 to left abutment and across dam to right abutment					
		8200 LF of roadway					
	1	Excavation		25,000	CY	$ 6.00	$ 150,000.00
	2	Compacted Embankment		52,000	CY	$ 6.80	$ 353,600.00
	3	Gravel Surfacing (6" Depth)		7,000	TON	$ 45.00	$ 315,000.00
	4	24" CMP Culvert (assume 17 culverts, 35LF EA)		595	LF	$ 60.00	$ 35,700.00
	5	Metal Beam Guard Railing with Wooden Post		6,400	LF	$ 38.00	$ 243,200.00
		to be installed across dam					
		Road from access house to other side of dike					
		2600 LF of roadway					
	6	Excavation		5,700	CY	$ 11.00	$ 62,700.00
	7	Compacted Embankment		13,000	CY	$ 11.00	$ 143,000.00
	8	Gravel Surfacing (6" Depth)		4,300	TON	$ 55.00	$ 236,500.00
	9	24" CMP Culvert (assume 5 culverts 35LF EA)		175	LF	$ 60.00	$ 10,500.00
	10	Metal Beam Guard Railing with Wooden Post		5,200	LF	$ 38.00	$ 197,600.00
		to be installed across dike					
		Road from SH821 to outlet works					
		3600 LF of roadway					
	11	Excavation		100	CY	$ 50.00	$ 5,000.00
	12	Compacted Embankment		330	CY	$ 22.00	$ 7,260.00
	13	Gravel Surfacing (6" Depth)		3,000	TON	$ 50.00	$ 150,000.00
	14	24" CMP Culvert (assume 7 culverts 35LF EA)		245	LF	$ 60.00	$ 14,700.00
		Sheet Subtotal =					**$ 1,924,760.00**

QUANTITIES		PRICES	
BY Nick Clough	CHECKED Chris Duke, Anne Pavol	BY JWZ Jerry Zander	CHECKED 8/4/08
DATE PREPARED 6/11/2008	PEER REVIEW Dave Edwards	DATE PREPARED August 4, 2008	PEER REVIEW DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Road and Creek Improvements
Improvements to Existing Lmuma Creek

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est 2008\[080408a - Wymer PP & R - MP Total Est -2008.xls]Summary 1C - Dam,Spill&Misc

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Earthwork (Lmuma Creek)					
	15	Common excavation of outlet channel	8140	86,000	CY	$ 5.00	$ 430,000.00
	16	Embankment	8140	11,500	CY	$ 10.00	$ 115,000.00
	17	Compacted Embankment	8140	11,500	CY	$ 7.00	$ 80,500.00
	18	Furnish/place rock riprap (d50 6", d100 12"), 120lb/cf	8140	24,000	TONS	$ 30.00	$ 720,000.00
	19	Furnish/place geotextile	8140	45,000	SY	$ 3.00	$ 135,000.00
	20	Furnish 9 steel sheet pile control structures	8140	22,000	SF	$ 20.00	$ 440,000.00
		using AZ13 sheet piles					
	21	Excavation for sheet piles	8140	1,700	CY	$ 25.00	$ 42,500.00
	22	Furnish and place cement bentonite slurry	8140	1,700	CY	$ 120.00	$ 204,000.00
	23	Furnish and handle cement in cement bentonite slurry	8140	230	TONS	$ 125.00	$ 28,750.00
		Sheet Subtotal =					**$ 2,195,750.00**

QUANTITIES		PRICES	
BY Anne Pavol	**CHECKED** K. A. Sayer	**BY** Jerry Zander	**CHECKED** 8/4/08
DATE PREPARED 6/12/2008	**PEER REVIEW** David K. Edwards	**DATE PREPARED** August 4, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable Cost Estimate
Road and Creek Improvements
I-82 Bridge Protection

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MP Total Est - 2008\[081208 - Wymer PP & R - MP Total Est.xls]Road&Creek,Dam&Dike (57-59)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		I-82 Bridges					
		Protect existing 2:1 slope bridge embankments					
		Apply waterproof membrane to existing bridge piers					
		that will be submerged					
		Embankment Protection					
	24	Furnish and place riprap on embankments, (D50 = 24")	8140	34,000	TONS	$ 30.00	$ 1,020,000.00
	25	Furnish and place riprap bedding	8140	16,000	TONS	$ 20.00	$ 320,000.00
	26	Excavate existing protection (18" deep)	8140	10,500	CY	$ 15.00	$ 157,500.00
		Bridge Pier Protection					
		Apply membrane to Bridge piers					
	27	Water jet face of piers	8140	490	SY	$ 20.00	$ 9,800.00
	27b	Remove concrete cover to expose vertical #11 reinf		0	CY	$ -	$ -
	27c	Clean entire length of exposed #11 bars by sandblasting		0	LF	$ -	$ -
	27d	Concrete jacket placed around exposed column		0	CY	$ -	$ -
	28	Remove spalling concrete (5% total area)	8140	25	SY	$ 50.00	$ 1,250.00
	29	Furnish and install liquid applied CIM 1000 urethane	8140	490	SY	$ 11.00	$ 5,390.00
		(spray application)					
	30	Furnish and install liquid applied CIM 61 primer	8140	490	SY	$ 13.00	$ 6,370.00
		(spray application)					
		coating on piers manufactured by					
		Permabond, Inc. Telephone (801) 465-2890.					
		Contact: Stan Terry 720-368-1357					
	31	Waste Excess Material from I-82 Modifications					
		Assume local waste.					
		Waste common material	8120	10,500	CY	$ 15.00	$ 157,500.00
	32	Borrow Material for I-82 Modifications					
		Assume 1 way haul of 10 miles.					
		Borrow Riprap	8120	30,000	CY	$ 28.00	$ 840,000.00
		Sheet Subtotal =					**$ 2,517,810.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Joe Gemperline (8140), Dick LaFond (8120)	Anne Pavol (8140), Brian Goplen (8120)	Jerry Zander	8/13/08
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
April 30, 2007, June 25, 2007	David K. Edwards	August 12, 2008	DLE

Wymer Alternative

Most Probable High (MPH) Field Cost Estimate

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Summary
Yakima River Intake, Pumping Plant,
Switchyard and Transmission Line
Summary Sheet 1 A of 59

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[082508 - Wymer - MPH Total Est.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Wymer Offstream Storage Facility consists of:					
		Fish-screened Intake on Yakima River, 400 cfs Pumping Plant and Switchyard,					
		Concrete-Faced Rockfill Dam, Crest El. 1750. Central Core Rockfill Dike, Crest EL. 1750.					
		Spillway and Outlet Works, Road (Access and I82) and Lmuma Creek Improvements					
		Yakima River Intake - Sheets 2 - 13					$ 19,478,498.60
		Pumping Plant - Sheets 14 - 25					$ 58,428,370.00
		Switchyard and Transmission Line - Sheets 26 - 27					$ 6,650,880.00
		Subtotal					$ 84,557,748.60
		Mobilization		5%	(+/-)		$ 4,200,000.00
		Subtotal with mobilization					**$ 88,757,748.60**
		Escalation during construction		0%	(+/-)		$ -
		Subtotal					$ 88,757,748.60
		Design Contingencies		20%	(+/-)		$ 16,242,251.40
		CONTRACT COST					**$ 105,000,000.00**
		Construction Contingencies		25%	(+/-)		$ 30,000,000.00
		FIELD COST					**$ 135,000,000.00**
		Non-Contract Costs **		35%	(+/-)		$ 45,000,000.00
		CONSTRUCTION COST					**$ 180,000,000.00**
		Escalation to notice to proceed , allowance for procurement strategies and utility relocations are not included					
		** Land Acquisition Cost of $7,000.00 associated with these features, are included in the Non-Contract Costs.					

QUANTITIES		PRICES	
BY Design Team	**CHECKED**	**BY** Jerry Zander	**CHECKED**
DATE PREPARED June 27, 2008	**PEER REVIEW**	**DATE PREPARED** August 25, 2008	**PEER REVIEW** NCW for DLM

BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Summary

Discharge Line
Summary Sheet 1B of 59

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[082508 - Wymer - MPH Total Est.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Wymer Offstream Storage Facility consists of:					
		Fish-screened Intake on Yakima River, 400 cfs Pumping Plant and Switchyard,					
		Concrete-Faced Rockfill Dam, Crest El. 1750. Central Core Rockfill Dike, Crest EL. 1750.					
		Spillway and Outlet Works, Road (Access and I82) and Lmuma Creek Improvements					
		Discharge Line - Sheets 28 - 33					$ 66,532,900.00
		Subtotal					$ 66,532,900.00
		Mobilization		5%	(+/-)		$ 3,300,000.00
		Subtotal with mobilization					**$ 69,832,900.00**
		Escalation during construction		0%	(+/-)		$ -
		Subtotal					$ 69,832,900.00
		Design Contingencies		15%	(+/-)		$ 10,167,100.00
		CONTRACT COST					**$ 80,000,000.00**
		Construction Contingencies		25%	(+/-)		$ 20,000,000.00
		FIELD COST					**$ 100,000,000.00**
		Non-Contract Costs **		35%	(+/-)		$ 35,000,000.00
		CONSTRUCTION COST					**$ 135,000,000.00**
		Escalation to notice to proceed , allowance for procurement strategies and utility relocations are not included					
		** Land Acquisition Cost of $0.00 associated with these features, are included in the Non-Contract Costs.					

QUANTITIES		PRICES	
BY Design Team	**CHECKED**	**BY** #7 Jerry Zander	**CHECKED** 4/1
DATE PREPARED June 27, 2008	**PEER REVIEW**	**DATE PREPARED** August 25, 2008	**PEER REVIEW** DLM for DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Summary
Concrete-Face Rockfill Dam, Cental Core Rockfill Dike,
Spillway, Outlet Works, Diversion, and Roadwork
Summary Sheet 1C of 59

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[082508 - Wymer - MPH Total Est.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Wymer Offstream Storage Facility consists of:					
		Fish-screened Intake on Yakima River, 400 cfs Pumping Plant and Switchyard,					
		Concrete-Faced Rockfill Dam, Crest El. 1750. Central Core Rockfill Dike, Crest EL. 1750.					
		Spillway and Outlet Works, Road (Access and I82) and Lmuma Creek Improvements					
		Concrete Face Rockfill Dam - Sheets 34 - 37					$ 451,624,800.00
		Central Core Rockfill Dike - Sheets 38 - 41					$ 115,332,850.00
		Spillway & Outlet Works - Sheets 42 - 52					$ 70,624,000.00
		Diversion During Construction - Sheets 53 - 56					$ 5,304,250.00
		Roadwork & Bridge - Sheets 57 - 59					$ 12,187,260.00
		Subtotal					$ 655,073,160.00
		Mobilization		5%	(+/-)		$ 33,000,000.00
		Subtotal with mobilization					**$ 688,073,160.00**
		Escalation during construction		0%	(+/-)		$ -
		Subtotal					$ 688,073,160.00
		Design Contingencies		15%	(+/-)		$ 101,926,840.00
		CONTRACT COST					**$ 790,000,000.00**
		Construction Contingencies		30%	(+/-)		$ 260,000,000.00
		FIELD COST					**$ 1,050,000,000.00**
		Non-Contract Costs **		35%	(+/-)		$ 350,000,000.00
		CONSTRUCTION COST					**$ 1,400,000,000.00**
		Escalation to notice to proceed , allowance for procurement strategies and utility relocations are not included					
		** Land Acquisition Cost of $1,407,000.00 associated with these features, are included in the Non-Contract Costs.					

QUANTITIES		PRICES	
BY Design Team	CHECKED	BY Jerry Zander	CHECKED
DATE PREPARED June 27, 2008	PEER REVIEW	DATE PREPARED August 25, 2008	PEER REVIEW DCA for DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Intake
Dewatering/Unwatering and Cofferdam

Geotechnical/Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct/Remove Cofferdam around Intake					
		Max River WS: El. 1284					
		Bottom of River: El. 1272					
		Assumed Construction WS: El. 1280					
		Assumed top of Rock: ±El. 1260					
	1	Furnish, fill, install, and remove "Super Sacks"		1	LS	$ 100,000.00	$ 100,000.00
		- Use 540 sacks @ 3'x3'x3' = 540 cy of fill					
		- Place sacks with crane - 8 tons at 35ft reach					
		- Use fill from Intake excavation to fill sacks with minor processing for 3"minus (run through "grizzly")					
	2	Furnish, install, and remove 40 mil PVC Geomembrane		600	SY	$ 18.00	$ 10,800.00
		- Use 20 ft long roll					
	3	Furnish, fill, and place Sand Bags		300	CF	$ 32.00	$ 9,600.00
		Placed by hand					
		Unwatering behind cofferdam					
		Furnish and install "french drains"					
	4	Gravel - (sand and/or gravel w/ less then 5% fines)		20	CY	$ 100.00	$ 2,000.00
	5	Slotted 6-in dia. PVC or HDPE		270	LF	$ 13.00	$ 3,510.00
		Sheet Subtotal =					**$ 125,910.00**

QUANTITIES		PRICES	
BY Bob Davis	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED April 30, 2007	**PEER REVIEW** Al Kiene	**DATE PREPARED** August 5, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Intake
Dewatering/Unwatering and Cofferdam

Geotechnical/Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est - 2008\[081208 - Wymer - MPH Total Est.xls]River Intake (2-13)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct/Remove Cofferdam around Intake Fish Return Structure					
		Max River WS: El. 1284					
		Bottom of River: El. 1272					
		Assumed Construction WS: El. 1280 (Q= cfs)					
		Assumed top of Rock: ±El. 1260					
	6	Furnish, fill, install, and remove "Super Sacks"		1	LS	$ 33,000.00	$ 33,000.00
		- Use 200 sacks @ 3'x3'x3' = 200 cy of fill					
		- Place sacks with crane - 8 tons at 35ft reach					
		- Use fill from pipeline excavation to fill sacks with minor processing for 3"minus (run through "grizzly")					
	7	Furnish, install, and remove 40 mil PVC Geomembrane		225	SY	$ 20.00	$ 4,500.00
		- Use 20 ft long roll					
	8	Furnish, fill, and place Sand Bags		115	CF	$ 30.00	$ 3,450.00
		Unwatering behind cofferdam					
		Furnish and install "french drains"					
	9	Gravel - (sand and/or gravel w/ less then 5% fines)		8	CY	$ 100.00	$ 800.00
	10	Slotted 6-in dia. PVC or HDPE		100	LF	$ 13.00	$ 1,300.00
		Sheet Subtotal =					**$ 43,050.00**

QUANTITIES		PRICES	
BY Bob Davis	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED April 30, 2007	**PEER REVIEW** Al Kiene	**DATE PREPARED** August 13, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Intake
Dewatering/Unwatering and Cofferdam

Geotechnical/Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Dewatering Intake and Pumping Plant					
		Max River WS: El. 1284					
		Bottom of River: El. 1272					
		Assumed Construction WS: El. 1280 (Q= cfs)					
		Assumed top of Rock: ±El. 1260					
		Assumed Ground WS: El. 1280 (same as river)					
	11	Wellpoints about Intake and PP structures		1	LS	$ 4,000,000.00	$ 4,000,000.00
		- Install and remove 340 wellpoints					
		- Operate well points approximately 9 months					
		- Do **not** assume well points are jetted.					
		- Each wellpoint installed by:					
		- Drilling borehole, 8" diameter 20-ft deep					
		- Backfill borehole with sand (place with sand casing)					
		- Install wellpoint using 1.5" steel riser pipe w/ self jetting wellpoint screen (2" dia typ)					
		- Wellpoints are placed at 6 ft centers 20 ft deep					
		- Assume excavation to El. 1280 before placement of wellpoints					
	12	Wellpoints behind cofferdam		1	LS	$ 800,000.00	$ 800,000.00
		- Install and remove 40 wellpoints					
		- Operate well points approximately 3 months					
		- Do **not** assume well points are jetted.					
		- Each wellpoint installed by:					
		- Drilling borehole, 8" diameter 12-ft deep					
		- Backfill borehole with sand (place with sand casing)					
		- Install wellpoint using 1.5" steel riser pipe w/ self jetting wellpoint screen (2" dia typ)					
		- Wellpoints are placed at 6 ft centers 12 ft deep					
		- Assume installation of cofferdam before placement of wellpoints					
		Sheet Subtotal =					**$ 4,800,000.00**

QUANTITIES		PRICES	
BY Bob Davis	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED April 30, 2007	**PEER REVIEW** Al Kiene	**DATE PREPARED** August 5, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Intake
Dewatering/Unwatering and Cofferdam

Geotechnical/Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Unwatering Intake and Pumping Plant					
		Max River WS: El. 1284					
		Bottom of River: El. 1272					
		Assumed Construction WS: El. 1280 (Q= cfs)					
		Assumed top of Rock: ±El. 1260					
		Assumed Ground WS: El. 1280 (same as river)					
		Unwatering at base of soil excavation					
		- Furnish, install, and remove (filter toe drain):					
	13	Sand/gravel filter material		715	CY	$ 78.00	$ 55,770.00
	14	Slotted pipe 6-in dia. PVC or HDPE		2,150	LF	$ 13.00	$ 27,950.00
	15	Wrap slotted pipe in non-woven filter fabric		475	SY	$ 7.00	$ 3,325.00
	16	- Furnish and operate sump pumps					
		- Operate 11 sump pumps for 9 months		1	LS	$ 860,000.00	$ 860,000.00
		- Each pump should have a 30 ft lift					
		and have a flow of about 4 gpm					
	17	Unwatering at base of rock excavation					
		- Furnish and operate sump pumps					
		- Operate 10 sump pumps for 9 months		1	LS	$ 940,000.00	$ 940,000.00
		- Each pump should have a 45 ft lift					
		and have a flow of about 5 gpm					
		- Operate 3 sump pumps for 9 months					
		- Each pump should have a 55 ft lift					
		and have a flow of about 5 gpm					
	18	Unwatering about fish return pipeline					
		- Furnish and operate sump pumps					
		- Operate 3 sump pumps for 2 months		1	LS	$ 130,000.00	$ 130,000.00
		- Each pump should have a 12 ft lift					
		and have a flow of about 5 gpm					
		Sheet Subtotal =					**$ 2,017,045.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Bob Davis	Bill Engemoen	Jerry Zander	8/13/08
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
April 30, 2007	Al Kiene	August 5, 2008	DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Intake

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Structural Excavation and Backfill					
		Excavation and backfill quantities are to existing ground level.					
		Excavation and backfill above existing ground level covered under PP yard.					
		Assume top of rock is at El. 1262					
	19	Excavation of common materials for structures (2:1)	8140	24,400	CY	$ 10.00	$ 244,000.00
	20	Excavation of rock for structures (drill & shoot) (1/2:1)	8140	2,060	CY	$ 69.00	$ 142,140.00
	21	Furnish backfill for structures (assume local borrow)	8140	13,715	CY	$ -	$ -
	22	Place backfill around structures	8140	13,715	CY	$ 17.00	$ 233,155.00
	23	Compact backfill around structures	8140	13,715	CY	$ 19.00	$ 260,585.00
		STRUCTURAL					
		Construct Gated Intake and Fishscreen Structure					
	24	Furnish, form, and place reinforced concrete (f'c=4ksi)	8140	2,950	CY	$ 920.00	$ 2,714,000.00
	25	Furnish and place concrete reinforcement.	8140	353,860	LBS	$ 2.00	$ 707,720.00
	26	Furnish and handle cement	8140	840	TONS	$ 165.00	$ 138,600.00
	27	W-Beam guardrails	8140	40	LF	$ 88.00	$ 3,520.00
		Construct Intake Structure Retaining Walls					
	28	Furnish, form, and place reinforced concrete (f'c=4ksi)	8140	203	CY	$ 1,290.00	$ 261,870.00
	29	Furnish and place concrete reinforcement.	8140	24,300	LBS	$ 2.00	$ 48,600.00
	30	Furnish and handle cement	8140	58	TONS	$ 165.00	$ 9,570.00
		Construct Sump for Fish Pumps and Bypass					
	31	Furnish, form, and place reinforced concrete (f'c=4ksi)	8140	1,040	CY	$ 1,035.00	$ 1,076,400.00
	32	Furnish and place concrete reinforcement.	8140	124,620	LBS	$ 2.00	$ 249,240.00
	33	Furnish and handle cement	8140	295	TONS	$ 165.00	$ 48,675.00
		Sheet Subtotal =					**$ 6,138,075.00**

QUANTITIES

BY	CHECKED
Joe Gemperline	Chou Cha / Dave Gesundheit
DATE PREPARED	**PEER REVIEW**
5/1/2007	David K. Edwards

PRICES

BY	CHECKED
Jerry Zander	8/13/08
DATE PREPARED	**PEER REVIEW**
August 5, 2008	DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Intake

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Earthwork for Fish Bypass Pipe					
		Price Alternative 2. Alternative 1 for reference only.					
		Alternative 1 Prices not included in sheet total					
		Alternative 1 - Payline Quantities - Vertical Trench Walls					
		Bypass pipe common excavation	8140	580	CY		
		Bypass pipe backfill	8140	310	CY		
		Bypass pipe soil cement bedding (100 psi)	8140	175	CY		
		(Soil Cement Slurry CLSM)					
		Alternative 2 - Takeoff Quantities - 2:1 Trench Walls					
	34	Bypass pipe common excavation	8140	1,600	CY	$ 15.00	$ 24,000.00
	35	Bypass pipe backfill	8140	1,180	CY	$ 21.00	$ 24,780.00
	36	Bypass pipe soil cement bedding (100 psi)	8140	330	CY	$ 230.00	$ 75,900.00
		(Soil Cement Slurry CLSM)					
		Notes:					
		Clearing and grubbing by other group	8120				
		Fencing by other group	8120				
		People guardrail by other group	8120				
		Gravel surfacing by other group	8120				
		Yard earthwork by other group	8120				
		Coffer Dam and Dewatering by other group	8312				
		Waste and borrow included under PP	8120				
		Sheet Subtotal =					**$ 124,680.00**

QUANTITIES

BY	CHECKED
Joe Gemperline	Chou Cha / Dave Gesundheit
DATE PREPARED	**PEER REVIEW**
5/1/2007	David K. Edwards

PRICES

BY	CHECKED
Jerry Zander	8/13/08
DATE PREPARED	**PEER REVIEW**
August 5, 2008	DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Intake

Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Structural Steel					
	37	Furnish and install structural steel (painted):	8120	2,000	LBS	$ 6.00	$ 12,000.00
		3-Ton Hoist monorail beam and frames					
	38	**Miscellaneous Metalwork**	8120	8,000	LBS	$ 12.00	$ 96,000.00
		3' wide walkway, steel, safety grating along fish screens					
		75-ft ea side with support frames at 11-ft centers					
		Gripstrut panels @ 23.5 lbs/ft					
		Guardrail					
		Ladders and landings into Intake					
		Control Building					
	39	Pre-engineered metal building - 15 ft. eave height	8120	1	EA	$ 74,000.00	$ 74,000.00
		3:12 roof pitch, 20' long x 20' wide					
	40	Furnish, form, and place reinforced concrete (f'c=4ksi)	8120	18	CY	$ 1,600.00	$ 28,800.00
		Assume 1-ft x 22-ft x 22-ft base slab					
	41	Furnish and place concrete reinforcement. (135 lbs/CY)	8120	2,500	LBS	$ 2.00	$ 5,000.00
	42	Furnish and handle cement (.282T/CY)	8120	5	TONS	$ 165.00	$ 825.00
		Sheet Subtotal =					**$ 216,625.00**

QUANTITIES		PRICES	
BY Dick LaFond	**CHECKED** Brian Goplen	**BY** JZ Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED May 1, 2007	**PEER REVIEW** Brian Goplen	**DATE PREPARED** August 5, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Intake

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP | **ESTIMATE LEVEL:** Appraisal
REGION PN | **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[081108 - Wymer - MPH Total Est.xls]River Intake (2-13)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
	43	Ventilating System for Fish Pump	8410	1	L.S.	$ 3,500.00	$ 3,500.00
		Electrical Equipment Control Building:					
		Consists of:					
		1 - Centrifugal fan; 500 cfm					
		1 - Backdraft damper; 24-inch by 24-inch					
		1 - Intake counterbalance damper; 24-inch by 24-inch					
		2 - 24-inch by 24-inch stationary louver					
	44	One (3) ton capacity, electric, wirerope, monorail hoist	8410	1	L.S.	$ 7,000.00	$ 7,000.00
		with manual trolley for intake structure stop logs					
		(hoist only; hoist beam provided by 8120)					
	45	Stoplog guides and seats (steel)	8410	2,800	LBS	$ 12.00	$ 33,600.00
	46	Stoplog lifting beam (steel)	8410	1,000	LBS	$ 5.00	$ 5,000.00
	47	Stoplogs (steel)	8410	13,600	LBS	$ 4.40	$ 59,840.00
	48	Trashracks and seats (steel)	8410	20,400	LBS	$ 9.00	$ 183,600.00
	49	One trash rake, rails, supports	8410	11,000	LBS	$ 11.00	$ 121,000.00
		(assume Atlas Polar DT8300 rake)					
	50	One conveyor (steel)	8410	5,000	LBS	$ 12.00	$ 60,000.00
	51	Fish screen guides, support structure, braces	8410				
		embedded seats, blank panel, and bypass walls					
		Structural steel		105,000	LBS	$ 9.00	$ 945,000.00
		(Does not include walkway, see 8120)					
		Sheet Subtotal =					**$ 1,418,540.00**

QUANTITIES		PRICES	
BY: J. Grass / P. Schlein / A. Ritt R. Christensen	CHECKED Rick Christensen / R. Egan	BY JZ Jerry Zander	CHECKED 8/13/08
DATE PREPARED: 4/28/07, 6/16/08	PEER REVIEW	DATE PREPARED August 11, 2008	PEER REVIEW DLR

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Intake

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP | **ESTIMATE LEVEL:** Appraisal
REGION PN | **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
	52	Fish screens 11' W x11' H panels, 10 + 2 spares	8410				
		Stainless steel		29,200	LBS	$ 28.00	$ 817,600.00
		Structural steel		0	LBS	$ -	$ -
	53	Barrier panels above fish screens, 11' W x 11' H	8410				
		10 + 2 spares					
		Structural steel		36,300	LBS	$ 6.00	$ 217,800.00
	54	Adjustable baffle panels, 10 bays	8410				
		Structural steel		60,500	LBS	$ 6.00	$ 363,000.00
	55	Fish screen cleaner with travel rail, 2 systems with	8410				
		one brush cleaner arm per system					
		a. Structural steel		8,200	LBS	$ 7.00	$ 57,400.00
		b. Stainless steel		1,000	LBS	$ 28.00	$ 28,000.00
		c. 2 Hp motors/gear reducers, with adj. speed		2	UNITS	$ 11,000.00	$ 22,000.00
		controllers and limit switches					
	56	Water level measuring systems	8410				
		Sensors/transducers		6	UNITS	$ 5,500.00	$ 33,000.00
		Receivers/transmitters		2	UNITS	$ 11,000.00	$ 22,000.00
		6" Dia. FRP pipe stilling wells		120	FT	$ 44.00	$ 5,280.00
		Sheet Subtotal =					**$ 1,566,080.00**

QUANTITIES		PRICES	
BY: R. Christensen	CHECKED: John Grass, R. Egan	BY: Jerry Zander	CHECKED: 8/13/08
DATE PREPARED: 4/28/07, 6/16/08	PEER REVIEW	DATE PREPARED: August 5, 2008	PEER REVIEW: DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Intake

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Pumping Units for Fish Bypass	8420				
		Furnish and Install:					
		Two - Wemco Hidrostal Model N36A screw centrifugal fish pumps w/ shrouded s.st. impellers, s.st. casings and s.st. pump shafts, right-angle gear drives, 60 cfs @ 14' TDH, 150 hp, TEFC, vertical induction motors, and vertical shafting with couplings					
		- Government to witness pump shop test					
		- Field testing with on-site pump mfr's rep.					
	57	a. stainless steel shrouded pump impellers, casings, and shafts		22,000	LBS	$ 88.00	$ 1,936,000.00
	58	b. right-angle gear reducers (4:1)		2,200	LBS	$ 63.00	$ 138,600.00
	59	c. "Premium Efficiency" vertical induction motors, inverter-duty rated, TEFC, hollow shaft, 150 hp, 1200 rpm, 3Ph/60Hz/460 V		6,300	LBS	$ 24.00	$ 151,200.00
	60	d. vertical shafting (30') and couplings		2,800	LBS	$ 18.00	$ 50,400.00
	61	e. common pump/gear reducer baseplate (11.25 ft x 9.25 ft)		14,300	LBS	$ 6.00	$ 85,800.00
		Variable Frequency Drives (on 8430 qty. est. worksheet)					
		Sheet Subtotal =					**$ 2,362,000.00**

QUANTITIES		PRICES	
BY R. Zelenka	CHECKED T. Hummel 6/5/08	BY Jerry Zander	CHECKED 8/13/08
DATE PREPARED June 4, 2008	PEER REVIEW T. Hummel 6/5/08	DATE PREPARED August 5, 2008	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Intake

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[081108 - Wymer - MPH Total Est.xls]River Intake (2-13)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
		Steel Pipe for Fish Bypass	8420				
	62	36" ID X 1/4" wall steel pipe					
		233 lin. Ft. @ 96 lbs. per lin. Ft. (22368 lbs.)		233	LF	$ 420.00	$ 97,860.00
	63	30" ID X 1/4" wall steel pipe					
		524 lin. Ft. @ 80 lbs. per lin. Ft. (41920 lbs.)		524	LF	$ 350.00	$ 183,400.00
		Flanges					
	64	8 - 36" AWWA Class D flanges		2,144	lbs	$ 4.40	$ 9,433.60
		Rectangular Pipe and Transition (Bypass Inlet)	8420				
	65	All welded steel plates		35,000	lbs	$ 4.40	$ 154,000.00
		Valves for Fish Bypass	8420				
	66	2 - 36" Manually Operated Knifegate Valves					
		2500 lbs per valve		5,000	lbs	$ 12.00	$ 60,000.00
		Sheet Subtotal =					**$ 504,693.60**

QUANTITIES		PRICES	
BY R. Frisz 6/5/08	**CHECKED** R. Zelenka 6/5/08	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED 5-4-08	**PEER REVIEW** R. Zelenka 6/5/08	**DATE PREPARED** August 11, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Intake

Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[081108 - Wymer - MPH Total Est.xls]Road&Creek,Dam&Dike (57-59)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		ELECTRICAL					
		Service Equipment (F&I)	8430				
	67	Distribution panelboard, indoor type		1	EA	$ 12,000.00	$ 12,000.00
		480 volts, 3-phase with 225 ampere bus					
	68	Transformer load center		1	EA	$ 9,100.00	$ 9,100.00
		15 kVA, 1-phase, 480-240/120 volt					
		Combination Motor Starters (F&I)	8430				
	69	NEMA size 2 reversing contactor, 480V, 3-phase		2	EA	$ 5,500.00	$ 11,000.00
		480-120 volt control transformer					
		NEMA type 4 enclosure					
		Adjustable Speed Drives (F&I)	8430				
	70	480 volt, 3-phase, 200 ampere		2	EA	$ 61,000.00	$ 122,000.00
		Lighting System (F&I)	8430				
	71	120 volt, fluorescent fixtures for 10' x 10' bldg		1	LS	$ 7,700.00	$ 7,700.00
		Sheet Subtotal =					**$ 161,800.00**

QUANTITIES

BY	CHECKED
Mike Schuh	Lisa Gamuciello
DATE PREPARED	**PEER REVIEW**
May 28, 2008	George Girgis

PRICES

BY	CHECKED
Jerry Zander	8/13/08
DATE PREPARED	**PEER REVIEW**
August 11, 2008	DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Pumping Plant

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[081108 - Wymer - MPH Total Est.xls]Pumping Plant (14-25)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		CIVIL	8120				
		HP Pumping Plant Yard= El. 1287					
		Site excavation for intake structure included in yard quantity.					
		Service Yard and Access Road					
	1	Stripping (remove and dispose 6" of topsoil)		34,500	SY	$ 6.00	$ 207,000.00
	2	Common excavation to Service Yard El. 1287		16,530	CY	$ 8.00	$ 132,240.00
	3	Place and compact embankment for service yard		18,500	CY	$ 11.00	$ 203,500.00
	4	Furnish and place 6-inch thick gravel surfacing		19,000	SY	$ 9.00	$ 171,000.00
	5	Furnish and place base course material - 6" thick		1,930	TONS	$ 33.00	$ 63,690.00
	6	Furnish and place bituminous Pavement - 3" thick		1,035	TONS	$ 110.00	$ 113,850.00
	7	Furnish and install 7-foot chain link fence for service yard		2,145	LF	$ 28.00	$ 60,060.00
	8	Furnish and install 7-foot x 24-foot access gate		1	EA	$ 5,100.00	$ 5,100.00
		Dewatering During Construction:					
		Included in quantities under River Intake.					
		Structural Excavation and Backfill					
		Assume top of rock= El. 1262.0					
	9	Excavation of common materials for structures		79,900	CY	$ 8.00	$ 639,200.00
	10	Excavation of rock for structures (drill & shoot)		23,800	CY	$ 33.00	$ 785,400.00
	11	Furnish backfill for structures (assume local borrow)		63,200	CY	$ -	$ -
	12	Place backfill around structures		63,200	CY	$ 4.40	$ 278,080.00
	13	Compact backfill around structures		63,200	CY	$ 4.00	$ 252,800.00
	14a	Furnish & place embedment material for manifold		485	CY	$ 110.00	$ 53,350.00
		pipe trench (CLSM)					
	14b	Waste Excess Material from River Excavations					
		Assume waste material within 1 mile at dam.					
		Quantities include intake, plant, swtchd, & 1/2 discharge.					
	i	Waste rock excavation	8120	72,000	CY	$ 9.00	$ 648,000.00
	ii	Waste common material	8120	115,000	CY	$ 8.00	$ 920,000.00
		Sheet Subtotal =					**$ 4,533,270.00**

QUANTITIES		PRICES	
BY Brian Goplen	**CHECKED** John Pattie	**BY** Jerry Zandel	**CHECKED** 8/13/08
DATE PREPARED April 26, 2007	**PEER REVIEW** Dick LaFond	**DATE PREPARED** August 11, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Pumping Plant

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		STRUCTURAL	8120				
		Concrete for Structures					
		Includes: Pumping Plant Structure = 14,300 CY					
		Air Chamber Foundation = 1980 CY					
		Flow Meter Vault = 260 CY					
		Miscellaneous Slabs = 10 CY					
	15	Furnish, form, and place reinforced concrete		16,550	CY	$ 800.00	$ 13,240,000.00
	16	Furnish and place concrete reinforcement.		2,151,500	LBS	$ 2.00	$ 4,303,000.00
		Assume 130 #/CY					
	17	Furnish and handle cement (.282T/CY)		4,667	TONS	$ 170.00	$ 793,390.00
	18	Furnish and install 6" PVC Waterstop		8,000	LF	$ 10.00	$ 80,000.00
		Structural Steel					
	19	Furnish and install structural steel (painted):					
		Superstructure roof trusses and crane girders		328,000	LBS	$ 6.00	$ 1,968,000.00
		Miscellaneous Metalwork					
	20	Furnish and install miscellaneous metalwork		73,000	LBS	$ 11.00	$ 803,000.00
	21	Pre-engineered metal stairs		26,000	LBS	$ 10.00	$ 260,000.00
	22	Roof Hatches: Bilco Type 8'x14' Type D Double leaf insul alum.		1	EA	$ 19,000.00	$ 19,000.00
	23	Floor Hatches: 3'x3' Type J alum floor hatch		3	EA	$ 9,900.00	$ 29,700.00
		Metal decking for roof system					
	24	1.5B20		15,820	SF	$ 6.00	$ 94,920.00
	25	1.5VL22		780	SF	$ 11.00	$ 8,580.00
	26	Air chamber cover:		1	LS	$ 900,000.00	$ 900,000.00
		Triang. Alum. Space Truss w/ non corrugated closure					
		panels. 58 ft. dia. clear span, 7 ft. high					
		self supporting from periphery concrete walls					
		(similar to Durango Pumping Plant)					
		Sheet Subtotal =					$ 22,499,590.00

QUANTITIES		PRICES	
BY Brian Goplen	**CHECKED** Dick LaFond	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED April 26, 2007, June 25, 2008	**PEER REVIEW** Dick LaFond	**DATE PREPARED** August 5, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Pumping Plant

Architectural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP
ESTIMATE LEVEL: Appraisal
REGION PN
PRICE LEVEL: Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		ARCHITECTURAL	8120				
	27	**Standing Seam Roofing System**		15,820	SF	$ 11.00	$ 174,020.00
		Service Bay - 1" high rib @ 18" o.c., 24ga.,					
		G-90 hot-dipped galvanized steel, UL 90 rated					
		Large roof - 3/12 hipped - 3,460 s.f.					
		Small roof - 3/12 hipped - 560 s.f.					
		Unit Bay - 1" high rib @ 18" o.c., 24ga., G-90,					
		hot-dipped galvanized steel, UL 90 rated					
		Gabled with 3/12 pitch each side - 11,800 s.f.					
		Roofing Felt					
	28	2-layers 15# - 31,640 s.f.	8120	31,640	SF	$ 1.00	$ 31,640.00
		Roof Insulation					
	29	4" thick, rigid	8120	4,020	SF	$ 5.00	$ 20,100.00
	30	2" thick, rigid	8120	11,800	SF	$ 3.00	$ 35,400.00
		Roll-up Doors (complete with hardware)					
		Exterior					
	31	4'-0" x 7'-0", manual operated, insulated roll-up door		1	EA.	$ 7,700.00	$ 7,700.00
	32	14'-0" x 14'-0", manual operated, insulated roll-up door		1	EA.	$ 11,000.00	$ 11,000.00
		Steel Doors & Frames (complete with hardware)					
		Interior					
	33	3'-0" x 7'-0" x 1 3/4", single, 90 min.		18	EA.	$ 1,300.00	$ 23,400.00
	34	3'-0" x 7'-0" x 1 3/4", double, 90 min.		5	EA.	$ 2,000.00	$ 10,000.00
		Sheet Subtotal =					**$ 313,260.00**

QUANTITIES		PRICES	
BY Brian Goplen	**CHECKED** Dick LaFond	**BY** JZ Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED April 26, 2007	**PEER REVIEW** Dick LaFond	**DATE PREPARED** August 5, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Pumping Plant

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Major Mechanical Equipment:					
		Furnish and Install:					
	35	Seven 60 cfs Pumps	8420	161,000	LBS	$ 25.00	$ 4,025,000.00
		Double suction, horizontal split-case pumps, coupling, 890 rpm, rated 468 feet TDH, ductile iron casing, s.st. impeller w/ s.st. casing/impeller wearing rings, and common steel base plate for pump and motor (23,000 lbs. ea.) - Government to witness pump shop test - pump shop testing with job motor					
	36	Seven 4,000 hp Motors	8430	210,000	LBS	$ 30.00	$ 6,300,000.00
		Horizontal synchronous, 6600 volt, 900 rpm, TEWAC motor enclosure, brushless exciter (30,000 lbs. ea.)					
		Sheet Subtotal =					**$ 10,325,000.00**

QUANTITIES		PRICES	
BY R. Zelenka	**CHECKED** T. Hummel 6/5/08	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED June 4, 2008	**PEER REVIEW** T. Hummel 6/5/08	**DATE PREPARED** August 5, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Pumping Plant

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Major Mechanical Equipment					
		Valves	8420				
	37	AWWA Class 150, Motor operated butterfly valves:					
		7 -48" Diameter valves, 7725 lbs. per valve.		54,075	LBS	$ 6.00	$ 324,450.00
	38	ANSI Class 300, Motor operated butterfly valves:					
		7 -42" Diameter valves, 6000 lbs. per valve.		42,000	LBS	$ 30.00	$ 1,260,000.00
	39	ANSI Class 300, Tilting disk check valves:					
		7 -42" Diameter valves, 8300 lbs. per valve.		58,100	LBS	$ 26.00	$ 1,510,600.00
	40	ANSI Class 300, Manually operated butterfly valves:					
		4 -24" Diameter valves, 1350 lbs. per valve.		5,400	LBS	$ 24.00	$ 129,600.00
	41	ANSI Class 300, Manually operated butterfly valves:					
		2 -16" Diameter valves, 550 lbs. per valve.		1,100	LBS	$ 31.00	$ 34,100.00
	42	2" Combination Air Valves					
		22 - 300 psi valves, 75 lbs. per valve		1,650	LBS	$ 12.00	$ 19,800.00
	43	2" Ball Valves					
		22 - 300 psi valves, 3 lbs. per valve		66	LBS	$ 115.00	$ 7,590.00
		Sheet Subtotal =					**$ 3,286,140.00**

QUANTITIES		PRICES	
BY R. Frisz	**CHECKED** R. Zelenka 6/5/08	**BY** Jerry Zander	**CHECKED** 8/18/08
DATE PREPARED 6-5-08	**PEER REVIEW** R. Zelenka 6/5/08	**DATE PREPARED** August 5, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Pumping Plant

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[082508 - Wymer - MPH Total Est.xls]Pumping Plant (14-25)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Steel Manifold (Suction and Discharge Manifolds)	8420				
		Steel plate used for pipe fabrication:					
		ASTM A36: Sy = 36 kpsi					
		(All pipe sizes are inside diameters)					
	44	120" ID, 3/4" wall, L= 321 ft., 968 lbs/ft (310728 lbs)		321	Lin. Ft.	$ 3,200.00	$ 1,027,200.00
	45	120" ID, 1" wall, L= 400 ft., 1,300 lbs/ft (520,000 lbs)		400	Lin. Ft.	$ 4,300.00	$ 1,720,000.00
	46	48" ID, 1/4" wall, L= 210 ft., 128 lbs/ft (26880 lbs)		210	Lin. Ft.	$ 420.00	$ 88,200.00
	47	42" ID., 7/16" wall, L= 210 ft., 198 lbs/ft (41580 lbs)		210	Lin. Ft.	$ 650.00	$ 136,500.00
	48	24" ID, 1/4" wall, L= 40 ft., 64 lbs/ft (2560 lbs)		40	Lin. Ft.	$ 210.00	$ 8,400.00
	49	16" ID, 1/4" wall, L= 90 ft., 43 lbs/ft (3870 lbs)		90	Lin. Ft.	$ 140.00	$ 12,600.00
		Flanges					
	50	2 - 96" AWWA Class E (3625 lb. ea.)		7,250	LBS	$ 5.00	$ 36,250.00
	51	14 - 48" AWWA Class D (440 lb. ea.)		6,160	LBS	$ 6.00	$ 36,960.00
	52	28 - 42" AWWA Class F (992 lb. ea.)		27,780	LBS	$ 6.00	$ 166,680.00
	53	21 - 36" AWWA Class D (268 lb. ea.)		5,630	LBS	$ 6.00	$ 33,780.00
	54	21 - 30" AWWA Class F (545 lb. ea.)		11,450	LBS	$ 6.00	$ 68,700.00
	55	20 - 24" AWWA Class F (384 lb. ea.)		7,680	LBS	$ 6.00	$ 46,080.00
	56	10 - 16" AWWA Class F (174 lb. ea.)		1,740	LBS	$ 6.00	$ 10,440.00
	57	2 - 120" AWWA Class D (3558 lb. ea.)		7,120	LBS	$ 4.00	$ 28,480.00
		Steel Air Chamber	8420				
	58	46 ft. ID, Spherical air chamber		705,000	LBS	$ 6.00	$ 4,230,000.00
		ASTM A 516 Grade 70 steel					
	59	200 horsepower, 750 cfm air compressor, 230 psig		1	LS	$ 240,000.00	$ 240,000.00
		Sheet Subtotal =					**$ 7,890,270.00**

QUANTITIES		PRICES	
BY R. Frisz	**CHECKED** R. Zelenka 6/5/08	**BY** Jerry Zander	**CHECKED**
DATE PREPARED 6-5-08	**PEER REVIEW** R. Zelenka 6/5/08	**DATE PREPARED** August 25, 2008	**PEER REVIEW** DCP for DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Pumping Plant

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
	60	Fire Suppression System: Consists of	8410	1	L.S.	$ 240,000.00	$ 240,000.00
		10 - Fire hose reels w/ 100 feet of hose					
		20 - Portable hand-held 20 lb. extinguishers					
		3 - Wheeled portable 125 lb. extinguishers					
		55 - Sprinkler system discharge heads					
		1 - 4-inch deluge valve, electric actuated					
		1 - Fire hydrant, dry type					
		1 - Fire department siamese connection					
		1 - Fire pump, horz. split-case, 500 gpm @ 300 ft of hd					
		10,000 lbs. of sch. 40 carbon steel pipe and fittings					
		1 - Clean agent gas fire suppression system for					
		4,500 ft^3 control room					
	61	Unit Cooling Water System: Consists of	8410	1	L.S.	$ 360,000.00	$ 360,000.00
		7 - Supply pumps, end-suction type, 150 gpm at 60 ft hd.					
		2 - 8-inch automatic, self cleaning strainers					
		4,000 lbs. of type K copper tubing & fittings					
		5,000 lbs. of ductile iron, mechanical joint pipe & fittings					
		4,000 lbs. of cast iron valving					
		2 - Mechanical seal end-suction pumping units; 25 gpm					
		at 100 ft hd.					
		2 - 4-inch self-cleaning filters, 25 micron					
	62	Compressed Air System: Consists of	8410	1	L.S.	$ 50,000.00	$ 50,000.00
		2 - 40 cfm @ 125 psi rotary screw air compressors					
		1 - 300 gal. carbon steel air receiver					
		1 - 80 cfm air dryer					
		3,000 lbs. of sch. 40 carbon steel pipe, valves & fittings					
	63	Service Water System: Consists of	8410	1	L.S.	$ 54,000.00	$ 54,000.00
		1 - Service water pump, 75 gpm @ 200 ft. of hd.					
		1 - Hydropneumatic steel tank, 300 gal.					
		1,500 lbs. of type K copper tubing, valves & fittings					
		10 - Service water rubber hose; 1-inch dia., 50 ft lengths					
		Sheet Subtotal =					**$ 704,000.00**

QUANTITIES		PRICES	
BY: J. Grass / R. Egan	**CHECKED** Rick Christensen	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED: 4/27/07, 6/16/08	**PEER REVIEW**	**DATE PREPARED** August 5, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Pumping Plant

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary IA - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont)					
	64	Gravity Drainage System: Consists of	8410	1	L.S.	$ 170,000.00	$ 170,000.00
		50 - Floor drains, cast iron, 4-inch					
		25,000 lbs. of cast iron hub & spigot, service weight					
		soil pipe					
	65	Plant Unwatering System: Consists of	8410	1	L.S.	$ 240,000.00	$ 240,000.00
		2 - Vertical turbine type sump pump, 1000 gpm @ 50 ft hd					
		1 - Drainage jet type drainage pump					
		1,500 lbs. of type K copper tube, valves & fittings					
		4,000 lbs. of ductile iron, mechanical joint pipe & fittings					
	66	Domestic Water and Sanitary Waste and Vent System:	8410	1	L.S.	$ 82,000.00	$ 82,000.00
		Consists of:					
		4 - Water Closets					
		2 - Urinal					
		4 - Lavatories w/ faucets & accessories					
		1 - Duplex sewage ejector assembly					
		2 - Drench shower and eye wash					
		1 - Water heater, 20 gallons, electric					
		1 - Janitor's service sink, 36" x 36" molded stone					
		2,000 lbs. of cast iron hub & spigot service weight					
		sewer and vent pipe					
		800 lbs. of type K copper tubing, valves & fittings					
	67	20-ton Electric overhead traveling unit bay bridge crane,	8410	1	L.S.	$ 360,000.00	$ 360,000.00
		remote control, 56'-0" span; 30 ft. lift					
	68	20-ton Electric overhead traveling service bay bridge	8410	1	L.S.	$ 320,000.00	$ 320,000.00
		crane, remote control, 55'-0" span; 25 ft. lift					
	69	Electric passenger elevator:	8410	1	L.S.	$ 200,000.00	$ 200,000.00
		Overhead, Geared traction type, Capacity =3500 pounds,					
		Travel = 43 feet, Landings = 4, Speed = 200 ft/min.					
	70	Sump waste oil skimmer assembly, electric operated,	8410	1	L.S.	$ 19,000.00	$ 19,000.00
		w/ 55 gallon collection drum					
		Sheet Subtotal =					**$ 1,391,000.00**

QUANTITIES		PRICES	
BY: J. Grass / A. Ritt / R. Egan	**CHECKED** Rick Christensen	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED: 4/27/07, 6/16/08	**PEER REVIEW**	**DATE PREPARED** August 5, 2008	**PEER REVIEW** DLR

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Pumping Plant

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont)					
	71	Heating, Ventilating, and Air Conditioning System (HVAC)	8410	1	L.S.	$ 1,200,000.00	$ 1,200,000.00
		for pumping plant building interior consisting of					
		197-ft long by 57-ft wide by 50-ft high unit bay,					
		55-ft long by 57-ft wide by 82-ft high service bay and					
		250-ft long by 25-ft wide by 12-ft high equipment gallery					
		for a total pumping plant volume of 893,520 ft^3					
		HVAC system designed for:					
		Outdoor summer design conditions: 100 degrees F					
		dry bulb and 86 degrees F wet bulb					
		Outdoor winter design conditions: minus 3.8 degree					
		dry bulb					
		Indoor plant summer design conditions: 90 degrees F					
		Indoor plant winter freeze protection: 45 degrees F dry bulb					
		Indoor control room, communication room and					
		office : 74 degrees F cooling and 68 degrees F heating					
		HVAC equipment consists of:					
		Central air handling units w/ hot water heating coils					
		Hot water boilers, circulating pumps and appurtenances					
		Office, control and communicating rooms air conditioning units					
		Unit heaters - hot water type					
		Electric fan forced wall heaters					
		Stairwell ventilation fans					
		Ducts - galvanized steel					
		Fire and smoke dampers					
		Backdraft dampers					
		Centrifugal fans					
		Propeller fans					
		Register/grills/louvers					
		Panel filters					
		Control system					
		Copper tubing					
		5,000 gallon propane tank and appurtenances					
		Carbon steel gas piping components					
		Sheet Subtotal =					**$ 1,200,000.00**

QUANTITIES		PRICES	
BY: J. Grass / P. Schlein	**CHECKED** Rick Christensen	**BY** JZ Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED: 4/27/07, 6/16,08	**PEER REVIEW**	**DATE PREPARED** August 5, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Pumping Plant

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07
FILE:	J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008 xls]Summary 1A - Yakima River		

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical (cont)					
	72	200 Kw diesel engine generator set with 500 gallon fuel tank (assume ConVault tank)	8410	1	L.S.	$ 140,000.00	$ 140,000.00
		Sheet Subtotal =					**$ 140,000.00**

QUANTITIES		PRICES	
BY: R. Christensen	**CHECKED** John Grass/ R. Egan	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED: 4/28/07, 6/16/08	**PEER REVIEW**	**DATE PREPARED** August 5, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Pumping Plant

Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		15 kV Non-Segregated-Phase Bus (F&I)	8430				
	73	15 kV, 3,000 amperes, outdoor type		300	FT	$ 7,000.00	$ 2,100,000.00
		15 kV Metal-Clad Switchgear (F&I)	8430				
	74	Indoor metal-clad switchgear with following features:		1	EA	$ 440,000.00	$ 440,000.00
		15 kV, 3,000 ampere bus					
		three 3,000 ampere vacuum power circuit breakers*					
		two 1,200 ampere vacuum power circuit breakers*					
		Plant Station-Service Equipment (F&I)	8430				
	75	Indoor double-ended secondary unit substation with		1	EA	$ 240,000.00	$ 240,000.00
		following features:					
		600 volts, 2,000 ampere main bus					
		Two dry-type transformers 6.9 kV-480Y/277 V, 1,500 KVA					
		Two 480 V power-circuit breakers, 2,000 amperes					
		Six 480 V power-circuit breakers, 800 amperes					
		7.2 kV Motor Control Equipment (F&I)	8430				
	76	NEMA 1 enclosure with following features:		1	EA	$ 3,100,000.00	$ 3,100,000.00
		7.2 kV, 3,000 ampere bus					
		Seven 400 ampere, class E2 full-voltage vacuum					
		contactors					
		Excitation equipment for 7 synchronous motors					
		Motor Control Centers (F&I)	8430				
	77	480 volts, 3-phase with 800 ampere bus		2	EA	$ 55,000.00	$ 110,000.00
		Five 20 inch wide sections w/ following equipment:					
		7 NEMA size 0 FVR contactors **					
		2 NEMA size 2 FVNR contactors ***					
		Three 100 A, 3-pole molded-case circuit breakers					
		* Continuous current rating					
		** FVR - Full-voltage reversing					
		*** FVNR - Full-voltage non-reversing					
		Sheet Subtotal =					**$ 5,990,000.00**

QUANTITIES		PRICES	
BY Mike Schuh	**CHECKED** Lisa Gamuciello	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED May 28, 2008	**PEER REVIEW** George Girgis	**DATE PREPARED** August 5, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Yakima River Pumping Plant

Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	78	**Distribution Panelboards (F&I)**	8430				
	a	480 volts, 3-phase with 800 ampere bus &		4	EA	$ 9,000.00	$ 36,000.00
		main circuit breaker					
	b	208Y/120, 3-phase with 225 ampere bus &		3	EA	$ 4,000.00	$ 12,000.00
		main circuit breaker					
	79	**Lighting & Distribution Transformer (F&I)**	8430				
		75 kVA, 480-208Y/120 volt, dry type		3	EA	$ 22,000.00	$ 66,000.00
		Building Lighting System (F&I)	8430				
		Interior luminaires:					
	80	High bay, high-pressure sodium, 400 W, 208 V		14	EA	$ 1,800.00	$ 25,200.00
	81	4 foot, 2 lamp, 120 V fluorescent fixtures		40	EA	$ 260.00	$ 10,400.00
	82	Exterior luminaires:					
		High-pressure sodium, wall mounted, outdoor		12	EA	$ 520.00	$ 6,240.00
		70 watt, 120 volt					
		Assumptions:					
		Redundant power transformers in switchyard					
		Split motor bus with tie breaker					
		Sheet Subtotal =					**$ 155,840.00**

QUANTITIES		PRICES	
BY Mike Schuh	**CHECKED** Lisa Gamuciello	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED May 28, 2008	**PEER REVIEW** George Girgis	**DATE PREPARED** August 5, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Switchyard and Transmission Line

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		CIVIL/STRUCTURAL	8120				
	1	**Excavation** (Common)		1,005	CY	$ 23.00	$ 23,115.00
	2	**Structural Concrete**		120	CY	$ 1,200.00	$ 144,000.00
		(Switchyard foundations and pullboxes)					
	3	**Concrete Reinforcement**		15,310	LBS	$ 2.00	$ 30,620.00
	4	**Compacting Backfill about Structures**		790	CY	$ 15.00	$ 11,850.00
	5	**Switchyard Steel Structures**		35,800	LBS	$ 6.00	$ 214,800.00
	6	**Gravel Surfacing - 6-inch thick**		2,045	SY	$ 14.00	$ 28,630.00
	7	**Oil-Spill Containment System**		1	LS	$ 42,000.00	$ 42,000.00
		Geotextile fabric 4,255 SF (12 oz per sq yard, 110 mils non-woven)					
		Geomembrane liner: 2,130 SF (30 Mils XR-5 Seaman Corporation)					
		Geocel: 1,635 SF (8" deep "enviro grid" polymeric cellular confinement system)					
		Piping: 140 LF (6" Dia. Schedule 80 PVC pipe perforated)					
		Piping: 3 EA (6" Dia. Schedule 80 PVC "L")					
		Piping: 1 EA (12" Dia. 3'-2" long Schedule 80 PVC Cap)					
		Piping: 3 LF (12" Dia. Schedule 80 PVC perforated pipe)					
		Preservative-Treated Lumber: 75 LF (2"x4")					
		Expansion Anchors (Stainless steel 3/8" x 5" drilled in conc): 84 EA					
		Excavation: Included in excavation for structures					
		Uncompacted crushed aggregate: 135 CY (ASTM C33 Size No 4, 1 1/2" to 3/4")					
	8	**Gravelfill for Switchyard Foundations** (Compacted)		65	CY	$ 61.00	$ 3,965.00
	9	**5-Inch PVC Schedule 80 Conduit** (CIP Power Duct Bank)		115	LF	$ 300.00	$ 34,500.00
		Includes:					
		115 LF of 1.5' tall x 2.33' wide concrete CIP					
		15 CY of concrete					
		1970 lbs of reinforcement					
	10	**7-foot Chain link fence**		400	LF	$ 41.00	$ 16,400.00
		Sheet Subtotal =					**$ 549,880.00**

QUANTITIES		PRICES	
BY Brian Goplen	**CHECKED** Dick LaFond	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED April 26, 2007	**PEER REVIEW** Dick LaFond	**DATE PREPARED** August 5, 2008	**PEER REVIEW** DLH

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Switchyard and Transmission Line

Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		ELECTRICAL					
		Switchyard					
		Furnish and Install:					
	11	Oil-filled, conservator-type power transformer	-68440	2	EA	$ 1,200,000.00	$ 2,400,000.00
		20/26.66/33.33 MVA OA/FA/FA; 115-6.9kV, 3-phase					
	12	115-kV disconnect switches, 1200 amp, 3-phase	-68440	4	EA	$ 39,000.00	$ 156,000.00
	13	115-kV circuit breakers, 1200 amp, 31.5-kA Int,	-68440	2	EA	$ 180,000.00	$ 360,000.00
		3-phase, dead-tank, SF6 type					
	14	115-kV oil-filled voltage transformers	-68440	3	EA	$ 23,000.00	$ 69,000.00
	15	115-kV oil-filled 1200:5 MR current transformers	-68440	3	EA	$ 22,000.00	$ 66,000.00
	16	**Construct Transmission Line**	-68440	5	MILES	$ 610,000.00	$ 3,050,000.00
		115-kV, steel single-pole towers, 556.5 AWG,					
		26/7 ACSR conductor					
		Sheet Subtotal =					**$ 6,101,000.00**

QUANTITIES		PRICES	
BY Doug Crawford	**CHECKED** Lisa Gamuciello	**BY** Dan Mar DM	**CHECKED** 8/13/08
DATE PREPARED May 28, 2008	**PEER REVIEW** George Girgis	**DATE PREPARED** August 5, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Discharge Line to Reservoir

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP | **ESTIMATE LEVEL:** Appraisal
REGION PN | **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Discharge Line					
		Discharge line quantities are from PP yard to outlet.					
		Discharge line piping through dam covered by 8410					
		Discharge line outlet: El. 1610, right abutment					
		Earthwork					
	1	Clearing and Grubbing (150 ft wide along discharge line)	8140	77,000	SY	$ 1.20	$ 92,400.00
		(150 ft wide along discharge line, includes under dam)					
		Earthwork for Discharge Pipe					
		Price Alternative 2. Alternative 1 for reference only.					
		Alternative 1 - Payline Quantities - Vertical Trench Walls					
		Common Excavation for pipe	8140	15,000	CY		
		Rock Excavation for pipe - (drill and shoot)	8140	46,000	CY		
		Backfill for pipe	8140	38,000	CY		
		Soil Cement Slurry (CLSM)	8140	7,000	CY		
		Alternative 2 - Takeoff Quantities - 1-1/2:1 Trench Walls					
	2	Common Excavation for pipe	8140	63,000	CY	$ 6.00	$ 378,000.00
	3	Rock Excavation for pipe - (drill and shoot)	8140	188,000	CY	$ 23.00	$ 4,324,000.00
	4	Backfill for pipe	8140	220,000	CY	$ 6.00	$ 1,320,000.00
	5	Soil Cement Slurry (CLSM)	8140	20,000	CY	$ 110.00	$ 2,200,000.00
		Earthwork for Conduit under dam - 1/2:1 Trench Walls					
	6	Common Excavation for conduit	8140	7,000	CY	$ 13.00	$ 91,000.00
	7	Rock Excavation for conduit - (drill and shoot)	8140	60,000	CY	$ 31.00	$ 1,860,000.00
	8	Mass Concrete	8140	53,000	CY	$ 660.00	$ 34,980,000.00
		(See Access Conduit for conduit lining)					
		120-inch Diameter Steel Pipe - ASTM A139 Gr C					
		(Mortar lined w/ flexible coating)					
	9	120 pipe thickness = 0.5000 (644 lb/ft steel weight)	8140	1,730	LF	$ 1,800.00	$ 3,114,000.00
	10	120 pipe thickness = 0.5625 (724 lb/ft steel weight)	8140	600	LF	$ 2,000.00	$ 1,200,000.00
	11	120 pipe thickness = 0.625 (805 lb/ft steel weight)	8140	500	LF	$ 2,200.00	$ 1,100,000.00
	12	120 pipe thickness = 0.6875 (886 lb/ft steel weight)	8140	300	LF	$ 2,400.00	$ 720,000.00
	13	120 pipe thickness = 0.75 (967 lb/ft steel weight)	8140	300	LF	$ 2,700.00	$ 810,000.00
	14	120 pipe thickness = 0.8125 (1048 lb/ft steel weight)	8140	400	LF	$ 2,900.00	$ 1,160,000.00
	15	120 pipe thickness = 0.875 (1130 lb/ft steel weight)	8140	400	LF	$ 3,100.00	$ 1,240,000.00
	16a	**Cathodic protection for pipeline**	8140	1	LS	$ 69,000.00	$ 69,000.00
	16b	**120"x120"x120" Tee for buried manhole**	8140	1	EA	$ 120,000.00	$ 120,000.00
		Sheet Subtotal =					**$ 54,778,400.00**

QUANTITIES		PRICES	
BY Anne Pavol	**CHECKED** Kevin Atwater	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED June 16, 2008	**PEER REVIEW** Tedd Calhoun	**DATE PREPARED** August 5, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Discharge Line to Reservoir

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[081108 - Wymer - MPH Total Est.xls]Discharge (28-33)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		SH821 Detour for open cut discharge line					
	17	Remove and Replace Concrete Asphalt on SH821	8140	135	ton	$ 120.00	$ 16,200.00
	18	Remove and Replace Aggregate base on SH821	8140	250	ton	$ 55.00	$ 13,750.00
	19	Compacted Embankment	8140	6,900	CY	$ 20.00	$ 138,000.00
	20	Concrete Asphalt for detour	8140	630	ton	$ 120.00	$ 75,600.00
	21	Aggregate base for detour	8140	1,150	ton	$ 55.00	$ 63,250.00
	22	Concrete Jersey Barriers	8140	200	LF	$ 110.00	$ 22,000.00
	23	Detour signage	8140	1	LS	$ 77,000.00	$ 77,000.00
	24	Detour removal	8140	1	LS	$ 44,000.00	$ 44,000.00
		Discharge Line Outlet Structure					
	25	Excavation of common materials for structures (2:1)	8140	960	CY	$ 17.00	$ 16,320.00
	26	Backfill (2:1)	8140	700	CY	$ 15.00	$ 10,500.00
	27	Compacted Backfill (2:1)	8140	700	CY	$ 11.00	$ 7,700.00
	28	Embankment	8140	790	CY	$ 17.00	$ 13,430.00
	29	Compacted Embankment	8140	790	CY	$ 8.00	$ 6,320.00
	30	Riprap (d50=24") (120 lb/cf)	8140	1,100	TONS	$ 77.00	$ 84,700.00
	31	Riprap Bedding (130 lb/cf)	8140	450	TONS	$ 55.00	$ 24,750.00
	32	Furnish, form, and place reinforced concrete	8140	240	CY	$ 1,200.00	$ 288,000.00
	33	Furnish and place concrete reinforcement.	8140	29,000	LBS	$ 2.00	$ 58,000.00
		Assume 120 #/CY					
	34	Furnish and handle cement (.282T/CY)	8140	60	TONS	$ 220.00	$ 13,200.00
		Discharge Line Outlet Chute					
	35	Excavation of common materials for structures (2:1)	8140	16,000	CY	$ 9.00	$ 144,000.00
	36	Backfill (2:1)	8140	3,600	CY	$ 14.00	$ 50,400.00
	37	Compacted Backfill (2:1)	8140	3,600	CY	$ 9.00	$ 32,400.00
	38	Embankment (chute crosses swale)	8140	44,000	CY	$ 10.00	$ 440,000.00
	39	Compacted Embankment (chute crosses swale)	8140	44,000	CY	$ 4.00	$ 176,000.00
	40	Riprap (d50=24") (120 lb/cf)	8140	8,300	TONS	$ 69.00	$ 572,700.00
	41	Riprap Bedding (130 lb/cf)	8140	3,700	TONS	$ 50.00	$ 185,000.00
	42	Furnish, form, and place reinforced concrete	8140	1,550	CY	$ 1,000.00	$ 1,550,000.00
	43	Furnish and place concrete reinforcement.	8140	185,000	LBS	$ 2.00	$ 370,000.00
		Assume 120 #/CY					
	44	Furnish and handle cement (.282T/CY)	8140	430	TONS	$ 190.00	$ 81,700.00
		Sheet Subtotal =					**$ 4,574,920.00**

QUANTITIES		PRICES	
BY Anne Pavol	**CHECKED** Joe Gemperline/ K. A. Sayer	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED May 1, 2007	**PEER REVIEW** David K. Edwards	**DATE PREPARED** August 11, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Discharge Line
Access conduit

Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[082508 - Wymer - MPH Total Est.xls]Discharge (28-33)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	45	**Concrete**	8130				
		Concrete in access house (18 x 18 x 1 foot walls)		60	CY	$ 1,400.00	$ 84,000.00
		Concrete in access shaft (H = 50')		240	CY	$ 1,300.00	$ 312,000.00
		Concrete in Gate Chamber (20 ft dia.)		210	CY	$ 1,200.00	$ 252,000.00
		Concrete in access conduit (L =440)		1,980	CY	$ 900.00	$ 1,782,000.00
		Concrete in pipe saddles		35	CY	$ 1,500.00	$ 52,500.00
		(concrete total)		2,525			
	46	Furnish and place concrete reinforcement.					
		Assume 180 #/CY		454,500	LBS	$ 2.00	$ 909,000.00
	47	Furnish and handle cement (.282T/CY)		712	TONS	$ 190.00	$ 135,280.00
	48	Waste Excess Material from Discharge & Road Exc near Dam					
		Assume local waste at dam.					
		Quantities include 1/2 discharge, Outlet Chute, Access Roads.					
		Waste rock excavation	8120	116,000	CY	$ 10.00	$ 1,160,000.00
		Waste common material	8120	0	CY		
	49	Borrow Material for Discharge & Access Roads near Dam					
		Assume 1 way haul of 3 miles.					
		Quantities include 1/2 discharge, Outlet Chute, Access Roads.					
		Borrow Riprap	8120	0	CY		
		Borrow Common	8120	93,000	CY	$ 9.00	$ 837,000.00
		Sheet Subtotal =					**$ 5,523,780.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Doug Stanton (8130), Dick LaFond (8120)	Jason Schneider (8130), Brian Goplen (8120)	Jerry Zander	
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
June 16, 2008		August 25, 2008	DLO for DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Discharge Line to Reservoir

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
	50	Heating and Ventilating System for Discharge	8410	1	L.S.	$ 90,000.00	$ 90,000.00
		Line Valve Access Tunnel:					
		Consists of:					
		2 - Electric unit heater; 7.5 kw					
		1 - Centrifugal fan; 750 cfm					
		1 - Propeller fan; 2400 cfm					
		1 - Axial fan: 5,000 cfm					
		550 ft. Oval steel duct; 38-inch x 16-inch; galvanized					
		2 - Control damper; 60-inch by 60-inch; motor-operated					
		2 - Control damper; 32-inch by 32-inch; motor-operated					
		2 - 60-inch by 60-inch stationary louver					
		2 - 32-inch by 32-inch stationary louver					
	51	Ventilating System for Flowmeter Vault:	8410	1	L.S.	$ 7,200.00	$ 7,200.00
		Consists of:					
		1 - Centrifugal fan, 450 cfm					
		25 ft. carbon steel pipe and fittings, 8-inch dia., galv.					
	52	Ventilating System for Air Chamber	8410	1	L.S.	$ 30,000.00	$ 30,000.00
		Structure:					
		Consists of:					
		1 - Centrifugal fan, 4000 cfm					
		50 ft. carbon steel pipe and fittings, 18-inch dia., galv.					
	53	Ultrasonic flowmeter, 2-path	8410	1	L.S.	$ 110,000.00	$ 110,000.00
	54	Bulkhead gate (13' x 13'), bulkhead gate frame	8410	39,000	LBS	$ 7.00	$ 273,000.00
		and guides above frame (steel)					
		Sheet Subtotal =					**$ 510,200.00**

QUANTITIES		PRICES	
BY: J. Grass / P. Schlein R. Christensen	CHECKED Rick Christensen	BY Dan Mar	CHECKED 8/13/08
DATE PREPARED: 4/28/07, 6/16/08	PEER REVIEW	DATE PREPARED August 5, 2008	PEER REVIEW DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Discharge Line to Reservoir

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[082508 - Wymer - MPH Total Est.xls]Discharge (28-33)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical					
		Discharge/Isolation Valve					
	55	96-inch dia. Motor-operated Slide gate					
		(for Discharge manifold outlet into the					
		reservoir. Pressure on downstream side of gate)					
		Differential head = 132 feet					
		Slide gate frame, slide, and stem: 25,000 #					
		Motor operator: 1,800 #	8420	26,800	LBS	$ 11.00	$ 294,800.00
		Steel Pipe: Sta. 49+00 to Sta. 53+70 (End of Discharge Pipe)					
	56	120-inch ID, 7/16-inch wall, 564 lb/ft	8420	470	LF	$ 1,700.00	$ 799,000.00
	57	14-inch OD steel pipe for filling line					
		(1/4-inch wall, 38 lb per lin. ft.)	8420	20	LF	$ 120.00	$ 2,400.00
		Valves					
	58	AWWA Class 150, manually operated butterfly valves (for filling line):					
		2 -14" Diameter valves, 400 lbs. per valve.	8420	800	LBS	$ 18.00	$ 14,400.00
		Sheet Subtotal =					**$ 1,110,600.00**

QUANTITIES		PRICES	
BY R. Frisz 6/5/08	CHECKED R. Zelenka 6/5/08	BY Jerry Zander	CHECKED
DATE PREPARED June 4, 2008	PEER REVIEW R. Zelenka 6/5/08	DATE PREPARED August 25, 2008	PEER REVIEW DCD For DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Discharge Line to Reservoir

Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		ELECTRICAL					
		Access Shaft/Gate Chamber Structure					
		Bldg Electrical Service Equipment (F&I)	8430				
	59	Distribution panelboard, indoor type		1	EA	$ 13,000.00	$ 13,000.00
		480 volts, 3-phase with 225 ampere bus					
	60	Transformer load center		1	EA	$ 10,000.00	$ 10,000.00
		15 kVA, 1-phase, 480-240/120 volt					
		Combination Motor Starters (F&I)	8430				
	61	NEMA size 2 reversing contactor, 480V, 3-phase		1	EA	$ 6,000.00	$ 6,000.00
		480-120 volt control transformer					
		NEMA type 4 enclosure					
		Lighting System (F&I)	8430				
	62	120 volt, fluorescent NEMA type 4 fixtures for		1	LS	$ 6,000.00	$ 6,000.00
		tower/gate chamber					
		Assumptions:					
		Bringing power to dam is part of unlisted items					
		Sheet Subtotal =					**$ 35,000.00**

QUANTITIES		PRICES	
BY Mike Schuh	**CHECKED** Lisa Gamuciello	**BY** Dan Mar DM	**CHECKED** 8/13/08
DATE PREPARED April 25, 2007	**PEER REVIEW** George Girgis	**DATE PREPARED** August 5, 2008	**PEER REVIEW** VLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Dam and Dike
Concrete-Faced Rockfill Dam

Dam Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP
ESTIMATE LEVEL: Appraisal
REGION PN
PRICE LEVEL: Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		GENERAL SITEWORK	8312				
		Assume no clearing and grubbing required					
		Assume road improvements and haul roads are part of unlisted items					
		DIVERSION & DEWATERING	8312				
		Given shallow alluvium & narrow valley, dewatering assumed to be minor (part of unlisted items)					
		FOUNDATION EXCAVATION					
		Assume common material stockpiled for reuse in misc. fill, haul roads, and similar					
		Assume rock material stockpiled for use (zone 4)					
		Stockpiles will be located within 1/2 mile of dam					
	1	Excavation, stripping, of dam foundation	8312	110,000	CY	$ 3.00	$ 330,000.00
		Assume depth of stripping 12 inches or less					
		Assume stripping will be stockpiled for topsoil use					
	2	Excavation, common, for dam foundation	8312	4,300,000	CY	$ 6.00	$ 25,800,000.00
		Assume about 45% of volume requires ripping					
		Assume suitable materials will be stockpiled for use as miscellaneous fill					
	3	Excavation, rock, for dam foundation	8312	75,000	CY	$ 30.00	$ 2,250,000.00
		Assume drill and blast in areas along plinth					
		FOUNDATION TREATMENT					
		Includes misc. surface foundation treatment, consolidation grouting, and curtain grouting					
	4	Slush grouting of foundation surface	8312	48,000	SF	$ 7.00	$ 336,000.00
		Over assumed 40% of plinth area					
	5	Dental concrete	8312	5,000	CY	$ 240.00	$ 1,200,000.00
	6	Furnish/place zone 2 sand filter on foundation	8312	35,000	CY	$ 60.00	$ 2,100,000.00
		Over assumed 20% of area between u/s toe and axis					
		Assume a 3-ft thickness above & below zone 3					
	7	Furnish/place zone 3 gravel drain on foundation	8312	35,000	CY	$ 48.00	$ 1,680,000.00
		Between the zone 2 filters in a 3-ft thickness					
		Sheet Subtotal =					**$ 33,696,000.00**

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** Jerry Zandel	**CHECKED** 8/13/08
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 5, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Dam and Dike
Concrete-Faced Rockfill Dam

Dam Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		FOUNDATION TREATMENT (continued)					
		Consolidation Grouting of Foundation					
		Generally limited to area beneath plinth					
	8	Setups for drilling grout holes	8312	2,700	EA	$ 120.00	$ 324,000.00
		Assume 2-inch dia. drilled on 7.5-foot centers					
	9	Drill grout holes	8312	160,000	LF	$ 36.00	$ 5,760,000.00
		Assume 2-inch dia. w/length= 60 feet					
	10	Hookups to grout holes	8312	2,700	EA	$ 72.00	$ 194,400.00
	11	Pressure grout	8312	480,000	CF	$ 12.00	$ 5,760,000.00
		Assume grouting process only minus cement					
		Assume 3 CF per 1 LF of hole					
	12	Furnish and handle cement for pressure grouting	8312	480,000	BAGS	$ 11.00	$ 5,280,000.00
		Assume 1 bag per CF					
		Curtain Grouting of Foundation					
		Three-row curtain beneath plinth					
	13	Setups for drilling grout holes	8312	**1,200**	EA	$ 120.00	$ 144,000.00
		Assume 3 rows of 2-inch dia.on 10-ft centers					
	14	Drill grout holes	8312	**300,000**	LF	$ 36.00	$ 10,800,000.00
		Assume 2-inch dia. w/length from 75 to 300 feet,					
		with average of 250 feet					
	15	Hookups to grout holes	8312	**1,200**	EA	$ 72.00	$ 86,400.00
	16	Pressure grout	8312	**900,000**	CF	$ 12.00	$ 10,800,000.00
		Assume grouting process only minus cement					
		Assume 3 CF per 1 LF of hole					
	17	Furnish and handle cement for pressure grouting	8312	**900,000**	BAGS	$ 11.00	$ 9,900,000.00
		Sheet Subtotal =					**$ 49,048,800.00**

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** #3 Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 5, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Dam and Dike
Concrete-Faced Rockfill Dam

Dam Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		EMBANKMENT CONSTRUCTION					
		Items are set up as furnish and place, which would include purchasing from commercial sites, processing onsite, development of quarry, or transporting from stockpiles of required excavation					
	18	Furnish and place zone 1	8312	**400,000**	CY	$ 12.00	$ 4,800,000.00
		Consists of selected impervious soils stockpiled from reqd exc within 3 miles of dam					
		Compaction to 6-inch lifts by tamping roller					
	19	Furnish and place zone 2 filter	8312	**535,000**	CY	$ 48.00	$ 25,680,000.00
		Sand/gravel material processed commercially or developed onsite					
		If commercial, assume 23 mile one-way haul					
		Compacted to 12-inch layers by vibratory steel drum					
		Assume horizontal width of 20 ft					
		Includes an upstream and downstream zone					
	20	Furnish and place zone 3 drain	8312	**530,000**	CY	$ 47.00	$ 24,910,000.00
		Gravel/cobble material processed commercially or developed onsite					
		If commercial, assume 23 mile one-way haul					
		Compacted to 12-inch layers by vibratory steel drum					
		Assume horizontal width of 20 ft					
	21	Furnish and place zone 4 rockfill	8312	**10,900,000**	CY	$ 12.00	$ 130,800,000.00
		Developed from basalt ridges surrounding reservoir					
		Assume average 3-mile haul to dam					
		Rock sizes up to 3-foot					
		Compacted in 3-ft layers by vibratory steel drum					
	22	Furnish and place miscellaneous fill	8312	**3,650,000**	CY	$ 8.00	$ 29,200,000.00
		Comes from stockpiles of required excavation within 1/2 mile of dam					
		Generally consists of gravelly soils					
		Compacted in 2-ft layers by vibratory steel drum					
		Sheet Subtotal =					**$ 215,390,000.00**

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** #7 Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 5, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Dam and Dike
Concrete-Faced Rockfill Dam

Dam Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		CONCRETE FACE & PLINTH CONSTRUCTION					
		Plinth					
		Typical thickness will be 1.5 feet					
		Width will range from 10 to 45 feet, assume 30 ft					
		Grouted anchors may be needed in poor rock areas					
	23	Furnish and place reinforced concrete in plinth	8312	**9,000**	CY	$ 660.00	$ 5,940,000.00
	24	Furnish and place concrete reinforcement (100#/CY)	8312	**900,000**	LBS	$ 2.00	$ 1,800,000.00
	25	Furnish and handle cement for concrete (.282T/CY)	8312	**2,600**	TONS	$ 140.00	$ 364,000.00
	26	Furnish and install grouted anchors	8312	**86,000**	LF	$ 31.00	$ 2,666,000.00
		Assume 1-inch diameter rebar grouted into rock					
		Assume 15-foot lengths					
		Concrete Deck					
		Thickness will average 2 feet					
		Adjacent panels will have waterstops and dowels					
		Concrete paved on 1.5:1 upstream face of dam					
	27	Furnish and place reinforced concrete in deck	8312	**170,000**	CY	$ 600.00	$ 102,000,000.00
	28	Furnish and place concrete reinforcement (100#/CY)	8312	**17,000,000**	LBS	$ 2.00	$ 34,000,000.00
	29	Furnish and handle cement for concrete (.282T/CY)	8312	**48,000**	TONS	$ 140.00	$ 6,720,000.00
		MISCELLANEOUS					
		Instrumentation					
		Assume part of unlisted items					
		Toe Drains					
		Assume part of unlisted items					
		Site cleanup and relandscaping					
		Assume part of unlisted items					
		Sheet Subtotal =					**$ 153,490,000.00**

QUANTITIES

BY	CHECKED
Chris Strickland	Bill Engemoen
DATE PREPARED	**PEER REVIEW**
June 12, 2008	Bill Engemoen

PRICES

BY	CHECKED
Jerry Zander	8/13/08
DATE PREPARED	**PEER REVIEW**
August 5, 2008	DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Dam and Dike
Central Core Rockfill Dike

Dike Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		GENERAL SITEWORK					
		Assume no clearing and grubbing required					
		Assume road improvements and haul roads are					
		part of unlisted items					
		DIVERSION & DEWATERING					
		Assume groundwater is below excavation					
		Assume natural stream beds in area are dry					
		FOUNDATION EXCAVATION					
		Assume common material stockpiled for reuse					
		Assume rock material stockpiled for reuse					
		Stockpiles will be located within 1/2 mile of dam					
	30	Excavation, stripping, of dam foundation	8312	**45,000**	CY	$ 5.00	$ 225,000.00
		Assume depth of stripping 12 inches or less					
		Assume stripping will be stockpiled for topsoil use					
	31	Excavation, common, for dam foundation	8312	**1,670,000**	CY	$ 6.00	$ 10,020,000.00
		Assume about 45% of volume requires ripping					
		Assume suitable materials will be stockpiled					
		for use as miscellaneous fill					
	32	Excavation, rock, for dam foundation	8312	**5,000**	CY	$ 58.00	$ 290,000.00
		Assume drill and blast in random locations					
		FOUNDATION TREATMENT					
		Includes misc. foundation surface treatment,					
		consolidation grouting, and curtain grouting					
		Miscellaneous Foundation Areas					
		Applied in areas of poor quality rock					
	33	Slush grouting of foundation surface	8312	**48,000**	SF	$ 7.00	$ 336,000.00
		Over assumed 40% of area beneath zone 1					
	34	Dental concrete	8312	**5,000**	CY	$ 240.00	$ 1,200,000.00
	35	Furnish/place zone 2 sand filter on foundation	8312	**40,000**	CY	$ 60.00	$ 2,400,000.00
		Over 50% of area between zone 1 and d/s toe					
		Assume a 3-ft thickness above and below zone 3					
	36	Furnish/place zone 3 gravel drain on foundation	8312	**40,000**	CY	$ 48.00	$ 1,920,000.00
		Between the zone 2 filters in a 3-ft thickness					
		Sheet Subtotal =					**$ 16,391,000.00**

QUANTITIES		PRICES	
BY: Chris Strickland	CHECKED: Bill Engemoen	BY: Jerry Zander	CHECKED: 8/12/08
DATE PREPARED: June 12, 2008	PEER REVIEW: Bill Engemoen	DATE PREPARED: August 5, 2008	PEER REVIEW: DLA

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Dam and Dike
Central Core Rockfill Dike

Dike Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP | **ESTIMATE LEVEL:** Appraisal
REGION PN | **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[081208 - Wymer - MPH Total Est.xls]Diversion (53-56)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		FOUNDATION TREATMENT (continued)					
		Consolidation Grouting of Foundation					
		Generally limited to area beneath zone 1					
	37	Setups for drilling grout holes	8312	**2,900**	EA	$ 110.00	$ 319,000.00
		Assume 2-inch dia. drilled on 7.5-foot centers					
	38	Drill grout holes	8312	**145,000**	LF	$ 35.00	$ 5,075,000.00
		Assume 2-inch dia. w/length= 50 feet					
	39	Hookups to grout holes	8312	**2,900**	EA	$ 70.00	$ 203,000.00
	40	Pressure grout	8312	**435,000**	CF	$ 11.00	$ 4,785,000.00
		Assume grouting process only minus cement					
		Assume 3 CF per 1 LF of hole					
	41	Furnish and handle cement for pressure grouting	8312	**435,000**	BAGS	$ 11.00	$ 4,785,000.00
		Assume 1 bag per CF					
		Curtain Grouting of Foundation					
		Three-row curtain beneath zone 1					
	42	Setups for drilling grout holes	8312	**810**	EA	$ 115.00	$ 93,150.00
		Assume 3-rows of 2-inch dia.on 10-ft centers					
	43	Drill grout holes	8312	**120,000**	LF	$ 35.00	$ 4,200,000.00
		Assume 2-inch dia. w/length from 60 to 200 feet,					
		with an average of 150 feet					
	44	Hookups to grout holes	8312	**810**	EA	$ 70.00	$ 56,700.00
	45	Pressure grout	8312	**360,000**	CF	$ 12.00	$ 4,320,000.00
		Assume grouting process only minus cement					
		Assume 3 CF per 1 LF of hole					
	46	Furnish and handle cement for pressure grouting	8312	**360,000**	BAGS	$ 11.00	$ 3,960,000.00
		Assume 1 bag per CF					
		Sheet Subtotal =					**$ 27,796,850.00**

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 12, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Dam and Dike
Central Core Rockfill Dike

Dike Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		EMBANKMENT CONSTRUCTION					
		Items are set up as furnish and place, which would include purchasing from commercial sites, processing onsite, development of quarry, or transporting from stockpiles of required excavation					
	47	Furnish and place zone 1 core	8312	**515,000**	CY	$ 16.00	$ 8,240,000.00
		Acquired from source 10 miles from dam					
		Compacted to 6-inch lifts by tamping roller					
	48	Furnish and place zone 2 filter	8312	**425,000**	CY	$ 49.00	$ 20,825,000.00
		Sand/gravel material processed commercially or developed onsite					
		If commercial, assume 23 mile one-way haul					
		Compacted to 12-inch layers by vibratory steel drum					
		Assume horizontal width of 20 ft					
		Includes both an upstream and downstream zone					
	49	Furnish and place zone 3 drain	8312	**210,000**	CY	$ 48.00	$ 10,080,000.00
		Gravel/cobble material processed commercially or developed onsite					
		If commercial, assume 23 mile one-way haul					
		Compacted to 12-inch layers by vibratory steel drum					
		Assume horizontal width of 20 ft					
	50	Furnish and place zone 4 rockfill	8312	**2,000,000**	CY	$ 14.00	$ 28,000,000.00
		Developed from basalt ridges surrounding reservoir					
		Assume average 3-mile haul to dam					
		Rock sizes up to 3-foot					
		Compacted in 3-ft layers by vibratory steel drum					
	51	Furnish and place miscellaneous fill	8312	**500,000**	CY	$ 8.00	$ 4,000,000.00
		Comes from stockpiles of required excavation within 1/2 mile of dam					
		Generally consists of gravelly soils					
		Compacted in 2-ft layers by vibratory steel drum					
		Sheet Subtotal =					**$ 71,145,000.00**

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED** 8/14/08
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 5, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Dam and Dike
Central Core Rockfill Dike

Dike Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		MISCELLANEOUS					
		Instrumentation					
		Assume part of unlisted items					
		Toe Drains					
		Assume part of unlisted items					
		Site cleanup and relandscaping					
		Assume part of unlisted items					
		Sheet Subtotal =					$ -

QUANTITIES

BY	CHECKED
Chris Strickland	Bill Engemoen
DATE PREPARED	**PEER REVIEW**
June 12, 2008	Bill Engemoen

PRICES

BY	CHECKED
Jerry Zander	
DATE PREPARED	**PEER REVIEW**
August 5, 2008	

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Spillway and Outlet Works
Spillway

Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[082508 - Wymer - MPH Total Est.xls]Spillway & Outlet Wks (42-52)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Uncontrolled Spillway (no gates)					
		Located on left abutment with crest at El. 1730					
		Earthwork	8130				
	1	Common excavation		728,000	CY	$ 7.00	$ 5,096,000.00
	2	Rock excavation (drill and blast)		189,000	CY	$ 28.00	$ 5,292,000.00
	3	Pervious backfill behind chute walls		5,200	CY	$ 24.00	$ 124,800.00
	4	Misc backfill behind chute walls		19,500	CY	$ 17.00	$ 331,500.00
	5	Riprap inlet structure		2,600	CY	$ 60.00	$ 156,000.00
	6	Bedding for riprap inlet structure		1,400	CY	$ 48.00	$ 67,200.00
	7	Riprap for stilling basin		1,700	CY	$ 60.00	$ 102,000.00
	8	Bedding for riprap stilling basin		1,000	CY	$ 48.00	$ 48,000.00
		Concrete	8130				
	9	Concrete in Inlet structure		1,100	CY	$ 1,100.00	$ 1,210,000.00
	10	Concrete in Crest structure		1,500	CY	$ 1,100.00	$ 1,650,000.00
	11	Concrete in Chute		18,900	CY	$ 850.00	$ 16,065,000.00
	12	Concrete in Stilling Basin structure		1,900	CY	$ 1,100.00	$ 2,090,000.00
	13	Furnish and place concrete reinforcement.		374,400	LBS	$ 2.00	$ 748,800.00
		Assume 160 #/CY					
	14	Furnish and handle cement (.282T/CY)		6,600	TONS	$ 140.00	$ 924,000.00
		Drains - Furnish and install	8130				
	15	6-inch dia PVC perf. And non perf. (90% perf.)		20,800	LF	$ 8.00	$ 166,400.00
	16	Furnish and install sand for drains		6,000	CY	$ 37.00	$ 222,000.00
	17	Furnish and install gravel for drains		5,200	CY	$ 37.00	$ 192,400.00
	18	Furnish and install 2-inch rigid insulation		169,000	SF	$ 3.00	$ 507,000.00
	19	Furnish and install 9-inch waterstops - spillway joints	8130	19,500	LF	$ 11.00	$ 214,500.00
	20	Drill and grout anchor bars	8130	460	EA	$ 220.00	$ 101,200.00
		(Total length of rock drilling= 1,850 feet)					
	21	Reinforcement for anchor bars	8130	11,700	LBS	$ 2.00	$ 23,400.00
	22	Furnish and install 48-inch chain link fencing	8130	8,200	LF	$ 24.00	$ 196,800.00
		for spillway					
		Sheet Subtotal =					**$ 35,529,000.00**

QUANTITIES		PRICES	
BY Doug Stanton	**CHECKED** Jason Schneider	**BY** Jerry Zander	**CHECKED**
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED** August 25, 2008	**PEER REVIEW** DCD for DLK

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Spillway and Outlet Works
Access Bridge across Spillway (upstream)

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[081208 - Wymer - MPH Total Est.xls]Spillway & Outlet Wks (42-52)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Access Bridge across Spillway (upstream)	86-8140				
	23	Furnish and install WSDOT W42G prestressed, concrete girders, L = 65 feet		5	Each	$ 9,700.00	$ 48,500.00
	24	Furnish and place reinforced concrete for deck, F-shape barriers & diaphragms, f'c = 4,000 psi (deck slab is 7.5 inch thick)		60	CY	$ 2,200.00	$ 132,000.00
	25	Furnish and handle cement material		17	Tons	$ 140.00	$ 2,380.00
	26	Furnish and install epoxy coated reinforcing steel Fy = 60,000 psi		15,000	LBS	$ 2.00	$ 30,000.00
	27	Furnish and install elastomeric bearing pads, (3" x 1'-6" x 2'-0"), total # = 10		30	SF	$ 340.00	$ 10,200.00
	28	Furnish and install compression seals, DS Brown CV-35 or Watson Bowman WA-350 elastomeric joint seals at ends of bridge		54	LF	$ 60.00	$ 3,240.00
		Deck drains (2 per side)					
	29	R-4005-A2 as manufactured by NEENAH Foundry or equal. Each one weighs~ 105 lbs		4	EA	$ 630.00	$ 2,520.00
	30	8-inch diameter black steel pipe, each L = 4'		16	LF	$ 180.00	$ 2,880.00
		Bridge is 65 feet long, with a 24-foot clear width. The bridge spans the spillway walls, which are 60-feet apart. The bridge superstructure will be supported on bearing seats, formed onto the spillway walls. Therefore, no foundation elements are included in this estimate worksheet. The bridge is located near the left abutment. The dam crest will be gravel surfaced. Chain link fence is required along the length of the spillway, so it is not included here. No approach guardrail is included in this estimate (see roadwork estimate). Water treatment for deck drainage is not included in this estimate.					
		Sheet Subtotal =					**$ 231,720.00**

QUANTITIES		**PRICES**	
BY Jesus G. Romero, PE	**CHECKED** Anne C. Pavol, PE	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED June 17, 2008	**PEER REVIEW** Tedd Calhoun, PE	**DATE PREPARED** August 12, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Spillway and Outlet Works
Access Bridge across Spillway (to access outlet works control house)
Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[081208 - Wymer - MPH Total Est.xls]Spillway & Outlet Wks (42-52)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Bridge over 60-foot wide trapezoidal channel, with 2:1	86-8140				
		side slopes. Flow in channel is 12,000 cfs					
	31	Furnish and install WSDOT W53DG prestressed,					
		concrete bulb tee girders, L = 96 feet		7	Each	$ 9,700.00	$ 67,900.00
	32	Furnish and place 3-inch thick concrete overlay,					
		approach slabs, F-shape barriers, diaphragms,		520	CY	$ 2,200.00	$ 1,144,000.00
		abutments & wingwalls, f'c = 4,000 psi					
	33	Furnish and handle cement material		150	Tons	$ 140.00	$ 21,000.00
	34	Furnish and install epoxy coated reinforcing steel					
		Fy = 60,000 psi		80,000	LBS	$ 2.00	$ 160,000.00
	35	Furnish and install elastomeric bearing pads,					
		(3" x 2'-0" x 2'-0"), total # = 14		56	SF	$ 340.00	$ 19,040.00
	36	Furnish and install compression seals, DS Brown		0	LF	$ -	$ -
		CV-35 or Watson Bowman WA-350 elastomeric					
		Deck drains (3 per side)					
		R-4005-A2 as manufactured by NEENAH					
	37	Foundry or equal. Each one weighs~ 105 lbs		6	EA	$ 630.00	$ 3,780.00
	38	8-inch diameter black steel pipe, each L = 4'		24	LF	$ 180.00	$ 4,320.00
	38b	Approach guardrail, 75-foot per side, 4 sides		300	LF	$ 80.00	$ 24,000.00
		Bridge is 96 feet long, with a 40-foot clear width. The					
		bridge spans over the spillway channel, which has a					
		60-foot bottom width and 2:1 side slopes. The					
		bridge superstructure is supported on reinforced					
		concrete abutments. 25-foot long approach slabs					
		are required.					
		The bridge is located downstream of the reservoir,					
		and carries SR281 (two12-foot lanes and two 8-foot					
		shoulders result in a 40-foot clear width).					
		Water treatment for deck drainage is not included					
		in this estimate.					
		Sheet Subtotal =					**$ 1,444,040.00**

QUANTITIES

BY	CHECKED
Jesus G. Romero, PE	Anne C. Pavol, PE
DATE PREPARED	**PEER REVIEW**
June 17, 2008	Tedd Calhoun, PE

PRICES

BY	CHECKED
Jerry Zander	8/13/08
DATE PREPARED	**PEER REVIEW**
August 12, 2008	DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Spillway and Outlet Works
Outlet Works

Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Earthwork U/S - channel, intake, conduit, portal	8130				
	39	Excavate common materials for structures		500	CY	$ 30.00	$ 15,000.00
	40	Excavate rock materials for structures (drill & shoot)		1,500	CY	$ 53.00	$ 79,500.00
	41	F & P bedding for riprap (processed on-site)		70	CY	$ 48.00	$ 3,360.00
	42	F & P rockfill from dam excavation (riprap)		140	CY	$ 56.00	$ 7,840.00
	43	Furnish and install chain link fabric around portal		1,750	SF	$ 4.00	$ 7,000.00
	44	F&I 18-inch x 1/2 in. dia resin anchors for fabric support		24	EA	$ 60.00	$ 1,440.00
		Earthwork D/S - portal, conduit, house, stilling basin	8130				
	45	Excavate common materials for structures		1,000	CY	$ 30.00	$ 30,000.00
	46	Excavate rock materials for structures (drill & shoot)		3,000	CY	$ 53.00	$ 159,000.00
	47	Excavate common materials for basin		12,000	CY	$ 10.00	$ 120,000.00
	48	Excavate rock materials for basin (drill & shoot)		4,000	CY	$ 53.00	$ 212,000.00
	49	F & P bedding for riprap (processed on-site)		4,500	CY	$ 31.00	$ 139,500.00
	50	F & P rockfill from dam excavation (riprap)		2,250	CY	$ 54.00	$ 121,500.00
	51	Furnish and install chain link fabric around portal		2,000	SF	$ 4.00	$ 8,000.00
	52	F&I 18-inch x 1/2 in. dia resin anchors for fabric support		30	EA	$ 60.00	$ 1,800.00
		Construct ROW tunnel u/s of gate chamber	8130				
	53	Drill and shoot 13.5-ft O.D.circular shaped u/s tunnel		850	LF	$ 2,400.00	$ 2,040,000.00
	54	Remove and stockpile rock (assume local stockpile)		4,500	CY	$ 23.00	$ 103,500.00
		Furnish, drill and install 750-10-ft long x 1-inch dia.					
	55	A307, 20K rockbolts		5,200	LF	$ 86.00	$ 447,200.00
	56	Furnish and install 6 steel sets (W8 x 40) (full circle)		11,400	LBS	$ 7.00	$ 79,800.00
		Construct ROW tunnel d/s of gate chamber	8130				
	57	Drill and shoot 19-ft OD circular shaped d/s tunnel		1,200	LF	$ 3,400.00	$ 4,080,000.00
	58	Remove and stockpile rock (assume local stockpile)		13,000	CY	$ 23.00	$ 299,000.00
		Furnish, drill and install 1250-10-ft long x 1-inch dia.					
	59	A307, 20K rockbolts		8,800	LF	$ 86.00	$ 756,800.00
	60	Furnish and install 6 steel sets (W10 x 40) in crown		20,000	LBS	$ 7.00	$ 140,000.00
		Construct Gate chamber					
	61	Drill and shoot 20-ft OD spherical shaped chamber		20	LF	$ 3,600.00	$ 72,000.00
	62	Remove and stockpile rock (assume local stockpile)		340	CY	$ 28.00	$ 9,520.00
		Furnish, drill and install 30-10-ft long x 1-inch dia.					
	63	A307, 20K rockbolts		300	LF	$ 168.00	$ 50,400.00
		Sheet Subtotal =					**$ 8,984,160.00**

QUANTITIES		PRICES	
BY Doug Stanton	**CHECKED** Jason Schneider	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED June 13, 2008	**PEER REVIEW**	**DATE PREPARED** August 5, 2008	**PEER REVIEW** DCR

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Spillway and Outlet Works
Outlet Works

Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: H:\D8170\EST\Spreadsheet\1Black Rock-Wymer\Wymer MPH total est\[082508 - Wymer - MPH Total Est.xls]Spillway & Outlet Wks (42-52)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	63	**Construct Upper Intake Structure**					
	b	FFP reinf. Conc - Upper Intake structure	8130	250	CY	$ 1,300.00	$ 325,000.00
	c	Furnish and place reinforcement (est 200#/CY)		50,000	LBS	$ 2.00	$ 100,000.00
	d	Furnish and handle cement (.282T/CY)		71	Tons	$ 140.00	$ 9,940.00
	e	FFP reinf. Conc (Steel lined) upper intake shaft (L=30')	8130	80	CY	$ 1,300.00	$ 104,000.00
	f	Furnish and place reinforcement (est 150#/CY)		12,000	LBS	$ 2.00	$ 24,000.00
	g	Furnish and handle cement (.282T/CY)		23	Tons	$ 140.00	$ 3,220.00
		Construct Intake Shaft	8130				
	h	Drill and shoot 13.5-ft OD vertical shaft		30	LF	$ 2,500.00	$ 75,000.00
	i	Remove and stockpile rock (assume local stockpile)		160	CY	$ 28.00	$ 4,480.00
		Furnish, drill and install 12-10-ft long x 1-inch dia.					
	j	A307, 20K rockbolts		120	LF	$ 168.00	$ 20,160.00
		Ring Grout Upper Intake Shaft	8130				
	k	Setups for drilling grout holes (2-in dia holes, 1 ring		1	EA	$ 480.00	$ 480.00
		with 6 holes per ring					
	l	Drill grout holes (2-in dia and L=25 ft)		150	LF	$ 48.00	$ 7,200.00
	m	Hookups to grout holes		6	EA	$ 60.00	$ 360.00
	n	Pressure grout (grouting process only minus cement)		300	CF	$ 18.00	$ 5,400.00
		Assume 2 CF per 1 LF of hole					
	o	Furnish and handle cement for pressure grouting		300	BAGS	$ 19.00	$ 5,700.00
		Assume 1 bag per CF					
		Sheet Subtotal =					**$ 684,940.00**

QUANTITIES

BY	CHECKED
Doug Stanton	Jason Schneider
DATE PREPARED	**PEER REVIEW**
June 13, 2008	

PRICES

BY	CHECKED
Jerry Zander	MC Greg Akin 8/12/08
DATE PREPARED	**PEER REVIEW**
August 26, 2008	Acd for DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Spillway and Outlet Works
Outlet Works

Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Ring Grout Upstream Conduit	8130				
	64	Setups for drilling grout holes (2-in dia holes, 20 ft ctrs,		43	EA	$ 300.00	$ 12,900.00
		and 6 holes per ring)					
	65	Drill grout holes (2-in dia and L=25 ft)		6,450	LF	$ 48.00	$ 309,600.00
	66	Hookups to grout holes		260	EA	$ 60.00	$ 15,600.00
	67	Pressure grout (grouting process only minus cement)		13,000	CF	$ 16.00	$ 208,000.00
		Assume 2 CF per 1 LF of hole					
	68	Furnish and handle cement for pressure grouting		13,000	BAGS	$ 12.00	$ 156,000.00
		Assume 1 bag per CF					
		Ring Grout Gate Chamber	8130				
	69	Setups for drilling grout holes (2-in dia holes, low, mid		3	EA	$ 480.00	$ 1,440.00
		and high rings and 6 holes per ring					
	70	Drill grout holes (2-in dia and L=25 ft)		450	LF	$ 48.00	$ 21,600.00
	71	Hookups to grout holes		18	EA	$ 60.00	$ 1,080.00
	72	Pressure grout (grouting process only minus cement)		900	CF	$ 18.00	$ 16,200.00
		Assume 2 CF per 1 LF of hole					
	73	Furnish and handle cement for pressure grouting		900	BAGS	$ 19.00	$ 17,100.00
		Assume 1 bag per CF					
		Sheet Subtotal =					**$ 759,520.00**

QUANTITIES		PRICES	
BY Doug Stanton	**CHECKED** Jason Schneider	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED June 13, 2008	**PEER REVIEW**	**DATE PREPARED** August 5, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Spillway and Outlet Works
Outlet Works

Civil

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Construct ROW cast in place (CIP) concrete	8130				
	74	Furnish, form, and place reinf. Conc - Intake structure		250	CY	$ 1,300.00	$ 325,000.00
	75	Furnish and place reinforcement (est 200#/CY)		50,000	LBS	$ 2.00	$ 100,000.00
	76	Furnish and handle cement (.282T/CY)		71	TONS	$ 140.00	$ 9,940.00
	77	FFP reinf. Conc - Steel lined U/S conduit (L=50' u/s of tunnel)		375	CY	$ 1,200.00	$ 450,000.00
	78	Furnish and place reinforcement (est 150#/CY)		56,250	LBS	$ 2.00	$ 112,500.00
	79	Furnish and handle cement (.282T/CY)		106	TONS	$ 140.00	$ 14,840.00
	80	FFP reinf. Conc - Steel lined U/S tunnel (L=850')		2,300	CY	$ 1,000.00	$ 2,300,000.00
	81	Furnish and place reinforcement (est 150#/CY)		350,000	LBS	$ 2.00	$ 700,000.00
	82	Furnish and handle cement (.282T/CY)		650	TONS	$ 140.00	$ 91,000.00
	83	FFP reinf. Concrete in gate chamber		180	CY	$ 1,300.00	$ 234,000.00
	84	Furnish and place reinforcement (160#/CY)		29,000	LBS	$ 2.00	$ 58,000.00
	85	Furnish and handle cement (.282T/CY)		51	TONS	$ 140.00	$ 7,140.00
	86	FFP reinf. Concrete - D/S tunnel (L=1200')		5,200	CY	$ 900.00	$ 4,680,000.00
		includes walkway and saddles					
	87	Furnish and place reinforcement (est 150#/CY)		780,000	LBS	$ 2.00	$ 1,560,000.00
	88	Furnish and handle cement (.282T/CY)		1,500	TONS	$ 140.00	$ 210,000.00
	89	FFP reinf. concrete - D/S conduit (L=130 ft d/s of tunnel)		290	CY	$ 1,300.00	$ 377,000.00
		includes walkway and saddles					
	90	Furnish and place reinforcement (est 150#/CY)		43,500	LBS	$ 2.00	$ 87,000.00
	91	Furnish and handle cement (.282T/CY)		82	TONS	$ 140.00	$ 11,480.00
	92	FFP reinf. concrete - D/S access house (30' x 30' x 12' tall)		580	CY	$ 1,100.00	$ 638,000.00
		includes wingwalls					
	93	Furnish and place reinforcement (est 150#/CY)		87,000	LBS	$ 2.00	$ 174,000.00
	94	Furnish and handle cement (.282T/CY)		164	TONS	$ 140.00	$ 22,960.00
	95	Furnish and install 48-inch chain link fencing	8130				
		on wingwalls @ Control House		80	LF	$ 52.00	$ 4,160.00
		Sheet Subtotal =					**$ 12,167,020.00**

QUANTITIES		PRICES	
BY Doug Stanton	CHECKED Jason Schneider	BY Jerry Zander	CHECKED 8/13/08
DATE PREPARED June 13, 2008	PEER REVIEW	DATE PREPARED August 5, 2008	PEER REVIEW DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Spillway and Outlet Works
Outlet Works

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP | **ESTIMATE LEVEL:** Appraisal
REGION PN | **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[081208 - Wymer - MPH Total Est.xls]Spillway & Outlet Wks (42-52)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Mechanical	8410				
	96	Heating and Ventilating Systems for Outlet Works	8410	1	L.S.	$ 190,000.00	$ 190,000.00
		Access Tunnel and Control House:					
		Consists of:					
		2 - Electric unit heater; 7.5 kw					
		1 - Centrifugal fan; 750 cfm					
		1 - Propeller fan; 2400 cfm					
		1 - Axial fan: 6,000 cfm					
		1,900 ft. Oval steel duct; 38-inch x 16-inch, galvanized					
		2 - Control damper; 60-inch by 60-inch; motor-operated					
		2 - Control damper; 32-inch by 32-inch; motor-operated					
		2 - 60-inch by 60-inch stationary louver					
		2 - 32-inch by 32-inch stationary louver					
		Lower Intake					
	97	Trashracks (steel)	8410	32,400	LBS	$ 10.00	$ 324,000.00
	98	Bulkhead gate (13' x 13'), bulkhead gate frame	8410	93,800	LBS	$ 8.00	$ 750,400.00
		and guides above frame (steel)					
		Upper Intake (Not used in most probable estimate)					
	99	Trashracks (steel)	8410	32,400	LBS	$ 10.00	$ 324,000.00
	100	Bulkhead gate (13' x 13'), bulkhead gate frame	8410	86,300	LBS	$ 8.00	$ 690,400.00
		and guides above frame (steel)					
	101	Ultrasonic flowmeter, 2-path	8410	1	L.S.	$ 110,000.00	$ 110,000.00
	102	50 Kw Diesel engine-generator set with 125 gallon	8410	1	L.S.	$ 72,000.00	$ 72,000.00
		fuel tank (assume ConVault)					
		Sheet Subtotal =					**$ 2,460,800.00**

QUANTITIES		PRICES	
BY John Grass Paul Schlein, Rick Christensen	**CHECKED** Rick Christensen / R. Egan	**BY** JZ, DM Jerry Zander, Dan Mar	**CHECKED** 8/13/08
DATE PREPARED 4/28/07, 6/16/08	**PEER REVIEW**	**DATE PREPARED** August 12, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Spillway and Outlet Works
Outlet Works

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Steel Pipe	8420				
	103	114-inch ID steel liner		900	LF	$ 3,200.00	$ 2,880,000.00
		(7/8-inch wall, 1074 lb per lin. ft.)					
	104	102-inch ID steel pipe, Supported on concrete saddles		1,330	LF	$ 1,700.00	$ 2,261,000.00
		(1/2-inch wall, 547 lb per lin. ft.)					
	105	72-inch ID steel pipe, encased in concrete		60	LF	$ 4,700.00	$ 282,000.00
		(3/8-inch wall, 290 lb per lin. ft.)					
	106	30-inch ID steel pipe					
		(1/4-inch wall, 80 lb per lin. ft.)		30	LF	$ 240.00	$ 7,200.00
	107	24-inch ID steel pipe for air vent					
		(1/4-inch wall, 64 lb per lin. ft.)		20	LF	$ 190.00	$ 3,800.00
	108	14-inch ID steel pipe for filling line					
		(1/4-inch wall, 38 lb per lin. ft.)		20	LF	$ 110.00	$ 2,200.00
		Valves					
	109	AWWA Class 250, manually operated butterfly valve (for air vent):					
		1 -24" Diameter valve, 1350 lbs. per valve.		1,350	LBS	$ 10.00	$ 13,500.00
	110	Combination air valve (for air vent to prevent vacuum)					
		1 -24" Diameter valve, 2600 lbs. per valve.		2,600	LBS	$ 12.00	$ 31,200.00
	111	AWWA Class 300, hydraulically operated ball valve:					
		1 -30" Diameter valve, 5900 lbs. per valve.		5,900	LBS	$ 17.00	$ 100,300.00
	112	AWWA Class 250, manually operated (filling line)butterfly valves:					
		2 -14" Diameter valves, 450 lbs. per valve.		900	LBS	$ 12.00	$ 10,800.00
		Sheet Subtotal =					**$ 5,592,000.00**

QUANTITIES		PRICES	
BY R. Frisz	CHECKED R. Zelenka 6/5/08	BY Jerry Zander	CHECKED 8/13/08
DATE PREPARED 6-5-08	PEER REVIEW R. Zelenka 6/5/08	DATE PREPARED August 5, 2008	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Spillway and Outlet Works
Outlet Works

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Gates and Gate Controls					
		Furnish and Install					
		7'x9' Hydraulically-actuated outlet gate					
	113	Head = 367 feet	8420	102,000	LBS	$ 10.00	$ 1,020,000.00
		Two tandem sets 4'x6' hydraulically-actuated outlet gates					
	114	Head = 367 feet	8420	130,000	LBS	$ 11.00	$ 1,430,000.00
		30" Hydraulically-actuated jet-flow gate and stand					
	115	Head = 367 feet	8420	10,000	LBS	$ 12.00	$ 120,000.00
		Hydraulic controls for 7'x9' emergency outlet gate, and					
	116	four 4'x6' outlet gates	8420	3,200	LBS	$ 13.00	$ 41,600.00
	117	Hydraulic controls for 30" jet-flow gate	8420	800	LBS	$ 14.00	$ 11,200.00
		Sheet Subtotal =					**$ 2,622,800.00**

QUANTITIES		PRICES	
BY R. Frisz	**CHECKED** R. Zelenka 6/5/08	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED June 5, 2008	**PEER REVIEW** R. Zelenka 6/5/08	**DATE PREPARED** August 5, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Spillway and Outlet Works
Outlet Works

Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[080408a - Wymer - MPH Total Est 7-2008.xls]Summary 1A - Yakima River

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Electrical					
		Bldg Electrical Service Equipment (F&I)	8430				
	118	600 volt motor control center, 3-phase, 800 amp bus		1	EA	$ 48,000.00	$ 48,000.00
		Four 20 inch wide sections					
		5 NEMA size 1 FVR contactors *					
		Three 100 A, 3-pole molded-case circuit breakers					
	119	Transformer load center	8430	1	EA	$ 22,000.00	$ 22,000.00
		30 kVA, 3-phase, 480-208Y/120 volt					
		Lighting System (F&I)	8430				
	120	120 volt, fluorescent NEMA Type 4 fixtures for control		1	LS	$ 78,000.00	$ 78,000.00
		house, 1900 foot long tunnel, & gate chamber					
		* FVR - Full-voltage reversing					
		Assumptions:					
		Bringing power to dam is part of unlisted items					
		Sheet Subtotal =					**$ 148,000.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY**	**CHECKED**
Mike Schuh	Lisa Gamuciello	Dan Mar	8/13/08
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW**
May 28, 2008	George Girgis	August 5, 2008	DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Diversion During Dam Construction

Geotechnical

PROJECT:
Yakima River Basin Water Storage Study

WOID:	YAKAP	**ESTIMATE LEVEL:**	Appraisal
REGION	PN	**PRICE LEVEL:**	Apr-07

FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est - 2008\[080508a - Wymer - MPH Total Est.xls]Diversion (53-56)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Excavation					
		For Cofferdam					
	1	Common		4,400	CY	$ 24.00	$ 105,600.00
		(assume alluvial soils; no dewatering)					
		Cofferdam					
	2	Embankment fill		171,000	CY	$ 19.00	$ 3,249,000.00
		(assume overburden from dam excavation					
		is used; probably of mix of silts to gravels,					
		placed and compacted in 9-inch lifts)					
	3	Geomembrane		13,000	SY	$ 18.00	$ 234,000.00
		(assume 40-mil HDPE)					
	4	Geotextile		26,000	SY	$ 4.00	$ 104,000.00
		(assume 16-ounce non-woven fabric)					
		Sheet Subtotal =					**$ 3,692,600.00**

QUANTITIES		PRICES	
BY Chris Strickland	**CHECKED** Bill Engemoen	**BY** Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED June 12, 2008	**PEER REVIEW** Bill Engemoen	**DATE PREPARED** August 5, 2008	**PEER REVIEW**

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Diversion During Dam Construction

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[082508 - Wymer - MPH Total Est.xls]Diversion (53-56)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Excavation					
		For 6-foot pipe and saddles	8130				
	5	Common		4,000	CY	$ 19.00	$ 76,000.00
		(Assume alluvial soil and weathered rock; no dewatering)					
	6	Rock		2,000	CY	$ 50.00	$ 100,000.00
		(Assume drill and blast; no dewatering)					
	7	Furnish and place reinforced concrete for pipe supports	8130	26	CY	$ 1,600.00	$ 41,600.00
		spaced @ 30 feet (21 required)					
	8	Furnish and place unreinforced concrete thrust blocks	8130	130	CY	$ 960.00	$ 124,800.00
		Assume 2 blocks 12 x 12 x 12 @ 3000 psi					
	9	Furnish and handle cement	8130	35	TONS	$ 150.00	$ 5,250.00
		Assume .212 T/CY thrust & .282T/CY supports)					
	10	Furnish and place concrete reinforcement.	8130	4,700	LBS	$ 2.00	$ 9,400.00
		Assume 180 #/CY					
		Sheet Subtotal =					**$ 357,050.00**

QUANTITIES		PRICES	
BY Doug Stanton	**CHECKED** Jason Schneider	**BY** Jerry Zander	**CHECKED**
DATE PREPARED June 16, 2008	**PEER REVIEW**	**DATE PREPARED** August 25, 2008	**PEER REVIEW** DCA for DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Diversion During Dam Construction

Mechanical/Electrical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[081108 - Wymer - MPH Total Est.xls]Diversion (53-56)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Diverting Stream into Diversion pipe					
		Dewatering Pumps:	8420				
	11	Two - 10 cfs (4500 gpm) Flygt C 3300 Wastewater		4,600	lbs	$ 24.00	$ 110,400.00
		Submersible Pumps, low head (LT), Curve/					
		Impeller No. 809, S-installation, 20' TDH, 900 rpm,					
		50 hp (34 kW), ~12" disch., 3 ph/60 Hz/460 V					
		(2300 lbs. ea.)					
		Submersible electrical cable	8430				
	12	3 - power conductor, 600 V, #4 AWG		500	LF	$ 24.00	$ 12,000.00
	13	2 - thermal sensor cables, #10 AWG		500	LF	$ 2.00	$ 1,000.00
	14	1 - ground cable, #6 AWG		500	LF	$ 2.40	$ 1,200.00
	15	Combination pump motor starters, 600 volt, NEMA 4	8430	2	each	$ 6,600.00	$ 13,200.00
		enclosure, Size 3, non-reversing contactor					
	16	Pump sump level controls	8430				
		2 floats, control relay in a NEMA 4 enclosure		1	each	$ 1,900.00	$ 1,900.00
	17	Pumping Costs					
		Estimate pumping 6 hours per day for 2 years		4,400	HRS	$ 110.00	$ 484,000.00
		Sheet Subtotal =					**$ 623,700.00**

QUANTITIES

BY	CHECKED
R. Zelenka	T. Hummel 6/5/08
DATE PREPARED	**PEER REVIEW**
June 4, 2008	T. Hummel 6/5/08

PRICES

BY	CHECKED
Dan Mar	8/13/08
DATE PREPARED	**PEER REVIEW**
August 11, 2008	DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Diversion During Construction

Mechanical

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est - 2008\[080508a - Wymer - MPH Total Est.xls]Diversion (53-56)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Diverting Stream into Diversion pipe					
		Steel Pipe	8420				
	18	72-inch dia. Steel pipe, 5/16-in thick wall, 241 lb/ft		600	LF	$ 940.00	$ 564,000.00
	19	20-inch dia. Sch. 10, 1/4-in thick wall, 53 lb/ft		250	LF	$ 200.00	$ 50,000.00
	20	12-inch dia. Sch. 20, 1/4-in thick wall, 34 lb/ft		50	LF	$ 130.00	$ 6,500.00
		Valves	8420				
	21	2 - 12-inch, Class 125 Double door check valves (150 lbs. each)		300	lbs	$ 13.00	$ 3,900.00
	22	2 - 12-inch, Class 150 AWWA Butterfly Valves (250 lbs. each)		500	lbs	$ 13.00	$ 6,500.00
		Sheet Subtotal =					**$ 630,900.00**

QUANTITIES		PRICES	
BY R. Frisz 6/5/08	CHECKED R. Zelenka 6/5/08	BY Jerry Zander	CHECKED 8/13/08
DATE PREPARED June 4, 2008	PEER REVIEW R. Zelenka 6/5/08	DATE PREPARED August 5, 2008	PEER REVIEW

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Road and Creek Improvements
Dam and Dike Access Roads

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal

REGION PN **PRICE LEVEL:** Apr-07

FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est - 2008\[080508a - Wymer - MPH Total Est.xls]Road&Creek,Dam&Dike (57-

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		CIVIL - ROAD					
		All roadway sections assume two 12' lanes w/o shoulders, 3:1 sloped ditches to 1' depth, and cut slopes of 2:1. A slope greater than 12% was utilized in several areas. Upon final design, alignment will be modified to better suit existing earthwork conditions and eliminate slopes greater than 12%.					
		Road from SH821 to left abutment and across dam to right abutment					
		11,700 LF of roadway					
	1	Excavation		46,000	CY	$ 7.00	$ 322,000.00
	2	Compacted Embankment		24,000	CY	$ 8.00	$ 192,000.00
	3	Gravel Surfacing (6" Depth)		11,000	TON	$ 52.00	$ 572,000.00
	4	24" CMP Culvert (assume 17 culverts, 35LF EA)		595	LF	$ 72.00	$ 42,840.00
	5	Metal Beam Guard Railing with Wooden Post		6,400	LF	$ 46.00	$ 294,400.00
		to be installed across dam					
		Road from access house to other side of dike					
		2600 LF of roadway					
	6	Excavation		5,700	CY	$ 13.00	$ 74,100.00
	7	Compacted Embankment		13,000	CY	$ 13.00	$ 169,000.00
	8	Gravel Surfacing (6" Depth)		4,300	TON	$ 63.00	$ 270,900.00
	9	24" CMP Culvert (assume 5 culverts 35LF EA)		175	LF	$ 72.00	$ 12,600.00
	10	Metal Beam Guard Railing with Wooden Post		5,200	LF	$ 46.00	$ 239,200.00
		to be installed across dike					
		Road from SH821 to outlet works					
		3600 LF of roadway					
	11	Excavation		100	CY	$ 60.00	$ 6,000.00
	12	Compacted Embankment		330	CY	$ 26.00	$ 8,580.00
	13	Gravel Surfacing (6" Depth)		3,000	TON	$ 58.00	$ 174,000.00
	14	24" CMP Culvert (assume 7 culverts 35LF EA)		245	LF	$ 72.00	$ 17,640.00
		Sheet Subtotal =					**$ 2,395,260.00**

QUANTITIES		PRICES	
BY Anne Pavol	**CHECKED** Chris Duke	**BY** JZ Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED 6/11/2008	**PEER REVIEW** Dave Edwards	**DATE PREPARED** August 5, 2008	**PEER REVIEW** DLM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Road and Creek Improvements
Improvements to Existing Lmuma Creek

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: C:\Documents and Settings\gzander\My Documents\Jerry Z\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est - 2008\[080508a - Wymer - MPH Total Est.xls]Road&Creek,Dam&Dike (57-

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Earthwork (Lmuma Creek)					
	15	Common excavation of outlet channel	8140	111,000	CY	$ 6.00	$ 666,000.00
	16	Embankment	8140	11,500	CY	$ 12.00	$ 138,000.00
	17	Compacted Embankment	8140	11,500	CY	$ 8.00	$ 92,000.00
	18	Furnish/place rock riprap (d50 6", d100 12"), 120lb/cf	8140	64,000	TONS	$ 36.00	$ 2,304,000.00
	19	Furnish/place geotextile	8140	49,500	SY	$ 3.50	$ 173,250.00
	20	Furnish 9 steel sheet pile control structures	8140	22,000	SF	$ 23.00	$ 506,000.00
		using AZ13 sheet piles					
	21	Excavation for sheet piles	8140	1,700	CY	$ 30.00	$ 51,000.00
	22	Furnish and place cement bentonite slurry	8140	1,700	CY	$ 144.00	$ 244,800.00
	23	Furnish and handle cement in cement bentonite slurry	8140	230	TONS	$ 140.00	$ 32,200.00
		Earthwork (Downstream Spillway Channel)					
	24a	Common excavation of outlet channel	8140	62,000	CY	$ 6.00	$ 372,000.00
	24b	Furnish/place rock riprap (d50 27"), 120lb/cf	8140	53,000	TONS	$ 36.00	$ 1,908,000.00
	24c	Furnish/place geotextile	8140	18,500	SY	$ 3.50	$ 64,750.00
		Sheet Subtotal =					**$ 6,552,000.00**

QUANTITIES		PRICES	
BY Anne Pavol	**CHECKED** K. A. Sayer	**BY** JWZ Jerry Zander	**CHECKED** 8/13/08
DATE PREPARED 6/12/2008	**PEER REVIEW** David K. Edwards	**DATE PREPARED** August 5, 2008	**PEER REVIEW** DCM

ESTIMATE WORKSHEET

FEATURE:
Wymer Pumping Plant and Reservoir
Most Probable High Cost Estimate
Road and Creek Improvements
I-82 Bridge Protection

Civil/Structural

PROJECT:
Yakima River Basin Water Storage Study

WOID: YAKAP **ESTIMATE LEVEL:** Appraisal
REGION PN **PRICE LEVEL:** Apr-07
FILE: J:\2008 JWZ Estimates\Black Rock-Wymer HML\Wymer MPH Total Est 2008\[081208 - Wymer - MPH Total Est.xls]Spillway & Outlet Wks (42-52)

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		I-82 Bridges					
		Protect existing 2:1 slope bridge embankments					
		Apply waterproof membrane to existing bridge piers					
		that will be submerged					
		Embankment Protection					
	24	Furnish and place riprap on embankments, (D50 = 24")	8140	34,000	TONS	$ 35.00	$ 1,190,000.00
	25	Furnish and place riprap bedding	8140	16,000	TONS	$ 23.00	$ 368,000.00
	26	Excavate existing protection (18" deep)	8140	10,500	CY	$ 17.00	$ 178,500.00
		Bridge Pier Protection					
	27	Water jet face of piers		0	SY	$ -	$ -
	27b	Remove concrete cover to completely expose vertical					
		# 11 column reinforcement. Volume calculated to					
		interior face of #11 bars.	86-8140	32	CY	$ 1,500.00	$ 48,000.00
	27c	Clean entire length of exposed #11 bars by sandblasting					
		Total length, Northbound bridge=74 lf x32=2368 lf	86-8140	4,900	LF	$ 50.00	$ 245,000.00
		Total length, Southbound bridge=140 lf x18=2520 lf					
	27d	Concrete jacket placed around exposed column	86-8140	60	CY	$ 1,200.00	$ 72,000.00
		reinforcement. Jacket will provide 3" cover.					
		Note: To do this work, traffic may need to be diverted.					
		The repairs on one bridge could be made while					
		both northbound and southbound traffic is detoured					
		onto the other bridge. Once the work is completed					
		on the first bridge, then traffic is detoured onto it					
		while work is done on the second bridge.					
		The cost of the detour is not included here.					
	28	Remove spalling concrete (5% of total area)		0	CY	$ -	$ -
	29	F&I liquid applied CIM 1000 Urethane (spray application)		0	SY	$ -	$ -
	30	F&I liquid applied CIM 61 primer (spray application)		0	SY	$ -	$ -
	31	Waste Excess Material from I-82 Modifications					
		Assume local waste.					
		Waste common material	8120	10,500	CY	$ 17.00	$ 178,500.00
	32	Borrow Material for I-82 Modifications					
		Assume 1 way haul of 10 miles.					
		Borrow Riprap	8120	30,000	CY	$ 32.00	$ 960,000.00
		Sheet Subtotal =					**$ 3,240,000.00**

QUANTITIES		PRICES	
BY	**CHECKED**	**BY** JZ	**CHECKED** 8/13/08
Joe Gemperline (8140), Dick LaFond (8120)	Anne Pavol (8140), Brian Goplen (8120)	Jerry Zander	
DATE PREPARED	**PEER REVIEW**	**DATE PREPARED**	**PEER REVIEW** DLM
June 17, 2007	Tedd R. Calhoun, PE	August 12, 2008	

APPENDIX C

Black Rock Alternative

Cost-Risk Analysis

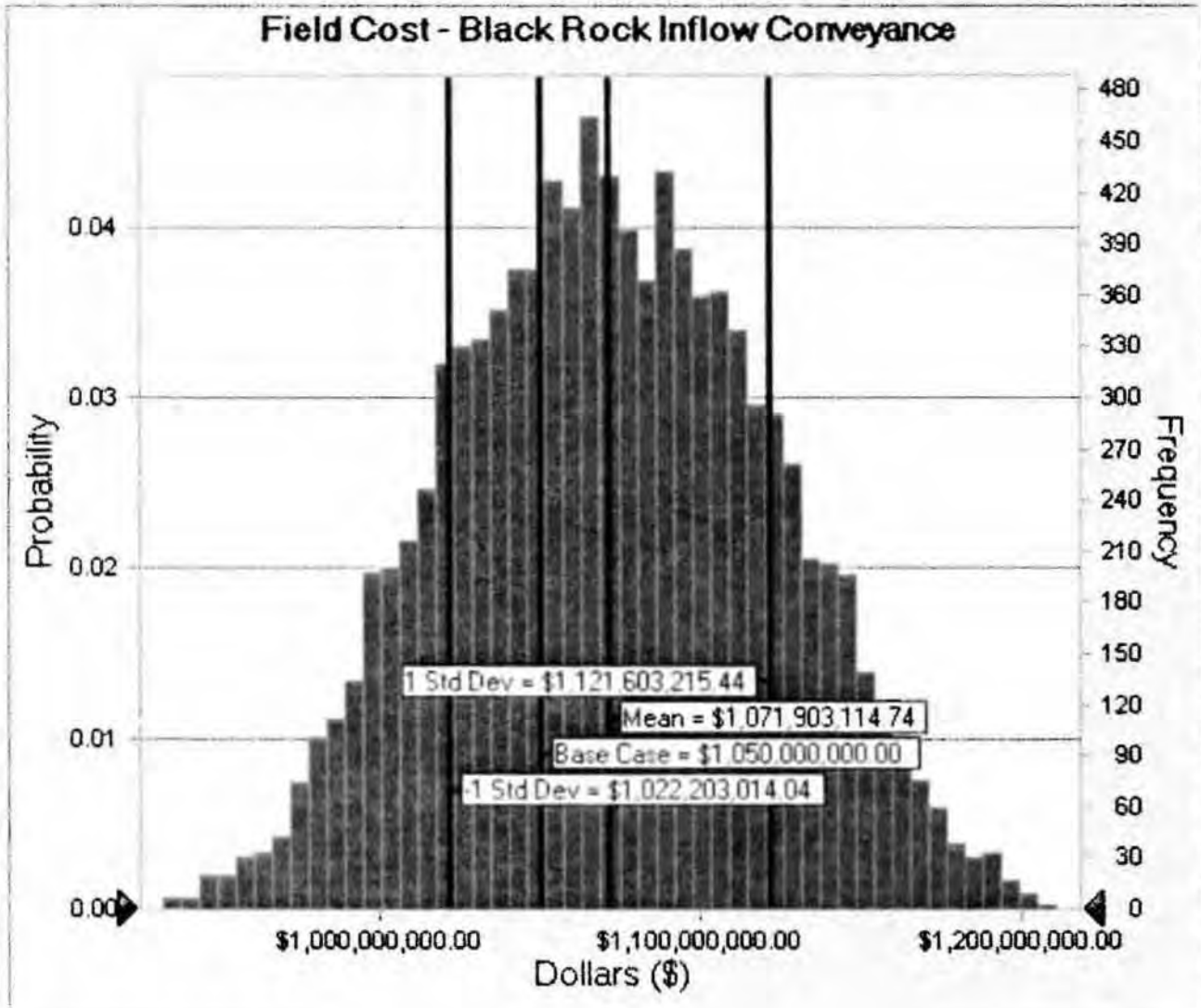
Crystal Ball Output

Inflow Conveyance

Field and Construction Cost Risk analyses

Crystal Ball Output

10,000 Trials | Split View | 9,980 Displayed

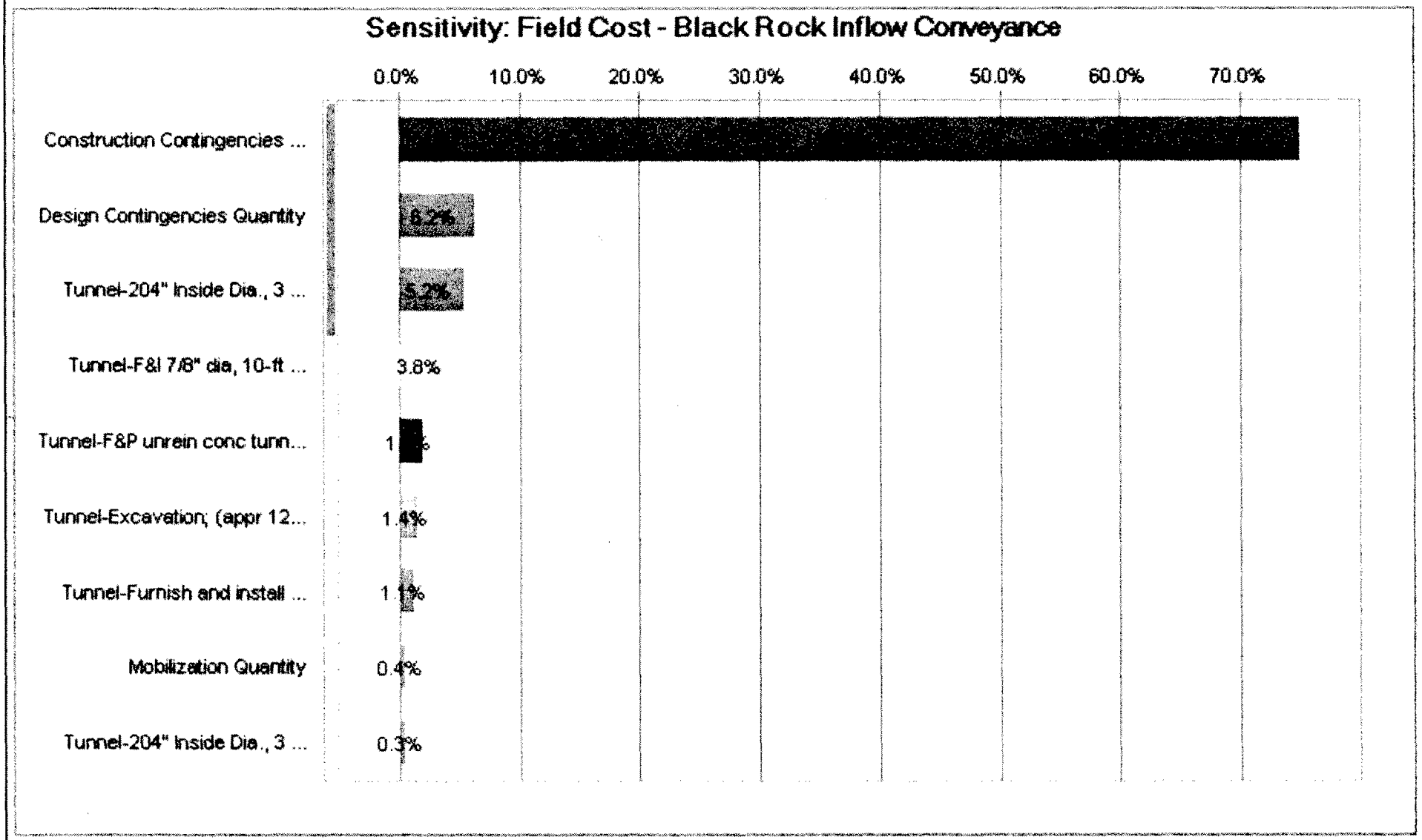


Statistic	Forecast values
Trials	10,000
Mean	$1,071,903,114.74
Median	$1,071,174,884.83
Mode	---
Standard Deviation	$49,700,100.70
Variance	$2,470,100,009,558,
Skewness	0.0281
Kurtosis	2.61
Coeff. of Variability	0.0464
Minimum	$919,355,956.13
Maximum	$1,240,334,120.11
Mean Std. Error	$497,001.01

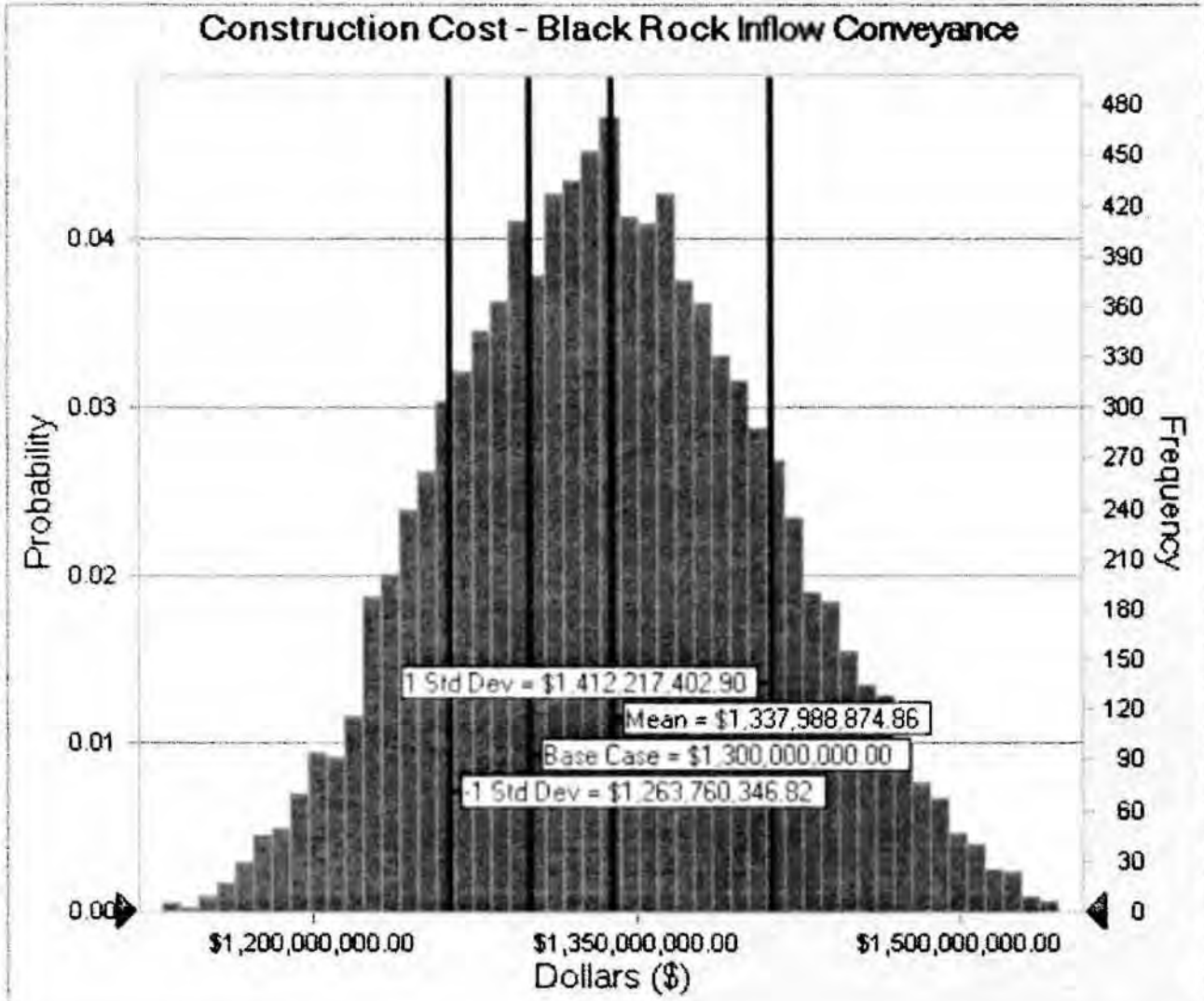
Percentile	Forecast values
0%	$919,355,956.13
10%	$1,006,895,213.41
20%	$1,027,584,641.15
30%	$1,043,895,606.98
40%	$1,058,064,109.39
50%	$1,071,171,360.44
60%	$1,085,473,013.09
70%	$1,099,560,922.03
80%	$1,115,780,422.74
90%	$1,137,826,743.74
100%	$1,240,334,120.11

10,000 Trials

Contribution to Variance View

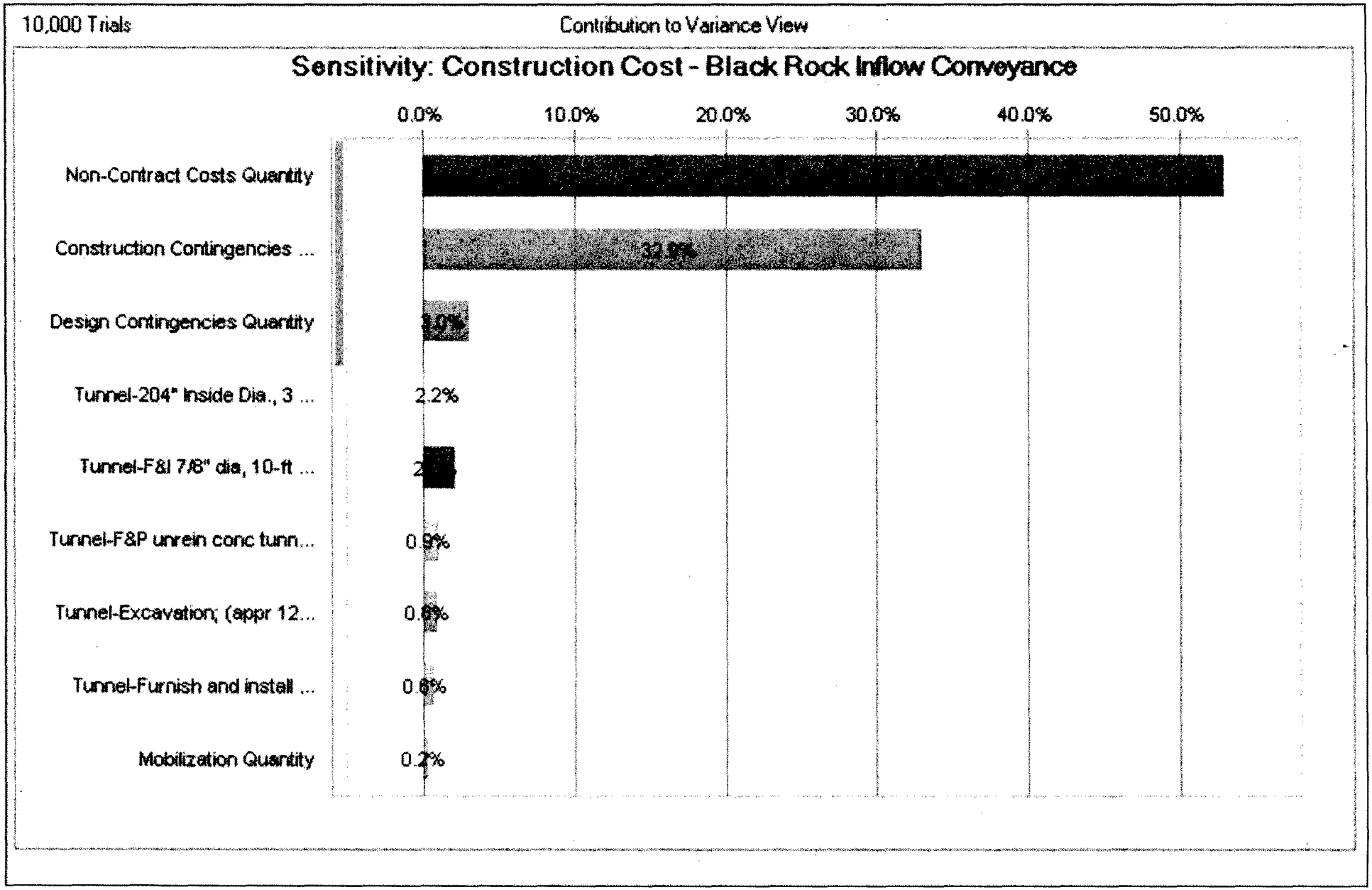


10,000 Trials | Split View | 9,968 Displayed



Statistic	Forecast values
Trials	10,000
Mean	$1,337,988,874.86
Median	$1,336,092,725.12
Mode	---
Standard Deviation	$74,228,528.04
Variance	$5,509,874,374,724,
Skewness	0.1382
Kurtosis	2.75
Coeff. of Variability	0.0555
Minimum	$1,105,669,131.80
Maximum	$1,597,575,092.95
Mean Std. Error	$742,285.28

Percentile	Forecast values
0%	$1,105,669,131.80
10%	$1,243,242,027.78
20%	$1,272,819,880.17
30%	$1,295,978,695.07
40%	$1,316,903,907.42
50%	$1,336,056,003.87
60%	$1,355,846,261.18
70%	$1,376,660,948.63
80%	$1,401,867,990.05
90%	$1,436,851,737.66
100%	$1,597,575,092.95

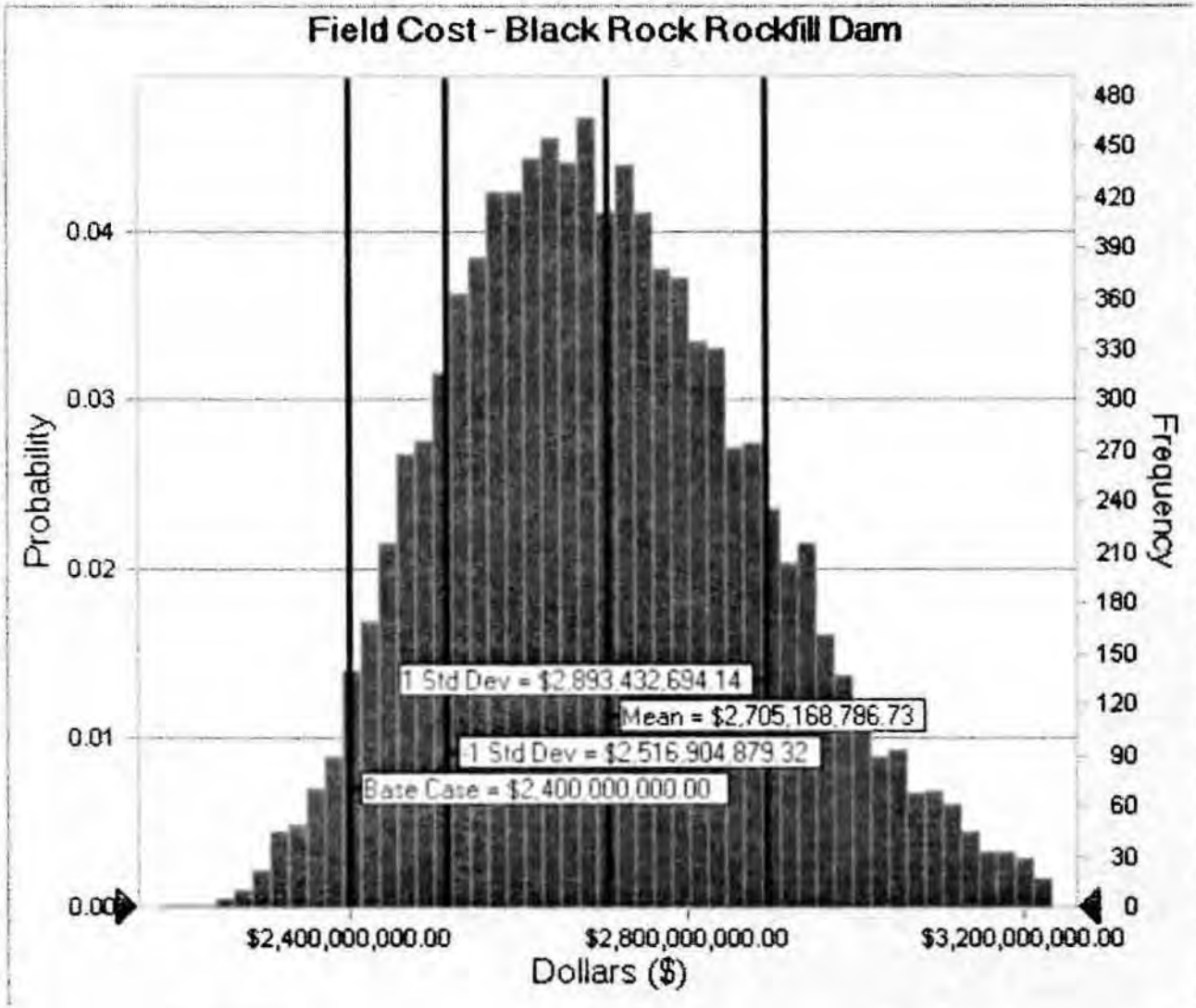

10,000 Trials
Contribution to Variance View
Sensitivity: Construction Cost - Black Rock Inflow Conveyance
0.0%
10.0%
20.0%
30.0%
40.0%
50.0%
Non-Contract Costs Quantity
Construction Contingencies ...
Design Contingencies Quantity
Tunnel-204" Inside Dia., 3 ...
2.2%
Tunnel-F&I 7/8" dia, 10-ft ...
Tunnel-F&P unrein conc tunn...
Tunnel-Excavation; (appr 12...
Tunnel-Furnish and install ...
Mobilization Quantity
0.2%

Dam and Reservoir

Field and Construction Cost Risk analyses

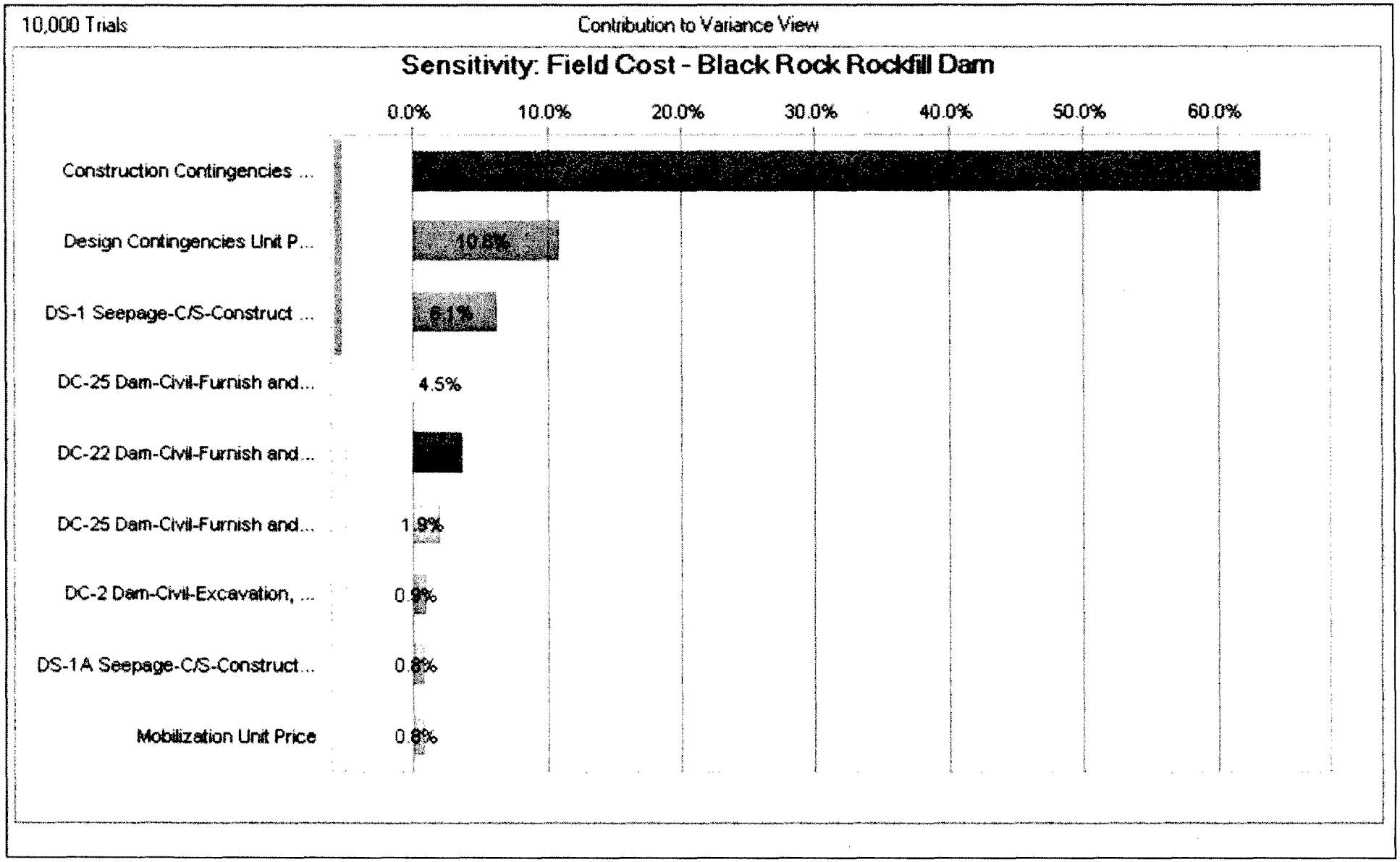
Crystal Ball Output

10,000 Trials | Split View | 9,939 Displayed

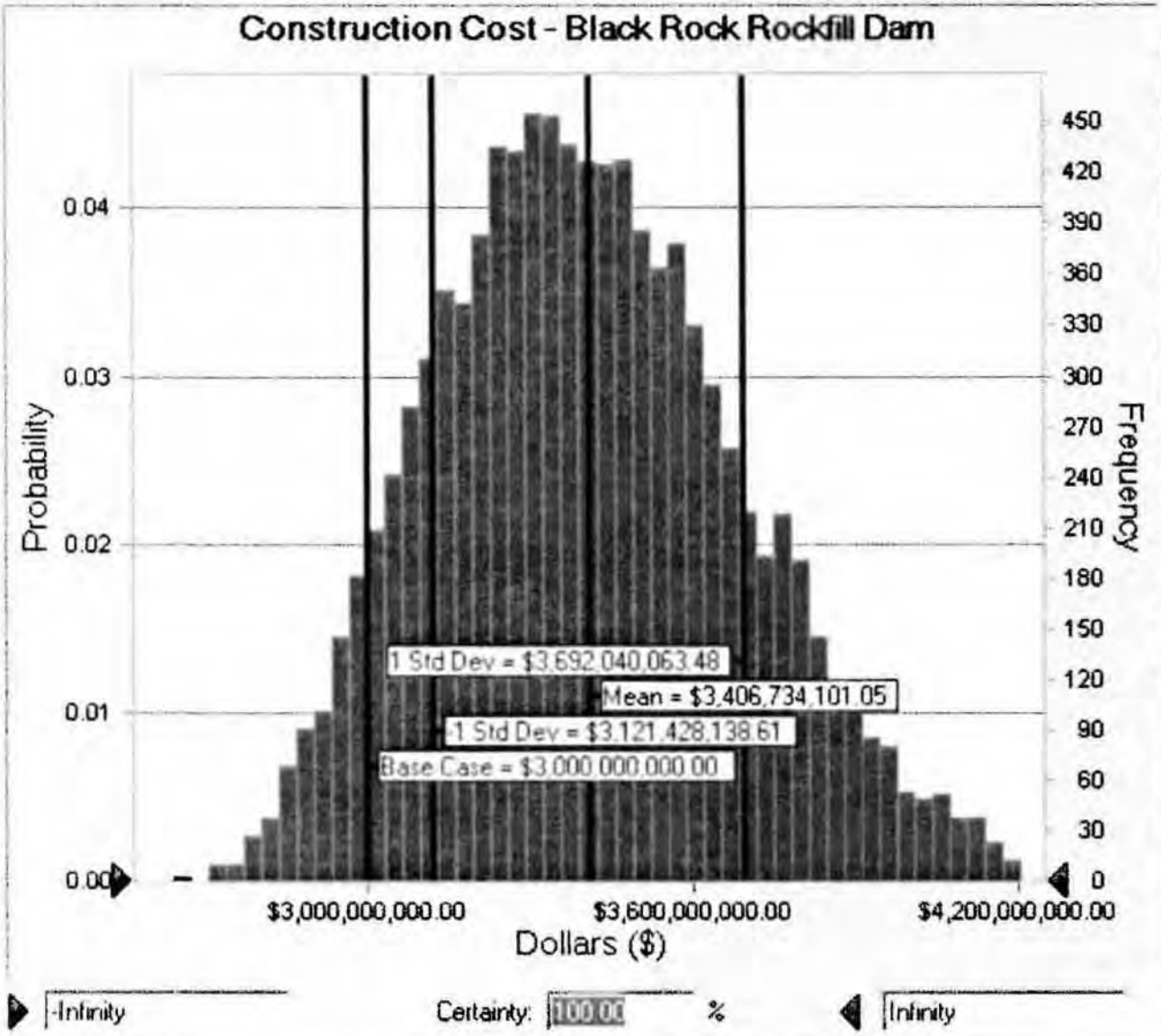


Statistic	Forecast values
Trials	10,000
Mean	$2,705,168,786.73
Median	$2,690,269,032.46
Mode	---
Standard Deviation	$188,263,907.41
Variance	$35,443,298,832,56
Skewness	0.4026
Kurtosis	2.99
Coeff. of Variability	0.0696
Minimum	$2,144,990,380.70
Maximum	$3,457,412,297.12
Mean Std. Error	$1,882,639.07

Percentile	Forecast values
0%	$2,144,990,380.70
10%	$2,472,610,916.99
20%	$2,540,869,939.43
30%	$2,594,411,367.55
40%	$2,642,330,763.39
50%	$2,690,259,135.53
60%	$2,739,934,987.77
70%	$2,796,379,420.87
80%	$2,862,928,774.84
90%	$2,955,181,755.27
100%	$3,457,412,297.12

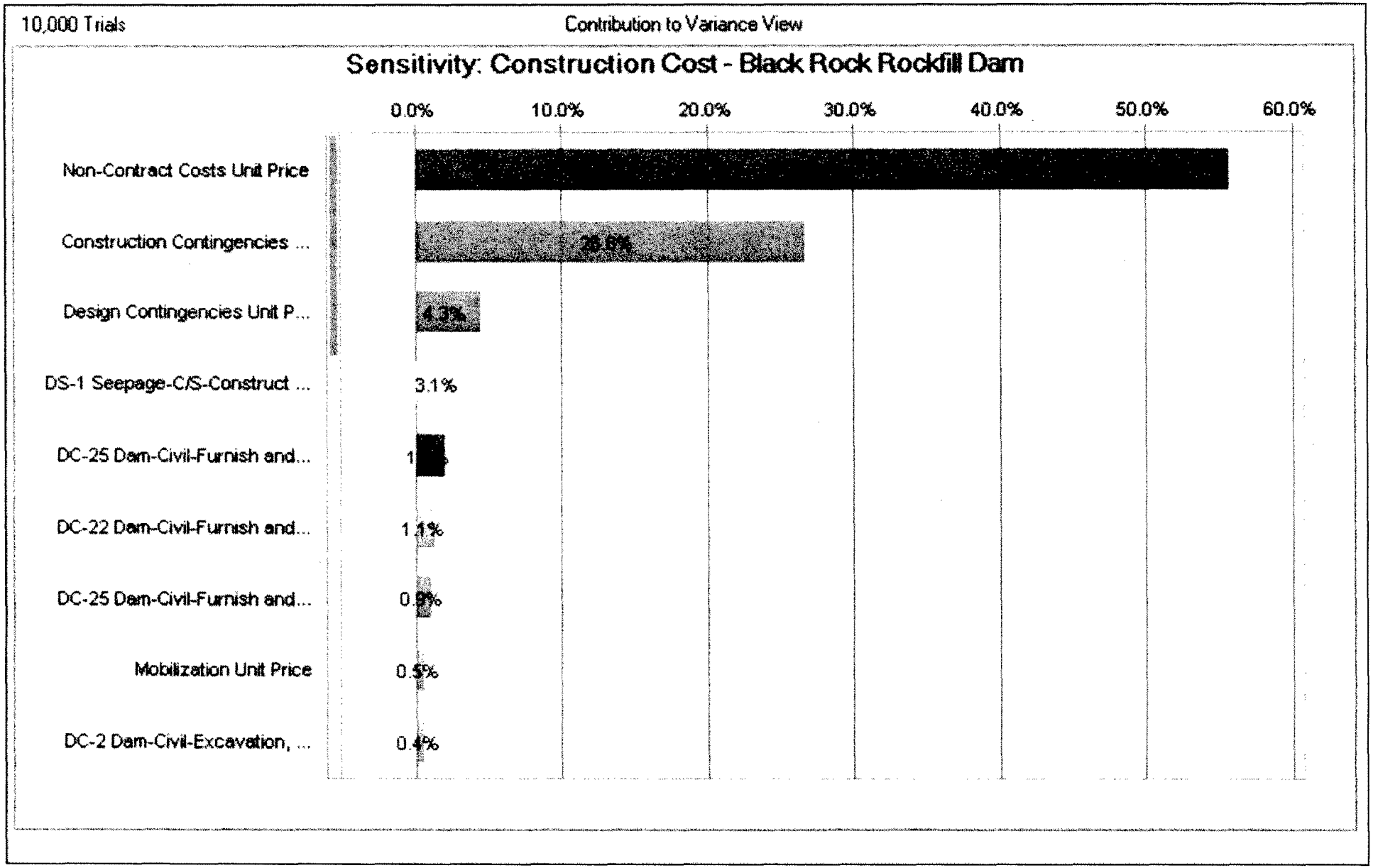

10,000 Trials
Contribution to Variance View
Sensitivity: Field Cost - Black Rock Rockfill Dam
0.0%
10.0%
20.0%
30.0%
40.0%
50.0%
60.0%
Construction Contingencies ...
Design Contingencies Unit P...
10.8%
DS-1 Seepage-C/S-Construct ...
6.1%
DC-25 Dam-Civil-Furnish and...
4.5%
DC-22 Dam-Civil-Furnish and...
DC-25 Dam-Civil-Furnish and...
1.9%
DC-2 Dam-Civil-Excavation, ...
0.9%
DS-1A Seepage-C/S-Construct...
0.8%
Mobilization Unit Price
0.8%

10,000 Trials | Split View | 9,958 Displayed



Statistic	Forecast values
Trials	10,000
Mean	$3,406,734,101.05
Median	$3,389,213,466.45
Mode	---
Standard Deviation	$285,305,962.44
Variance	$81,399,492,201,90
Skewness	0.3181
Kurtosis	2.85
Coeff. of Variability	0.0837
Minimum	$2,587,033,931.45
Maximum	$4,474,262,049.46
Mean Std. Error	$2,853,059.62

Percentile	Forecast values
0%	$2,587,033,931.45
10%	$3,046,947,114.06
20%	$3,154,738,053.92
30%	$3,242,675,515.55
40%	$3,315,020,851.13
50%	$3,389,040,673.34
60%	$3,465,901,921.86
70%	$3,548,820,330.40
80%	$3,644,290,251.09
90%	$3,790,902,544.63
100%	$4,474,262,049.46

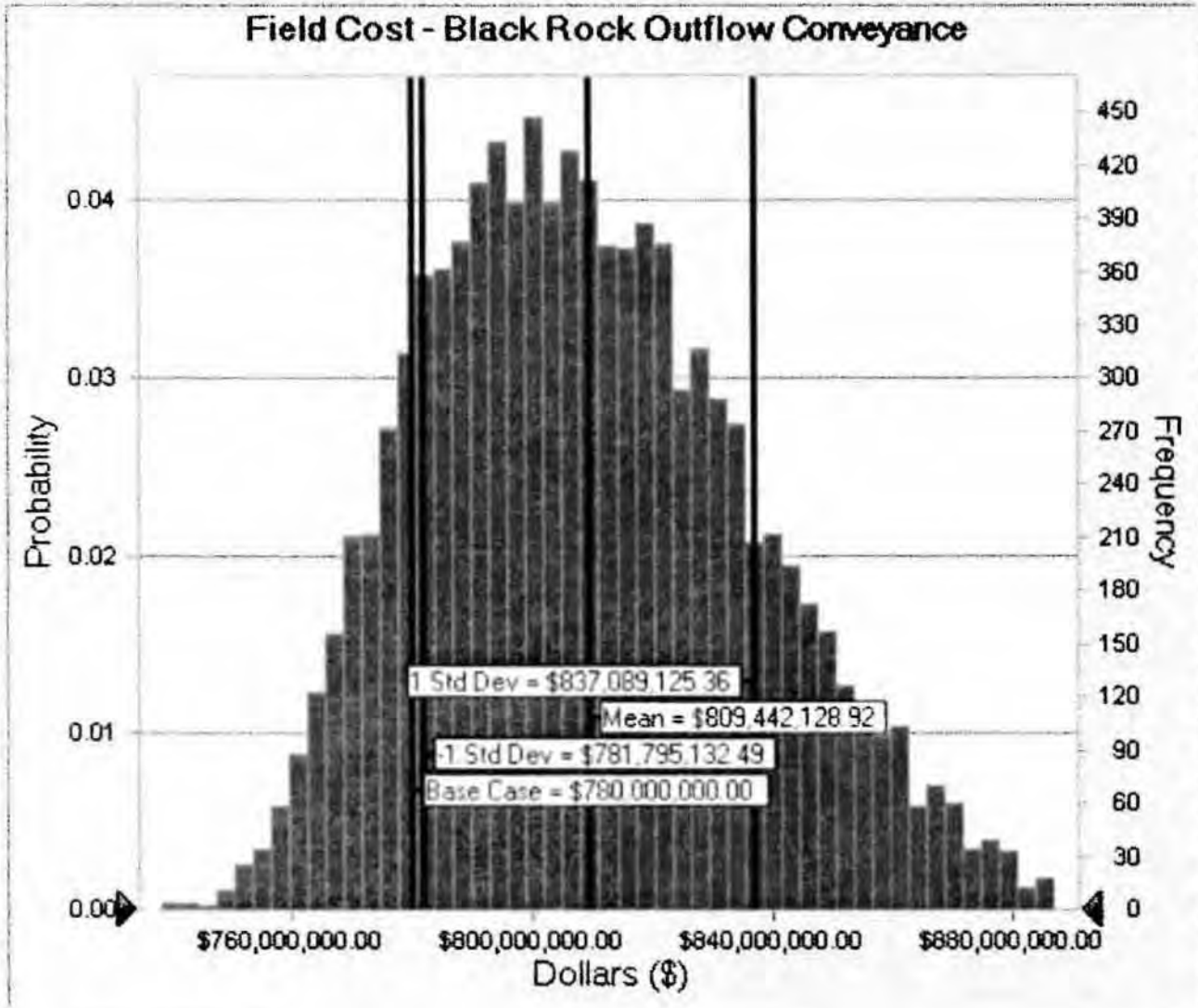

10,000 Trials
Contribution to Variance View
Sensitivity: Construction Cost - Black Rock Rockfill Dam
0.0%
10.0%
20.0%
30.0%
40.0%
50.0%
60.0%
Non-Contract Costs Unit Price
Construction Contingencies ...
Design Contingencies Unit P...
DS-1 Seepage-C/S-Construct ...
3.1%
DC-25 Dam-Civil-Furnish and...
DC-22 Dam-Civil-Furnish and...
DC-25 Dam-Civil-Furnish and...
Mobilization Unit Price
DC-2 Dam-Civil-Excavation, ...

Outflow Conveyance

Field and Construction Cost Risk analyses

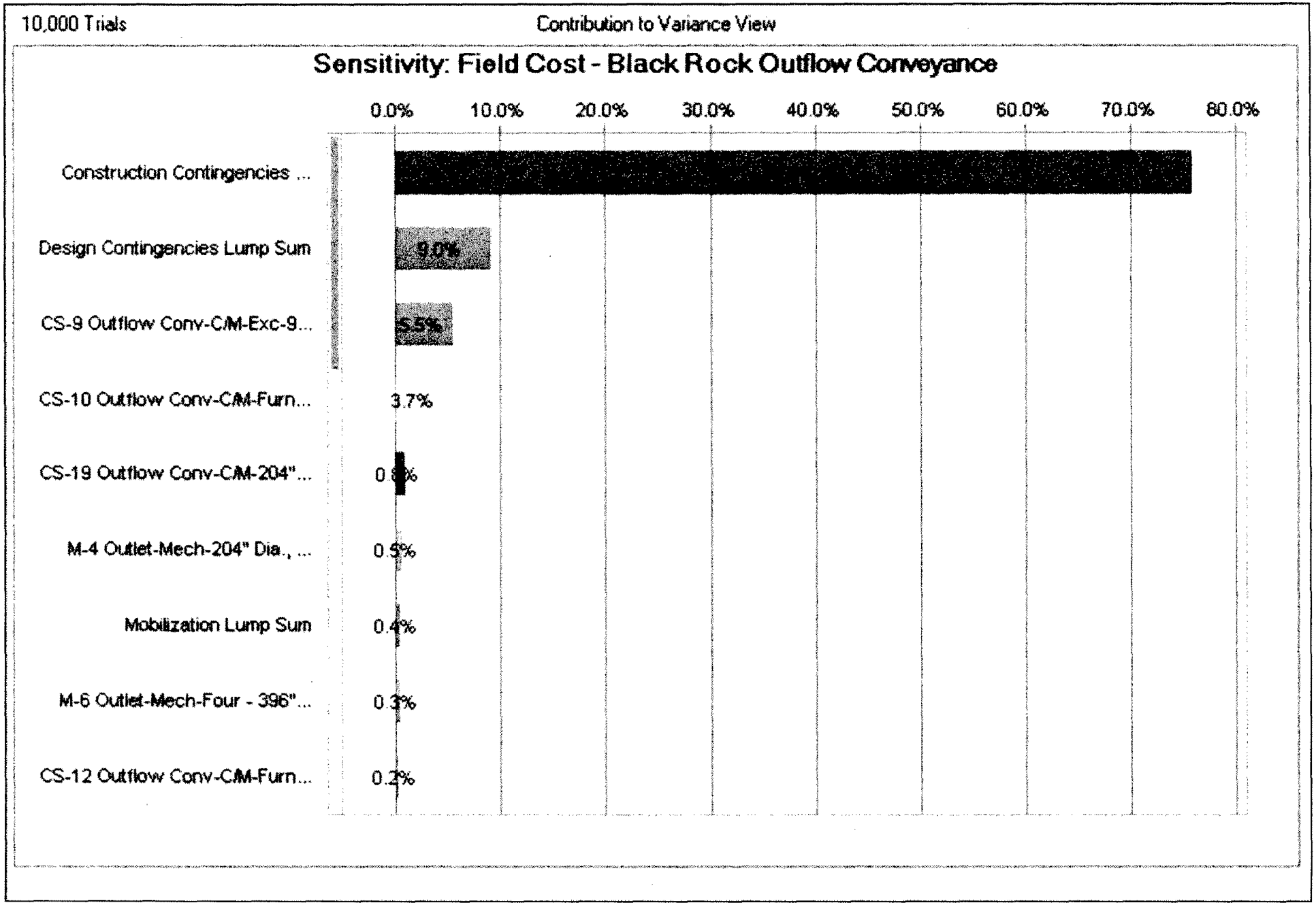
Crystal Ball Output

10,000 Trials | Split View | 9,946 Displayed

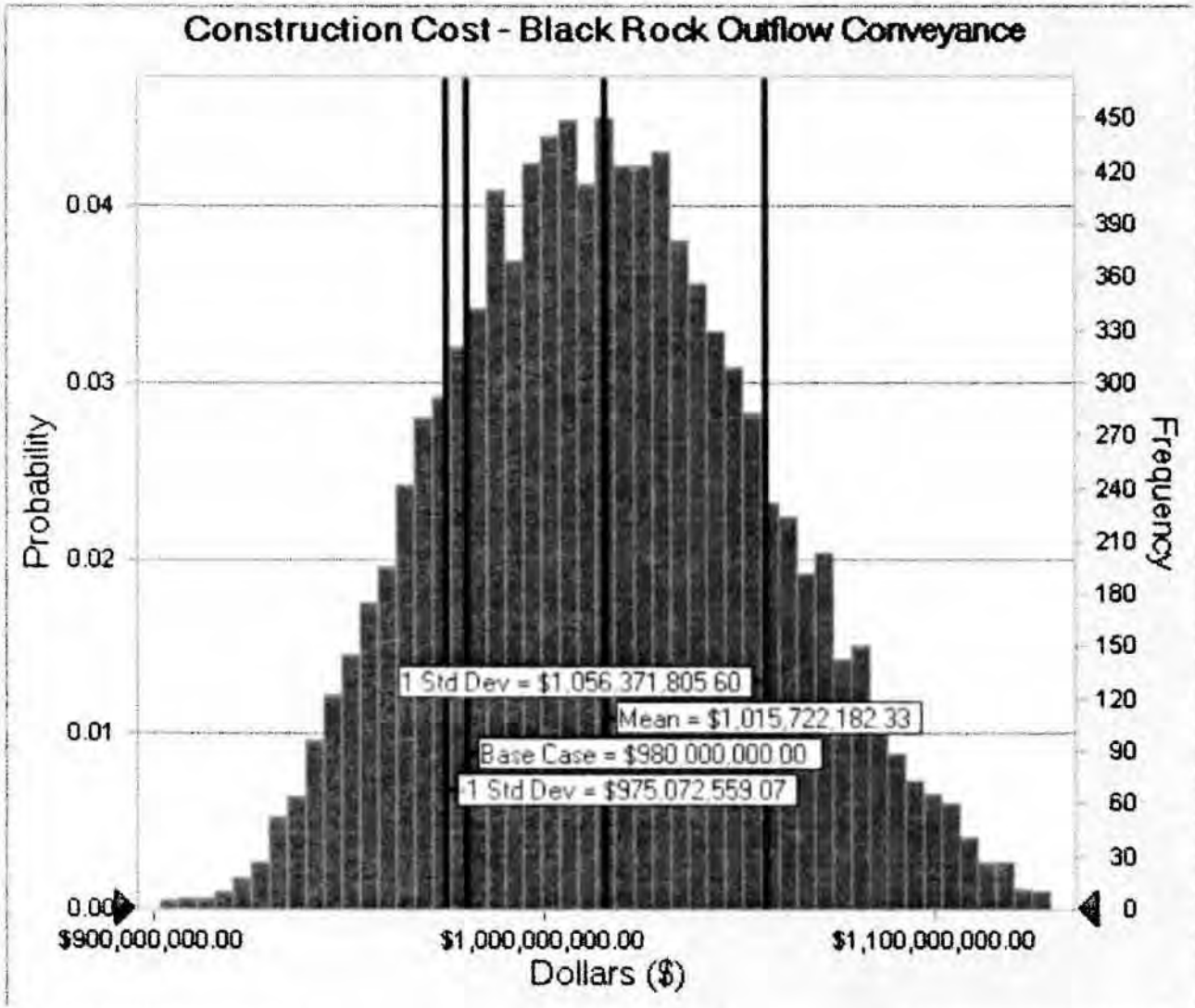


Statistic	Forecast values
Trials	10,000
Mean	$809,442,128.92
Median	$807,008,381.90
Mode	---
Standard Deviation	$27,646,996.44
Variance	$764,356,411,944.5
Skewness	0.4300
Kurtosis	2.91
Coeff. of Variability	0.0342
Minimum	$738,296,965.18
Maximum	$929,570,114.02
Mean Std. Error	$276,469.96

Percentile	Forecast values
0%	$738,296,965.18
10%	$775,470,197.84
20%	$784,826,772.25
30%	$792,658,222.73
40%	$799,716,092.26
50%	$807,005,864.41
60%	$814,792,743.61
70%	$822,763,406.60
80%	$832,814,189.19
90%	$847,174,039.67
100%	$929,570,114.02

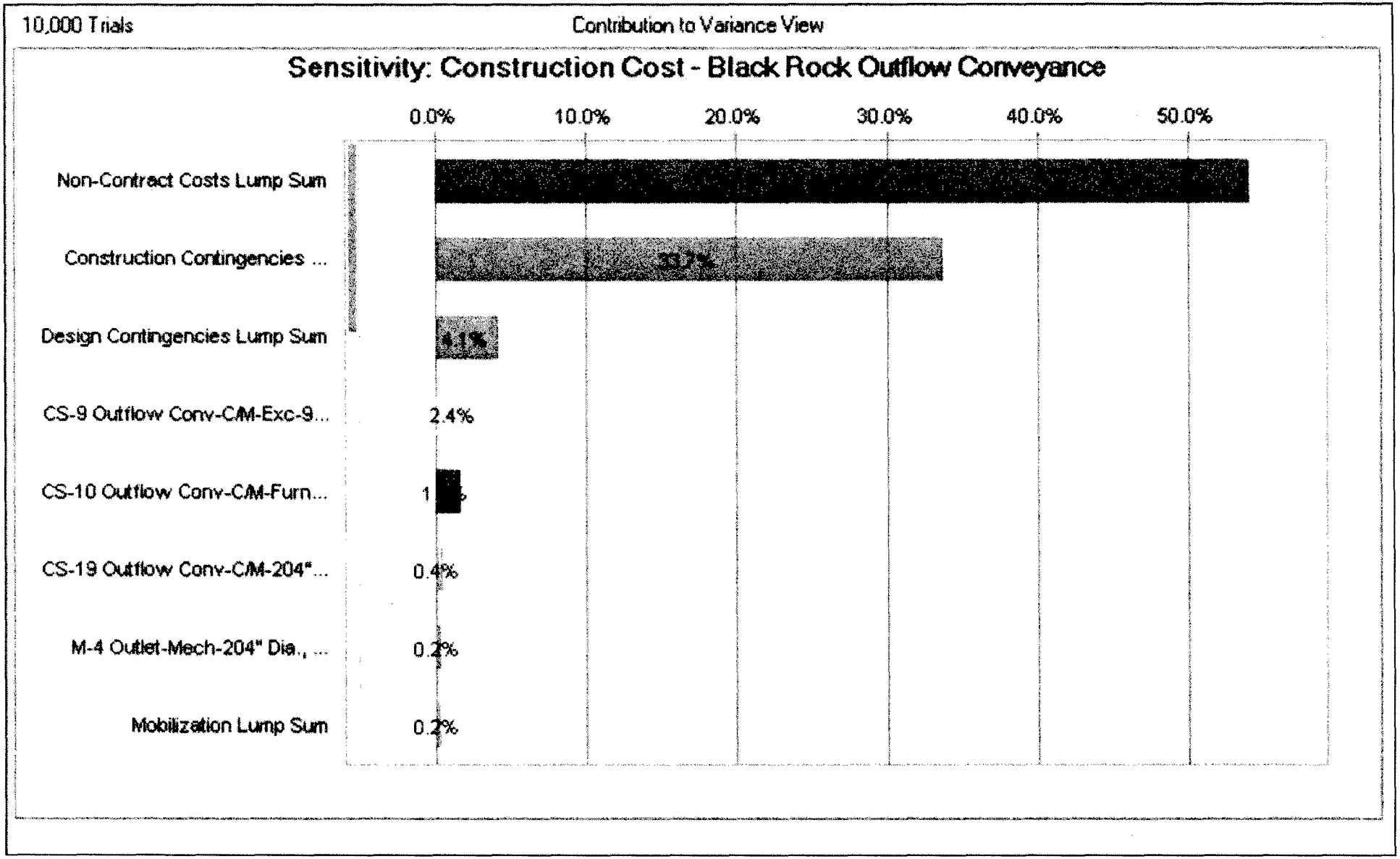

10,000 Trials
Contribution to Variance View
Sensitivity: Field Cost - Black Rock Outflow Conveyance
0.0%
10.0%
20.0%
30.0%
40.0%
50.0%
60.0%
70.0%
80.0%
Construction Contingencies ...
Design Contingencies Lump Sum
9.0%
CS-9 Outflow Conv-C/M-Exc-9...
5.5%
CS-10 Outflow Conv-C/M-Furn...
3.7%
CS-19 Outflow Conv-C/M-204"...
M-4 Outlet-Mech-204" Dia., ...
Mobilization Lump Sum
0.4%
M-6 Outlet-Mech-Four - 396"...
CS-12 Outflow Conv-C/M-Furn...

10,000 Trials | Split View | 9,964 Displayed



Statistic	Forecast values
Trials	10,000
Mean	$1,015,722,182.33
Median	$1,014,217,567.61
Mode	---
Standard Deviation	$40,649,623.27
Variance	$1,652,391,871,899,
Skewness	0.2113
Kurtosis	2.78
Coeff. of Variability	0.0400
Minimum	$897,162,440.58
Maximum	$1,169,255,198.83
Mean Std. Error	$406,496.23

Percentile	Forecast values
0%	$897,162,440.58
10%	$963,942,785.90
20%	$979,988,374.31
30%	$992,596,383.63
40%	$1,003,604,277.64
50%	$1,014,214,804.92
60%	$1,025,217,604.91
70%	$1,036,316,359.34
80%	$1,050,262,194.26
90%	$1,070,503,610.42
100%	$1,169,255,198.83

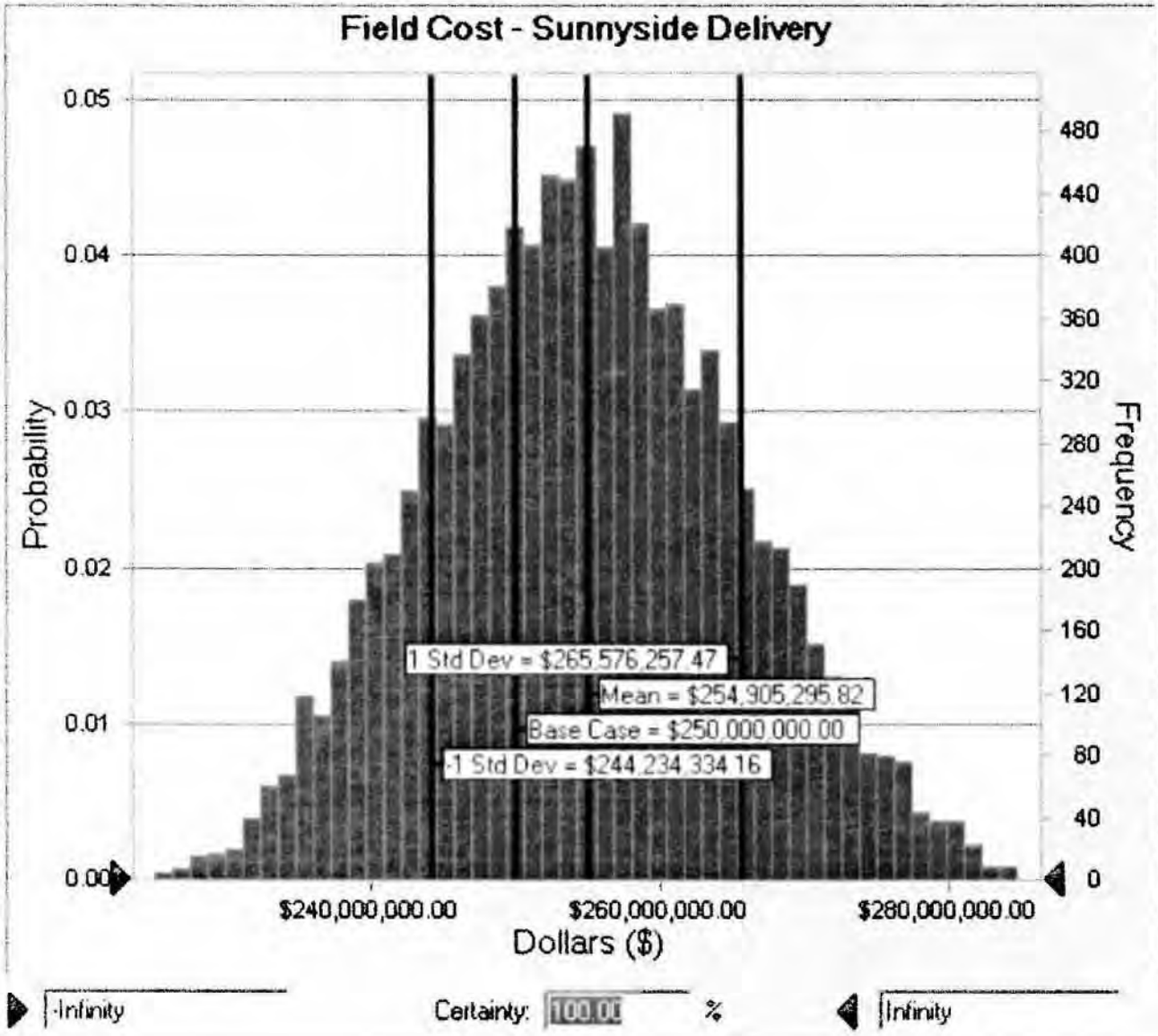

10,000 Trials
Contribution to Variance View
Sensitivity: Construction Cost - Black Rock Outflow Conveyance
0.0%
10.0%
20.0%
30.0%
40.0%
50.0%
Non-Contract Costs Lump Sum
Construction Contingencies ...
33.7%
Design Contingencies Lump Sum
4.1%
CS-9 Outflow Conv-C/M-Exc-9...
2.4%
CS-10 Outflow Conv-C/M-Furn...
CS-19 Outflow Conv-C/M-204"...
0.4%
M-4 Outlet-Mech-204" Dia., ...
0.2%
Mobilization Lump Sum
0.2%

Sunnyside Delivery System

Field and Construction Cost Risk analyses

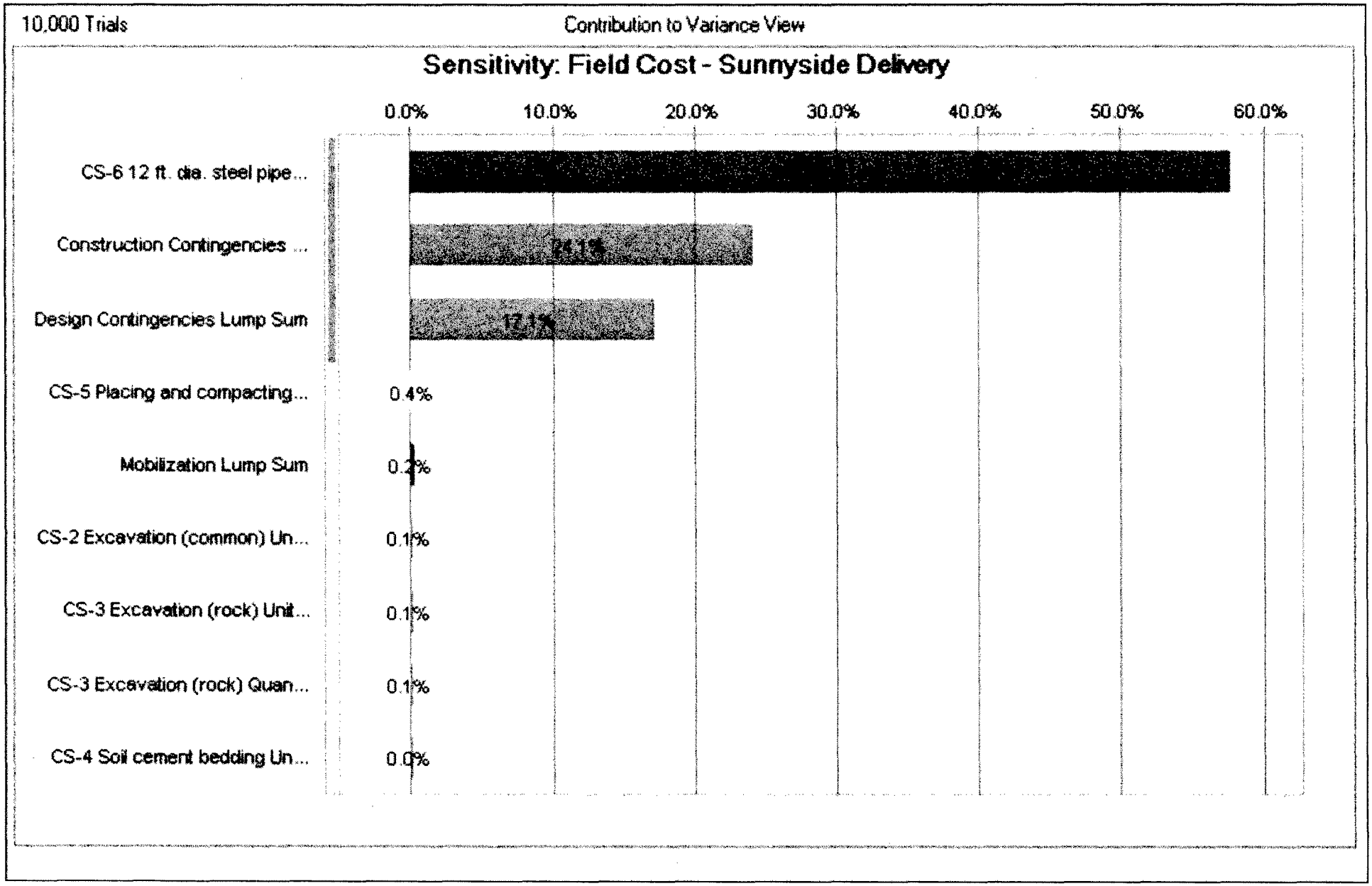
Crystal Ball Output

10,000 Trials | Split View | 9,969 Displayed

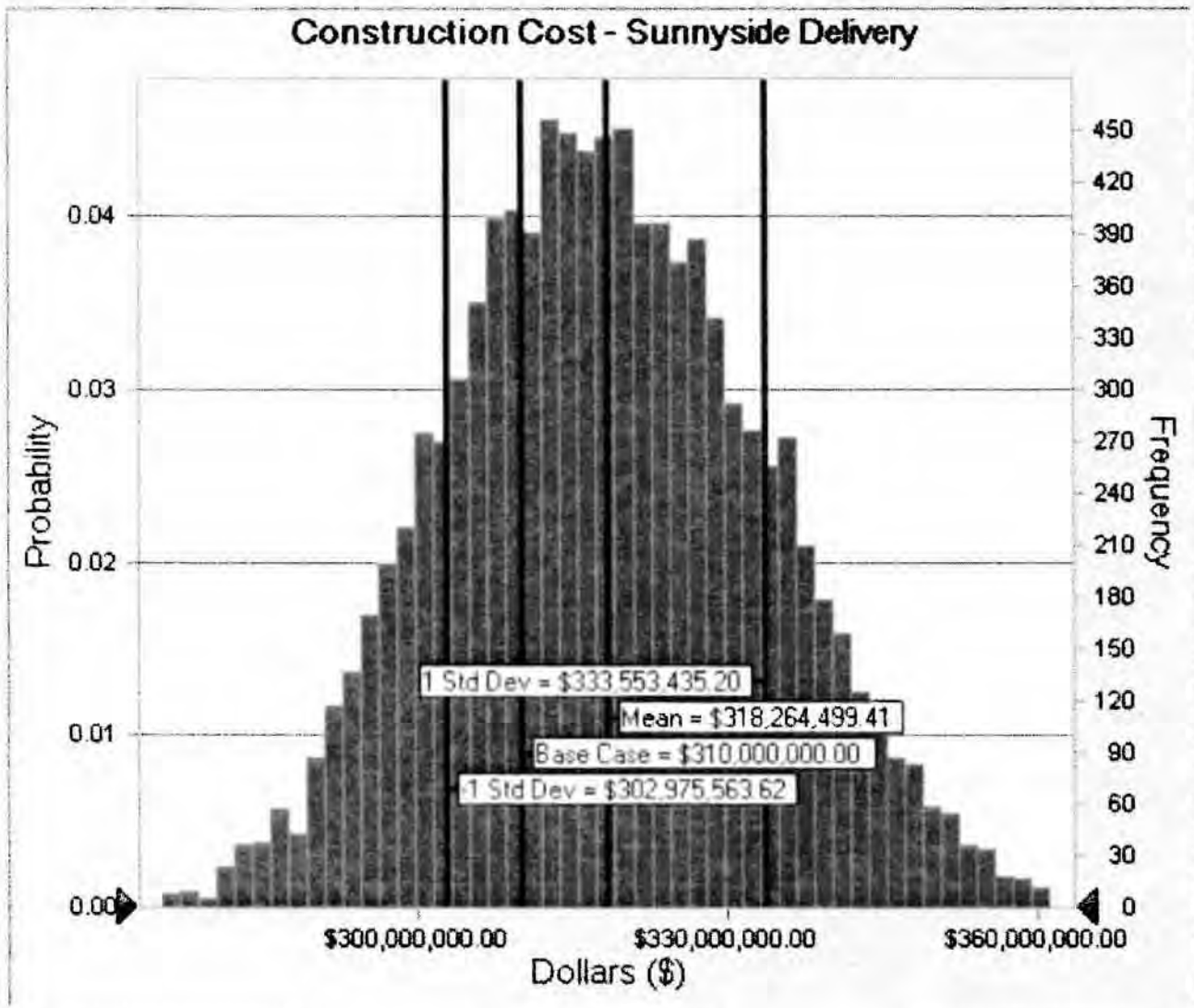


Statistic	Forecast values
Trials	10,000
Mean	$254,905,295.82
Median	$254,695,799.71
Mode	---
Standard Deviation	$10,670,961.66
Variance	$113,869,422,693,1
Skewness	0.1246
Kurtosis	2.78
Coeff. of Variability	0.0419
Minimum	$222,470,609.78
Maximum	$298,587,148.92
Mean Std. Error	$106,709.62

Percentile	Forecast values
0%	$222,470,609.78
10%	$241,002,166.38
20%	$245,619,526.38
30%	$249,085,510.73
40%	$252,016,720.17
50%	$254,694,612.31
60%	$257,447,800.23
70%	$260,411,659.57
80%	$263,980,455.55
90%	$268,979,067.22
100%	$298,587,148.92


10,000 Trials
Contribution to Variance View
Sensitivity: Field Cost - Sunnyside Delivery
0.0%
10.0%
20.0%
30.0%
40.0%
50.0%
60.0%
CS-6 12 ft. dia. steel pipe...
Construction Contingencies ...
24.1%
Design Contingencies Lump Sum
17.1%
CS-5 Placing and compacting...
0.4%
Mobilization Lump Sum
0.2%
CS-2 Excavation (common) Un...
0.1%
CS-3 Excavation (rock) Unit...
0.1%
CS-3 Excavation (rock) Quan...
0.1%
CS-4 Soil cement bedding Un...
0.0%

10,000 Trials | Split View | 9,969 Displayed

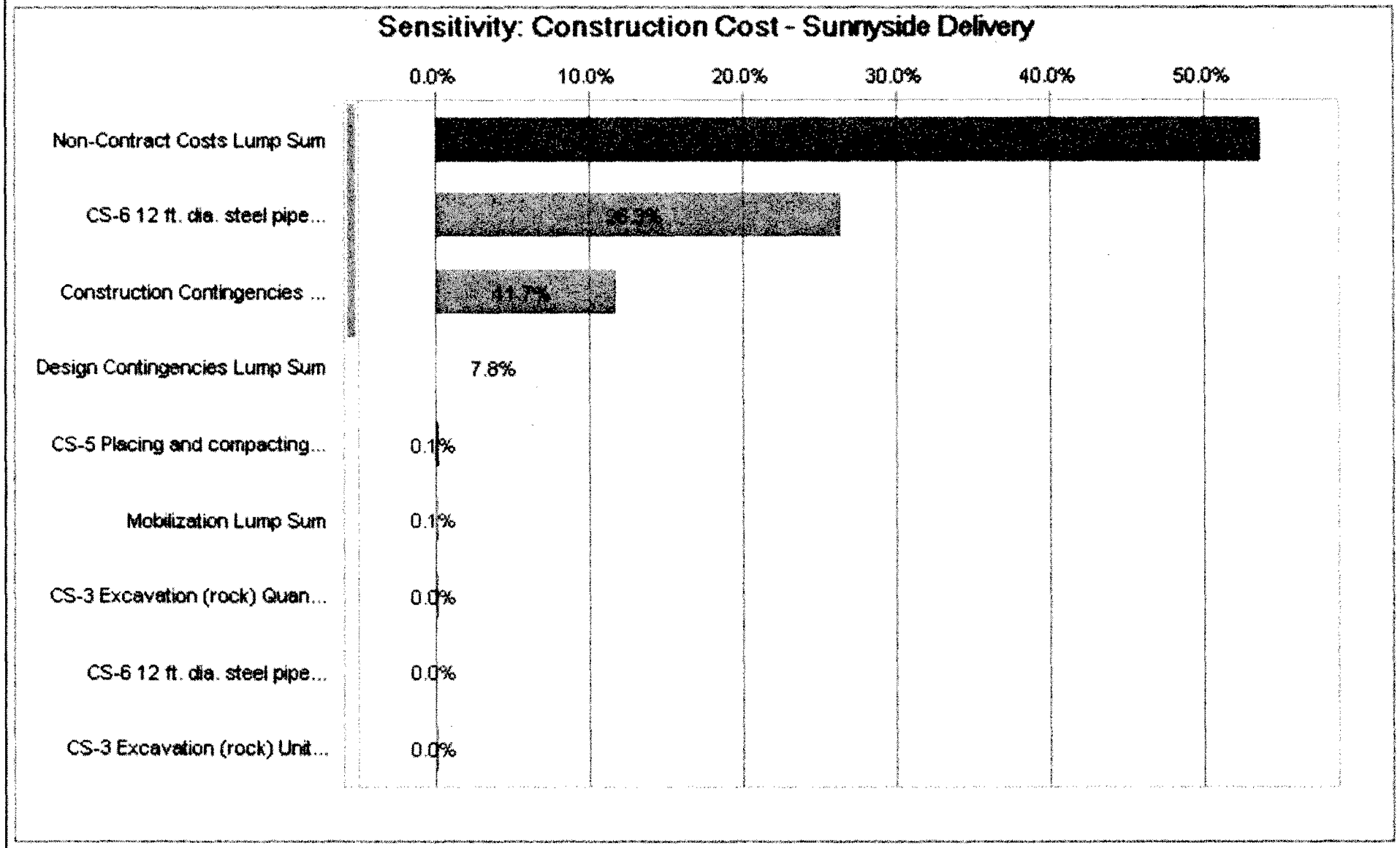


Statistic	Forecast values
Trials	10,000
Mean	$318,264,499.41
Median	$317,797,289.08
Mode	---
Standard Deviation	$15,288,935.79
Variance	$233,751,557,653,8
Skewness	0.1368
Kurtosis	2.78
Coeff. of Variability	0.0480
Minimum	$272,723,621.80
Maximum	$373,969,013.25
Mean Std. Error	$152,889.36

Percentile	Forecast values
0%	$272,723,621.80
10%	$298,591,162.92
20%	$305,119,922.22
30%	$309,664,654.94
40%	$313,872,225.10
50%	$317,791,700.60
60%	$321,801,346.37
70%	$326,275,067.02
80%	$331,442,427.68
90%	$338,323,348.35
100%	$373,969,013.25

10,000 Trials

Contribution to Variance View

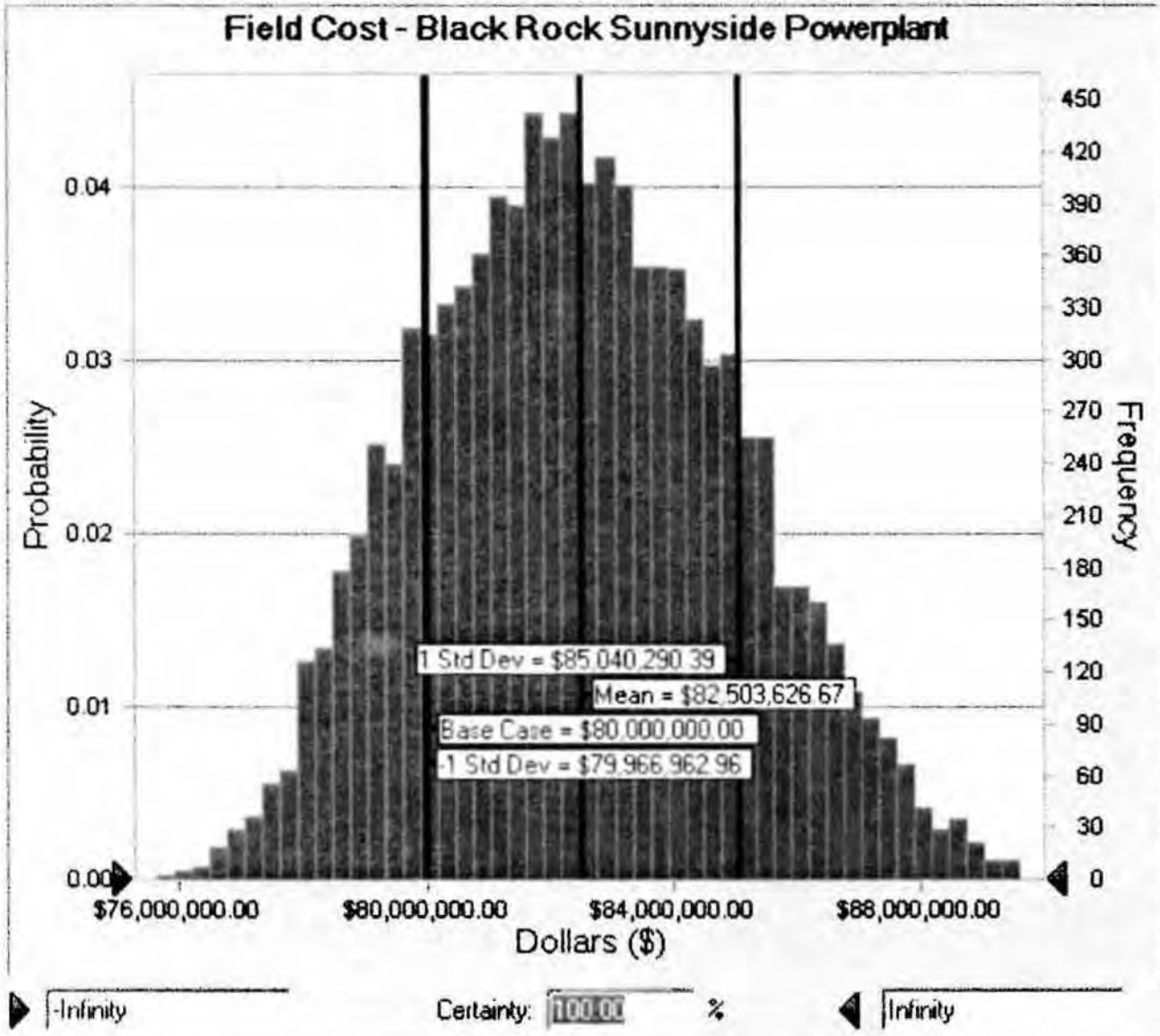


Sunnyside Powerplant

Field and Construction Cost Risk analyses

Crystal Ball Output

10,000 Trials | Split View | 9,971 Displayed

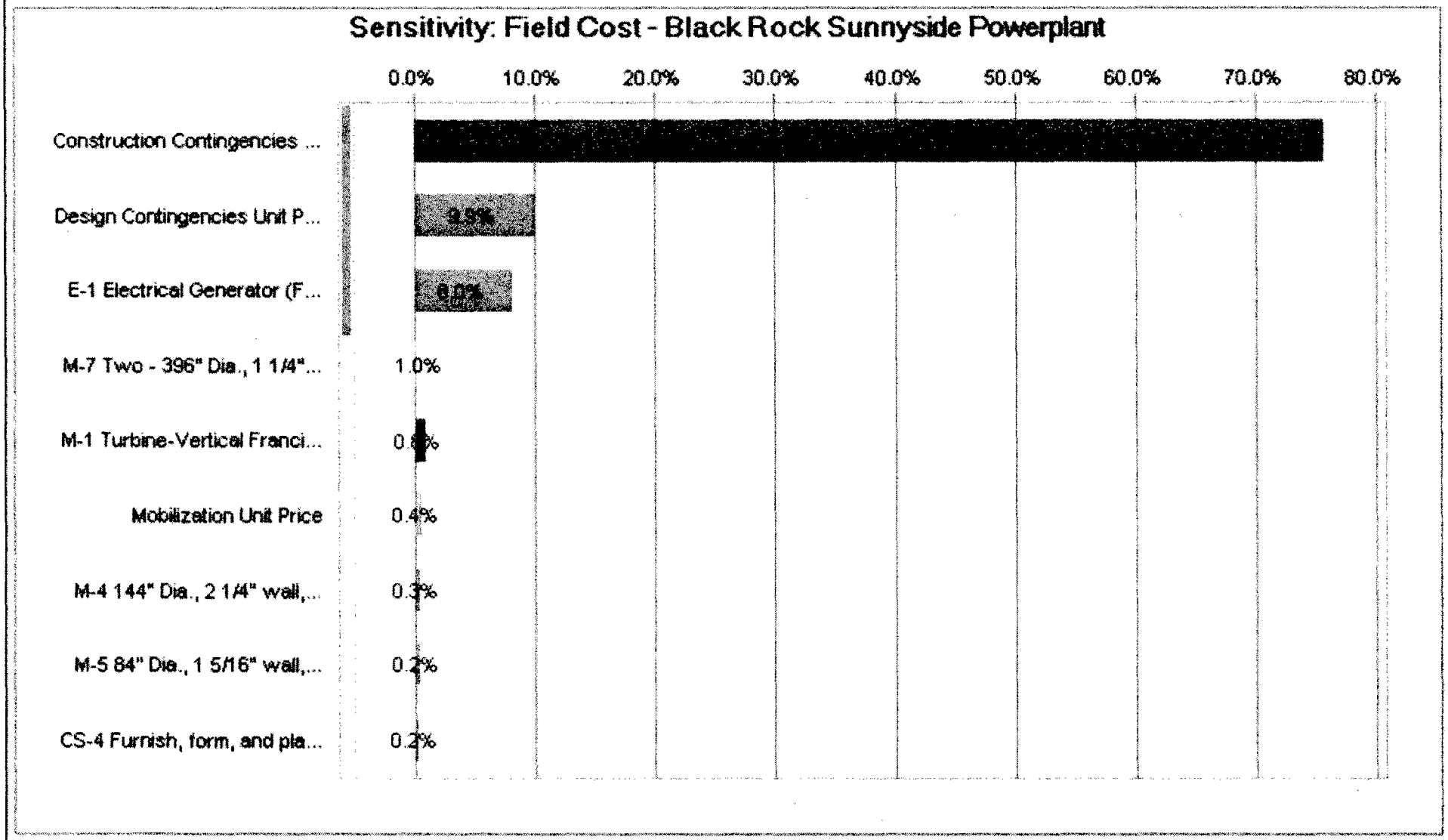


Statistic	Forecast values
Trials	10,000
Mean	$82,503,626.67
Median	$82,398,011.46
Mode	---
Standard Deviation	$2,536,663.72
Variance	$6,434,662,806,937.
Skewness	0.1974
Kurtosis	2.65
Coeff. of Variability	0.0307
Minimum	$75,628,683.79
Maximum	$93,025,716.16
Mean Std. Error	$25,366.64

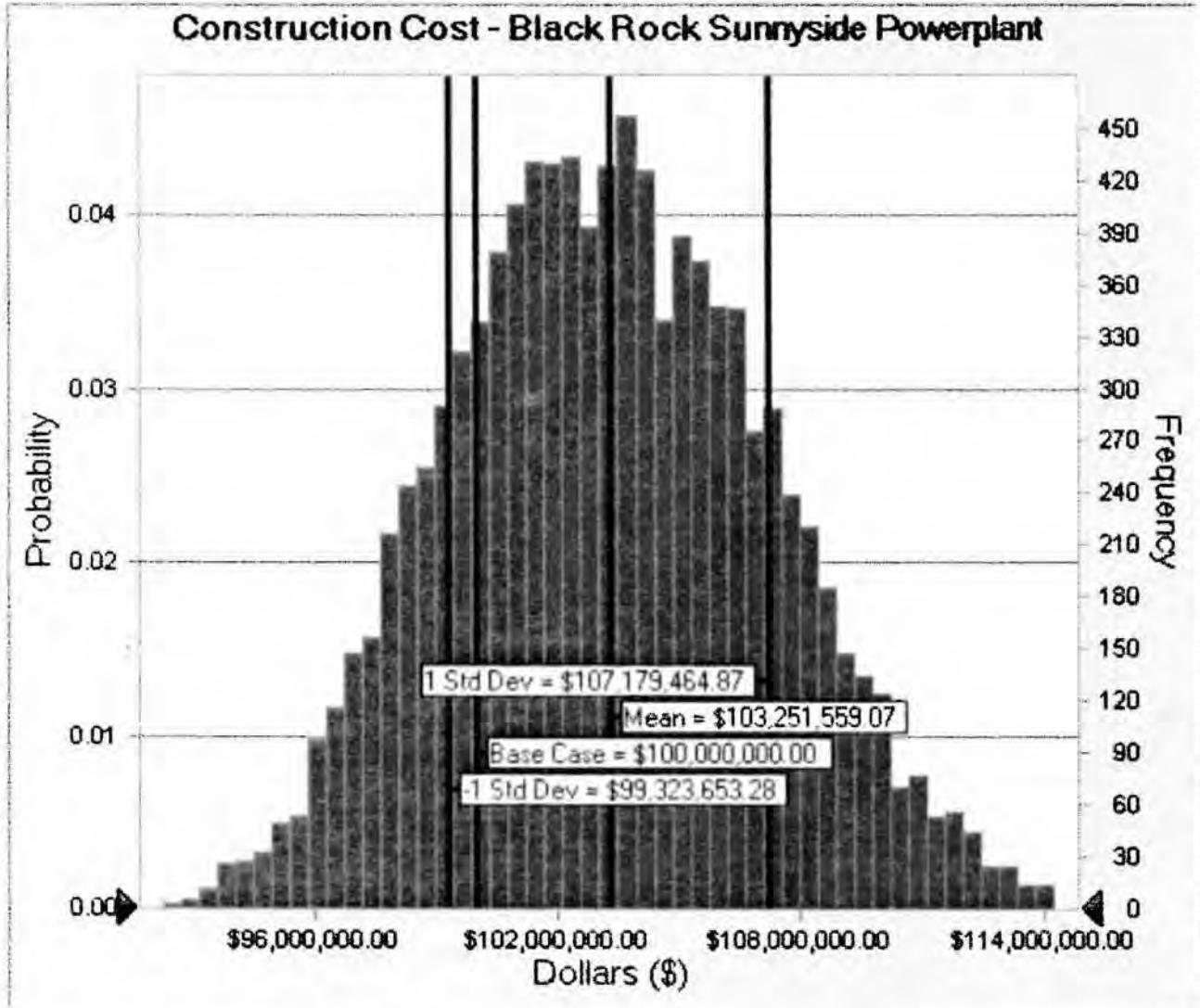
Percentile	Forecast values
0%	$75,628,683.79
10%	$79,222,581.09
20%	$80,208,242.87
30%	$81,030,062.64
40%	$81,733,369.68
50%	$82,396,794.72
60%	$83,089,952.36
70%	$83,859,134.00
80%	$84,735,832.92
90%	$85,890,884.48
100%	$93,025,716.16

10,000 Trials

Contribution to Variance View



10,000 Trials | Split View | 9,979 Displayed

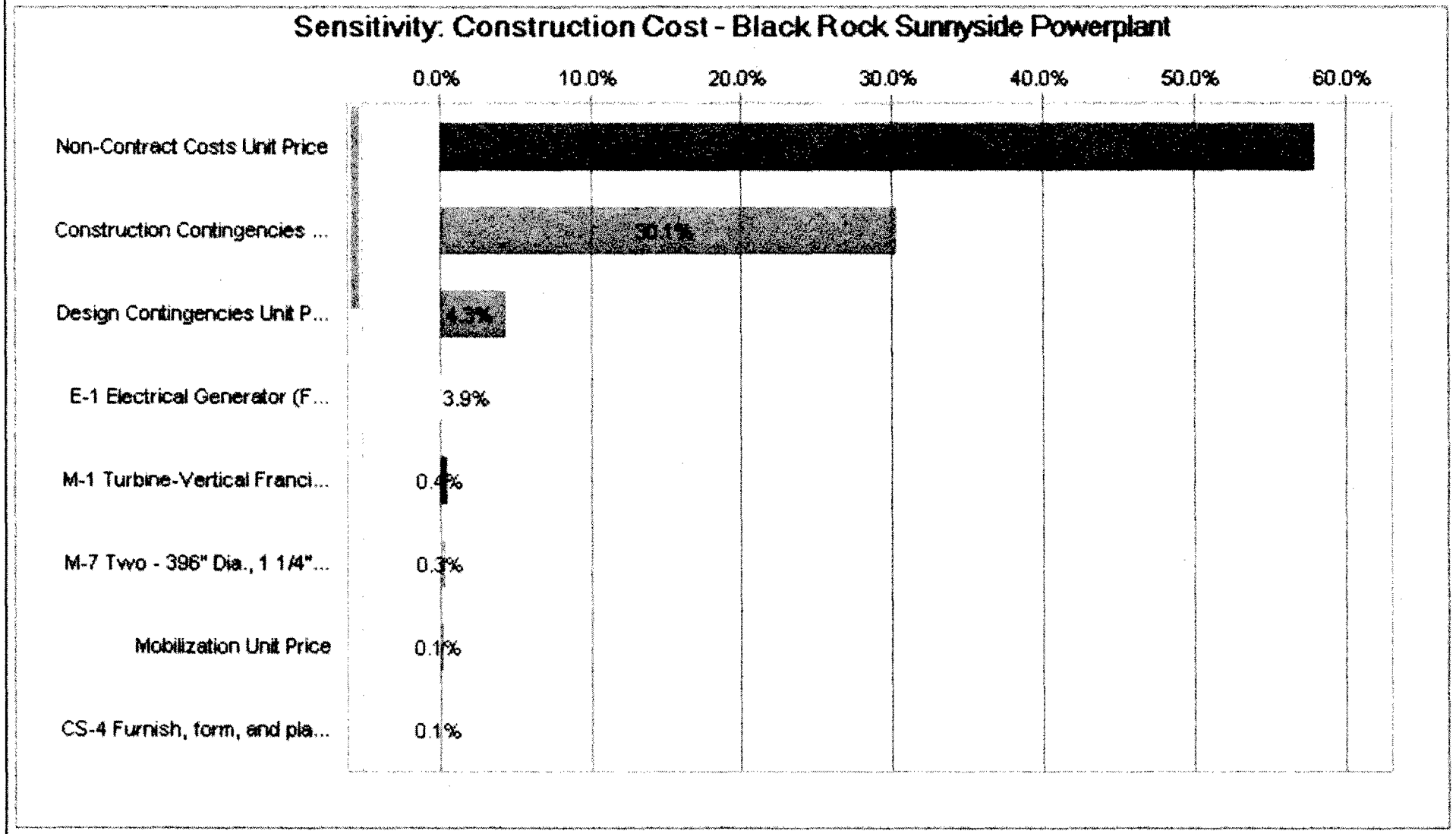


Statistic	Forecast values
Trials	10,000
Mean	$103,251,559.07
Median	$103,162,584.06
Mode	---
Standard Deviation	$3,927,905.80
Variance	$15,428,443,949.81
Skewness	0.1361
Kurtosis	2.72
Coeff. of Variability	0.0380
Minimum	$91,473,090.21
Maximum	$117,503,798.07
Mean Std. Error	$39,279.06

Percentile	Forecast values
0%	$91,473,090.21
10%	$98,179,150.77
20%	$99,800,954.72
30%	$101,029,128.73
40%	$102,085,514.72
50%	$103,162,418.54
60%	$104,161,183.34
70%	$105,376,831.91
80%	$106,639,814.39
90%	$108,406,646.33
100%	$117,503,798.07

10,000 Trials

Contribution to Variance View



APPENDIX D

Wymer Dam and Reservoir Alternative

Cost-Risk Analysis

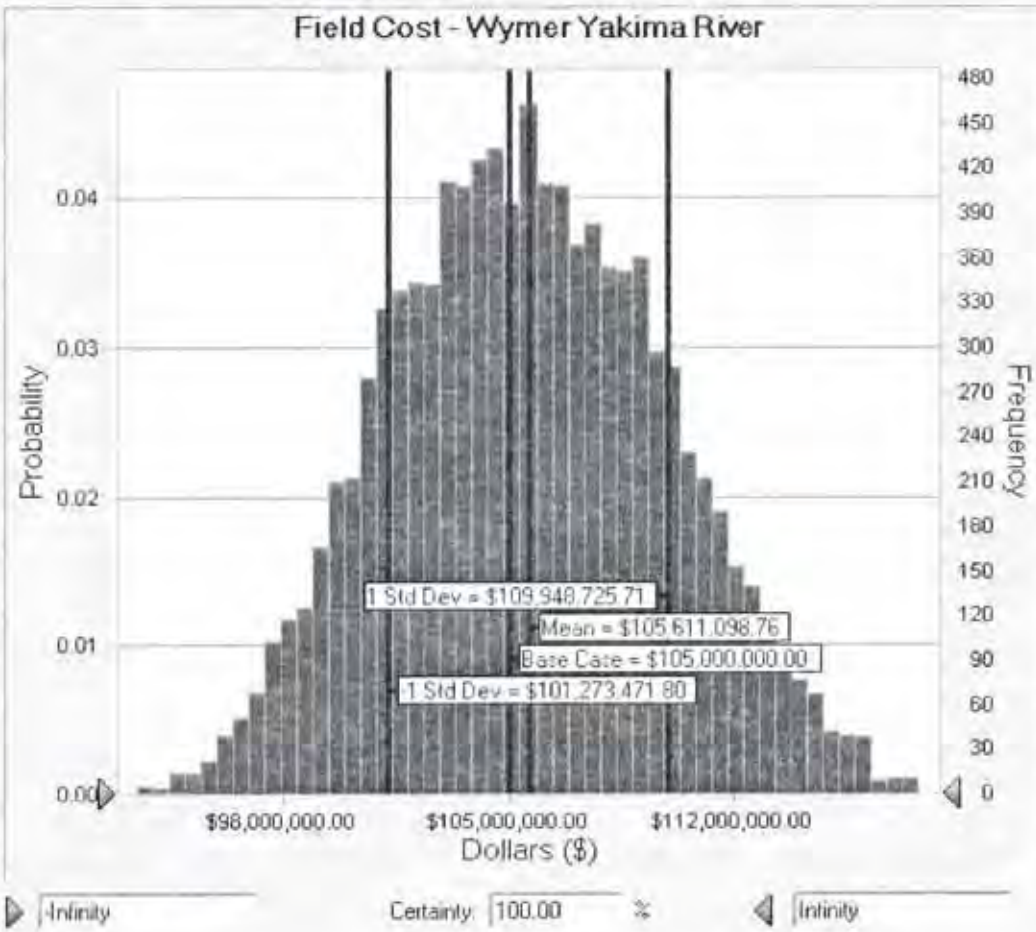
Crystal Ball Output

Intake, Pumping Plant and Switchyard

Field and Construction Cost Risk analyses

Crystal Ball Output

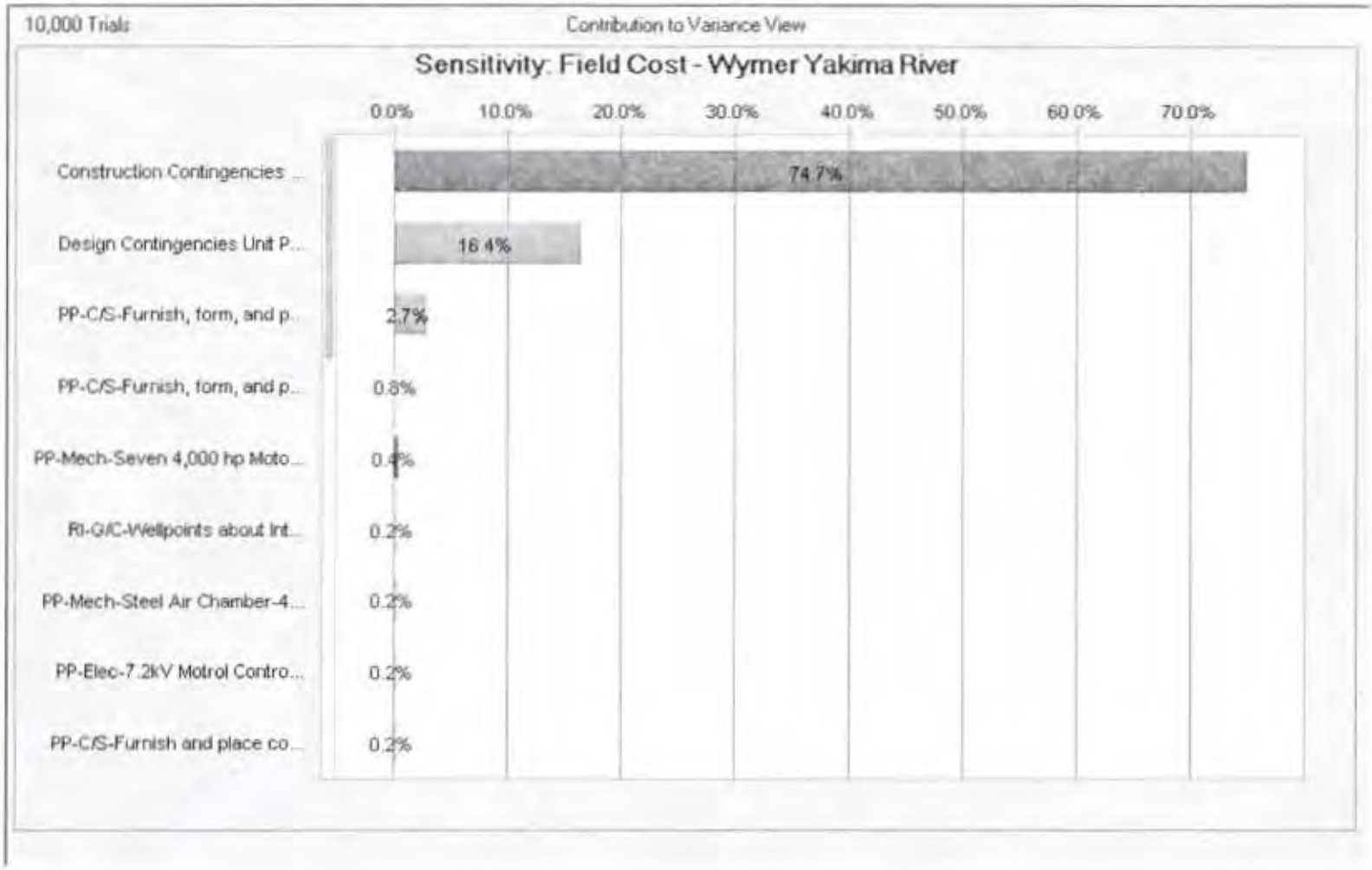
10,000 Trials | Split View | 9,974 Displayed



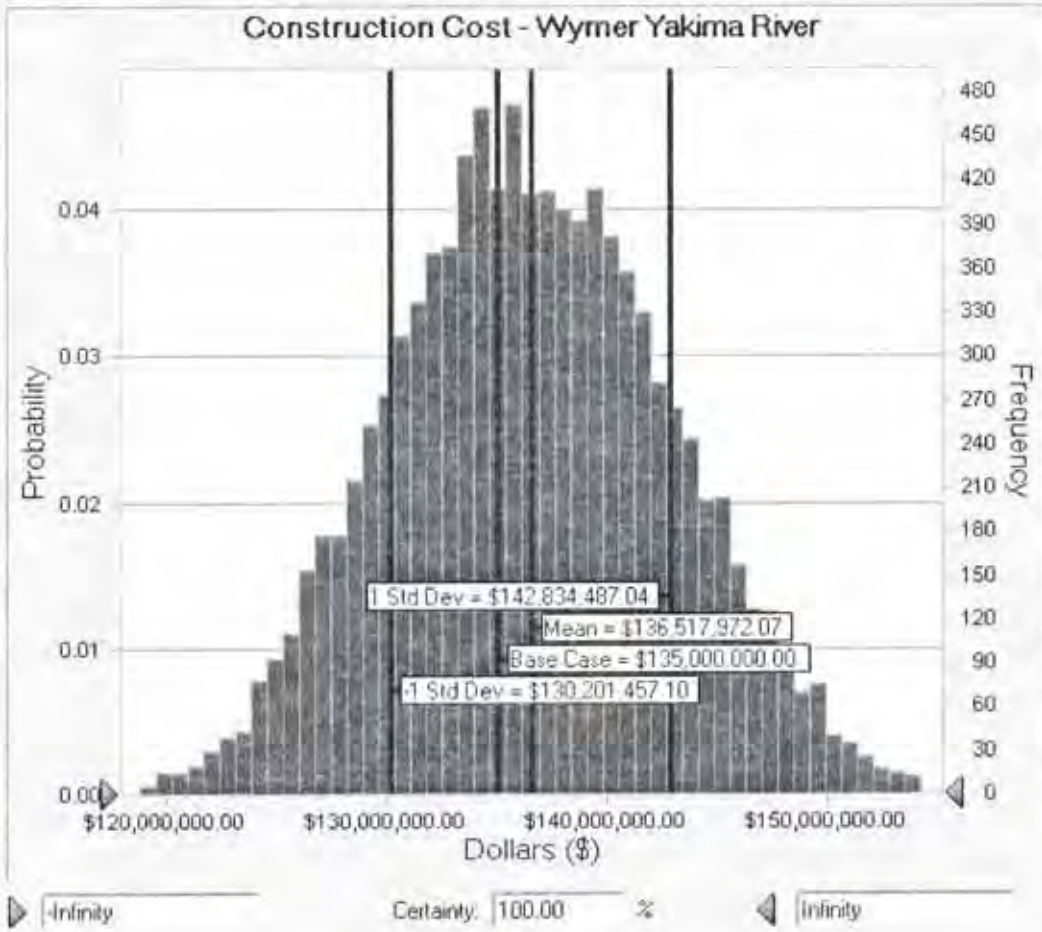
-Infinity | Certainty: 100.00 % | +Infinity

Statistic	Forecast values
Trials	10,000
Mean	$105,611,098.76
Median	$105,533,710.84
Mode	---
Standard Deviation	$4,337,626.95
Variance	$18,815,007,598.73
Skewness	0.1139
Kurtosis	2.65
Coeff. of Variability	0.0411
Minimum	$92,724,487.01
Maximum	$120,091,610.01
Mean Std. Error	$43,376.27

Percentile	Forecast values
0%	$92,724,487.01
10%	$100,023,040.26
20%	$101,745,036.11
30%	$103,136,303.74
40%	$104,320,544.44
50%	$105,533,645.87
60%	$106,677,761.61
70%	$107,978,994.18
80%	$109,379,810.46
90%	$111,329,951.26
100%	$120,091,610.01

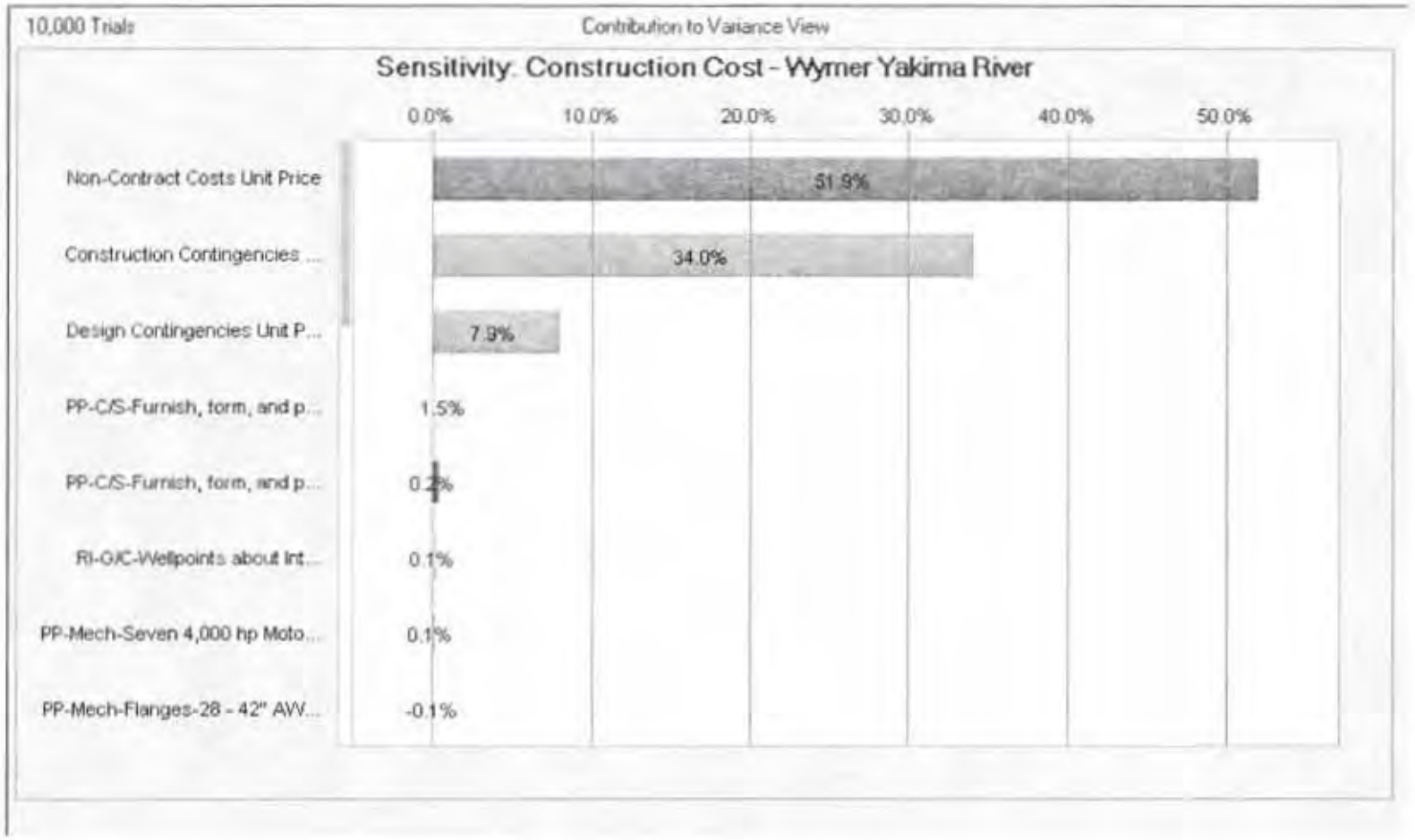

10,000 Trials
Contribution to Variance View
Sensitivity: Field Cost - Wymer Yakima River
0.0%
10.0%
20.0%
30.0%
40.0%
50.0%
60.0%
70.0%
Construction Contingencies ...
74.7%
Design Contingencies Unit P...
16.4%
PP-C/S-Furnish, form, and p...
2.7%
PP-C/S-Furnish, form, and p...
0.8%
PP-Mech-Seven 4,000 hp Moto...
0.4%
RI-G/C-Wellpoints about Int...
0.2%
PP-Mech-Steel Air Chamber-4...
0.2%
PP-Elec-7.2kV Motrol Contro...
0.2%
PP-C/S-Furnish and place co...
0.2%

10,000 Trials | Split View | 9,975 Displayed



Statistic	Forecast values
Trials	10,000
Mean	$136,517,972.07
Median	$136,338,275.08
Mode	---
Standard Deviation	$6,316,514.97
Variance	$39,898,361,321.67
Skewness	0.0768
Kurtosis	2.74
Coeff. of Variability	0.0463
Minimum	$117,822,553.20
Maximum	$159,467,086.98
Mean Std. Error	$63,165.15

Percentile	Forecast values
0%	$117,822,553.20
10%	$128,360,436.05
20%	$131,037,184.43
30%	$133,097,087.53
40%	$134,691,783.45
50%	$136,337,550.50
60%	$138,129,876.72
70%	$139,887,160.76
80%	$141,944,226.44
90%	$144,863,014.81
100%	$159,467,086.98

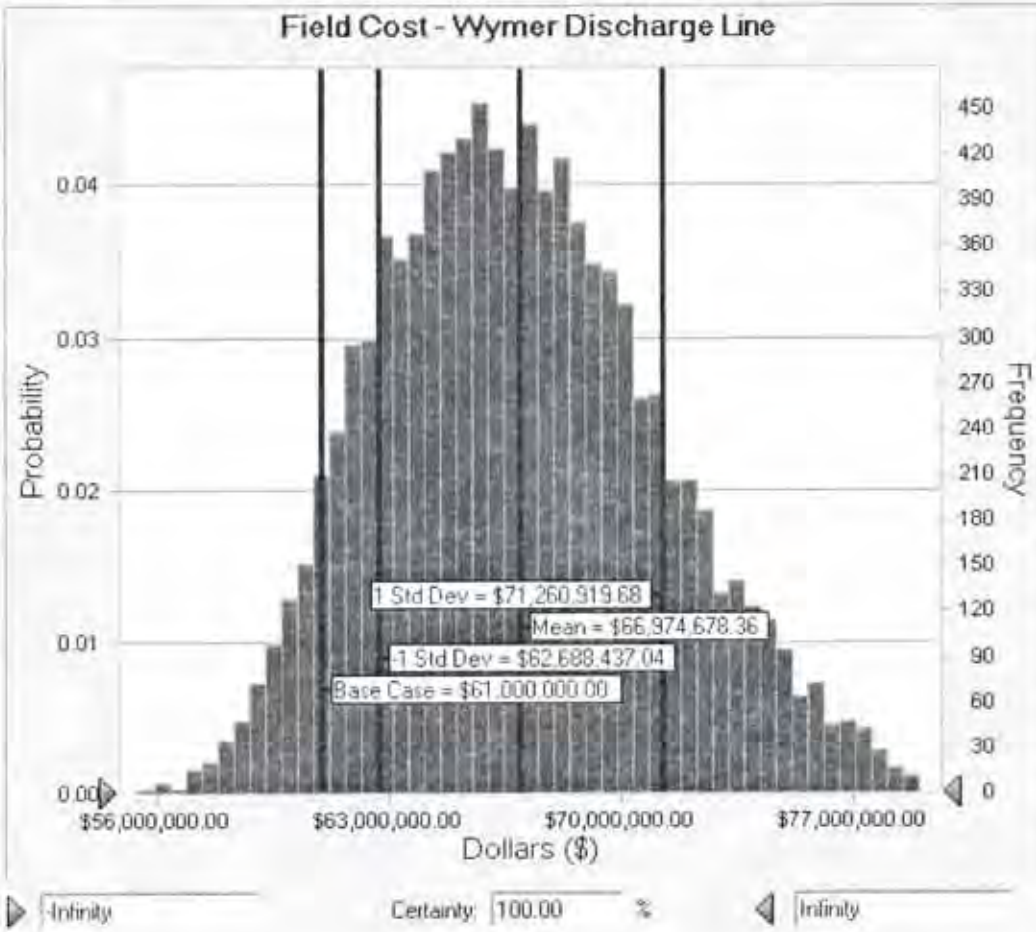

10,000 Trials
Contribution to Variance View
Sensitivity: Construction Cost - Wymer Yakima River
0.0%
10.0%
20.0%
30.0%
40.0%
50.0%
Non-Contract Costs Unit Price
51.9%
Construction Contingencies ...
34.0%
Design Contingencies Unit P...
7.9%
PP-C/S-Furnish, form, and p...
1.5%
PP-C/S-Furnish, form, and p...
0.2%
RI-G/C-Wellpoints about Int...
0.1%
PP-Mech-Seven 4,000 hp Moto...
0.1%
PP-Mech-Flanges-28 - 42" AW...
-0.1%

Discharge Line

Field and Construction Cost Risk analyses

Crystal Ball Output

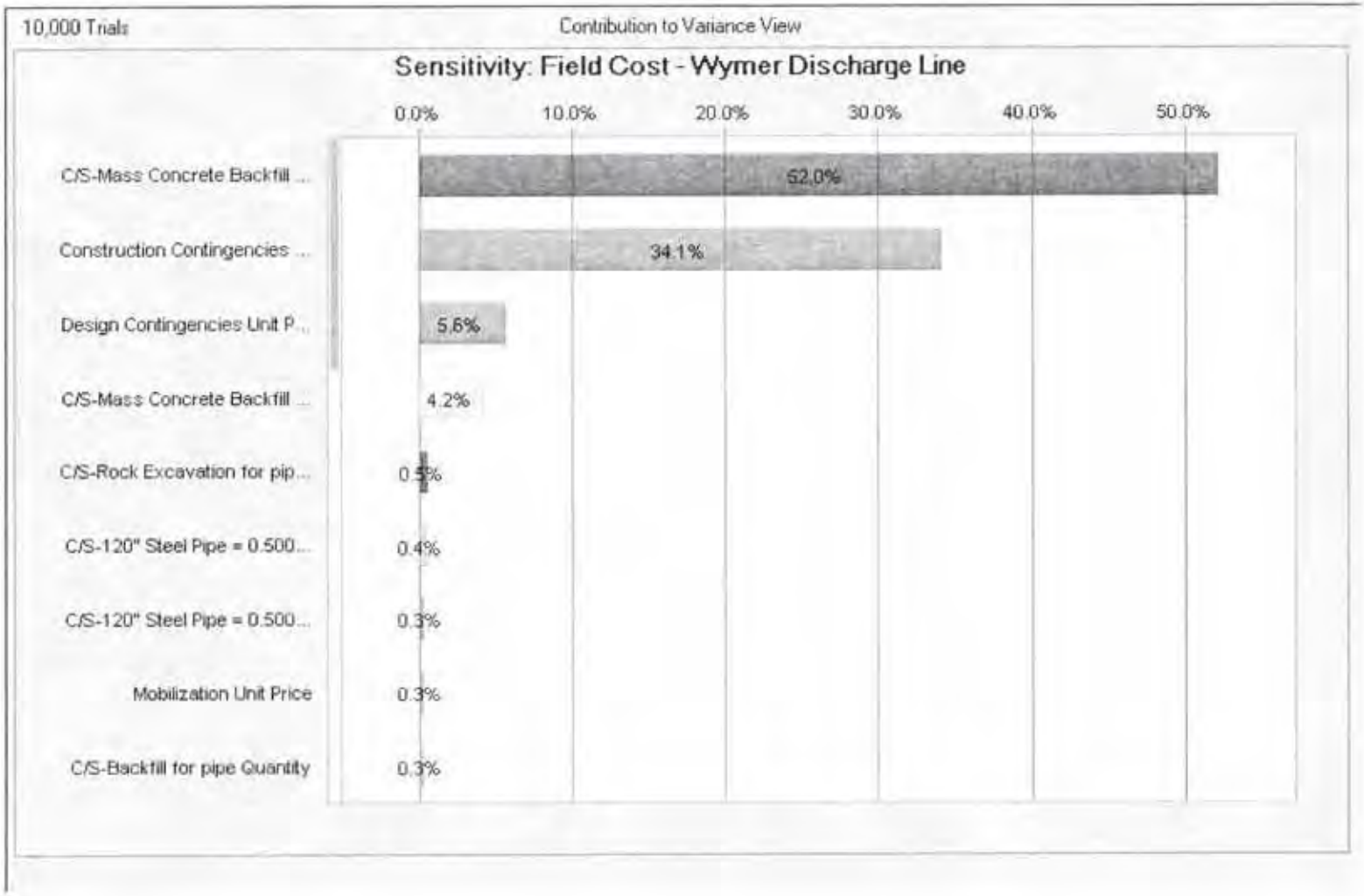
10,000 Trials | Split View | 9,944 Displayed



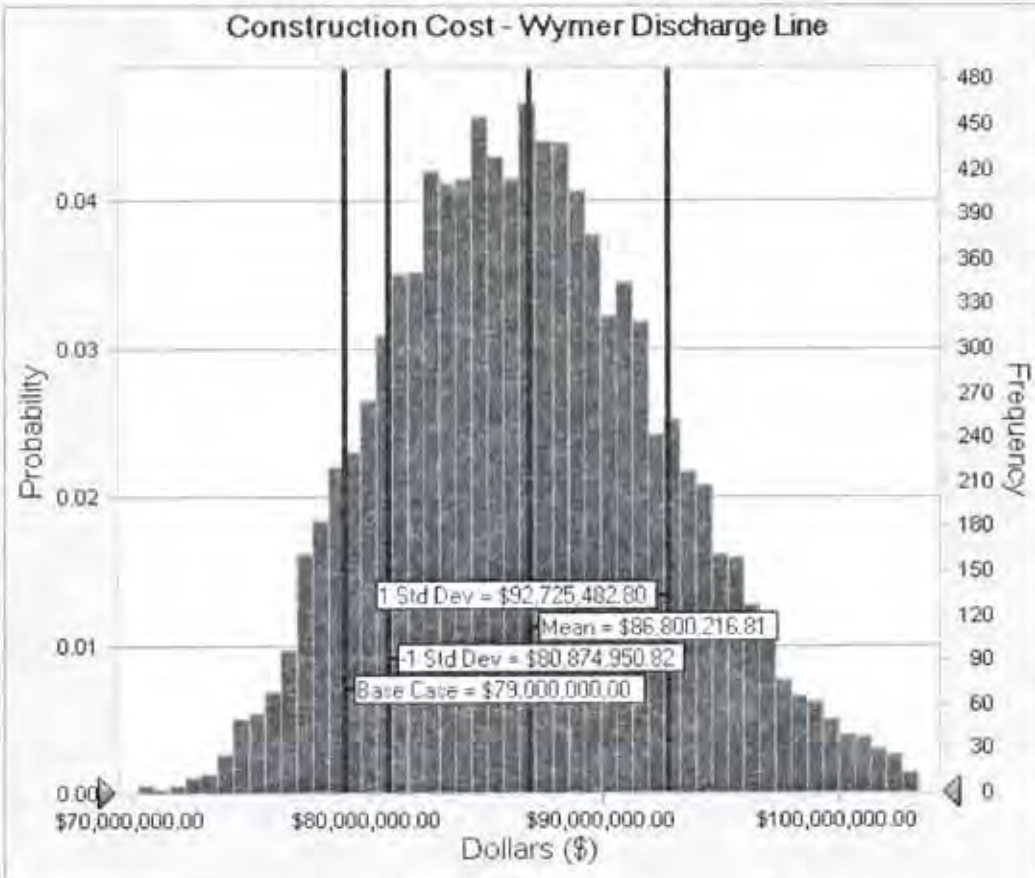
-Infinity | Certainty: 100.00 % | Infinity

Statistic	Forecast values
Trials	10,000
Mean	$66,974,678.36
Median	$66,680,000.04
Mode	---
Standard Deviation	$4,286,241.32
Variance	$18,371,864,643.00
Skewness	0.3597
Kurtosis	2.88
Coeff. of Variability	0.0640
Minimum	$55,468,383.46
Maximum	$82,900,530.27
Mean Std. Error	$42,862.41

Percentile	Forecast values
0%	$55,468,383.46
10%	$61,644,331.02
20%	$63,159,560.41
30%	$64,444,745.54
40%	$65,572,349.50
50%	$66,679,810.14
60%	$67,836,345.92
70%	$69,073,766.34
80%	$70,564,123.15
90%	$72,722,201.40
100%	$82,900,530.27

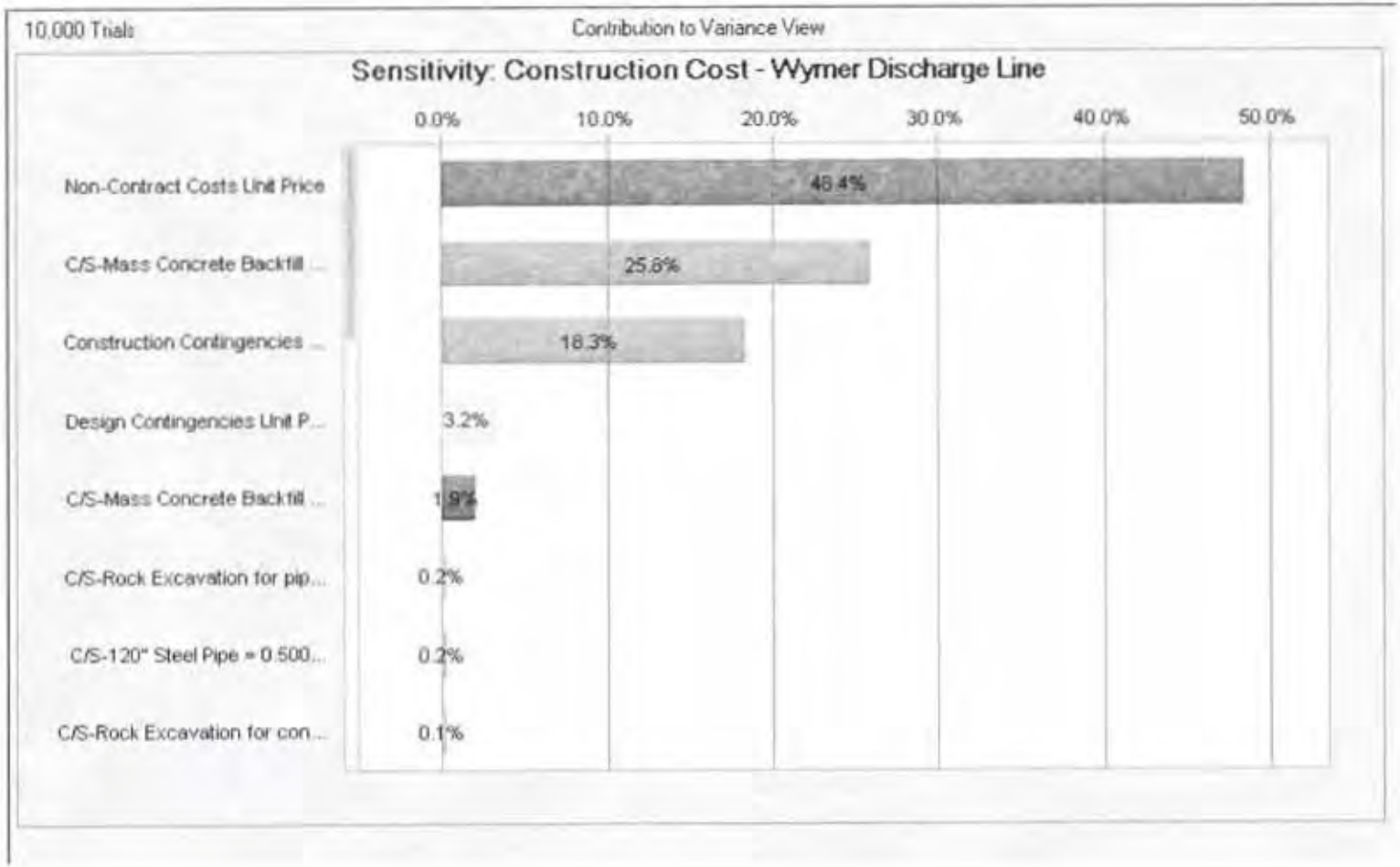

10,000 Trials
Contribution to Variance View
Sensitivity: Field Cost - Wymer Discharge Line
0.0%
10.0%
20.0%
30.0%
40.0%
50.0%
C/S-Mass Concrete Backfill ...
Construction Contingencies ...
Design Contingencies Unit P...
C/S-Mass Concrete Backfill ...
C/S-Rock Excavation for pip...
C/S-120" Steel Pipe = 0.500...
C/S-120" Steel Pipe = 0.500...
Mobilization Unit Price
C/S-Backfill for pipe Quantity
52.0%
34.1%
5.6%
4.2%
0.5%
0.4%
0.3%
0.3%
0.3%

10,000 Trials | Split View | 9,955 Displayed



Statistic	Forecast values
Trials	10,000
Mean	$86,800,216.81
Median	$86,512,459.55
Mode	—
Standard Deviation	$5,925,265.99
Variance	$35,108,777,079.97
Skewness	0.3214
Kurtosis	2.97
Coeff. of Variability	0.0683
Minimum	$70,155,196.88
Maximum	$109,991,044.48
Mean Std. Error	$59,252.66

Percentile	Forecast values
0%	$70,155,196.88
10%	$79,355,769.44
20%	$81,614,713.82
30%	$83,352,654.90
40%	$84,949,882.41
50%	$86,511,655.36
60%	$88,029,696.76
70%	$89,682,224.29
80%	$91,755,877.07
90%	$94,637,610.81
100%	$109,991,044.48

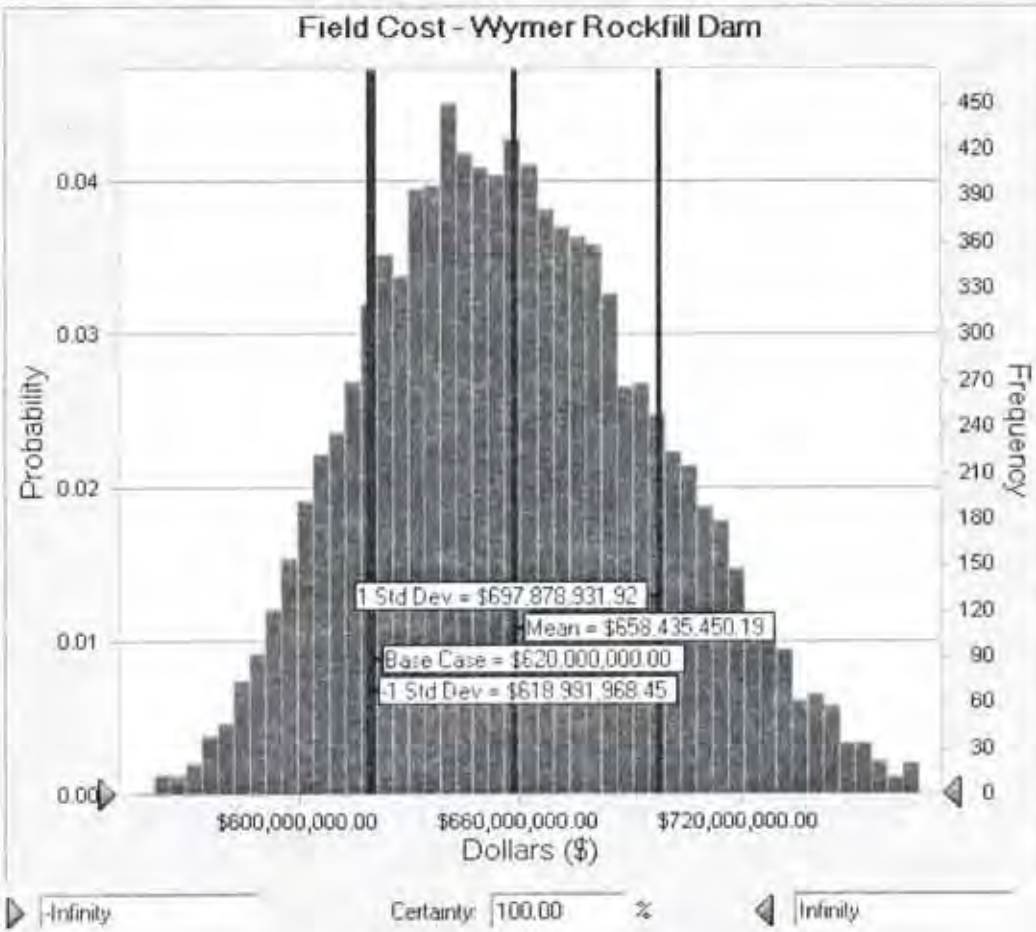

10,000 Trials
Contribution to Variance View
Sensitivity: Construction Cost - Wyrner Discharge Line
0.0%
10.0%
20.0%
30.0%
40.0%
50.0%
Non-Contract Costs Unit Price
46.4%
C/S-Mass Concrete Backfill ...
25.6%
Construction Contingencies ...
18.3%
Design Contingencies Unit P...
3.2%
C/S-Mass Concrete Backfill ...
C/S-Rock Excavation for pip...
0.2%
C/S-120" Steel Pipe = 0.500...
0.2%
C/S-Rock Excavation for con...
0.1%

Dam and Reservoir

Field and Construction Cost Risk analyses

Crystal Ball Output

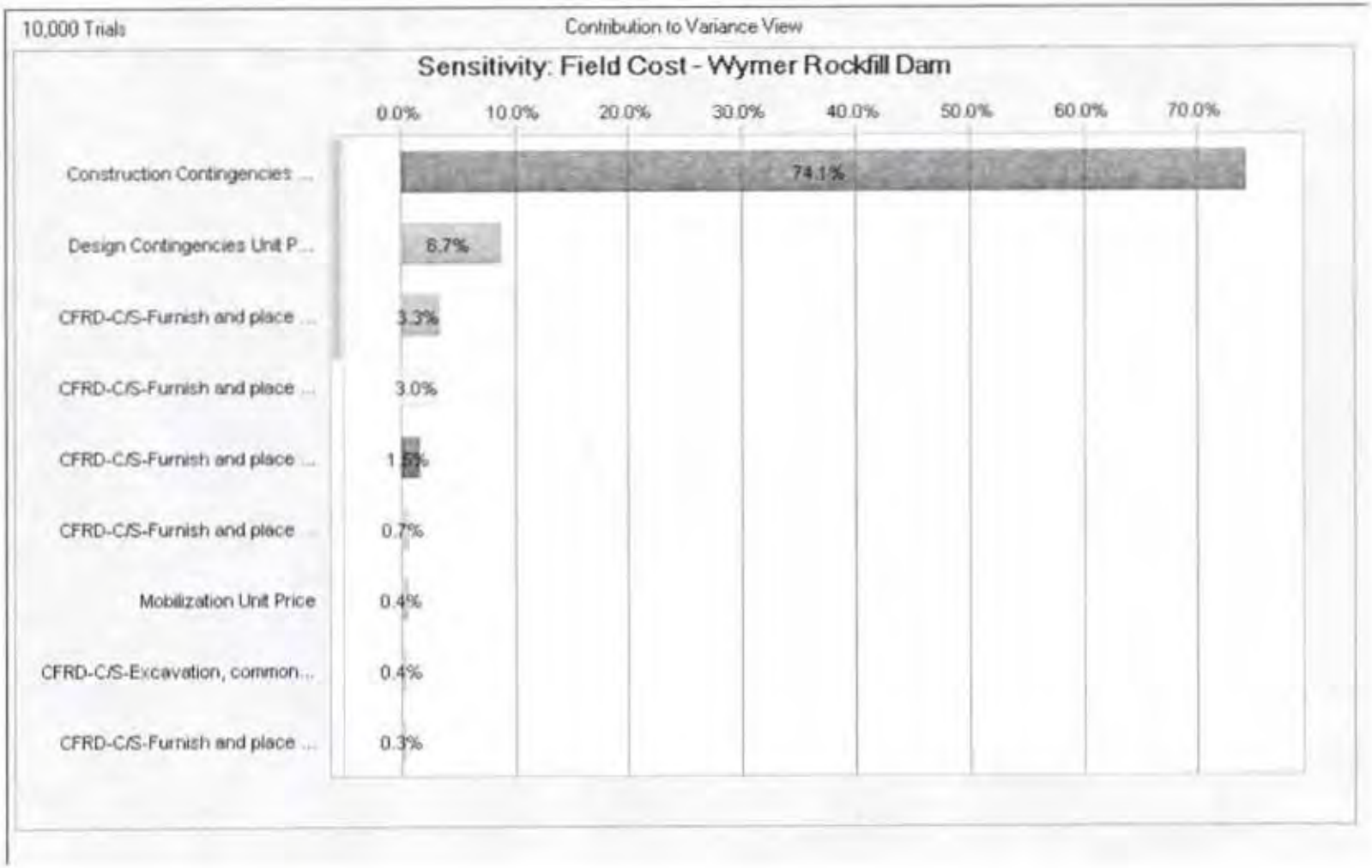
10,000 Trials | Split View | 9,968 Displayed



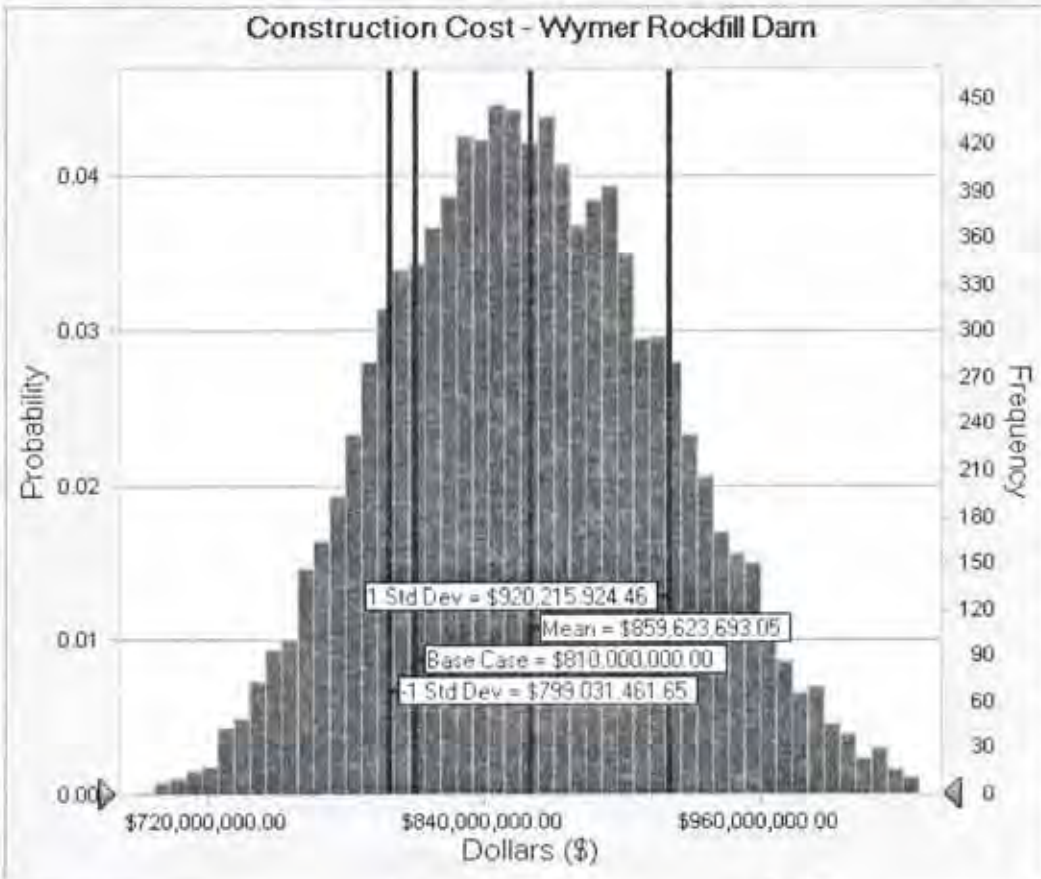
-Infinity | Certainty: 100.00 % | Infinity

Statistic	Forecast values
Trials	10,000
Mean	$658,435,450.19
Median	$656,153,000.63
Mode	---
Standard Deviation	$39,443,481.74
Variance	$1,555,788,251,579,
Skewness	0.2751
Kurtosis	2.73
Coeff. of Variability	0.0599
Minimum	$555,986,306.49
Maximum	$808,954,166.58
Mean Std. Error	$394,434.82

Percentile	Forecast values
0%	$555,986,306.49
10%	$608,430,892.20
20%	$623,672,717.14
30%	$635,244,869.72
40%	$645,544,774.37
50%	$656,127,307.95
60%	$666,942,621.80
70%	$678,455,242.70
80%	$692,696,380.94
90%	$711,902,543.18
100%	$808,954,166.58


10,000 Trials
Contribution to Variance View
Sensitivity: Field Cost - Wymer Rockfill Dam
0.0%
10.0%
20.0%
30.0%
40.0%
50.0%
60.0%
70.0%
Construction Contingencies ...
74.1%
Design Contingencies Unit P...
6.7%
CFRD-C/S-Furnish and place ...
3.3%
CFRD-C/S-Furnish and place ...
3.0%
CFRD-C/S-Furnish and place ...
1.5%
CFRD-C/S-Furnish and place ...
0.7%
Mobilization Unit Price
0.4%
CFRD-C/S-Excavation, common...
0.4%
CFRD-C/S-Furnish and place ...
0.3%

10,000 Trials | Split View | 9,970 Displayed



-Infinity | Certainty: 100.00 % | Infinity

Statistic	Forecast values
Trials	10,000
Mean	$859,623,693.05
Median	$857,457,044.95
Mode	---
Standard Deviation	$60,592,231.40
Variance	$3,671,418,506,506,
Skewness	0.1721
Kurtosis	2.75
Coeff. of Variability	0.0705
Minimum	$679,822,180.95
Maximum	$1,067,949,200.36
Mean Std. Error	$605,922.31

Percentile	Forecast values
0%	$679,822,180.95
10%	$782,312,494.44
20%	$805,719,971.41
30%	$825,351,716.90
40%	$842,012,052.49
50%	$857,456,502.44
60%	$873,593,103.87
70%	$891,765,123.82
80%	$911,952,430.98
90%	$939,519,026.79
100%	$1,067,949,200.36