WATER USER AGENCIES AND ORGANIZATIONS

49. Birch Creek Irrigation Company, Board of Directors

50. Birch Creek Irrigation Company, M. LaMont Pugmire, Secretary-Treasurer

51. Carbon Water Conservancy District, Richard Lee

52. Cottonwood Gooseberry Irrigation Company, Lynn Anderson, President

53. Gunnison Irrigation Company, Allen Dyreng, President

54. Mayfield Irrigation Company, William Kay Christiansen, President

55. North Carbon Salinity Improvement Project, Frank Saccomanno, President, Spring Glen Canal Company

56. Price River Water Improvement District

57. Price River Water Users Association, William Butcher, President

58. Rock Dam Irrigation Company, Don Hardy, President

59. Sanpete Water Conservancy District, David L. Peterson, Member

60. Sanpete Water Conservancy District, Edwin B. Sunderland, Chairman

61. Spring Canyon Irrigation Company, Scott Durrant, President

62. Wales Irrigation Company, Roger Rees, President

49. BIRCH CREEK IRRIGATION COMPANY, BOARD OF DIRECTORS

JUN-1-2010 15:50 FROM:SKYLINE MOUNTAIN RES 14354279505 TO:4801379 1159 PG 1/1

ORIGINAL

Birch Creek Irrigation Company

P.O. Box 116

Mt. Pleasant, UT 84647

June 1st, 2010

To: Bureau of Reclamation

Attention Peter Crookston, PRO 774

302 East 1860 South

Provo, UT 84606-7317

Fax # 801 379 1159

From: Birch Creek Irrigation Company

P.O. Box 116

Mt. Pleasant, UT 84647

Re" Narrows project

49-1 Thank you for allowing comment. At this time, we would like to plead with you to see the need after so many years of deprivation, to finally allocate our 5,400 acre feet of water for use in the north Sanpete Valley.

You will hear much hue and cry from the east side of the mountains. Please don't be swayed by the volume and loudness of the cries from them. They have numerous reservoirs and ponds that allow them to water the whole year. They will bombard you with noise.

We ask that you see through the noise and look at what is fair and right. The Sanpete Valley has been denied too long its water and now is the time to rectify this injustice.

Our farmers and ranchers are only able to water for typically two crops of hay. This is not because the season is too short but it is because without reservoir storage, when the snow melt ends, the watering ends. With this water and its ability to be held and distributed later in each season, a tremendous value will occur.

Please decide this on what is fair and right and not who may be the loudest.

Thankyou for listening.

Sincerely,

Stan Smith, Mont Pugmire, John Lee, Kevin Turpin and Alan Summerhays

Board of Directors for Birch Creek Irrigation Company, Mt. Pleasant/Fairview, UT

50. BIRCH CREEK IRRIGATION COMPANY, M. LAMONT PUGMIRE, SECRETARY-TREASURER

AL

ORIGINAL

Crookston, Peter L

From: Monte Pugmire [dadpug@gmail.com]
Sent: Tuesday, June 01, 2010 3:25 PM
To: PRO NarrowsEIS
Subject: Narrows project comment.

50-1 Thank you for allowing comment. It is our hope that reason and fairness will apply in the decision that comes forth. The Sanpete Valley has been denied its rightful
share of the water for too many years. There will be a lot of rhetoric by those on the east side of the mountain even though they have multiple reservoirs to store and
provide water throughout the irrigation season. We have none. Our farmers and ranchers have only what comes down from snow melt and when that is gone, they just
have to quit watering.

What a boone to the farming economy of the Sanpete Valley if we were to finally have access to our 5,400 acre feet of water. This water could be held in storage and released toward the end of the season enabling the users the opportunity to farm and water for the whole season and not be deprived life sustaining water for the latter 1/2 of each year.

Please. We plead with you to make your decision NOT based on who makes the loudest noise but in favor of those whose water right this is. This is not a vote and the one with the most noise and advertising effort wins. It is an issue of right and fair. We urge you to see the need here and allow our water to come to our valley for its highest and best use.

Thank you for listening.

Respectfully,

M. LaMont Pugmire
Sec-Treas.
Birch Creek Irrigation Company

dated this 1st Day of June 2010.

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Reply Date:		
Date	Initials	Code
		100
		105
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	KS	700
6/22/10	Bcm	770
6/23/10	PC	774CY

Action:
Classification: ENV - 6.00
Project: Narrows
Control Number: 1004116612
Folder: 1122816

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51. CARBON WATER CONSERVANCY DISTRICT, RICHARD LEE

AL

ORIGINAL

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JUN 0 1 2010

CARBON WATER CONSERVANCY DISTRICT

P.O. Box 509
Helper, Utah 84526
Phone: (435) 472-3357
Fax: (435) 472-3324

Chairman
Richard N. Lee
Secretary • Treasurer
David R. Anderson, CPA
Attorney
Bryce K. Bryner

Reply Date	Initial	
Date	Richard	100
	Fred Helstern	125
	Richard Mikkelsen	127
	Nick J. Sampinos	700
6/10/10	Matt Wise	770

774 Cop

Action:
Classification: ENV - 6.00
Project: Narrows
Control No: 10039696

June 1, 2010

Bureau of Reclamation
Attention Peter Crookston (PRO-774)
302 East 1860 South
Provo, UT 84606-7317
narrowsSDEIS@usbr.gov

Re: Narrows Project – Comments of Carbon Water Conservancy District on Supplemental Draft Environmental Impact Statement 1122816

Dear Mr. Crookston:

The Carbon Water Conservancy District hereby submits the attached comments (and associated exhibits) to the referenced Supplemental Draft Environmental Impact Statement ("SDEIS") covering the proposed Narrows Project. As you know, the District may submit additional comments once it receives and reviews documents from the Bureau in response to our outstanding FOIA request.

Please contact me if you have any questions regarding this submission.

Sincerely,

Carbon Water Conservancy District

Richard Lee

cc: Timothy Witman (U.S. Army Corps of Engineers)
William Damery (Utah Division of Water Quality)
Larry Svoboda, NEPA Program Chief; Brian Caruso, Wetlands Unit Chief (U.S. Environmental Protection Agency, Region 8)
Forest Supervisor, Manti-La Sal National Forest

NOTICE: IF YOU DETACH ENCLOSURES, PLEASE INSERT CODE NO. PRO 774

4831-8869-8374.1

Comments of the Carbon County Water Conservancy District On the Narrows Project Supplemental Draft Environmental Impact Statement

June 1, 2010

This document provides the initial comments of the Carbon Water Conservancy District ("CWCD") on the Narrows Project Supplemental Draft Environmental Impact Statement (SDEIS). Because the CWCD is awaiting documents in response to a Freedom of Information Act Request made to the Bureau of Reclamation (the "Bureau") in April 2010, it reserves the right to supplement these comments after it has obtained and reviewed the requested documents, and the Bureau has indicated it has a policy of accepting such comments even if submitted after the technical close of the comment period.

The CWCD oversees operation and maintenance of Scofield Reservoir, which is located a few miles downstream of the proposed Narrows Project and would suffer significant impacts if the Narrows Project were constructed. The Scofield Reservoir is the largest single source of water supply for municipal, industrial, and agricultural water in Carbon County and also provides a major recreational resource and sport fishery.

As the responsible entity overseeing Scofield Reservoir, the CWCD has an obvious interest in the accuracy and thoroughness of the final EIS for the proposed Narrows Project. This interest has been further confirmed since the publication of the 1998 draft EIS for the Narrows Project ("DEIS"), in the form of two decisions by the federal courts. (*Sanpete Water Conservancy District v. Carbon Water Conservancy District et al.*, Findings of Fact and Conclusions of Law, entered June 3, 1991 (Case No. 2:96-CV-975); *aff'd* 226 F.3d 1170 (10th Cir. 2000)). As held by the Federal District Court of Utah, and affirmed by the Tenth Circuit Court of Appeals, the CWCD and other Carbon County water interests have never agreed to development of the Narrows Project, including by their participation in the 1984 Compromise Agreement, and they have every right to submit critical comments and otherwise participate in the NEPA and permitting process for the Narrows Project.

When the DEIS was last released for comment in 1998, several Carbon County interests combined to form the Carbon Water Committee, and submitted a detailed set of comments to the Bureau and to the Army Corps of Engineers (a cooperating agency for the EIS)(the "Corps") on the DEIS and the Clean Water Act ("CWA") Section 404 permit application ("DEIS Comments"). The DEIS Comments have never been responded to or otherwise specifically addressed by the Bureau or Corps. The CWCD adopts and incorporates the substance of the DEIS Comments here and requests that each comment be addressed in the Final EIS, as required under the Council of Environmental Quality ("CEQ") NEPA regulations. (A copy of the DEIS Comments is attached as Exhibit 1). To assist the agencies in this task we have created a table that briefly summarizes each of the DEIS Comments, provides the relevant citation to the 1998 DEIS section being addressed as well as the citation to the corresponding section of the SDEIS, and includes a notation of whether it appears that changes or updates were made to that section of the document. This Comment Table is attached as Exhibit 2, and we hereby request the

Bureau, with input from the Corps as appropriate, consider and respond to the DEIS Comments as well as any other additional comments included in the Comment Table.

In short, based on the DEIS Comments, the Comment Table, and as further supplemented below[1], the CWCD believes the SDEIS is fundamentally flawed, both in terms of the process that was used to prepare and issue the SDEIS, and in terms of the scope and content of the analysis itself. To address these shortcomings, the Bureau must either withdraw this SDEIS and start over with a new scoping and EIS process followed by release of a comprehensive new draft EIS, or issue a supplement to the SDEIS that includes the new and updated analysis and alternatives that are required in order for the EIS to pass muster under NEPA and the CWA.

A. COMMENTS REGARDING THE PROCESS OF THE SDEIS.

51-1

1. The DEIS Should Have Been Re-scoped and Then Re-issued.

The Bureau should have re-scoped the project and then published a new draft EIS for public comment and review rather than issuing a so-called "Supplemental" draft EIS eleven years after the first draft was released and never finalized. The Bureau's decision to publish a "supplement" improperly avoids the scoping process, and the response-to-comment process, and thereby violates NEPA. In addition, the SDEIS fails to identify, let alone explain whether and how it responded to the extensive substantive comments it received on the 1998 DEIS, further evidencing the current SDEIS is more analogous to a new draft EIS rather than a supplement.

First, based on the facts of this project—where a DEIS was prepared eleven years earlier but subsequently not released— the Bureau has improperly avoided NEPA's scoping requirements by preparing a so called "supplemental" DEIS rather than issuing a new DEIS. While the CEQ regulations (40 C.F.R. § 1502.9) provide that true "supplements" to a draft EIS are not always required to undergo NEPA's scoping procedures, we disagree with the Bureau's interpretation and application of this regulation in the present case. The CEQ could not have intended to allow an agency to circumvent the scoping requirement by characterizing a stale document as a "Supplement" to a draft EIS, compiled eleven years earlier and subsequently abandoned and then revived.

51-2 Significantly, the SDEIS never specifies what information is being supplemented from the 1998 DEIS; there is no identification in the SDEIS as to what information remains relevant, what information has been updated, what information and analysis is supplemental, nor the substance of the comments that were received and how they affected the revised studies. (One way this might have been done was using a redline-strikeout format, or making notations in the margins, where changes had been made, and including a separate section explaining the basis for each update or supplement to the DEIS.) By failing to identify and discuss these issues, the SDEIS leaves the reader guessing and is nothing more than a new stand-alone DEIS. Consequently, it should have been undergone a full scoping review pursuant to NEPA regulations 40 C.F.R. § 1501.7.

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[1] CWCD also hereby adopts the comments on the SDEIS submitted by Price River Water Improvement District and Trout Unlimited.

Of course, the primary purpose of scoping is to identify the significant issues related to the proposed action. Once the significant issues are identified, they can be analyzed and documented in the draft EIS, which is put out for public comment specifically to facilitate review and input by other agencies and public stakeholders, so that the final EIS has the benefit of that input. When proper scoping is not conducted for a draft EIS, there is the possibility that significant issues will be missed, and then raised for the first time in the public comments on the draft EIS. If the agency then chooses to analyze those issues for the first time in the final EIS, rather than preparing a supplemental draft EIS, the public will be deprived of its chance to review and comment on this new analysis. This is essentially what has happened in the present case.

For example, in 1998 Climate Change was a relatively obscure environmental issue, whereas today it is one of the leading environmental issues that is routinely addressed in NEPA documents, and which has particular relevance to the analysis for long-term water resource
51-3 projects. New information has also arisen regarding the toxic substances that are created from the treatment of water containing high levels of organics, like the water that will be released from the Scofield Reservoir if the Narrows Project is built. The lists of species considered endangered, threatened or sensitive have been revised, as has our understanding of the location and nature of important habitat. Had proper scoping been done, these issues (and no doubt other new issues that the Bureau will hear about for the first time in comments on the SDEIS) would have been included and analyzed in the SDEIS, allowing the public to review and comment on the same before the EIS is finalized. Instead, unless the Bureau either withdraws and re-releases the SDEIS with analysis of these new issues incorporated, or issues a true draft supplement to the SDEIS that addresses the new issues and information, the public will see the Bureau's analysis of these issues for the first time when a final EIS is released. That, of course, would deprive the public of a meaningful chance to comment, contrary to a bedrock NEPA requirement.

Second, the failure to address the comments the agencies received on the 1998 DEIS further demonstrates that the SDEIS is nothing more than a re-release of an outdated draft rather than a true supplement. If this SDEIS were truly a supplement, it should identify what information is actually being supplemented, and the original comments from 1998 should have been recognized and substantively addressed in this SDEIS, in a transparent fashion. Instead, the SDEIS provides no information regarding what comments were submitted by whom to the Bureau and the other cooperating agencies back in 1998, whether and how the substance of those comments was considered by the agencies, and if so whether the analyses were revised, and if not, why not. By failing to identify whether and how the substantive comments received in 1998 were addressed, the Bureau has further muddied the NEPA process and improperly precluded meaningful public involvement.

There are two things the Bureau might do to address this flaw, prior to issuing a final EIS: First, it could withdraw the SDEIS, treat the comments it received on the SDEIS as essentially being scoping comments, and then issue a new draft EIS that includes analysis that takes the substance of the comments into account. Or, second, it could prepare and issue a true supplement to the SDEIS, which specifically calls out and addresses all of the new issues and updated information and analysis, take public comment on the supplement, and then issue a combined final EIS that

incorporates the substance of both documents, including comment responses. In the absence of doing one or the other, the Bureau will issue a final EIS that violates NEPA's scoping and public involvement process.

B. COMMENTS REGARDING THE SCOPE AND CONTENT OF THE SDEIS

51-4

1. The Purpose and Need Description in the SDEIS Violates NEPA.

The purpose and need of the project, including the alternatives selection criteria, is problematic in at least two regards. First, the SDEIS adopts the private party's interest—the SWCD's purpose for the project— entirely, and fails to set forth any purpose and need on behalf of the agencies that will utilize the EIS for their decisions (Bureau, Corps, Forest Service). While acknowledging that it permissible for an EIS to include a statement of the applicant's purpose and need, the regulations and case law are clear that an EIS must also include a separate statement of the agency's purpose and need, and it is the agency's purpose and need, not the applicant's, that should dictate the alternatives considered. *See* 40 C.F.R. § 1502.13; *Nat'l Parks & Conservation Ass'c v. Bureau of Land Mgmt.*, --F.3d--, 2010 WL 1980717, *10 (9th Cir. 2010). The Narrows SDEIS acknowledges that its statement of purpose and need is drawn directly from SWCD's "stated purpose and need in making its application." SDEIS at 1-6. The "primary" purpose is described as "to enable SWCD to develop an irrigation and M&I supply source for users in north Sanpete County, Utah, whereby the average annual shortages to irrigators in the project area might be reduced as nearly as possible to 5%." *Id.* The secondary objectives are to provide "improved and additional recreation and fishery opportunities in Sanpete County." SDEIS at 1-7.

By exclusively relying on SWCD's stated purpose and need, the Bureau has failed in its duty to provide its own, agency-specific statement of purpose and need as required by NEPA. In effect, the Bureau has adopted Sanpete's concept of "irrigation shortage" (*i.e.*, having less than 95% of the water needed to ensure a third or fourth crop of alfalfa can be grown every year), and Sanpete's desire for an additional fishery and recreation source in Sanpete County, as "needs" that must be satisfied for purposes of the EIS alternatives analysis. There is no separate purpose and need statement from the Bureau's perspective, or why the stated goals and desires of SWCD were allowed to dictate the scope of the alternatives analysis.

51-5

Second, the selection criteria developed to formulate alternatives are too narrow, and thus preclude meaningful review of reasonable and practicable alternatives. The courts have consistently recognized that the purpose and need of a project cannot be defined "so narrowly that it foreclose[s] a reasonable consideration of alternatives." *See Utah Env'tl Congress v. Bosworth*, 439 F.3d 1184, 1194-95 (10th Cir. 2006) (citing *Davis v. Mineta*, 302 F.3d 1104, 1119 (10th Cir. 2002)); *Nat'l Parks & Conservation Ass'c v. Bureau of Land Mgmt.*, *supra* (holding an agency may not "circumvent this proscription by adopting private interests to draft a narrow purpose and need statement that excludes alternatives that fail to meet *specific private objectives* . . . ."). Indeed, the Corps, a cooperating agency on this project, also repeatedly commented on this problem with the DEIS. *See* correspondence between the Corps to Mr. Noble, dated Oct. 7, 1992 and July 21, 1994, which is included as an attachment to the DEIS Comments. For example, one of the selection criteria provides that the project must satisfy the SRPA

requirements. SDEIS at 2-1. Thus, alternatives such as conservation through retirement of irrigated lands; Central Utah Water Project alternative; or year-round release with groundwater exchange are but just a few of the alternatives eliminated from consideration because they do not meet the overly narrow criteria of SRPA eligibility.

In effect, by including this SRPA eligibility requirement, the SDEIS has transformed the purpose of the action from providing SWCD with a new supply of late season irrigation water, to ensuring that SWCD gets a project that requires an SRPA loan. This essentially eliminates the Bureau's discretion to issue a record of decision that denies SWCD's SRPA loan application even if there is an alternative that is less expensive, is capable of being funded without an SRPA loan, and has far less environmental impacts. Notably, members of Utah's congressional delegation have repeatedly informed Carbon County and Sanpete County interests that if the two counties can agree on a plan to provide SWCD late season water, the delegation would work to secure funding for such a plan. Eliminating any alternative that is not, or may not be, eligible for SRPA funding is particularly unreasonable under these circumstances.

Having such a narrow selection criteria artificially constricts the list of feasible alternatives so as to result in only the proposed action, or similar variations of the same project, satisfying the selective criteria. This overly restrictive formulation violates well-established NEPA principles.

51-6

2. The SDEIS Includes an Improper Review of Alternatives.

a) Failure to Consider Reasonable and Practicable Alternatives violates NEPA and Section 404 of the CWA.

The SDEIS fails to consider one or more reasonable alternatives, which is particularly egregious because the proposed action would have a significant impact on wetlands and other special aquatic sites, which are provided special protection under Section 404 of the federal CWA. Section 404's requirements are in fact more stringent than NEPA's with respect to the alternatives analysis, thus further confounding the SDEIS's insufficient alternatives review.

NEPA requires an EIS include "all reasonable alternatives" to a proposed action. In fact, the consideration of alternatives is often referred to as the "heart of the environmental impact statement." *See Fuel Safe Washington v. FERC*, 389 F.3d 1313, 1323 (10th Cir. 2004) (internal quotations omitted). Therefore, an agency must rigorously explore and objectively evaluate all reasonable alternatives. *Ass'ns Working for Aurora's Residential Env't v. Colorado Dep't of Transp.*, 153 F.3d 1122, 1130 (10th Cir. 1998). Indeed, the failure to consider viable alternatives renders an EIS invalid. *See Utahns for Better Transp. v. Dep't of Transp.*, 305 F.3d 1152, 1171 (10th Cir. 2002) (holding an EIS to be inadequate because it omitted consideration of certain reasonable alternatives in the FEIS); *see also Friends of Southeast's Future v. Morrison*, 153 F.3d 1059, 1065 (9th Cir. 1998) (holding the existence of reasonable but unexamined alternatives renders an EIS inadequate).

Further, for a project like the Narrows, when an EIS is being utilized by the Corps in connection with its decision on whether to grant a CWA Section 404 permit for a project that will include a significant impact to wetlands, the Corps' regulations provide that the EIS alternatives analysis

should be even more rigorous and should be structured to provide the specialized information required under Section 404(b)(1) guidelines. *See* 40 C.F.R. § 230.10(a)(4). The Section 404(b)(1) guidelines create a presumption against filling those types of waters "if there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem." *See* 40 C.F.R. § 230.10(a). Under the guidelines, a "practicable" alternative is one that is "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes." *Id.* Where, as with the Narrows Project, the discharge is proposed for wetlands and the project is not "water dependent," practicable alternatives are presumed to exist, and the applicant has a burden of affirmatively demonstrating that the proposed action is the "least environmentally damaging practicable alternative," or "LEDPA," and that other less environmentally damaging alternatives are not practicable. Consequently, the CWA/LEDPA analysis requires even more than a typical NEPA "reasonable alternatives" analysis, in the sense that it should contain information that allows the Corps to conclude that the presumption of the existence of a less environmentally damaging to the proposed action has been overcome, and the proposed action is truly the LEDPA. *See generally Greater Yellowstone Coalition v. Flowers*, 359 F.3d 1257 (10th Cir. 2004) (citations omitted) (discussing alternative obligations applicable to Corps' permit issuance).

In addition, NEPA regulations require an agency to consider alternatives that are not within the jurisdiction of the lead agency. See 40 C.F.R. § 1502.14(c). This means the Bureau's overly narrow selection criteria, which require an alternative to meet the SRPA requirements, violated NEPA's standard.

For reasons explained in the DEIS Comments, (*see* Exhs. 1 and 2) the SDEIS improperly rejects a number of "reasonable" and "practicable" alternatives, that would cause far less damage to the aquatic ecosystem, and we fully adopt those comments and criticisms here. For example, the SDEIS should have considered the following alternatives in detail:

- Conservation measures
- Development of existing groundwater
- Conjunctive use of surface and groundwater
- Water from Central Utah Project or funding pursuant to Sections 206 and/or 207 of the Central Utah Project Completion Act
- Retiring irrigated lands
- Not growing a third crop of hay
- A combination of conservation measures, retiring irrigated lands, and not growing a third crop of hay

51-7

b) Improper Rejection of Aquifer Storage and Recovery Alternative

In addition, we address the SDEIS's unjustified failure to carry forward yet another reasonable and practicable alternative that would have far smaller impacts to wetlands and other environmental resources than the proposed action, *i.e.,* the so called "Carbon County Proposed Recharge Alternative." This alternative, which was suggested by Carbon County interests, would effectively substitute an aquifer storage facility in Sanpete County, near the lands that would be served by Sanpete's 5400 acre foot water right, for the proposed Narrows Dam and Reservoir, thereby avoiding almost all of the very sizeable wetland, streambed and riparian

impacts of the dam and reservoir in the Gooseberry headwaters. Under this proposed alternative, water would be diverted from the Gooseberry drainage during the early season high flows, conveyed through a rehabilitated Narrows Tunnel, down Cottonwood Creek, and then into a pipeline system along the east bench of northern Sanpete Valley. The water would be directed into a series of infiltration basins located in alluvial fan deposits along the bench, where it would infiltrate and be stored in the shallow aquifer and then pumped (from existing and new wells) and piped to nearby project lands for late season irrigation.

Similar systems, often referred to as aquifer storage and recovery systems (ASRs), or managed aquifer recharge systems (MARs), are increasingly being constructed in Utah and throughout the West, as a less costly and less wasteful means than a dam and reservoir for storing water. Indeed, Utah enacted the Groundwater Recharge and Recovery Act (U.C.A. §§ 73-3b-101 *et seq.*) to enable ASR projects and six such projects are currently either operational or in the permitting process in Utah.[2] It was the success of these projects, and the obvious advantages of ASR/MAR over reservoir storage that contributed to Carbon County's suggestion that an ASR alternative to the Narrows Project be considered. Further, due to its avoidance of most of the wetland impacts of the proposed action, the ASR alternative must be given very serious consideration for purposes of the LEDPA analysis.

Unfortunately, while the SDEIS acknowledges that Carbon County's suggested ASR alternative would meet the project's purpose and need, that alternative was summarily rejected based on the Bureau's adoption of the findings of the Sanpete County Master Plan Update ("Sanpete Update"), a document prepared for SWCD by a private consultant with "oversight" by the Central Utah Water Conservancy District ("CUWCD"). SDEIS at 2-60. There is no indication in the SDEIS that the Bureau independently reviewed and verified the work and conclusions in the Sanpete Update, as it is legally required to do. *See* 40 C.F.R. § 1506.5(a); *see also San Francisco Baykeeper v. U.S. Army Corps of Eng'rs*, 219 F. Supp. 2d 1001, 1012 (N.D. Cal. 2002). This was especially important here, given that much information in the Sanpete Update came from SWCD, and also given the close relationship between CUWCD and SWCD (SWCD is a member of the CUWCD and regularly looks to it for funding and assistance with its desired projects[3]), and between the private consultant and CUWCD (the consultant has been engaged by CUWCD to undertake several large and likely lucrative projects). Had the Bureau done a thorough review, it no doubt would have found the analysis and conclusions in the Sanpete Update, as well as the so called "public comment" process for the report, to be sorely lacking, and certainly not adequate under NEPA or the CWA for rejection of an alternative that would be far less damaging to the aquatic ecosystem than the proposed action.

In order to confirm whether the SDEIS and the Sanpete Update improperly rejected the ASR alternative, the CWCD engaged Golder Associates ("Golder"), an independent engineering firm

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[2] *See* http://www.waterrights.utah.gov/groundwater/asr/ASRlist.asp; *see also* http://geology.utah.gov/utahgeo/water/index.htm

[3] *See, e.g.*, http://www.ch2m.com/corporate/markets/water/assets/ProjectPortfolio/water_resources/Agricultural Svcs1.pdf (Uinta Basin Irrigation Replacement Project); *see also* http://www.hydroworld.com/index/display/article-display/358952/articles/hydro-review/volume-28/issue-3/feature-articles/project-profiles/jordanelle-developing-new-hydro-at-an-existing-dam.html (Jordanelle Dam hydro design); *see also* http://www.allbusiness.com/science-technology/engineering-civil-engineering/11435838-1.html (Olmstead Flowline Project).

that has considerable experience with ASR/MAR projects, to review the assessment of the ASR alternative in the SDEIS and Sanpete Update, and to provide its view of whether such an alternative is feasible. Golder concluded that the technical justifications given for rejection of the ASR alternative were unsubstantiated, and that the ASR alternative appears to be feasible, from both a technical and economic standpoint. A copy of the technical memorandum, referred to herein as Golder ASR Memo, prepared by Golder is attached as Exhibit 3, and is briefly referred to in the following discussion. Also attached are professional resumes for Mike Brown, Exhibit 4, and for Robert Long, Exhibit 5, authors of the Golder ASR Memo. In addition to its conclusion that an ASR project is feasible and would avoid most of the wetland and riparian impacts of the proposed Narrows project, the Golder ASR Memo also notes other advantages of ASR, including a lower cost, considerably less evaporative loss (over 1,200 acre feet less evaporation annually), and benefits to the stream environment in the Sanpete Valley.

The Golder ASR Memo provides a more thorough and substantiated assessment of the feasibility of an ASR alternative than the Sanpete Update, and it must be carefully reviewed and considered by the Bureau, with the results of that review reflected and documented in the final EIS. We believe the only reasonable and legal conclusion is for the Bureau to include an ASR alternative in the new supplemental DEIS that the Bureau must prepare.

An summary of why it was wrong for the Bureau to reject the ASR alternative in the SDEIS follows:

- The first reason given by the SDEIS for rejecting ASR is that "[i]t is unlikely that an aquifer with a capacity to hold over 4,000 acre-feet of water could be found in northern Sanpete County." SDEIS at 2-60. Even if this were true, the fact it is "unlikely" that an adequate aquifer could be found is not grounds, under NEPA or the CWA, to dismiss an environmentally attractive alternative – an effort must be made to determine, based on objective and verifiable information and with a degree of confidence, whether adequate aquifer storage capacity exists. Further, the basis for this conclusion is apparently a mere conversation between the author of the Sanpete Update and a geologist during which the geologist "indicated" that it is "unlikely" a sufficiently large aquifer could be found. *See* Sanpete Update at 20 (notably, the Sanpete Update does not include a reference list). This is the only source of information given by the Sanpete Update for its aquifer storage conclusion. Yet, in a technical memorandum that was submitted as a comment on the draft Sanpete Update, and which was included in the Sanpete Update's Appendix but ignored in the body of the document, an experienced and credible engineer with detailed, long-term knowledge of surface and groundwater use in Sanpete Valley flatly disputed the Sanpete Update's conclusion: "There has been unplanned conjunctive use going on for many years throughout the valley, with surface water supplies being supplemented with ground water pumped from alluvial fan aquifers at Manti Creek, Willow Creek, Ephraim Cottonwood Creek, Twin Creek, Cedar Creek, Oak and Canal Creeks (near Spring City), Pleasant Creek, Excell Canyon, and in the Fountain Green area. <u>These alluvial fans are very suitable for aquifer storage and recovery operation. Indeed, they have been functioning in an unplanned and natural manner for many years.</u>" *See* Memorandum to CUWCD from Carl H. Carpenter, P.E. (June 18, 2008) (emphasis

added), attached hereto as Exhibit 6 and incorporated by reference.[4] In keeping with Mr. Carpenter's comment, Golder also concludes that based on geologic and hydrogeologic information published by the USGS and local well data, the near-surface aquifer near the mouth of Cottonwood Creek and throughout the northeastern portion of the Sanpete Valley is hydraulically connected to the deeper aquifer system and easily has the capacity to store up to 6,000 acre-feet of water. *See* Golder ASR Memo at 2.[5] These documents demonstrate that adequate aquifer storage is, in fact, likely to exist, and they confirm that the Bureau was not justified in relying on an unsupported statement in the Sanpete Update to conclude in the SDEIS that aquifer storage was not feasible.

- The second reason the SDEIS gives for rejecting the ASR alternative is that "Direct diversion of flows would require extensive construction of diversion dams and canals within the reservoir basin, potentially negating the avoidance impacts by not building the proposed reservoir." SDEIS at 2-60; *see also* Sanpete Update at 20. Yet there is no substantiation for this vague and broadly stated conclusion, in either the Sanpete Update or the SDEIS, and it is absurd to believe that the system needed to collect and convey water to the Narrows Tunnel would have a footprint remotely as large as the 600-plus acre reservoir, and the dam (in another shortcoming, the SDEIS does not include the size of the dam's footprint), and the 32 acres needed for highway relocation, or that the diversion facilities would come even close to destroying between 90 and 100 acres of wetlands and inundating over 5 miles of stream. In fact, in another section of the SDEIS addressing the "Direct Diversion with Reservoir in Sanpete Valley" alternative, the SDEIS indicates that the facilities required for the direct diversion of up to 5400 acre-feet would consist of a single diversion structure and pump building about 1000 feet downgradient of where SR-264 crosses Gooseberry Creek, an electrical transmission line to the pump station, a single 1000 ft. pipeline and an open canal about 0.8 miles long -- facilities that are hardly comparable in size or impacts to the Narrows dam and reservoir. SDEIS at 2-46 to 2-47. Golder similarly concluded that the facilities that would need to be newly added for the ASR alternative would be relatively small and would produce far fewer impacts than the proposed action. Golder ASR Memo at 11. Again, there was no reasonable, documented basis, in either the SDEIS or the Sanpete Update, for a conclusion that the impacts of a direct flow diversion system in the Gooseberry Basin would be equivalent, or even close to those of the proposed action. The proper and legally required course is to carry the ASR alternative forward in the EIS for detailed analysis, so that the impacts to upper Gooseberry Creek from the diversion works can be

[4] CWCD hereby incorporates the substance of the Carpenter memorandum into our comments, and requests that the Bureau consider and respond not only to this part of the memo, but also to the other sections which effectively dispute a number of conclusions in the SDEIS.

[5] As stated in the Golder ASR Memo, "[t]he alluvial fan deposits consist of unconsolidated to semi-consolidated clay, silt, sand, gravel, cobbles and boulders up to 350 feet thick in areas east of Mount Pleasant, coarsening toward the base of the Wasatch Plateau (Robinson, 1971). The aquifer within the alluvial fan deposits in the northeastern portion of the Sanpete Valley is unconfined and the depth to water can range from 10 to 30 feet towards the San Pitch River to approximately 100 feet within the alluvial fans to the east. Transmissivity values for the alluvial fan deposits can range from approximately 13,000 gpd/ft to 1,250,000 gpd/ft (1,000 to 20,000 ft^2/day), based on ten aquifer tests and specific capacity data from more than 40 wells (Robinson, 1971)." Golder ASR Memo at 4.

accurately compared with those of the proposed dam and reservoir, including for purposes of the Corps' LEDPA analysis.

- The third reason for dismissing the ASR alternative is that "Water would have to be treated to drinking water standards before injection; or alternately, a large infiltration pond and settling basin, equivalent to a small reservoir, would be required to hold water diverted during spring runoff." SDEIS at 2-60. Again, there is no analysis or substantiation for these conclusions, in either the Sanpete Update or the SDEIS. Further, even assuming that water treatment would be required if injection wells were used for the ASR project (data in the SDEIS for Gooseberry and Cottonwood Creeks indicates that the quality of injected water would actually be very good, *see* Table 3-14), and that such treatment were expensive, the Bureau still must do enough analysis or confirmation to be confident in those conclusions, and then it must make a reasonable estimate of treatment costs for use in an overall cost comparison between ASR and the proposed action. The Bureau cannot simply jump from "the water may need to be treated" to "treatment would be expensive" to "therefore ASR is infeasible." Instead, it must do enough work (or independently review work done by others) to confirm the legal and practical need for treatment, and the likely expense of such treatment, before it can make a comparison to the proposed action and potentially dismiss the injection-based ASR alternative based on a need to treat the injected water.

  Even more important is the lack of foundation or explanation in the SDEIS as to why it was appropriate to reject <u>infiltration-based</u> ASR (which is the type of system that was actually suggested by Carbon County interests) on grounds that a "large infiltration pond and settling basin, equivalent to a small reservoir, would be required." Obviously, an infiltration-based ASR system will require infiltration ponds or basins. The SDEIS falls short because it does not even attempt to determine <u>how</u> large the basins would likely be, or to explain why, even if the basins would be "large," that would justify rejecting ASR as an alternative for NEPA or CWA purposes. A "large" infiltration basin or pond located in uplands (perhaps even as large as a "small reservoir," whatever that means) would in almost every case be environmentally preferable to a large, or a medium, or even a small dam and reservoir located in high value wetlands. Thus, a large infiltration basin is not a per se basis to dismiss an otherwise reasonable and practicable alternative that meets the purpose and need. Finally, Golder has done what the Bureau failed to do, by actually estimating the size of the infiltration basins, using conservative estimates of the transmissivity of the underlying alluvial materials, the depth to groundwater, and the required infiltration rate. *See* Golder ASR Memo at 6. The conclusion was that a system using up to 10 infiltration basins of up to 10 acres each (for a maximum total of 100 acres), located in alluvial fans along the edge of the Sanpete Valley, should be sufficient. Its not clear whether the Bureau would consider 100 acres to be a "large" area, but it surely is a much smaller area than the nearly 700 acre footprint of the proposed dam and reservoir, and the infiltration basins would likely be located in well drained uplands in the alluvial fans, not in wetlands and a pristine stream bottom. Again, the proper and legal course of action is to carry the ASR alternative forward as a reasonable alternative so a comparison can be made of the impacts of the infiltration basins versus those of the dam

and reservoir, rather than rejecting it based on vague assertions that the infiltration basins would be too large.

- The fourth and fifth reasons for rejecting the ASR alternative are "the nature and location of available aquifers and apparent separation of bedrock and shallows aquifers poses technical problems" and "high drawdown from the proposed high capacity wells could affect adjacent wells and water rights." SDEIS at 2-61. Again, the potential fact that a less damaging alternative may "pose technical problems" or "could" affect other wells and water rights does not warrant dismissal. For NEPA, and particularly for LEDPA, there must be solid evidence that the alternative is technically infeasible before it can be dismissed and that burden clearly has not been met by the Bureau here. And again, as already noted above, Golder and Mr. Carpenter have concluded, based on published geologic and well data, and existing and historic water use practices, that the characteristics of the aquifer are indeed suitable for infiltration and withdrawal of sufficient quantities of water, and indeed that similar practices have been informally occurring for years. *See* Golder ASR Memo at 11 ("the published technical data indicate that the proposed [ASR] facility could successfully recharge directly to the aquifer without significant separation between the shallow and deeper aquifers in this portion of the valley."). Golder further notes that through use of existing wells, and the careful location of the new wells (for purposes of its review, Golder assumes that as many as 12 new wells might be required), it should be possible to avoid unacceptable impacts to other wells and water rights. *Id.* at 11-12. Again, the proper course was not for the Bureau to blindly rely on the Sanpete Update's conclusions on purported technical challenges, the Bureau should have independently reviewed and verified the available information, including the contradictory comments that were submitted on the draft Sanpete Update but ignored in the final document. Now the Bureau must also consider the Golder ASR Memo.

- We also note that the SDEIS indicates that the Sanpete Update was distributed in draft for public review and comment, and that "following consideration of comments" the Sanpete Update was finalized, which leaves the implication that NEPA-type public involvement process occurred and that the substance of the comments was recognized in the final document. To the contrary, while several substantive comments were submitted that were critical of the draft (including the comments of Mr. Carpenter, as discussed above), and copies of most of those comments were appended to the final Sanpete Update, no attempt was made to respond to or otherwise address these comments, and there were no apparent changes to the final Update based on the comments. If the Bureau is going to rely on the Sanpete Update as the basis for dismissing alternatives, then it must consider and respond to those comments that were made on the draft of that document, and we hereby request that it do so now.

In sum, we believe that the SDEIS improperly relied on the Sanpete Update, without independent verification and review by the Bureau, to reject the ASR alternative. Moreover, it is our position that the Golder ASR Memo and other information outlined above, further demonstrate that the ASR alternative is a reasonable and practicable alternative that needs to be considered in detail in the EIS. As the Golder ASR evidences, the ASR alternative would provide significant benefits

such as a reduction in evaporative losses, a reduction in impacts to water resources and riparian habitat, thus requiring less mitigation, and an overall cost-savings compared to the proposed action. For these reasons, we urge the Bureau to conduct a review of the Golder ASR Memo and the Sanpete Update, and/or conduct its own independent ASR assessment, and/or seek a more detailed assessment of ASR by another entity with ASR expertise. For example, the Utah Geological Survey, which has performed such assessments for other Utah ASR projects[6], or the U.S. Geological Survey, which has also done such assessments,[7] would be good candidates for such a review. NEPA strongly encourages agencies to solicit input and analysis from other agencies with special expertise, *see* 40 C.F.R § 1501.6, and there are several such agencies with ASR expertise in Utah that the Bureau could have relied upon instead of blindly accepting the unsupported conclusions of the Sanpete Update.

51-8

c) Inadequate Consideration of Carbon's Offer to Purchase Water Rights and the Resulting Funding Source

In Section 2.3.12, the SDEIS rejects purchase of Sanpete County's water rights by Carbon County water interests as an alternative, on grounds that this proposal does not provide any relief from the purported water shortages in Sanpete County and that the proposal is "infeasible without the presence of both willing sellers and willing buyers." SDEIS at 2-60. While the CWCD is pleased that the SDEIS documents Carbon's repeated offer to purchase all or a part of the Sanpete water right, which still stands, we are disappointed that the SDEIS fails to acknowledge the context and intent of that offer, with the result that the purchase offer is inappropriately trivialized. As made very clear by reading of the SDEIS, the biggest obstacle to Sanpete's obtaining a new late season water supply, under essentially all of the alternatives, is the ability to obtain funding and pay for project construction. Indeed, lack of funding is given as a reason for dismissing most of the alternatives that were not carried forward for detailed evaluation, including those that would not utilize the 5400 acre foot water right.

As Carbon County interests made very clear when they made their offer to purchase Sanpete's water rights, one of the primary purposes was to provide additional funding to Sanpete County to help it afford one of the other less damaging alternatives. In other words, while the SDEIS limits its consideration of potential funding sources to federal and state funds, Carbon's offer comprises another sizeable source of funding that is readily available, and ignored by the SDEIS. To correct this oversight, the alternatives analysis must be redone, taking into account the several million dollars of funding that will be available from Carbon County for any project alternative that does not utilize the Sanpete water right, or utilizes something less than the total water right. Nor can the Bureau avoid taking this funding into account on grounds that Sanpete says it isn't willing to accept the offer. If that were the case, Sanpete could also cause the rejection of other reasonable alternatives that it doesn't find ideal like, by simply saying it would refuse to pursue or accept available project funding, whether it be federal, state, local or even private. Sanpete's refusal to accept a readily available funding source is not a legitimate basis for rejection of an alternative on grounds of economic infeasibilty.

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[6] http://geology.utah.gov/utahgeo/water/index.htm#aquiferstorage.

[7] The USGS recently completed a Report assessing the function of the Sand Hollow Reservoir in Washington County, Utah http://pubs.usgs.gov/sir/2009/5050/pdf/sir2009-5050.pdf.

Perhaps one of the most natural uses of the money that could be provided by Carbon's purchase of Sanpete's water right would be to purchase water rights in Sanpete Valley to be used in conjunction with an ASR project like the one found feasible by Golder. The SDEIS recognizes that there is considerable excess flow in the streams in northern Sanpete Valley but claims those flows cannot be utilized due to the Cox Decree, which purportedly forbids the use of these excess flows. SDEIS at 2-57. The SDEIS also documents the practice of Sanpete Valley water users to divert and apply excessive water during spring runoff when water is plentiful, in an attempt to maximize soil moisture and sustain crops as long as possible after streamflows have diminished. SDEIS at 3-84. Assuming these claims and assertions are correct, the money received by Sanpete from Carbon for purchase of some or all of the Gooseberry water right could be used to purchase rights in Cottonwood Creek, and other streams along the east side of Sanpete Valley, that could be used during spring runoff (including to capture some of the "excess" water) as a recharge source for an ASR system, in place of water diverted from the Gooseberry drainage and down Cottonwood Creek. Indeed, under this type of approach the infiltration basins could be located near the mouths of several different streams in which water rights have been purchased, reducing or eliminating the need for an expensive pipeline system running along the eastern edge of the Valley, making such an approach even more cost effective. The purchase of groundwater rights in Sanpete Valley could also potentially be used, to the same affect, alone or in conjunction with surface water purchases using funding from Carbon's purchase of the Gooseberry water right. This type of approach would also eliminate or reduce concerns regarding potential channel erosion from added flows under an ASR system that relied exclusively on flows diverted from the Gooseberry drainage down Cottonwood Creek.

Because of the attractiveness of this alternative (ASR using surface water and/or groundwater rights purchased with funds obtained by Carbon's purchase of Sanpete's Gooseberry rights), we ask that it be specifically considered and carried forward for detailed analysis in the EIS, as an alternative that would be reasonable, practicable, and almost certainly the LEDPA.

51-9

3. The SDEIS Fails to Consider the Impacts of Climate Change and Greenhouse Gas Emissions.

The SDEIS fails to consider the impacts of climate change on both Carbon and Sanpete Counties. Instead, the SDEIS summarily dismisses any analysis on climate change impacts by concluding, without providing a substantive discussion, that "models have not been developed with sufficient detail or sensitivity to capture small projects such the proposed Narrows Project . . . [and] without verified models addressing climate change at this project level, Reclamation concludes that, at this time, data and modeling tools are not yet developed to the point that meaningful analysis of a small project can be achieved." *See* SDEIS at 1-25, Issue No. 20. Besides this conclusory and circular statement, the SDEIS has no discussion on climate change. In addition, the SDEIS never addresses nor attempts to quantify the greenhouse gas ("GHG") emissions from the project. These omissions are contrary to law (*see Pacific Coast Federation of Fishermen's Ass'ns v. Gutierrez*, 606 F. Supp. 2d 1122, 1184 (E.D. Cal. 2008)) and agency directives.

The Bureau is required to analyze climate change impacts in NEPA documents pursuant to Secretarial Order No. 3289, dated September 14, 2009, which requires a "Department-wide approach for applying scientific tools to increase understanding of climate change and to coordinate an effective response to its impacts on land, water, ocean, fish and wildlife, and cultural heritage resources that the Department manages." Indeed, the CEQ is also developing guidance on climate change impacts and draft guidance consistent with the Secretarial Order has been issued. This draft guidance provides, in part, that agencies should focus on aspects of climate change that may lead to changes in the impacts, sustainability, vulnerability and design of the proposed action and alternatives.

Based on these directives, the SDEIS must consider climate change in two regards: (1) the relationship and effect of climate change impacts on the proposed action and alternatives, including the relationship to the proposed design, environmental impacts, mitigation and adaptation; and (2) the GHG emissions from the proposed action and alternatives considered. The SDEIS fails on both fronts.

Perhaps most relevant to this Project is the Bureau's decision to ignore the effects of climate change on the proposed action, given predictions of increased temperature, reduced runoff and increased drought frequency in the southwestern United States. Notably, the Secretarial Order specifically identifies the need to assess climate change impacts on "water management imperatives" because water projects are highly susceptible to climate change impacts. The proposed CEQ guidance shares this view as well. Additionally, climate change impacts are all the more significant when the project has long-term utility and is located in an area considered vulnerable to climate change impacts. The Narrows Project presents exactly these circumstances, thus the Bureau needs to consider climate change impacts in the SDEIS.

To claim that modeling is not sophisticated enough to provide a meaningful analysis for a "small project" is not only inadequate pursuant to NEPA regulations (*see* 40 C.F.R. § 1502.22) but is also simply wrong. In fact, a recent climate change report does just what the Bureau claims cannot be done--assesses the affects of climate change in a small area, in that case Park City, Utah. *See* Stratus Consulting, Inc., *Climate Change in Park City: An Assessment of Climate, Snowpack, and Economic Impacts* (Sept. 29, 2009). The report includes different climate change models to provide a range of future scenarios in which to assess the consequences of potential environmental conditions. Reporting the average of these models, the study predicts future temperature and precipitation effects 20, 40, and 65 years into the future. Following this approach, the study estimates that in 2030 the annual temperatures in the Park City area will rise approximately 3°F and precipitation levels will decrease nearly 3.5%. By 2075, however, the report estimates an average warming of 6.8°F and a decrease by 4.3% in precipitation levels. Accordingly, this report demonstrates that, contrary to the Bureau's claim, it is possible to model changes in precipitation and temperature gradations associated with climate change. Consequently, the Bureau is obligated to assess climate change predictions for the project area and discuss the subsequent impacts from these changed conditions.

Moreover, preparation of this kind of analysis is fully consistent with other Bureau guidance documents. For example, in a 2007 report by the Bureau's "Climate Change Technical Work Group", it was recommended that for Bureau water resource studies and decisions concerned

with greater than a 20-year "look-ahead," a quantitative sensitivity analysis be conducted on operation responses to projected climate change using technical approaches endorsed by the Work Group. "By comparing system performance using projected climate change hydrology to historical hydrology, useful knowledge about system sensitivity should be ascertained." *See Climate Technical Work Group Final Report.*[8] The SDEIS contains what is essentially a "look-ahead" type operations analysis that seeks to determine how the Narrows Project would impact Scofield Reservoir and other downstream resources over the next 45 years (as discussed below, an even longer period should be studied) and so it is the exact type of study contemplated by the Work Group's guidance.

In addition, the Interior Department and the Forest Service (a cooperating agency on the SDEIS) have considerable climate change expertise, including assessment methodologies that can be used to project future climate trends that are regularly drawn upon by agencies for NEPA purposes. For the Forest Service, this includes the Rocky Mountain Research Station and the Climate Change Research Center.[9] For Interior agencies like the Bureau, this includes the U.S.G.S. Office of Global Change.[10]

Consequently, the Bureau is obligated to assess climate change predictions for the project area and discuss the subsequent impacts from these conditions. To the extent it may need to rely on other federal agency resources that have the expertise with this type of analysis, NEPA requires that the Bureau request and utilize such expertise so a meaningful analysis can be performed.

This obligation is all the more significant because of the nature of the proposed action—a water development project. Therefore, once the Bureau completes its analysis of projected climate change for the area, it must then consider the environmental consequences of those impacts. Among the issues the Bureau must consider are the following:

- Reduced runoff. Warmer temperatures may result in reduced spring runoff as well as an increase in evaporative losses. Both directly impact the availability of water. As the SDEIS notes, water resources are a central environmental issue that must be carefully evaluated in this action. For instance, the SDEIS discusses that impacts to Scofield Reservoir would likely occur during multiple successive drought years, a condition that may result from climate change impacts. Consequently, the SDEIS should include an analysis of how temperature and evaporation changes may impact water resources and water availability.

51-10

- Algae blooms. The SDEIS acknowledges the impacts of increased algae blooms and recognizes that Scofield Reservoir, as of 2007, was a mesotrophic system. *See* SDEIS

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[8] This report is available on the Bureau's website at: http://www.usbr.gov/lc/region/programs/climateresearch.html. A direct link to the relevant section of the report is available at: http://www.usbr.gov/lc/region/programs/strategies/FEIS/AppU.pdf.

[9] Web links to these resources are as follows: Forest Service Climate Change Research Center: http://www.fs.fed.us/ccrc/aboutus.shtm; Rocky Mountain Research Station Climate Change: http://www.fs.fed.us/rmrs/climate-change/.

[10] *See* http://www.usgs.gov/global_change/.

at S-15 and 3-46. This data is now outdated and the Bureau should provide a more accurate baseline condition, especially when it notes that "accelerated eutrophication" under the proposed action could degrade the recreation areas. *See* SDEIS at 3-77. In addition, the SDEIS discusses the State's total daily maximum load ("TMDL") for Scofield Reservoir which identifies the need for a shift in phytoplankton dominance from blue green algae. Despite the SDEIS's acknowledgement of the significance of algae blooms, it fails to discuss how these conditions may be exacerbated as a result of future climate change scenarios.

- Evaporative losses. The SDEIS identifies evaporative losses in the Price River drainage as an environmental consequence yet the SDEIS fails to consider what might happen when evaporative losses increase due to warmer temperatures associated with climate change. In addition, the SDEIS discusses the issue of increased salinity levels in the project area and attributes nearly one-third of the increase in salinity levels to reservoir evaporation. SDEIS at 3-116. But again, there is no analysis as to how these consequences will be further exaggerated due to climate change impacts.

- Temperature variations. Changes in temperature, specifically an increase in temperatures, is considered a pollutant (*see* SDEIS at S-16) and directly affects water quality. Significantly, warmer water reduces dissolved oxygen ("DO") levels which in turn affect fish populations among other things. *See* SDEIS at S-18. However, the SDEIS fails to take into account the environmental consequences of increased temperatures due to climate change impacts in the area.

51-11 In addition, and as an example of the relevance of climate change impacts, the SDEIS currently projects the frequency of Scofield Reservoir being drained to the bottom, *i.e.*, entirely drying up, will increase from 3 times in 43 years to 12 times in 43 years under the proposed action. *See* SDEIS at 3-18. This four-fold increase of likelihood of losing Scofield Reservoir is significant and requires a more thorough analysis in the SDEIS. Moreover, the SDEIS fails to consider how this probability might be further exaggerated in light of increased temperatures and decreased precipitation levels, conditions directly related to climate change impacts. Given the significance of Scofield Reservoir as a water source for municipal, residential, irrigation, and recreational purposes, the Bureau's oversight is evidence it failed to take the requisite "hard look." Accordingly, the SDEIS must address the effects of climate change on the availability of water in Scofield Reservoir. For a more detailed discussion and comment on water resources in the project area generally, *see also* Comment 7 below.

51-12 Lastly, nowhere does the SDEIS discuss the potential for GHG emissions from the proposed action or the alternatives. While the Project may be of relatively "small scale," constructing a dam that is 120' high with a crest length of 550' and crest width of 30' is not insignificant. In addition, the proposed action also includes the construction of a trans-mountain diversion, rehabilitating the Narrows Tunnel, relocating SR-264, and modifying and constructing recreation facilities. GHGs will be emitted from these construction activities, thus the Bureau is required to, at a minimum, provide an estimate of these emissions in light of the sizable construction activities that will be necessary to build this Project.

51-13 **4. The SDEIS's Discussion of Project Funding is Confusing and Inadequate and There is No Demonstration that the Proposed Action Itself Meets the Funding Criteria.**

The cost and financing description in the SDEIS is inadequate because it is confusing and provides insufficient information or details about the financing of the proposed project or the alternatives. This is all the more significant in light of the fact that the Bureau relies on compliance with SRPA financing requirements as a criterion to screen out otherwise reasonable NEPA alternatives. *See* SDEIS at 2-1. If receiving SRPA monies is going to serve as the basis for considering and/or eliminating alternatives, as was the case here (as discussed in the DEIS Comments, this is an impermissible screening criteria that makes the "purpose and need" statement too narrow to satisfy NEPA and CWA), the SDEIS is required to provide a thorough analysis, in "plain English" (not Bureau jargon) of the funding and repayment aspects of the proposed action and each alternative.

For example, the "selection criteria" used in the SDEIS to determine which alternatives were reasonable include a SRPA-based requirement that the project must demonstrate that it is "financially feasible," which is to be determined by the following factors: (1) the project sponsor must pay a minimum of 25% of the project costs; (2) the loan repayment must use 100% of the project's irrigation amortization capacity and must be repaid within 40 years or less; and (3) the loan factor must be 0.5 or less. SDEIS at 2-2. Because an alternative must satisfy these requirements in order to be considered in the EIS, it obviously must be demonstrated that the proposed action itself meets these requirements. Yet, the only discussion of the costs and financing of the proposed project is found in section 2.2.2.3, where the SDEIS simply states the proposed action would cost approximately $40.3 million and would be "funded by SWCD, the State of Utah, and a loan from the Federal Government;" that about $7.6 million of that amount would be "allocated to fish and wildlife enhancement" and that "these costs" (unclear what "these" refers to) would be "nonreimbursable to the project sponsor" (example of more Bureau jargon). A final sentence then states, in seeming contradiction with everything before it, that "Total financing would be through provisions of the SPRA [sic]." SDEIS at 2-31.

In addition to being totally confusing, this language certainly does not demonstrate whether or how the sponsor (SWCD) will meet the SRPA eligibility requirements, *i.e.*, there is nothing to explain whether the sponsor will actually pay 25% of the cost and how they will do that; and nothing explains the repayment terms of the loan and whether and how it can be repaid in 40 years. There is also no discussion of whether the State of Utah has actually committed to pay a share of the cost, and if so in what amount and from what source. Yet, despite the lack of this information, and the lack of a showing that the proposed action is financially feasible under either the oddly formulated SRPA definition or a more typical definition, the Bureau nevertheless disregards other alternatives based on the fact that they do not, or may not, meet the funding criteria. *See* , *e.g.*, the Valley Damsite alternative, SDEIS at 2-53 (describing the reasons this alternative was eliminated from further consideration). This severely limited discussion not only fails the "hard look" requirement of NEPA, but it also strongly suggests that the proposed action does not meet the very criteria that were used to reject other alternatives from consideration in the SDEIS.

In addition to these concerns, the SDEIS is confusing and contradictory in its statements. For instance, the Bureau rejects the Direct Diversion with Reservoir in Sanpete Valley Alternative ("Direct Diversion alternative") because it would not be eligible for state or federal grants because it does not provide for carryover storage, or recreation or fish and wildlife benefits. However, there is no explanation as to why this alternative would be ineligible for state or federal funding. Or stated otherwise, there is nothing in the proposed action which explains why *the proposed action would be eligible* for these state and federal grants even though other alternatives are not. Even more confusing is that this alternative was dismissed because the total project cost would be nearly $50 million "or about $18.4 million higher than the Proposed Action." *See* SDEIS at 2-47. The math simply does not add up. The proposed action is estimated to cost nearly $40.3 million which is not $18.4 million less than $50 million—the estimated cost of the Direct Diversion alternative. These are just a few examples of how the SDEIS is confusing and how it fails to provide the requisite analysis.

The Bureau must go back and start over and write an understandable explanation of project costs, funding sources (grants and loans), repayment amounts and terms, and explain the ability of the project sponsor to obtain and repay all of the estimated costs for the proposed action. Only then can the Bureau determine if the proposed action is itself financially feasible, and if so, make a legitimate comparison with other potential alternatives.

51-14 **5. The Cost Estimate in the SDEIS is Flawed.**

The accuracy of the cost estimates for the proposed action and alternatives are unusually important for purposes of the Narrows Project EIS, for several reasons. First, according to the SDEIS, a project is not eligible for funding under the SRPA if the total project cost would exceed $50 million. SDEIS at 2-58. The SDEIS further provides that if an alternative is not eligible for SRPA funding, it is considered financially infeasible and therefore screened from consideration in the SDEIS. *See* SDEIS at 2-2; 2-58. Indeed, the SDEIS screened one alternative from detailed consideration because its estimated cost was in excess of this $50 million SRPA funding eligibility threshold and it screened several others out due to purported inconsistencies with other SRPA eligibility requirements, *e.g.*, SWCD's purported inability to meet SRPA repayment obligations. *See* for example, SDEIS at 2-47 (dismissing the Direct Diversion alternative because "the sponsor lacks resources to meet SRPA cost-sharing requirements.")

Since the primary reason the Bureau is preparing the Narrows EIS is to determine whether to approve an SRPA loan application for Sanpete's proposed project, the Bureau must do a detailed, objective, and if anything conservatively high cost estimate of the proposed project (and the other alternatives) to confirm that the proposed project is indeed eligible for SRPA funding. In effect, the Bureau has the burden of demonstrating conclusively that the proposed action will cost less than $50 million and that all other SRPA eligibility criteria (including ability to repay) are met, otherwise there is simply no legitimate basis for the Bureau to prepare the EIS.

Second, and as noted above, the SDEIS alternatives analysis must meet not only NEPA "reasonable alternative" requirements, but also the requirements of the CWA Section 404 LEDPA analysis. Under the LEDPA analysis, cost can be a legitimate factor in the determination of whether a less environmentally damaging alternative is practicable, but that

determination requires that there be an accurate cost estimate, of both the proposed action and the less environmentally damaging alternatives, and cost is a screen-out factor for only a less damaging alternative if it is "extraordinary." The lack of accurate, reproducible cost estimates, with adequate support in the record is grounds for invalidation of an EIS, particularly where a Section 404 permit is involved. *See Utahns for Better Transp. v. Dep't of Transp.*, 305 F.3d 1152, 1187 (10th Cir. 2002).

Third, the SDEIS includes an assessment of the per-acre foot capital cost of water for the proposed action and other detailed alternatives, which is then used to compare among the alternatives. SDEIS at 2-31. Because cost per-acre foot is an important comparison indicator (and should also have been applied to some of the alternatives that were wrongfully screened out), it is essential that the overall construction cost estimates be accurate and well documented.

Having demonstrated the critical importance of having accurate, comprehensive, and if anything conservatively high project cost estimates in the SDEIS, we now explain why CWCD believes the $40.3 million cost estimate for the proposed action in the SDEIS (and likely the cost estimates for the mid-sized and small-sized project alternatives as well) is significantly underestimated. *See* SDEIS Table 2-5 (Narrows Project Cost Comparison of Storage Alternatives Evaluated in Detail.)

First, as discussed further below, the SDEIS wrongly assumes that the maximum credible seismic event ("MCE") for purposes of the Narrows Project design is an earthquake of magnitude 5.5 on the Richter scale. As explained in the DEIS Comments, and as further expanded upon below, there is no reason to believe this estimate is accurate. Notably, the Bureau concluded that for the Scofield Dam the MCE is 7.5, which is 100 times larger than the 5.5 MCE used here. Yet, the Narrows Dam site is only about 12 miles away from the Scofield dam site, and it is several miles closer to the Joes Valley Fault (the source of the 7.5 MCE for purposes of the Scofield Dam) than the Scofield site. (This is just one of many examples of outdated and unverified information in the SDEIS). The Bureau must assume that the design MCE for the Narrows Project is at least 7.5, and perform the necessary analysis (including additional field work to better characterize the underlying foundation materials) to determine the design features needed to safely withstand this MCE, and then do an objective and complete cost estimate based on that information, and after these revisions are complete, the Bureau must then determine whether the project is SRPA eligible and, if so, redo the EIS alternatives analysis to reflect these more accurate costs.

The second reason we believe the cost estimate is far too low is the much higher cost estimate contained in the Sanpete Update, a document that the Bureau relies upon elsewhere in the SDEIS but has conveniently chosen to ignore for purposes of the cost estimate. The Sanpete Update estimates that the proposed action would cost just over $59 million (in 2008 dollars), plus the costs of engineering, contract administration, land acquisition, permitting, environmental documentation and mitigation, which are not estimated, but no doubt would add many millions of dollars. *See* Sanpete Update at 22. Golder now estimates the more likely cost for the proposed action is well over $70 million. *See* Golder ASR Memo at Table 2.

This much higher cost estimate, and the fact that it is contained in a document which the Bureau relies upon for other aspects of the SDEIS, provides yet another reason the Bureau must prepare

an updated, accurate project cost estimate that accounts for the higher design MCE, and then explain any differences between that revised estimate as compared with the estimate included in the Sanpete Update. Only then can the Bureau determine SRPA eligibility, and only then can it provide a legally defensible NEPA and CWA Section 404 alternatives analysis.

51-15

6. The SDEIS's Seismic Analysis is Flawed and Outdated.

In Section 3.15.1, the SDEIS repeats virtually verbatim the language and conclusions of the 1998 DEIS which states that based on "preliminary studies," the MCE for the Narrows Project is magnitude 5.5, and that accordingly "geologic hazards are not of notable concern" and "from a geoseismic standpoint the . . . damsite is suitable for construction." SDEIS at 3-102. Yet again, the SDEIS has simply ignored the DEIS Comments, which explained why an MCE of 5.5 was far too small, particularly when the Bureau used an MCE of 7.5 when it required an upgrade of the nearby Scofield Reservoir, which is actually further from the Joes Valley Fault system (one of the sources of the 7.5 MCE for Scofield) than the Narrows dam site.

In order to further confirm whether the seismic analysis in the SDEIS is adequate, the CWCD retained a seismic expert, Mr. Don East of Golder Associates, to review the relevant portions of the SDEIS. Mr. East also reviewed relevant portions of documents that were associated with the seismic upgrade of the Scofield Dam. Golder's review, in the form of a technical memorandum, is attached hereto as Exhibit 7, and we ask that it be reviewed, considered, and responded to in the new EIS supplement that we believe the Bureau must prepare. In addition, a brief professional resume for Mr. East is also attached as Exhibit 8.

The following summarizes some of Golder's conclusions:

- There is no apparent additional seismic information or analysis in the SDEIS, beyond that contained in the 1998 DEIS. Much more technical information regarding the tectonics and seismic hazards of the Wasatch Plateau has become available since 1998 (*e.g.*, U.S. Geological Survey 2006, Quaternary Fault and Fold Database for the United States). A dam is a critical structure and its seismic design and seismic hazard evaluation should be based on current, and the most up-to-date information on the active tectonics, potential seismogenic sources and seismic hazards in its region.

- The discussions of seismic hazards and seismic design in the SDEIS do not address or reflect the seismic design requirements of either Utah or federal law, which outline the processes of seismic design and evaluation for dams, and list the types of investigations and analyses that should be completed in order to develop deterministic seismic design parameters. No detailed or comprehensive site-specific seismic hazard assessments and evaluations (as required by federal and state law) appear to have been carried out for the dam site. There is no clear description of what type of assessment (*e.g.*, deterministic or probabilistic) is being used to develop the seismic design parameters.

- The SDEIS has no criteria for what constitutes an active fault that must be considered in seismic design. Federal and Utah guidelines indicate an active or capable fault is one that demonstrates "movement at or near the ground surface at least once within the past

35,000 years," and federal guidelines further note that "for high-hazard potential dams, movement of faults within the range of 35,000 to 100,000 years BP [before present] is considered recent enough to warrant 'active' or 'capable' classification." Also, dePolo and Slemmons (1998) recommend that for faults in the extensional Basin and Range Province, a latest Pleistocene, 130,000-year activity criterion be used because of the long recurrence intervals of these faults. The Narrows Dam project is within the extensional tectonic transition zone between the Basin and Range on the west and the Colorado Plateau on the east.

- If a 30,000-, 100,000-, or 130,000-year activity criterion is invoked for the Narrows Dam project, the Gooseberry Graben faults, which are late Quaternary and within 1 km (0.6 mi) of the dam, may be potential seismogenic sources that should be studied, evaluated and considered in site seismic design. This would result in the use of high design ground motions, and would introduce the potential for surface fault rupture at the dam. Currently, neither the fault nor the potential for surface rupture is considered in site seismic design as described in the SDEIS. It also that no fault-specific paleoseismic studies were done on the Gooseberry Graben faults, or other nearby active and potentially active faults in order to dismiss them as potential seismogenic sources.

- The SDEIS implies there are no active faults near the site that could influence seismic hazards and thus seismic design, and concludes that the "random" earthquake (a magnitude 5.5) controls earthquake ground motions at the site. However, the U.S.G.S. Quaternary Fault and Fold Database indicates there are six active and potentially active faults (*i.e.*, may have had at least one movement event in the past 35,000 years) within about 46 km (28 mi.) of the proposed dam site. Three of these faults are within 12 km (7 mi) of the dam site, and one is as close as about 1 km (0.6 mi) from the dam site.

- The Bureau's seismic design for the nearby Scofield Dam considered the Pleasant Valley and Joes Valley fault zones as active faults capable of generating MCEs of surface wave magnitude 7.0 and 7.5 respectively. Neither of these earthquake sources is addressed in the SDEIS. The seismic design of the Scofield Dam also considered the random or background earthquake to be a local magnitude (ML) 6.5, while the SDEIS states that the random earthquake is magnitude 5.5. Because the site of the proposed Narrows Project is closer to the Joes Valley fault zone than the Scofield Dam, there is no apparent justification for a design MCE for the Narrows Project smaller than 7.5.

- Based on applicable criteria, and considering the seismic hazard and design studies for the Scofield Dam project, the six potential seismogenic sources within 46 km (28 mi) of the Narrows dam site could produce large potential design earthquakes (e.g., magnitudes of 6.8 to 7.5). Using these earthquake magnitudes, and current New Generation Attenuation earthquake attenuation relationships, results in potentially high earthquake ground motions (*e.g.*, mean PGA > 0.45 g) at the Narrows Dam site. The presence of a potentially active fault at the dam site (the Gooseberry Graben faults) also indicates a potential for surface fault rupture through the dam and facility foundations.

- Utah seismic design requirements state that the random or background earthquake to be considered should have a minimum magnitude of 6.5, and that the PGA developed for the background earthquake be taken from the seismic hazard mapping for Utah titled "Peak Accelerations (%g) with 5,000 Year Return Time, no fault-specific sources". This seismic hazard mapping indicates that the PGA from just a random or background earthquake could range from 0.30 to 0.40 g.

- The SDEIS does not address or discuss the potential for soil liquefaction induced by earthquake shaking and it does not address the potential for earthquake-induced landslides to affect the reservoir, or other facilities of the proposed alternatives.

- Overall, the tectonic setting is not well described in the SDEIS, appropriate identification, characterization and evaluation of significant potential seismogenic sources at the site (*e.g.*, the Gooseberry Graben faults) and in the vicinity of the site (*e.g.*, Pleasant Valley, Joes Valley, Gunnison and Wasatch faults) is lacking, and the identification and description of potential earthquake hazards is incomplete (*e.g.*, the potential for liquefaction, surface fault rupture and earthquake-induced landslides into the reservoir are not addressed). The development of the seismic design parameters is cursory, conflicting and inadequate resulting in a seismic design that is less than it should be.

- While the SDEIS is an environmental document, and not a design document, it should nevertheless provide an adequate and complete treatment of seismic hazards and the proposed seismic design that assures that the EIS cost estimates are accurate, and provide sufficient information to agency decision-makers and the public to assure that they understand the seismic setting, potential hazards and risks, and the potential for related environmental impacts. Such information is lacking in this document.

- If the seismic hazard assessment and seismic design were performed in accordance with current standard of professional practice, it is likely that the costs for alternatives involving dams at the Narrows site would increase significantly because of increased cost of site-specific hazard identification, characterization, evaluation and design, and the additional cost of permitting, and construction to accommodate a higher PGA, and required provisions to investigate for, and protect against surface fault rupture.

Based on Golder's technical review, and on the DEIS Comments, it is clear that the Bureau should have, and now must, reassess the MCE and the seismic risks for the Narrows Project, using up-to-date methodology and information, and including the results of the additional field studies that are required. Unless and until this is done, it cannot be known whether the proposed site of the Narrows Project is suitable for a dam, or what kind of risks the dam would pose to the downstream environment, including people and structures (*e.g.*, Scofield Dam and Reservoir, and the cabins and people residing there). Further, as explained above, it is particularly important for the Narrows Project that accurate MCE and ground movement projections be developed, and then taken into account for purposes of project design, so that an accurate cost estimate can be determined.

51-16

7. The Analysis of Impacts on Carbon County Water Resources is Flawed, Incomplete and Outdated.

Section 3.3 of the SDEIS contains an assessment of projected effects on water resources if the proposed Narrows Project (or one of the smaller project alternatives) is constructed. This assessment is not only outdated, it is also incomplete and badly flawed, particularly with respect to assessment of impacts on Carbon County water users and on environmental and other resources downstream of the proposed Narrows Dam. In addition to the criticisms of the water resource analysis in the DEIS Comments, we make the following points.

- First, there is no apparent recognition in the SDEIS of the dam operations analysis by Robert Murdock that was attached to and summarized in the DEIS Comments. The DEIS included an operations analysis based on the period from 1960 to 1992, and concluded that with the Narrows Reservoir in place, Scofield Reservoir would have been drained to the bottom of active storage in 9 of the 33 years simulated. While that is certainly a very significant impact, Murdock's analysis, which utilized data going back to 1946, concluded not only that the reservoir would be drained to the bottom of active storage in 14 of the 48 years studied (nearly 30% of the time), but also that in several of those years, there would be so little water that a large portion of normal releases to satisfy water demands would not occur. DEIS Comments at 58-59. Despite this comment on the DEIS, the Bureau failed to incorporate the readily available data, from the period 1946 to 1960, into its operations analysis, or to otherwise recognize Murdock's work, including additional concerns regarding the failure of the DEIS to account for the depletions that would occur during the time the Narrows Reservoir is being filled. These oversights and errors must be corrected. There is no justification for ignoring readily available data and analysis that is important for accurately assessing impacts. We request that Murdock's work and comments be fully considered and incorporated into the EIS.

- Second, while the operations analysis in SDEIS has been modified and partially updated, by adding data from the ten-year period between 1992 and 2002, it stops there and fails to include the available data from 2002 to 2010, and thus is far out of date. Moreover, by including the data from 1992 to 2002, which was a very wet period with high runoff, and excluding the data from 2002 to 2010, which was generally very dry and included several back-to-back years of very low runoff, the analysis is badly skewed. That error, together with the exclusion of the 1946 to 1960 data, another generally dry period, results in a misleading and incomplete assessment of impacts on Scofield Reservoir, which are almost certainly much worse than portrayed in the SDEIS. This is extremely important, because the SDEIS already concludes that in 12 of the 43 years studied, Scofield would be drained to the bottom of active storage. We expect that when the 23 years of missing data is included in the analysis, as it must be, it will make a material difference not only in this important statistic, but also in all of the impact indicators in the SDEIS, *e.g.*, magnitude of average flow reductions in Gooseberry Creek, Fish Creek, the Price River and downstream; magnitude of average, maximum and minimum depletions to the Price River drainage; reduced amount of annual Scofield Reservoir storage and release; greater reductions in size of Scofield surface area, etc.). These differences, in turn, would ripple through the other resource and impact areas in the SDEIS (*e.g.*, impacts to downstream

water users; decreased water quality and increased need for water treatment; impacts to fisheries and riparian zones; and impacts to recreation at Scofield Reservoir, etc.). In order to ensure that the EIS impacts analysis is accurate and up to date, and provides meaningful information to the public and decision-makers, the water resources analysis must incorporate the data from 1946 to 1960, and from 2002 to 2010, and resulting changes in impacts to the other affected resources, based on this new information, must also be reviewed and revised as appropriate.

- Third, the water resources analysis fails to take account of expected future changes in climate, a very important omission given the likelihood of reduced snowpack and runoff and increased temperature that is projected to occur over the coming decades. As explained above, Interior Department policy and other legal and practical considerations require the Bureau to analyze and take account the expected changes in climate in their planning and NEPA documents, particularly when considering long-term water resource issues. The SDEIS at least partially recognizes the importance of taking a long-term look at the water resource impacts of the Narrows Project, as reflected in the 43-year look-back period that is essentially used to predict what the future impacts to water resources, and water dependent environmental resources, might be over the coming decades – if the Narrows Project is built, the impacts to Carbon County will essentially be permanent. (As noted above, the Bureau should also have included the additional 23 years of available data, for an even longer and more representative period of 60-plus years.) Consistent with that general approach, the Bureau's analysis of projected water resource impacts from the Narrows Project must include consideration of the changes in climate that are predicted to occur during the coming decades, or it certainly will underestimate the impacts to water resources and other related resources in Carbon County. To appropriately account for this factor, the Bureau needs to determine the likely changes in snowpack, spring runoff, and temperature over at least the next 60 to 70 years, using available climate change models and assessment tools (most of which conveniently include modeling horizons in the 50 – 90 year range), and then apply those changes to the operational and impact analysis in the EIS. As indicated in the climate change discussion above, this type of analysis is capable of being done (a similar analysis was recently completed for the Park City area) and will likely show significant reductions in snowpack and spring runoff, and significant increases in temperature (which will affect evaporation and water quality). These trends and values need to be factored into the six operational studies listed on pages 3-11 to 3-12 of the SDEIS, which should then be revised (or supplemented to include one or more "climate change" scenarios), and these results would need to be factored into the impact assessment for water resources and the various water-dependent environmental resources.

- Finally, the SDEIS analysis of water resource impacts is deficient because it fails to assess or quantify what are the truly relevant, important effects of the reduced water availability due to the Narrows Project on the citizens and water users in Carbon County. The SDEIS makes estimates of the average depletions in the Price River drainage, the average total contents of Scofield Reservoir, the number of times over the next 43 years that the Scofield Reservoir might be drained to the bottom of active storage (at least 12). And it notes that "impacts to regulated releases from Scofield would occur . . . during

multiple successive drought years, such as occurred in the early 1960s, 1990s and 2000s." SDEIS at 3-16 to 3-17. Those are important statistics and conclusions, but what is even more important, and what NEPA certainly requires, is an analysis and description of what the consequences will be, to the citizens and water users in Carbon County, of the depletion and shortage and drought events that are projected to occur. For example, when the multiple successive drought years occur, causing the Scofield Reservoir to be drained below its active storage for an extended period of time (much longer than it ever has in the past), what will the impacts be to Carbon County?

- Will there be any municipal water available in Price and the surrounding area, for drinking and bathing? What will the quality of that water be, and what additional water treatment might be required?
- Will the Carbon Power Plant have cooling water, or will it need to limit operations or even shut down?
- Will the coal mines that depend on Scofield water have to cease or limit operations? (All in the name of providing an extra crop of hay in Sanpete County?)
- And how will these impacts be exacerbated by climate change?

In the absence of such analysis, the fundamental goal of NEPA – to disclose the impacts of proposed action on the human environment – is not met. The Bureau must do an assessment of the actual, human (and economic) impacts of the depletions it predicts will occur in the Price River drainage and the shortages it predicts will occur in Scofield Reservoir storage (after those predictions are updated and adjusted to account for the additional available historic data and projected changes in climate). Unless and until such an analysis is done, the EIS for the Narrows Project will remain deficient.

8. The SDEIS' Wetlands and Other Waters Analysis is Inadequate with Respect to both NEPA and § 404 Permitting Requirements.

51-17 The overall objective of the CWA is to restore and maintain the chemical, physical and biological integrity of the nation's waters. The SDEIS and 404 Permit Application establish that the Narrows Dam and Reservoir Project and associated infrastructure (the "Project") would impact approximately 89 acres of waters of the United States, including wetlands (and referred to collectively as "waters"). In this era of evolved water management options, the Project's impacts on waters reflect a particularly stark inconsistency with the CWA.

The Corps and EPA have repeatedly affirmed (as a fundamental pretext to compliance with the CWA 404 permitting obligations under the 404(b)(1) guidelines) that impacts to waters must be first avoided and then minimized and that compensatory mitigation should be used only for impacts that cannot be avoided or minimized. *See generally* 40 C.F.R. Part 230; 73 Fed. Reg. 19594, 19619 (April 10, 2008) (preamble to mitigation rule clarifying that avoidance and minimization are achieved through application of the 404(b)(1) guidelines). The SDEIS fails to document the Project's consistency with these Corps/EPA sequencing requirements. Instead, the SDEIS appears to restate many of the same, unsupported themes identified in the 1998 DEIS; it does not acknowledge or address many of the earlier comments (which have been incorporated

herein by reference and attached as Exh. 1) and disregards the substantive changes to waters permitting and mitigation that post-date the 1998 DEIS. *See generally* Exhs. 1 and 2.

The following waters-related comments are not intended to retrace all the themes and issues raised in the DEIS Comments. Instead, these comments supplement the same and provide additional, current examples of the failure of the SDEIS to appropriately assess the impacts of the Project on waters. These comments focus on (1) the lack of adequate information identifying the nature and extent of Project-related impacts to waters; and (2) the archaic (and incomplete) nature of the mitigation assessment particularly evident when comparing the SDEIS and 404 permit application information with the recent Corps' rulemaking addressing mitigation.

We are aware that NEPA does not require that a final, approved waters mitigation plan be in place prior to finalization of an EIS. NEPA does require, however, that an EIS include more than a speculative assessment of the effectiveness of proposed mitigation, *see Wyoming Outdoor Council v. Corps of Eng'rs*, 351 F. Supp. 2d 1232 (D. Wyo. 2005) (citing numerous Ninth and Tenth Circuit cases documenting need for informative mitigation specifics), which of course requires that the EIS contain sufficient information regarding the nature and extent of the waters impacts, and also the nature and extent of the offsetting mitigation, to allow such assessment.
51-18 The Narrows SDEIS contains no assessment of the effectiveness of mitigation for wetland impacts (or any other impact), nor does it contain nearly enough information regarding the nature and magnitude of the impacts to waters to allow such an assessment, as explained below.

Nature and Extent of Project-Related Impacts to Waters. The inconsistency in the 404 Permit Application and SDEIS assessment of the nature and extent of waters and Project-related impacts undermines efforts to comprehend or verify the same. The confusion begins with the myriad inconsistent references to jurisdictional assessments.

The 404 Permit Application establishes that wetland acreages were estimated based on aerial photography followed by a 2003 delineation determining "that the actual wetland acreage was likely 29% less than previously determined." 404 Permit Application at 9 (emphasis added). On the other hand, the SDEIS indicates that a delineation for the reservoir site was completed in 1991-1992 and a "wetlands delineation verification" performed for a "portion of the area within the proposed Narrows Reservoir" in 2003 verified by the Corps in 2004 and again in 2009. SDEIS at 3-63. The confusion regarding the delineation information (and which version represents the foundation for assessing the nature and extent of Project-related impacts to waters) is exacerbated by a post-SDEIS and post-404 Permit Application preliminary jurisdictional determination ("JD") (dated January 12, 2010 and issued by the Corps' Jason Gipson). This "new" preliminary JD refers to "approximately 83.66-acres of wetlands and 5.44-acres of other water bodies present within the survey area." The 2010 preliminary JD information appears to follow-up on the information submitted in 2009 (and referenced in the SDEIS as previously submitted in 2004) covering the area that would be inundated by the proposed reservoir.[11] The apparent scope of the preliminary JD indicates that other Project-related impacts to waters (*i.e.*, those not related to inundation) have not been covered by the preliminary JD thereby raising

[11] Schematics supporting the preliminary JD confirm it is limited to the proposed reservoir area.

questions as to how those impacts have been evaluated and whether the relevant information is current and accurate.[12]

The information in the 404 Permit Application is also internally inconsistent. The text of the application indicates that the "actual acreage of wetlands to be impacted by the dam and reservoir is approximately 71 acres [and that] 100 acres of wetlands will be mitigated." 404 Permit Application at 9. In contrast, Table 1 of the 404 Permit Application indicates that the dam construction will permanently impact: 0.9 acre of wetlands and 810 feet of perennial streams; and that the reservoir inundation will permanently impact 83.66 acres of wetlands and 5.44 acres and 39,297 feet of perennial and intermittent streams. In other words, the narrative and corresponding Table in the application are inconsistent. *See also* 404 Permit Application at 18 (referencing "71 acres of wetlands will be affected by the construction of the Narrows Reservoir").

References to Project-related impacts on non-wetland waters are also inconsistent and vague. The 404 Permit Application identifies impacts to those waters (both temporary and permanent) associated with the Oak Creek and East Bench Pipelines and numerous pipeline drainage and ditch crossings. *See* 404 Permit Application at Table 1. By comparison, the SDEIS references impacts of the Project as "most pronounced near the reservoir", *i.e.*, the 1 mile of Upper Gooseberry Creek and the 4.3 miles of small steams in the proposed reservoir basin along with possible impacts to Cottonwood Creek associated with the construction of the discharge structure at the end of the Upper Cottonwood Creek Pipeline. *See, e.g.*, SDEIS at 3-16; 3-65. The SDEIS contains virtually no reference to the other pipeline-related impacts.[13] Since all phases of the project should be assessed in the SDEIS, the hodgepodge of references divided between the 404 Permit Application and the SDEIS undermine an accurate understanding of the Project's impacts on jurisdictional waters, are inconsistent with the corresponding NEPA obligations and fail to provide a proper foundation for 404 permit issuance.

Mitigation Rule Clarifications. Whereas the Corps' 2008 rulemaking on compensatory mitigation reaffirmed some of the concepts fundamental to Section 404 CWA permitting, it also clarified aspects of the permitting program's mitigation requirements. 73 Fed. Reg. 19594 (April 10, 2008) (referred to as the "mitigation rule"). In addition to confirming the above-referenced sequencing requirements under the 404(b)(1) guidelines, the mitigation rule further specified: (1) the detail essential for mitigation planning; (2) the requirement to assess mitigation from a
51-19 function and services perspective; and (3) the importance of watershed planning. These key

[12] Notably, issuance of a preliminary JD should not, in a project of this size and scope be deemed adequate to support 404 Permit issuance. The Corps has recognized, in its Regulatory Guidance Letter ("RGL") addressing preliminary JDs, that "[g]enerally, approved JDs should be used to support individual permit applications, but the applicant should be made aware of his or her option to elect to use a preliminary JD wherever the applicant feels doing so is in his or her best interest." 08-02 at Para. 4.h. (June 26, 2008) (emphasis added).

[13] The incomplete, superficial nature of the information in the SDEIS is particularly troubling in that the 404 permit Application specifies "the SDEIS provides a far greater level of detail about the impacts [from the Project] with the exception of the discussion of impacts due to stream crossings . . . Please refer to the SDEIS if greater detail is needed." 404 Permit Application at 7 (emphasis added). The 404 Permit Application can't "supplement" the SDEIS. Clearly, information missing from the SDEIS but incorporated into the 404 Permit Application has not been adequately assessed in the overall analysis of environmental impacts.

components of mitigation are disregarded in both the SDEIS and 404 Permit Application. Each of these issues is further addressed below.

Inadequate Mitigation Detail. The mitigation rule requires that "[b]efore an individual permit can be issued, a final mitigation plan must be approved by the district engineer. . . [and that] mitigation plans need to be sufficiently detailed to demonstrate [compliance with the rules] . . . ." 73 Fed. Reg. at 19641. The planning and documentation requirements in the mitigation rules are particularly detailed and specifically include twelve required components aimed at ensuring consistency and comprehensive mitigation planning. 33 C.F.R. § 332.4(c). In contrast, the SDEIS discussion of the four alternative potential Project mitigation sites is missing information essential to assess the adequacy of the same.[14] For example, Section 2.2.2.2.4.1 identifies a Mud Creek mitigation project as the mitigation alternative with the "highest priority." Despite that assertion, the SDEIS contains no information demonstrating the site's viability as a mitigation alternative. The following provides five examples of the lack of information necessary to evaluate whether the preferred Mud Creek location can support adequate mitigation.

First, the reader is unable to assess the exact location of the project. Figure 8 depicts the "Proposed Alternative Wetlands Mitigation Area" on such a gross scale, it is impossible to evaluate its definitive location. Second, it is not clear the mitigation sites (wherever they are) will be available. The 404 Permit Application acknowledges that this mitigation alternative would require "the purchase of private land adjacent to Mud Creek, south of the town of Scofield." 404 Permit Application at 18-19. *See also* SDEIS at 3-66 (indicating that "[t]his measure would entail purchasing about 220 acres of private land . . . ."). Third, the SDEIS, by its own terms, recognizes that a preliminary study has to be done to evaluate whether the proposed design concept will even work. SDEIS at 2-22; 2-26. It references possible reliance on spring sources or Mud Creek as the hydrology for wetland mitigation but includes no evidence that those sources are available or adequate to accomplish the mitigation objectives. Despite missing that basic information, the SDEIS baldly asserts that "[a]ll or a portion of the required mitigation could be performed at this site."[15] SDEIS at 2-26. Fourth, the 404 Permit Application refers to the appended Figure 6 which includes a different gross scale map of potential mitigation areas; the Mud Creek mitigation site in the 404 Permit Application appears to be different from the site proposed and "assessed" in the SDEIS. 404 Permit Application at 18-19. Fifth, the 404 Permit Application indicates that the necessary 100 acres of wetland mitigation may not all occur at the site and it depends on the "availability of property north of the town of Scofield." That parcel (also depicted on the referenced application figure) does not appear in any references in the SDEIS.[16] It is, therefore, impossible for the reader to understand how the SDEIS can accurately assess mitigation when fundamental aspects of the same are not even mentioned. In summary,

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[14] The "Wetland Measures" section is improperly incorporated into the Alternatives provisions of Chapter 2. The referenced section does not, however, provide any information related to avoidance and minimization, i.e., essential steps that need to be employed as a precondition of the referenced impacts.

[15] Incredibly, the mitigation costs assessed relative to the project have not been updated since the October 1994 Fish and Wildlife Coordination Act Report (incorporated in Appendix D of the SDEIS).

[16] Similarly, the 404 Permit Application includes additional references to stream mitigation, information not detailed in the SDEIS. For example, Table 4 indicates that 6.5 miles of stream length of Mud Creek will be mitigated. 404 Permit Application at 21. This information is not supported with any specific assessment of the nature and extent of that mitigation and the location, ownership or availability of the referenced stream segments.

the Mud Creek mitigation description in the SDEIS is nothing more than a summary paragraph with no factual foundation and is inadequate for purposes of NEPA compliance and will not support 404 Permit issuance.

The three other wetland mitigation options echo the information provided in the 1998 DEIS and have similar shortcomings to those identified for the Mud Creek site. Despite comments on the DEIS raising questions regarding, among other things, the availability of the sites and the lack of any information to support the notion that those sites would adequately mitigate the impacted waters, the SDEIS (and 404 Permit Application) include virtually the same description of the mitigation options with no additional information. The SDEIS includes qualitative descriptions indicating that "[c]areful monitoring of the mitigation sites would be conducted to ensure that the value of the mitigation sites was similar in function and equal in value to the wetlands lost." SDEIS at 2-27. The document incorporates a set of generic assurances that a HEP analysis or equivalent for the mitigation sites will suffice to ensure that "at a minimum, a replacement of lost habitat values had occurred."[17] *Id.* The short shrift given to the wetland mitigation details is problematic for a number of reasons including the lack of adequate information for assessing the environmental implications of the project and its inconsistency with Section 404 permitting obligations as evidenced by the new mitigation rule requirements.[18]

On a related issue, the "stream" mitigation options are similarly flawed. The 404 Permit Application identifies "stream mitigation," a concept the SDEIS only addresses in the context of fishery impacts (as opposed to jurisdictional waters impacts). The SDEIS references impacts to 4.3 miles of stream but only provides specific flow mitigation for 2.3 miles of trout spawning habitat; that fishery mitigation will purportedly be created by the release of water into two unnamed tributaries and into Upper Gooseberry Creek. *See, e.g.*, SDEIS at Table 3-11. The fisheries' mitigation also includes assumptions regarding, for example, the ability to acquire and fence 4.0 miles of Mud Creek and other stream segments which, as noted above, are without any foundation. It also asserts (without supporting evidence) that the narrowing of the Middle Gooseberry channel will improve fishery habitat (with the reduced flows). SDEIS at 3-37. Rather than incorporating any substance, the SDEIS notes that a detailed plan would have to be prepared and a right-of-way acquired. Similarly, the 404 Permit Application indicates that "[p]rior to construction . . . a detailed design will be developed. . . ." 404 Permit Application at 20. As indicated above, details regarding the stream mitigation are mandatory for both the NEPA assessment and as a prerequisite to CWA 404 permit issuance. The information provided to the agencies and the public is inadequate.

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[17] See comments below on ecological performance standards.

[18] The confusion and lack of certainty regarding mitigation is even evident in the Corps' Public Notice of the 404 Permit Application. That notice states "[a]fter construction of the proposed Narrows Reservoir, Fairview Lakes would likely provide some of the water needed for wetland mitigation." Public Notice at 3. In fact, the mitigation alternative that would utilize the Fairview Lakes water is third in the list of the four possible mitigation sites in order of priority. The characterization of that mitigation option as "likely" is contradictory to the information in both the SDEIS and the 404 Permit Application. *Compare* SDEIS at 2.2.2.2.4 and 404 Permit Application at 4.1. *See also* Public Notice at 4 (referencing the applicant's assertion that "all or a portion of the required wetland mitigation could be performed at [the Mud Creek] site").

Improper Mitigation Focus. The Corps' 2008 rulemaking underscored the evolution of wetland science in its support of ecological performance standards and focus on the mitigation of lost aquatic resource functions and services (as opposed to mere replacement of impacted acreage). Mitigation projects should incorporate "performance standards . . . based on ecological outcomes, not construction milestones that may not reflect gains in aquatic resource functions or services." 73 Fed. Reg. at 19644. Moreover, "[t]he rationale for the required replacement ratio (based on functions and services) must be documented in the administrative record for the permit action." 33 C.F.R. § 332.3 (f)(2).

The 404 Permit Application and SDEIS fail to track the required focus on ecological outcomes. For example, the 404 Permit Application establishes that "[t]he functions of the wetlands to be disturbed have been identified by the [Corps] WET method and by professional judgment during field observations" as identified in the *Narrows Project Description and Alternatives Aquatic and Wetland Resource Report*, Engineering Science, Inc., 1989. 404 Permit Application at 9. Astoundingly, the application and corresponding evaluation of impacts is founded on documentation that is over twenty years old; the information fails to track the substantial development of wetland science and is so dated as to be completely inadequate to assess Project impacts or to ensure the adequacy of planned follow-up mitigation. On the other hand, the SDEIS improperly (and inconsistently) maintains that the primary function of wetlands is wildlife habitat, [so that] HEP was used to evaluate wetland values."[19] SDEIS at 3-63. Reliance on a HEP analysis to justify mitigation adequacy mimics the information provided in the DEIS (and does not address comments provided on the same). It also contradicts the information provided with the 404 Permit Application which, as indicated, suggests that there are a multitude of other functions and services for the impacted waters. *See* 404 Permit Application, Table 2 (Identifying alternative functions in addition to wildlife habitat).

Watershed Approach Is Missing. The mitigation rule affirmed the importance of relying on a watershed approach to mitigation – mitigation projects ought to be located in the same watershed as the proposed impacts. 33 C.F.R. § 332.3 (c). The preferred mitigation alternative, *i.e.*, Mud Creek, is located in a separate watershed. This fact is not identified in SDEIS or 404 Permit Application and is further evidence of the outdated, incomplete nature of the evaluation of mitigation and its lack of consistency with the CWA and implementing regulations.

In sum, the SDEIS does not reflect a step forward with respect to the evaluation of Project-related waters impacts. Rather, the document reveals key flaws and missing information inconsistent with the required NEPA "hard look." Similarly, the significant waters-related gaps in the SDEIS (and 404 Permit Application) provide evidence that it cannot support issuance of a CWA 404 Permit.

[19] The use of the term "values" in the SDEIS is illustrative of its outdated analysis. The Corps specifically rejected that term in its 2008 rulemaking in favor of "services," *i.e.*, a current term in the ecological literature. 73 Fed. Reg. at 19604.

51-20

9. The SDEIS's Cultural Resources Analysis is Flawed and Does Not Follow the Applicable Requirements of the National Historic Preservation Act.

Section 106 of the National Historic Preservation Act ("NHPA") and the implementing regulations describe specific obligations essential to accomplish the objectives encouraging the preservation and protection of America's historic and cultural resources. *See generally* 16 USC § 470(b). The SDEIS assessment of historic and cultural resources and, more specifically, the documentation regarding compliance with Section 106 of the NHPA is without substance. There is virtually no analysis of any facts related to historic properties' consideration. As such, the SDEIS provides no means for assessing corresponding Project-related impacts.

The SDEIS cultural resources discussions does not track the step-by-step procedural requirements and, instead, appear to consist of a "cut and paste" of information from some earlier version of Project-related documentation. By its own statements, the SDEIS maintains that "[t]he design and, therefore, the Area of Potential Effect ("APE") . . . have changed since the 1979 cultural resource inventory." SDEIS at 3-81. Instead of providing any meaningful information on those changes, the SDEIS defers that effort indicating "Class I and Class III inventories covering the entire APE of the proposed project will be conducted prior to initiation of final design and construction. . . ." *Id.* The SDEIS promises that if effects to historic properties occur, it will address those at some future time and pursuant to an NHPA memorandum of agreement. SDEIS at 3-81 to 3-82. As explained below, the reasoning presented in the SDEIS is at odds with the law.

The NHPA regulations incorporate specific requirements for coordination of Section 106 compliance with NEPA obligations. *See generally* 36 CFR 800.6. Those provisions establish that "[a]gency officials should ensure that preparation of . . . an EIS and record of decision includes appropriate scoping, identification of historic properties, assessment of effects upon them, and consultation leading to resolution of any adverse effects." 36 C.F.R. § 800.6(a)(3). The regulations prescribe a process to avoid duplication of efforts noting that the NEPA process itself can be used to comply with section 106 obligations in lieu of following the specific NHPA procedures. 36 C.F.R. § 800.6(c). In particular and during preparation of the draft EIS, the agency officials "shall," among other things: identify consulting parties; identify historic properties; consult regarding the effects of the undertaking on historic properties with the State Historic Preservation Officer ("SHPO") Indian tribes, other consulting parties, and the Advisory Council on Historic Preservation ("Council"); involve the public; and develop, in consultation with identified consulting parties, mitigation measures (and describe them in the DEIS). 36 CFR 800.6(c)(1). The regulations define how those environmental documents shall be reviewed by the public, consulting parties and other agencies (including the mandatory submission of the DEIS to the Council). 36 C.F.R. § 800.6 (c)(2). The provisions also contemplate a process (including integration with the Council) for resolving any objections to the environmental documentation related to 106 compliance.[20] 36 C.F.R. § 800.6(c)(3).

[20] These process issues are not novel. The Corps has similar requirements with respect to NHPA compliance. "If a permit application requires the preparation of an [EIS] pursuant to [NEPA], . . . the SHPO and the [Council] will be given the opportunity to participate in the scoping process and to comment on the Draft and Final EIS." 33 C.F.R. Part 325, App. C, Para. 2.d (Corps' Procedures for the Protection of Historic Properties).

The SDEIS fails to fulfill any of the referenced NHPA regulatory requirements. The SDEIS acknowledges that its preparation has not included a review of historic properties in the vast majority of the area potentially affected by the Project. SDEIS at 3-81 to 3-82. Indeed, the SDEIS states that an evaluation of "predicted effects" must be postponed pending inventories to be conducted at some future time period. SDEIS at 3-82. The lack of substance with respect to the NHPA analysis is further apparent in the 404 Permit Application; it includes four sentences on NHPA compliance referencing a 1979 survey report. 404 Permit Application at 17.[21]

In summary, the cultural resources' section of the SDEIS falls far short of the required documentation necessary to comply with Section 106 of NHPA. The recitation of commitments made in a prior decade --based on thirty year old surveys of a portion of an earlier iteration of a reservoir site -- is insufficient under NEPA, the NHPA and fails to provide the information essential to support issuance of a 404 permit for the Project.

10. The SDEIS Analysis of Fish and Wildlife Impacts is Flawed and Outdated.

The primary basis of the SDEIS analysis of fish and wildlife mitigation and impacts is the Fish and Wildlife Coordination Act Report. *See* SDEIS at 3-7. That report was prepared by the U.S. Fish & Wildlife Service ("FWS") and the Utah Division of Wildlife Resources ("DWR"), in 1994, over 15 years ago! Based on the SDEIS, the Report has not been updated since that time, and the last time the Bureau even sought the input of the FWS regarding whether the Report should be updated was in 2006, four years ago (there is no indication that the Bureau solicited the view of the DWR at that time). *See* SDEIS at 4-1. Yet according to a letter in the SDEIS, in Appendix D, the Bureau would typically seek FWS review of a potentially stale Fish and Wildlife Coordination Act Report at least every three years ("Because it has been almost three years since the Coordination Act Report was prepared, Reclamation believes it is necessary for the Service to review and update, if needed, the 1994 report for inclusion with the revised EIS being prepared").

The fact is, the SDEIS analysis relies on a Coordination Act Report that is nearly 16 years old, which is light years in terms of fish and wildlife impact assessment methods, and also in terms of FWS and DWR mitigation policies (which are the primary focus of the report, i.e., ensuring that a project fully complies with both FWS and DWR's fish and wildlife mitigation policies). For example, many fish and wildlife habitat mitigation ratios have changed over the last few
51-21 years, an extremely important consideration for a project like the Narrows. The Bureau must go back to the FWS and DWR, and seek a review an update of that report, or there can be no assurance that the impacts and mitigation in the EIS are accurate and meet current standards.

Similarly, in terms of ESA-listed species and state and federal sensitive species, there is no indication that the Bureau has ever gone back to the FWS or DWR and requested an updated list

[21] The SDEIS appears to rely on 1996 and 1997 correspondence between the Bureau and SHPO as satisfying its Section 106 responsibilities. SDEIS at 4-2 and Appendix E. That assertion is flawed for a number of reasons including the fact that the Project has evolved since the time period in question and that the Section 106 regulations have been amended since the time period in question. *See* SDEIS at 4-2. Similarly, 1996 communications with certain tribes (as articulated in a single paragraph in the SDEIS) fail to satisfy, among other things, the obligations specified under the Section 106 regulations. *See id.*

of which of those species might be in the project area, which is typically done every year or so during a prolonged permitting process. Nor is there any evidence that the project's biological assessment has been reviewed and updated since 1999, over ten years ago. Again, this is highly
51-22 problematic because the lists of ESA-listed species, and of state and federal sensitive species, is constantly being updated (and typically growing), and because the understanding of suitable habitat and the historic range of many of these species has also advanced.

As just one example, concerns over declining populations and habitat of the greater sage grouse have mounted over the last decade or so, and the sage grouse was first designated a state-sensitive species several years ago, and now has been designated as a federal ESA candidate
51-23 species after the FWS recently issued a "warranted but precluded" listing decision. We understand that the Narrows project area may contain good summer habitat for sage grouse, and there have even been reports of sage grouse sitings in this area over the last few years, yet the SDEIS is totally silent on sage grouse, a direct result of being badly outdated and evidence of a
51-24 failure to obtain updated reviews by the FWS and DWR. Similarly, there is almost certainly habitat for the threatened Ute ladies'-tresses (Spiranthes diluvialis) in the project area, both at and just below the dam site, and in the Sanpete Valley where the pipeline and distribution facilities would be located, but the SDEIS does not even consider this threatened plant in its analysis.

In light of the above, we believe it is clear that the SDEIS analysis of fish and wildlife impact and mitigation is badly outdated and needs to be redone in order to comply with NEPA's "hard look" and data quality requirements.

51-25 **11. Water Quality Impacts are not Sufficiently Addressed in the SDEIS.**

The SDEIS makes passing reference to potential Project-related water quality issues. *See, e.g.*, SDEIS at 3.5.3. Notably, the identified water quality implications include, among other things, risks to the existing good quality of the streams affected by construction (*e.g.*, Gooseberry Creek); decreased water quality (e.g., increased phosphorus concentrations) in Scofield Reservoir; and increasing salinity concentrations in the Colorado River system.[22] There are, in addition to those specific water quality issues, other water quality considerations not identified in the SDEIS.

For example, the SDEIS fails to incorporate adequate information so that the agencies (and the public) can properly consider (1) the pertinent Project-related limitations (such as those associated with related permitting efforts) in light of possible contributions to water quality excursions in an already "impaired" water body; (2) the requirements (and Project implications)
51-26 associated with the State's mandatory antidegradation analysis of the possible Project – related discharges; and (3) public health concerns considering the population's reliance on a potable
51-27 water supply from Scofield Reservoir, i.e., downgradient from and affected by the Project. These three particular issues are examples of other water quality implications that need full consideration in the environmental analysis; they are further addressed below.

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[22] Most of these SDEIS water quality discussion simply parrots the discussion in the DEIS and disregards most of the earlier comments related to the same. *See, e.g.*, Exh. 2.

Scofield Reservoir is included in the Utah Division of Water Quality ("DWQ") list of impaired waters, *i.e.*, the CWA 303(d) list, based on its low dissolved oxygen and high total phosphorus loading. EPA adopted DWQ's plan for reducing phosphorus loading into the reservoir (calling for a 28% reduction as part of establishing the Total Maximum Daily Load ("TMDL") for the reservoir); the implementation of the TMDL is ongoing. Whereas the SDEIS information acknowledges that the Project may increase the phosphorus concentrations in Scofield Reservoir, the SDEIS does not specifically evaluate whether, and to what degree, construction-related
51-28 storm water or other Project-related discharges to the drainage basin could be contributing to that load.[23] Those Project discharges may be precluded by the National Pollutant Discharge Elimination regulatory provisions which prohibit the issuance of a permit for a new source or discharger if the discharge from its construction or operation will cause or contribute to a violation of water quality standards. *See* 40 C.F.R. § 122.4(i) (as codified in Utah Admin. R317-8-2.2.7); *Friends of Pinto Creek v. EPA*, 504 F.3d 1007 (9th Cir. 2007) (deciding that permit could not be issued for discharge that would contribute to water quality standards violations in an impaired water body despite specific plans to implement offsets reducing contributions of that pollutant to the water). The SDEIS fails to provide sufficient information to analyze the water quality consequences of the Project-related construction (and the possible implications for required permit issuance). The outcome of this assessment will, in turn, shed light on the viability of the referenced (and very conceptual) water quality mitigation.[24]

Scofield Reservoir is classified as a Class IC water under the State water quality standards provisions. Utah Admin. R317-2-13.12. Class IC waters are protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water. Utah Admin. R317-2-6. DWQ has recently promulgated regulations providing additional detail related to implementation of the CWA antidegradation requirements. *See generally* Utah Admin. R317-2-3.5. An antidegradation review is required for proposed federally regulated activities, such as those applicable to the Project under Sections 401 and 404 of the CWA, i.e., the water quality certification and the CWA 404 permit provisions. The antidegradation provisions are more rigorous for discharges with the potential to affect potential drinking water sources. As such, an inadequate water quality analysis in the SDEIS has substantial implications for a Project; the lack of details associated with Project water quality implications is inconsistent with
51-29 NEPA and is insufficient to support a 404(b)(1) assessment for purposes of issuance of the CWA 404 Permit. Correspondingly, these flaws undermine DWQ's assessment of water quality standards compliance (essential for 401 certification and any required antidegradation analysis for Project-related storm water or other discharges). *See also* Price River Water Improvement District, SDEIS Review and Comments (May 24, 2010) (noting additional treatment costs related to increasing levels of phosphorus and disinfection byproduct formation potentially associated with reductions in flows to Scofield Reservoir).

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[23] The DEIS Comments addressed, among other issues, the fact that there are numerous potential water quality impacts associated with the Project, the majority of which were not analyzed in the DEIS and still have not been addressed in the SDEIS.

[24] The SDEIS includes vague references to generic channel stabilization measures, stream improvement commitments and assurances of control under other permitting programs as evidence of effective offsets to measurable water quality impacts. *See* SDEIS at 3-55 to 3-59. It does not provide a substantive analysis of the effectiveness of these measures or whether the proposed options are even available for implementation such as land ownership for fencing.

Earlier comments on the DEIS looked to specific potential health concerns associated with low water levels in Scofield Reservoir. The prior comments referenced the view of one Carbon County physician who conducted an informal study of patient illnesses during drought conditions in 1992. He indicated he believed there is a correlation between low water levels in Scofield
51-30 Reservoir and gastrointestinal illness. These comments have never been addressed in the various iterations of the DEIS. The issue is directly relevant since the Project will (as specified in the SDEIS) result in lower water levels in Scofield Reservoir which, as indicated, is an important source of Carbon County drinking water. The disregard of (and complete failure to consider) this public health concern in the SDEIS violates the requirements of NEPA and provides further evidence that the SDEIS is not a current, compelling document.

In addition, in verbal comments provided to the Bureau at a public meeting in Price, the Price River Water Improvement District described the increasing awareness over the last several years
51-31 of how treatment of water containing high levels of organics, which will increasingly occur if the Narrows Project is built, results in the production of toxic disinfection byproducts in the treated water, presenting unacceptable risks to those who drink and otherwise utilize the water. The SDEIS does not address this problem at all.

In sum, there are a number of water quality considerations that are not adequately addressed by the incomplete SDEIS references to Project-related discharges and the vague, unsupported
51-32 identification of water quality mitigation. The SDEIS water quality analysis is insufficient under NEPA, and also will not support issuance of a 404 Permit Application (and the corresponding, required DWQ 401 Certification).

C. Miscellaneous Comments

51-33 • Based on text in the SDEIS at 1-5, it appears that the Sanpete District has not updated its SRPA loan application since 1994. Reliance on this 16-year old application appears to be part of the reason that so much information in the SDEIS is outdated. The Bureau must require an updated loan application be filed, and make it available to the public, and describe the information from the updated application in the final EIS.

• At page 1-6 of the SDEIS, it is stated that the Bureau considers the "historical tie" between the Gooseberry Project and the Scofield Dam Project sufficient to justify an impact analysis in Chapter 3 that assumes the Scofield Reservoir had not been enlarged. This analysis has no place in the SDEIS and indicates a continuing bias by the Bureau that fails to accept the findings of federal courts that Carbon County water interests did not agree to the Narrows Project as part of the 1984 Compromise Agreement.

51-34 • At page 1-18 of the SDEIS, it is stated that "through a proposed operating agreement associated with the Narrows Project, releases would be made from the privately owned Fairview lakes to re-establish minimum instream flows in two small tributaries to Gooseberry Creek above the Narrows Reservoir Site." Because this is part of the proposed mitigation, the EIS needs to provide evidence that such an agreement is realistic and will actually be reached, and that there is a legal basis in Utah law to protect the

purported instream flow rights. There is reason to believe the private owners of Fairview Lakes are not inclined to such an agreement. Indeed, the Narrows Project would trigger the need for numerous land use agreements/land use changes. These issues are loosely referenced in the SDEIS with no corresponding details. *See, e.g.*, SDEIS at 3-56 (referring to "protection zones" eliminating land use practices that would impact water quality).

51-35 • At page 1-19, the SDEIS notes that the process of developing flow recommendations for the Price River to assist in the recovery of endangered Colorado River Fish Species is still underway. The EIS should not be finalized until after these recommendations are finalized so they can be taken into account with respect to Price River depletions that would be caused by the Narrows Project, which could require further consultation under the Endangered Species Act.

51-36 • The "required permits" list on page 1-26 of the SDEIS is incomplete. A footnote says that the Sanpete District would determine the full list of required permits before it actually begins construction. That does not satisfy NEPA's disclosure requirements; a complete list must be supplied.

• At page 3-86, the SDEIS contains a discussion of the 1941 Reclamation Act Withdrawal in the project area, including a portion of the proposed dam site, and the interplay between the Bureau's and the Forest Service's authority over these lands. While not expressly stated, it appears this discussion is meant to explain or justify why the Forest Service is not required to issue a Special Use Authorization for construction of the Narrows Project on National Forest Land. This discussion is confusing and needs to be clarified, by addressing at least the following points.

51-37
- The 1941 Reclamation Withdrawal was for the Gooseberry component of a Bureau project under the 1902 Reclamation Act. The SDEIS states in several places that the Gooseberry Project was never built, and that the Narrows Project is not a Bureau project under the 1902 Act, but instead is a private project that seeks Bureau financing under the SRPA. The Bureau needs to confirm whether and under what legal interpretation of the 1941 Withdrawal the Narrows Project, which is private, can be authorized to use the subject land.

51-38
- Assuming that the Narrows Project is a legitimate use under the Withdrawal, how will the Bureau authorize use of the land? Will it be through a lease, and if so will it be for fair market value? A land sale? Some other mechanism?
- Has the Forest Service agreed that it does not have the authority to require a Special Use Authorization for the Project? In writing? If so, that should be documented in the EIS.

51-39 • At page 3-55 to 3-56, the SDEIS describes a eutrophication study performed by Franson-Noble, dated 2006. Because Franson-Noble is the applicant's long-time engineering firm, and increased eutrophication is a very important impact of the proposed action, the Bureau is required to review, verify and take responsibility for the results of this study.

The Bureau should verify that it has done this independent review, applying the appropriate expertise, and document that fact in the EIS.

- At pages 4-1 to 4-3, the SDEIS addresses "Consultation and Coordination." According to this discussion, the following appears to be the case:

  - Section 4.1: Interagency coordination meetings took place between 1996 and 2003, and then apparently either were discontinued or severely pared back. The EIS needs to document whether, when and what kind of interagency coordination took place over the last 7 years (2003 until present). Based on the outdated nature of much of the information in the SDEIS, we suspect that little if any coordination has occurred over the last several years.

51-40 ○ Section 4.2.1: Fish and Wildlife Coordination Act: It appears that it has been four years since the Bureau verified with the FWS and DWR that this Report, and the resulting impact and mitigation sections of the EIS, were adequate and up to date. This should be confirmed and, if correct, the FWS and DWR should be contacted and asked again whether they consider this very old (1994) report to have continued validity.

51-41 ○ Section 4.2.2: Endangered Species: It appears that the last time the Bureau requested a list of endangered, threatened and/or sensitive species from the FWS and/or DWR with the potential to exist in the project area was sometime in the late 1990s, and that there has been no reevaluation of the biological assessment since about the same time.

52-42 ○ Section 4.2.3: NHPA: It appears that it has been 13 years (since 1997) that input was sought from the Utah SHPO on this project. That is a very long time, and much has changed in terms of survey protocols, documentation requirements, and mitigation. The SHPO should be consulted again, to ensure continued concurrence.

51-43 ○ Section 4.2.4: Tribal Consultation: It appears that the last consultation with any Native American Tribe was in 1997 or 1998. Many tribes have become much more active in terms of commenting on or otherwise being involved in proposed projects since that time. The Bureau should reach out to the Tribes again, to ensure their input is received, and that they are included in any NHPA or other efforts to assess and mitigate impacts to cultural resources with ties to Native American Tribes.

51-44 ○ Section 4.3: Public Involvement and Scoping: It appears that the last public scoping effort took place in 2003, almost 7 years ago. As discussed above, this is far too long and several important issues have since arisen. The Bureau needed to provide an additional opportunity for scoping, which it can satisfy through considering the comments received on the SDEIS as being scoping comments, and issuing either a completely new supplemental draft EIS or a small supplement that deals with new information and analysis.

51-45 ○ In the section of the SDEIS that addresses estimated project costs, Table 2-5 indicates that the Bureau has or will spend $950,000 for participation in the "EIS and planning," and that to date the Sanpete District has spent over $2.8 million on the project. With respect to the Bureau, what is included in $950,000? Is this the

cost attributed to the time spent by Bureau employees working on the EIS? Or has the Bureau also retained outside consultants or otherwise expended funds on the project? With respect to Sanpete, what is the basis for the cost estimate, i.e., what was its source, and who was the money paid to? Are any of Sanpete's costs reimbursable by the Bureau or pursuant to the loan?

Exhibit "A"

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT CORPS OF ENGINEERS
650 CAPITOL MALL
SACRAMENTO CALIFORNIA 95814-4794

REPLY TO
ATTENTION OF

April 2, 1991

Utah Regulatory Office

Mr. Richard M. Noble
Franson-Noble & Associates
P.O. Box 69
American Fork, UT 84003

Dear Mr. Noble:

51-46 With respect to the proposed Narrows Project and anticipated wetland losses, the 404 b(1) guidelines require an analysis of alternatives which would avoid impacts to wetlands. This analysis should also include a clear justification and need for the project.

The plan description states the project is to develop supplemental water for irrigation to help offset mid- to late-season shortages. The shortages are said to average 20,300 acre feet per year. For the purpose of our analysis and documentation, we will need to know the following:

1. What has the frequency of these shortages over the last fifteen years been? Are the shortages typical for years of normal precipitation? It would be helpful if you could provide the water supply study from which the average shortage was calculated.

2. What is the significance of mid- to late-season shortages? Does the shortage affect all lands serviced by the irrigation company, or just some of the farms? How many crops of alfalfa are typically grown and harvested in a season and does the shortage affect all crops or just second or third crops? What is the cash value of those alfalfa crops for which the supplemental irrigation water would be used? In other words, if the supplemental irrigation water would enable the harvesting of a second or third crop, what is the value of that second or third crop versus the cost of the project including mitigation costs?

3. Not all farms serviced by the irrigation company are on a pressurized sprinkler system. What would the water savings be if the remainder of these farms are placed on such a system? Can the conveyance system be

made more efficient by lining the canals (if they are not already lined) and what would the water savings be from such lining? Would the water savings from completing the pressurized system and/or lining canals make up for the mid- to late-season shortfalls?

This information will help enable us to define the purpose and need for the project as well as to evaluate the practicability of other alternatives. Should you have any further questions, please contact Mr. Michael Schwinn, of my staff, 1403 South 600 West, Suite A, Bountiful, Utah 84010, telephone (801) 295-8380.

Sincerely,

Brooks Carter
Chief, Utah Regulatory Office

Copies furnished:

Utah Division of Wildlife Resources
Utah Division of Water Rights
U.S. Fish and Wildlife Service

Exhibit "B"

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA 95814-2922

REPLY TO
ATTENTION OF

October 7, 1992

Utah Regulatory Office (9250255)

Richard M. Noble
Franson-Noble & Associates Inc.
P.O. Box 69
American Fork, Utah 84003

Dear Mr. Noble:

51-47 We have completed our review of the Narrows Draft Environmental Assessment Report (DEAR) and the Draft Small Reclamation Loan Application Report (DSRLAR).

Only two alternatives are presented for consideration: Alternative A (the no action alternative) and Alternative C (the proposed plan). Other alternatives have been dismissed on the basis such alternatives would involve a breach of contract as per the 1984 Compromise Agreement. Our decision to issue or deny a permit will be based on the effect of the project upon the aquatic ecosystem, whether or not the project is in the public interest and an analysis of practicable alternatives. A range of alternatives, therefore, becomes critical in that decision making process. We cannot accept an alternatives analysis that is so narrowly defined by the 1984 Compromise Agreement as to preclude consideration of other, less damaging practicable alternatives nor to allow our decisions to be prejudiced by such an agreement.

The 1984 Compromise Agreement is used in a statement on page S-2 of the Draft Environmental Assessment Report to limit the location and storage capacity of the Narrows Project. However, this is only partially true. The agreement establishes a maximum storage capacity and a maximum flow that can be diverted annually. A smaller dam and reservoir could be constructed and less water stored and diverted under the 1984 agreement. The statement on page S-2 is misleading and eliminates consideration of other valid alternatives. Also, the agreement will only allow a maximum of 5,400 acre feet annually to be diverted to Cottonwood Creek. It is, therefore, difficult for us to justify storage capacity for 17,000 acre feet.

The documents, in our opinion, too quickly dismiss water conservation and efficiency improvements. Approximately 40 percent of the project area is still under flood irrigation and serviced by open ditches and canals. There is obviously considerable room for additional water savings that have not been

quantified. Indeed, the documents state that receipt of project water would be contingent upon additional water conservation measures being implemented. We see no reason such measures cannot be addressed and the water savings quantified as an alternative.

The documents state that water shortages, which begin to occur during mid-July, affect production of third crops during most years. However, according to the Manti Office of the U.S. Soil Conservation Service, this may be true for project lands in Moroni and Mt. Pleasant but growing season length for the Fairview area is probably more of a limiting factor. This leads us to believe that even under the best of water years the Fairview area may still be limited in its ability to produce a third crop. In our opinion, the water shortage problem may be overstated since growing season limitations appear to be a factor in some areas and have not been investigated in the documents.

Under the purpose and need section on page 1-4, the project would provide additional Municipal and Industrial water for future population growth. However, in checking with the Utah Population Estimate Committee's Economic Report to the Governor, Sanpete County's population increased by only 1.2 percent over the last decade. Even projected future population trends for the county, according to Economic Demographic Projections of the Office of Planning and Budget, shows only minor increases from a present level of 16,900 to 21,000 by the year 2010. Based on these data, it appears that the need for additional M & I water for future population growth is minimal.

According to the Draft EA, the reservoir will fluctuate approximately 10 to 20 feet a year. One of the mitigation measures for the fishery is to restore flows into tributaries to Gooseberry Creek as a means of providing additional habitat. These tributaries would be captured by the Narrows reservoir. We question the value of this mitigation plan in light of the amount of annual fluctuation of the reservoir. Reservoir drawdown will ~~leave stretches of these tributaries surrounded by exposed and~~ inhospitable mudflats. As a result, the tributaries may be inaccessible to fish fry, depending on the timing and duration of such drawdowns. This issue needs further analysis on the effect of reservoir drawdown to the value of the restored tributaries.

It is not clear to us what exactly flushing flows are nor how amounts and frequency of such flows would be determined. Furthermore, channel morphology, sinuosity, wavelength, amplitude of meanders, bed load and sediment size are primarily determined by a 1 1/2 year to 2 year event. It would appear to us that releases from the dam for the purpose of maintaining channel capacity, sinuosity and stability should model the frequency, duration and amounts of flows for such events.

We have serious doubts that the wetland mitigation proposed in the documents is practical and have serious concerns for the long-term maintenance and management of such a proposed wetland mitigation plan. The proposed mitigation lacks specifics and, in our view, is fraught with uncertainties making the success of the mitigation questionable.

The documents state the most affected water will be the middle 3 miles of Gooseberry Creek (page 2-17, DEAR) which will experience flow reductions of 90 percent. The proposed mitigation is to physically narrow the channel to compensate for the reduced flows and provide more fish fry habitat. We have concerns about how this channel narrowing will be accomplished and what impacts will be to existing riparian vegetation as a result. We also question whether or not the expertise and ability exists to re-create fry habitat. This proposal seems rather conjectural in nature .

Finally, we disagree with the results and conclusions of the degradation analysis on Cottonwood Creek. There is empirical evidence that streams with flows increased beyond the two year event for sustained periods have suffered severe degradation, i.e., Sixth Water on the Diamond Fork drainage. We have conducted a preliminary review of the September 12, 1991 degradation report and find fault with the analyses. Critical shear stresses were calculated based on mean bed particle size. However, there is no analysis on bank particle size and there is little correlation between bed particle size and that of bank particle size. The results are only a reflection of the increased flow's ability to scour the bed of the channel but has no bearing on the banks ability to resist such stress. The model also assumes a homogeneous substrate and is based on the average size of the bed material. However, the material is heterogeneous and the other 50 percent of the particles are smaller and the scouring of the smaller material will ultimately affect the integrity of the larger. We would also like to know if there has been any field verification of the model under natural stream conditions and whether or not the model is an accurate predictor of actual channel behavior. The study also disregards the increased flows affect on different channel types associated with Cottonwood Creek. For example, type A sections that are steep and well armored will probably experience little change while type C sections will suffer serious damage. Also, in addition to the two year event, the analysis should consider an event of greater magnitude. Stream degradation is nearly irreversible once started. A ten year event on top of tunnel releases may have very serious consequences that must be considered.

We appreciate the opportunity to review and comment on these documents. If you have any questions regarding our comments, you may contact Mr. Michael Schwinn, of my staff, at 1403 South, 600 West, Suite A, Bountiful, Utah 84010 or telephone (801) 295-8380.

Sincerely,

Brooks Carter
Chief, Utah Regulatory Office

Copies furnished:

U.S. Fish & Wildlife Service
U.S. Bureau of Reclamation
U.S. Environmental Protection Agency
Utah Division of Wildlife Resources

Exhibit "C"

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA 95814-2922

REPLY TO
ATTENTION OF

July 21, 1994

Utah Regulatory Office (199250255)

Richard M. Noble
Franson-Noble & Associates Inc.
P.O. Box 69
American Fork, Utah 84003

Dear Mr. Noble:

51-48 Reference is made to your letter dated June 30, 1994 in which you asked whether or not the Narrows Draft Environmental Impact Statement contained the information necessary for the Corps to conduct its own 404 (b)(1) Guidelines analysis.

After a second review of the DEIS, we have concluded that the document only partially addressees the information necessary for the Corps' 404 (b)(1) analysis. The major flaw of the DEIS is in the development and analysis of the alternatives. The DEIS unreasonably restricts the scope of alternatives to that which was identified in the 1984 Compromise Agreement. It is the Corp's responsibility under the Guidelines to consider all practicable alternatives that address the basic and overall purpose and need of the project as it is determined by the Corps. As stated in earlier correspondence (see our letter dated October 7, 1992), the Corps cannot restrict its own alternatives analysis to so narrow a field as that given by the 1984 Compromise Agreement.

Prior to an alternatives analysis, it is also the Corp's responsibility under the Guidelines to determine if the proposed project (i.e., the preferred alternative as described in the DEIS) would result in significant degradation of the waters of the United States (see 40 CFR 230.10(c)). In using this approach, the environmental impacts of the proposed activity are given substantial weight. If the environmental impacts are severe, this overshadows the remainder of the 404 (b)(1) Guidelines analysis. The more valuable the wetland and the more destructive the project, the more rigorous the alternatives analysis will be. Therefore, it is the Corps' intent to conduct its own independent analysis under the 404 (b)(1) Guidelines.

If you have any questions, please contact Mr. Michael Schwinn, at the Utah Regulatory Office address, 1403 South 600 West, Suite A, Bountiful, Utah 84010, or telephone (801) 295-8380.

Sincerely,

Brooks Carter
Chief, Utah Regulatory Office

Copies furnished:

U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service, Manti LaSal National Forest
U.S. Bureau of Reclamation, Upper Colorado Office
Utah Division of Wildlife Resources

Exhibit "D"

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA 95814-2922

REPLY TO
ATTENTION OF

July 20, 1994

Utah Regulatory Office (199250255)

Robert D. Williams
U.S. Fish & Wildlife Service
Utah Field Office
145 East 1300 South, Suite 404
Salt Lake City, Utah 84115

Dear Mr. Williams:

51-49 We have completed our review of the Draft Coordination Act Report for the Draft Environmental Impact Statement for the Narrows Project. It would be premature at this time for the Corps to comment on the adequacy of the mitigation either proposed by the proponent or recommended by the Service and the Utah Division of Wildlife Resources; the presumption being that the preferred alternative and the impacts identified in the DEIS are a given. Furthermore, we are not prepared at this point to accept the project proponent's overall purpose and need of the project nor will we restrict ourselves to so narrow a range of alternatives as the proponent's reliance on the 1984 Compromise Agreement would dictate.

If you have any questions, please contact Mr. Michael Schwinn, at the Utah Regulatory Office address, 1403 South 600 West, Suite A, Bountiful, Utah 84010, or telephone (801) 295-8380.

Sincerely,

Brooks Carter
Chief, Utah Regulatory Office

Exhibit "E"

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO CALIFORNIA 95814-2922

REPLY TO
ATTENTION OF

December 30, 1997

Regulatory Branch (199250255)

Kerry Schwartz
U.S. Bureau of Reclamation
Provo Area Office
302 East 1860 South
Provo, Utah 84604-7317

Dear Mr. Schwartz:

51-50 We have completed our review of the Preliminary Draft Environmental Impact Statement for the Narrows Project. In general, we are concerned about the objectivity of the information, analyses and conclusions in the document. Our comments are as follows:

CHAPTER 1: PURPOSE AND NEED

Section 1.4.1 Additional Municipal Water Supply

Part of the purpose and need has been stated in the framework of providing additional M&I water. The rationale given is that during irrigation shortages high quality culinary water is diverted to outside use, such as lawn watering, to make up the deficit. We do not consider this a valid need. The diversion of culinary water to lawn watering is a voluntary act on the part of the individual(s) and we fail to see the connection to legitimate M&I needs. An obvious alternative that we deem practicable in the sense of the 404 (b)(1) guidelines is landscaping that is compatible with north Sanpete's precipitation and climate. We seriously question the argument of building a dam and reservoir in order to water lawns and state it as an M&I need.

This section also discusses population trends in Sanpete County in light of additional M&I water. The amount of water needed is calculated at an additional 2,800 acre feet by the year 2020. This demand is based upon an average use of 270 gallons of water per capita per day (Tables 1-2, 1-4). The discussion here should place Sanpete's per capita water consumption in the context of national and regional averages. Utah in general and Sanpete County specifically, have some of the highest, if not the highest, per capita water consumption rates in the country. The point being that considerable room exists to reduce M&I demands without affecting economic development or lifestyle. We question

the validity of the stated M&I shortfall given the lavish use of water in Sanpete County.

Section 1.4.4 Recreation and Fishery Opportunities

Fishing and recreation have been identified as a need within the County. While we do not disagree that demand for such opportunities exist and continues to increase, we do not accept this as part of the purpose and need of the project. Recreation and fishing have been defined so narrowly that only a dam and reservoir can meet the need. Stating this as a purpose and need will be problematic in the alternatives analysis since there exists readily available and practicable alternatives. Certainly, a dam and reservoir can furnish such activities, but so can many other existing bodies of water in the vicinity. Pursuant to the 404 (b)(1) guidelines, the Corps may only permit the least damaging alternative. If the purpose and need of the project is to provide for recreation then the Corps is obliged to look at other, less damaging alternatives to meet that need.

CHAPTER 2: THE ALTERNATIVES CONSIDERED

Section B.2.5 Wildlife Measures

The U.S. Fish and Wildlife Service's Habitat Evaluation Procedures (HEP) were used to model impacts in terms of Habitat Units (HU's). It is unclear what relationship the 150 acres of conservation easements and the acquisition and enhancement of 640 acres of land has to replacing lost HU's. There is no quantification of HU's from the proposed mitigation to indicate that lost HU's are adequately compensated for. This is true for both the proposed and small reservoir alternative.

On page 2-22 a statement is made that the SWCD will augment seed for the U.S. Forest Service's watershed and range improvement projects. Again, it is not clear how this fits in the overall mitigation for wildlife impacts nor is it quantified in terms of HU's gained. Additionally, we see little merit giving mitigation credit on federally owned lands when the land management agency already has a charge and responsibility for wise stewardship of its trust resources.

Section C.1 Water Supply and Use

A problem cited with the smaller reservoir plan is the lack of carry-over storage and reduced yield during below average precipitation. A worse case scenario is presented without a probability or frequency of occurrence. The seriousness of this limitation cannot be assessed without such an analysis.

Section 2.4 Alternatives Considered and Eliminated

C. Conservation Without Development of Other Water Supplies.

Converting the remainder of north Sanpete County to sprinkler irrigation and replacing open ditches and canals with pipelines is estimated to save approximately 8,000 acre feet per year. To understand what this means in reducing the shortage, it should be compared to the Proposed Action and small reservoir alternative; i.e., the proposed plan will reduce shortages from 30 percent to approximately 19 percent of the time. What will the shortage be reduced to with conservation measures alone?

On page 2-52 it states that one reason this alternative was not considered further is because irrigation supplies would still be inadequate. However, we note that irrigation supplies under the proposed plan are also inadequate. It becomes a matter of degree to which the shortages are reduced and we are not prepared to concur that conservation measures alone are not a practicable alternative.

CHAPTER 3: AFFECTED ENVIRONMENT

Section 3.2.3. Predicted Effects (Wildlife)

This section describes the HU's lost to the alternatives but there is no discussion on the HU's gained from the proposed mitigation. One cannot evaluate the anticipated effectiveness of the mitigation without modelling the results.

Section 3.3. Water Resources

General: Table 3-4 should be accompanied with a corresponding hydrograph for each stream segment for a more graphic presentation of the changes in quantity, timing, frequency and duration of flows. Also, the frequency at which wet years, dry years and average years occur should be quantified and plotted.

Similarly, Figure 3.2 should be expanded to comparatively show the operational hydrograph for Scofield on a monthly basis pre- and post-project for average, wet and dry years. The depiction of reservoir contents at the end of various water years is not very helpful.

Section 3.5 Water Quality

3.5.1.b Lower Gooseberry Reservoir: Because a water quality problem has been identified and the risk appears high for further water quality degradation and fish kills in Lower Gooseberry Reservoir, the discussion needs more detail on the problems and limiting factors of the reservoir. The existing analysis is, in our view, inadequate both for the affected environment and the predicted effects. The depth of analysis should be at least

commensurate with that given to Scofield Reservoir.

3.5.2 Methodology and Impact Indicators; Flushing Rate Comparison Phosphorus Mass Balance Analysis and Trophic State Index (pg 3-51): It is stated that fish kills will occur 80 percent of the time when flushing rates drop below 0.85. This occurred in 4 of the 33 years under the no action plan and is predicted to increase to 5 out of 33 years under the proposed plan (pg 3-53). It is also stated that no fish kills occurred when the flushing rate exceeded 1.1. However, in reviewing Figure 3-7 we note that fish kills occurred in 11 years out of 33 and the correlation between flushing rates and fish kills appears weak; roughly 45 percent of fish kills occurred when flushing rates were greater than 0.85. Also, fish kills occurred in 1961, 1982 and 1990 when, it appears, that flushing rates did indeed exceed 1.1.

The discussion in this section leads one to believe that fish kills only occur when flushing rates drop below 0.85 and, furthermore, that this has only happened in 4 years out of 33 under the no action plan and will increase to 5 years out of 33 under the proposed plan. The data however, demonstrate otherwise and this is not an accurate presentation of water quality problems and fish kills. A more thorough discussion of reservoir conditions at the time of year that fish kills occurred is warranted. Also, presenting yearly averages of flushing rates, phosphorus loading and TSI's is not very helpful in understanding the problems in Scofield Reservoir nor how the proposed plan may affect the reservoir's limnology. Monthly flushing rates, phosphorus loading and TSI's for wet, dry and average years should be presented for pre- and post- project conditions. In addition, other factors that may be contributing to fish kills and whether or not there is a synergistic relationship with flushing rates, phosphorus loading and TSI's needs investigation and discussion.

Section 3.6 Vegetated Resources

3.6.3.b Proposed Action: The second paragraph on page 3-64 states that, because the stability and width of Cottonwood Creek will not be affected, there will be no impact to riparian vegetation. We disagree. From Table 3-4 it can be seen that flows in Cottonwood Creek at the canyon mouth drop off substantially after June under the no action alterative. Implementation of the proposed plan will result in significantly higher flows through July, August and September. Most riparian plants are adapted to survive short-term flooding; i.e, during spring runoff and thunderstorm events. However, it has been demonstrated from previous studies that mortality of riparian species increases with prolonged flooding. High flows on Cottonwood Creek will be extended an additional three months over base conditions. There is no reason to believe that the riparian community will not be affected by such a change.

Section 3.9 Economic and Social Resources

3.9.1 Affected Environment: Table 3-21 shows an average water supply shortage of 30 percent. Paragraph 4 on that same page states that two crops of alfalfa are harvested every year and that in favorable water years a third crop is harvested. The frequency at which the shortage occurs and the frequency at which a third crop of alfalfa is harvested under the no action plan and the proposed plan should be enumerated.

3.9.3.b Proposed Action: The sixth paragraph on page 3-78 states that increased M&I supplies will result in an economic benefit of $46,000 per year. Explain what those benefits are and how the project affects it.

Section 3.13 Slope and Channel Stability

3.13.3.b Proposed Action: On page 3-93 it states that the dominant discharge in Cottonwood Creek will not change under the proposed plan. However, what is missing from this discussion is that the dominant discharge under the proposed plan will be extended an additional three months beyond baseline conditions. We believe it is premature to conclude that extended high flows will not have an impact on channel stability. In fact, we cannot conceive of a scenario where bedload and erosion would not increase as a result of extending the duration of dominant discharge. The amount of bedload moved under the no action plan should be measured and compared to what is predicted for the proposed plan in tons per day.

A comparison of the baseline hydrograph and the post-project hydrogragh should be included here. The presentation of such a graph should be a daily discharge and not a monthly average. One needs to understand what the duration of dominant discharge is under the no action plan in terms of days or weeks verses what the duration will be under the proposed plan.

We appreciate the opportunity to review and comment on this draft. If you have any questions, please contact me at the Utah Regulatory Office, 1403 South 600 West, Suite A, Bountiful, Utah 84010, telephone (801) 295-8380.

Sincerely,

Michael A. Schwinn

Michael A. Schwinn
Chief, Utah Regulatory Office

Copies furnished:

U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

U.S. Forest Service, Manti La-Sal National Forest
Utah Division of Wildlife Resources, Salt Lake City
Utah Division of Wildlife Resources, Price

12/31/57

650 CAPITOL MALL
SACRAMENTO CALIFORNIA 95814-4794

Exhibit "F"

REPLY TO
ATTENTION OF

JUL 3 0 1991

Utah Regulatory Office

Mr. Patrick Collins
Mt. Nebo Scientific
P.O. Box 337
Springville, Ut 84663

Dear Mr. Collins:

51-51 This is in response to your request for information on the Corps' mitigation policy. Pursuant to a Memorandum of Agreement with the U. S. Environmental Protection Agency, dated February 6, 1990, our mitigation policy is as follows:

1. Avoidance; No discharge will be permitted if there is a practicable alternative that would have less adverse impacts. This presumes that upland alternatives for non-water dependent projects exists and that such alternatives have less adverse impacts. Compensatory mitigation may not be used to reduce environmental impacts in the evaluation of the least environmentally damaging practicable alternatives.

2. Minimization; All appropriate steps will be taken to minimize adverse impacts. Such steps will require project modification and permit conditions as a means to reduce impacts.

3. Compensatory Mitigation; Appropriate mitigation will be required for any unavoidable impacts which might remain after all appropriate steps have been taken to minimize those impacts. Generally, in-kind and on-site mitigation is preferred. Our preference for compensatory mitigation, in terms of priority, is as follows:

a. Restoration of previously impacted wetlands.
b. Creation of new wetlands in upland areas.
c. Enhancement of existing wetlands.

The sequence of events; avoidance, minimization and mitigation, may only be interrupted under the following circumstances: the discharge is necessary to avoid environmental harm, or the discharge is expected to result in an environmental gain or insignificant environmental

loss. In other words, one may not proceed directly to compensatory mitigation without adequately demonstrating that a practicable alternative to developing in a wetland does not exist.

If you need further information, you may contact Mr. Michael Schwinn, of my staff, at 1403 South 600 West, Suite A, Bountiful, Utah 84010 or telephone (801) 295-8380.

Sincerely,

Brooks Carter
Chief, Utah Regulatory Office

Exhibit "G"

Robert J. Murdock, P.E.
2964 East 3135 South
Salt Lake City, Utah 84109

Phone 487-0258
March 18, 1994

Richard N. Lee, President
Carbon Water Conservancy District
P.O. Box 509
Helper, Utah 84526

Re: Studies related to the proposed Narrows Project

Dear Richard,

51-52 Enclosed is a copy of the results of an operation study I have performed that shows the affects of the Narrows Reservoir upon the storage water supply available from Scofield Reservoir. The calculations assume BOTH Scofield Reservoir and the Narrows Reservoir were constructed when Scofield Dam was enlarged in 1946 and that both reservoirs operated during the full 47 year period since then. The study was performed for two different sizes of the Narrows Reservoir. These were 14,500 and 5,400 acre-feet active storage, plus 2,500 acre-feet dead storage, which are the Recommended Plan and Smaller Reservoir Alternate Plan discussed in the Narrow Project DRAFT EIS.

The water releases from the Narrows Reservoir are those proposed for the Narrow Project in the DRAFT EIS. The historic storage record of Scofield Reservoir was adjusted based upon the amount of water retained in the Narrows Reservoir. Evaporation from the Narrows Reservoir and the change in evaporation losses from Scofield Reservoir due to its smaller size were part of the calculations.

The study covers the period from October 1, 1946 through September 30, 1993. The study uses historic storage amounts in Scofield Reservoir, the stream gauge records of the Price River below Scofield Reservoir, Gooseberry Creek near Scofield and near Fairview, and the Fairview Ditch and Tunnel all as published by the U.S.G.S. I supplemented this data with information from the Price River Commissioner Reports in the State Engineers office.

The Gooseberry Creek flows were adjusted to get the water supply at the proposed Narrows Dam site. All water released from Scofield Reservoir to make room for flood storage was added to Scofield Reservoir storage. Spills from Scofield Reservoir were evaluated based upon how much of the spill flow was likely used to satisfy the demands for irrigation and other uses.

Storage in Scofield Reservoir less than 72,100 acre-feet was assumed to be used for irrigation etc if the flow rates were typical of rates released for usage. If the flow rates

were higher than typical use rates, part of the flow was assumed retained in storage and part was assumed released for usage. Calculated storage greater than 72,100 acre-feet was assumed spilled and lost.

Tables 1, 2 and 3 show monthly water storage amounts in Scofield Reservoir. Table 1 shows the historic data. It shows that Scofield Reservoir has been managed to never be without some active storage water available for use. Tables 2, 3, 4 and 5 show that with either size of the Narrows Reservoir, Scofield Reservoir could not have supplied the same amount of water as the historic uses. Tables 2 and 3 show the active storage pool in Scofield Reservoir would have been empty many times. Tables 4 and 5 show the amounts of shortage of the historic releases from storage in Scofield Reservoir. This is the amount of water that would not have been available if the Narrows Reservoir had been operating.

Based upon the Price River Commissioner Reports the average annual supply form Scofield Reservoir storage has been 21,924 acre-feet per year. Tables 4 and 5 show the total loss of historic storage supply from Scofield Reservoir is 76,471 or 62,829 acre-feet depending upon the size of the Narrow Reservoir. These losses average 1,627 or 1,337 acre-feet per year or 7.4 or 6.1 percent of what has been available.

Tables 6 and 7 show what the active storage contents of the Narrow Reservoirs would have been. Tables 8 and 9 show what the diversions of water and shortages to Sanpete uses would have been from the Narrow Reservoirs of different sizes. The total releases to Sanpete would have been 256,479 or 230,252 acre-feet depending upon the reservoir size. These diversions average 5,343 or 4,797 acre-feet per year. The shortages would have been 2,721 or 28,948 acre-feet or average 57 or 603 acre-feet per year depending upon the reservoir size. The shortages are 1.1 or 11.2 percent of the proposed diversion amount.

Calculations show the surface area of Scofield Reservoir (available for flat water fishery) is reduced an average of 302 or 253 acres depending upon the size of the Narrows Reservoir. The surface area losses at Scofield are 67 percent of the area gained by the larger Narrows Reservoir, and greater by 15 acres than the area gained by the smaller Narrows Reservoir.

COMMENTS:

1. The Narrows Reservoir causes losses to the useable stored supply in Scofield Reservoir. These losses would require frequent alteration of historic use patterns.

2. Only the months of March and April would not at some time require changes in the historic use patterns. The greatest and most frequent changes would be required during the late summer months.

Richard Lee, 3/18/94, page 3.

3. The negative impacts of the loss of Scofield Reservoir water for municipal, industrial etc uses should be evaluated and included in the DRAFT EIS.

4. The June 8, 1984 Agreement and the State Engineer's January 7, 1985 MEMORANDUM DECISION only allow 10,000 acre-feet active storage for transmountain diversion. Up to an additional 4,500 acre-feet active storage is allowed only as needed to provide for the minimum streamflow of Gooseberry Creek below the Narrows Dam. Brooks Canyon Creek was approved to be diverted to provide for the minimum streamflow below the dam. The minimum streamflow is 1.0 to 1.25 cfs or about 730 acre-feet per year.

   The proposed plans outlined in the DRAFT EIS do not include a diversion from Brooks Canyon Creek so Gooseberry Creek water must be used for the minimum streamflow. Using Gooseberry Creek which has a minimum flow of 0.6 cfs for 2 to 3 months would require only about 60 to 75 acre-feet of active storage to provide the minimum streamflow. The Recommended Plan of the Narrows Project with 4,500 acre-feet active storage for minimum streamflow and 14,500 acre-feet total active storage does NOT comply with the approved water rights for the project.

5. The Small Reservoir Alternate for the Narrows Project has an average annual shortage of 11.2 percent which is a significant loss of benefits and would affect the economic feasibility of the project.

6. The Narrow Reservoir causes a reduction of the flat water fishery value of Scofield Reservoir. There is a water surface area reduction that closely offsets the area gained at the Narrows Reservoir. The decrease in water stored in Scofield Reservoir would cause the reservoir to be warmer in the summer and have less winter carry over capacity. These negative impacts should be addressed and included in the DRAFT EIS.

7. Adding storage at the Narrows Dam Site increases the total average useable stored supply from the Price River drainage by 3,716 or 3,460 acre-feet per year. I doubt that this amount of water for supplemental irrigation is worth the estimated costs.

These comments relate to the operation study. If you have questions please contact me. I intend to list other comments that relate to the DRAFT EIS.

Sincerely,

Robert J. Murdock, P.E.

cc: James Lee
Marvin Allen
E.J. Skeen

TABLE 1.

SCOFIELD RESERVOIR HISTORIC STORAGE - ACRE FEET DATE 03-18-1994 TIME 11:20:25

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1946	0.	0.	0.	0.	0.	0.	0.	0.	1,450.	1,740.	3,450.	4,830.
1947	5,760.	6,490.	8,340.	15,800.	35,900.	34,100.	23,000.	18,700.	12,800.	9,640.	10,700.	11,500.
1948	13,000.	13,900.	15,400.	19,900.	28,000.	20,300.	9,150.	2,160.	771.	441.	1,920.	2,780.
1949	3,950.	5,050.	6,490.	14,100.	39,300.	46,000.	35,700.	24,600.	18,900.	18,300.	19,700.	21,300.
1950	23,200.	24,200.	25,700.	32,900.	51,900.	51,100.	43,700.	31,800.	26,900.	25,000.	26,500.	27,400.
1951	29,300.	30,900.	32,200.	37,100.	53,800.	51,400.	39,000.	34,300.	26,500.	25,300.	26,300.	27,600.
1952	30,200.	31,600.	33,800.	43,500.	76,500.	66,600.	57,500.	52,200.	47,300.	43,500.	43,900.	43,900.
1953	46,100.	48,300.	50,900.	54,000.	58,300.	57,500.	46,700.	39,500.	31,100.	28,500.	30,000.	30,400.
1954	32,000.	32,700.	34,800.	37,100.	33,600.	23,600.	16,300.	9,310.	7,250.	6,640.	7,090.	7,710.
1955	8,990.	10,200.	11,500.	14,800.	26,100.	22,300.	13,000.	9,150.	3,680.	2,160.	2,910.	4,360.
1956	5,900.	6,940.	8,660.	14,300.	29,100.	23,600.	13,500.	6,640.	2,040.	1,100.	1,450.	2,410.
1957	3,680.	4,630.	6,050.	9,310.	26,500.	53,000.	44,700.	41,700.	37,800.	35,200.	36,600.	37,600.
1958	38,800.	40,000.	41,700.	40,000.	71,200.	64,900.	50,600.	39,300.	34,800.	31,800.	32,200.	32,000.
1959	32,900.	34,500.	35,900.	34,300.	34,500.	27,800.	18,700.	13,300.	8,180.	6,640.	6,050.	5,470.
1960	5,760.	6,640.	8,020.	10,800.	19,300.	14,100.	5,760.	2,160.	1,560.	2,040.	2,160.	1,920.
1961	2,160.	2,290.	3,680.	5,900.	6,050.	3,420.	1,330.	661.	551.	882.	992.	1,330.
1962	1,560.	2,530.	3,420.	13,700.	39,300.	40,300.	30,900.	21,700.	16,700.	17,100.	17,100.	16,700.
1963	16,500.	18,100.	20,100.	21,900.	30,000.	27,800.	17,100.	13,700.	12,600.	9,640.	9,980.	9,640.
1964	9,980.	10,300.	11,500.	15,200.	35,000.	38,100.	26,900.	17,500.	11,700.	9,640.	10,200.	10,800.
1965	13,000.	13,900.	15,200.	19,500.	42,200.	61,600.	59,100.	56,200.	51,400.	49,300.	49,800.	50,900.
1966	51,900.	53,200.	55,100.	63,000.	67,800.	61,300.	50,100.	39,500.	35,000.	33,800.	34,100.	33,800.
1967	36,600.	37,800.	39,800.	42,000.	60,500.	70,600.	61,900.	51,900.	46,700.	43,700.	44,200.	44,500.
1968	45,700.	46,700.	48,500.	51,600.	72,300.	69,500.	59,100.	55,100.	44,200.	42,200.	42,700.	43,700.
1969	45,200.	46,700.	39,000.	44,000.	72,300.	68,900.	59,100.	50,600.	45,700.	47,000.	47,500.	48,300.
1970	49,600.	51,400.	52,400.	52,700.	69,200.	67,500.	57,500.	46,000.	38,800.	38,500.	39,000.	39,800.
1971	41,200.	43,500.	45,700.	52,700.	69,500.	66,100.	53,500.	43,000.	37,300.	37,100.	37,800.	38,500.
1972	40,700.	41,500.	44,500.	49,000.	53,000.	48,300.	33,400.	24,000.	19,100.	20,900.	21,300.	21,700.
1973	22,300.	23,200.	24,600.	26,700.	64,400.	68,300.	59,700.	49,300.	42,200.	40,000.	40,700.	41,500.
1974	43,500.	44,000.	45,500.	48,000.	66,900.	59,400.	48,500.	37,300.	32,200.	31,500.	32,000.	31,500.
1975	32,200.	32,900.	34,500.	35,900.	51,900.	69,200.	63,300.	51,100.	43,700.	41,000.	42,500.	43,200.
1976	43,700.	44,500.	45,500.	49,000.	61,600.	55,100.	43,200.	34,300.	31,100.	30,000.	29,800.	29,300.
1977	28,400.	29,100.	30,200.	30,700.	27,200.	24,600.	20,900.	19,100.	17,700.	17,300.	17,300.	17,300.
1978	17,300.	17,300.	19,700.	26,100.	50,300.	62,200.	51,600.	42,500.	37,300.	35,900.	37,300.	38,500.
1979	40,000.	41,000.	42,500.	40,700.	65,200.	66,600.	56,700.	49,300.	41,500.	39,800.	40,700.	41,500.
1980	43,200.	44,500.	44,500.	43,500.	71,200.	68,300.	60,000.	50,100.	47,500.	46,200.	47,500.	48,500.
1981	49,300.	50,300.	51,600.	55,100.	55,600.	49,800.	39,500.	31,500.	29,100.	30,400.	31,500.	32,500.
1982	34,300.	35,700.	37,300.	43,200.	73,800.	68,900.	61,300.	53,000.	47,500.	49,800.	52,400.	53,200.
1983	52,700.	46,700.	38,500.	36,400.	61,900.	72,900.	67,200.	60,200.	50,300.	40,700.	43,000.	46,200.
1984	48,500.	50,100.	39,000.	27,600.	60,000.	70,900.	64,400.	58,900.	51,600.	47,800.	43,500.	47,000.
1985	49,000.	51,100.	53,200.	57,000.	70,300.	64,900.	56,400.	44,500.	40,200.	41,500.	43,500.	45,000.
1986	46,700.	49,300.	43,700.	45,700.	73,800.	68,600.	60,500.	50,100.	44,200.	45,700.	47,000.	48,800.
1987	50,900.	52,700.	55,100.	60,500.	61,600.	55,600.	47,500.	40,700.	35,900.	34,300.	35,900.	37,600.
1988	39,500.	40,700.	42,700.	47,800.	57,000.	50,900.	39,800.	31,300.	27,200.	26,700.	27,200.	28,700.
1989	30,000.	31,500.	34,300.	37,100.	35,200.	29,100.	19,300.	14,400.	11,500.	9,980.	10,660.	11,180.
1990	11,700.	12,420.	13,510.	20,500.	21,930.	19,500.	12,240.	8,500.	7,400.	7,090.	7,250.	7,250.
1991	7,710.	8,340.	9,810.	12,960.	23,580.	28,450.	19,300.	12,600.	9,310.	6,640.	7,560.	8,180.
1992	8,990.	9,640.	11,530.	13,320.	9,480.	4,220.	2,530.	1,450.	980.	1,460.	2,170.	2,790.
1993	3,690.	4,770.	6,800.	12,600.	47,510.	55,100.	44,970.	37,360.	31,780.	0.	0.	0.

TABLE 2.

SCOFIELD RESERVOIR STORAGE WITH NARROWS RESERVOIR - ACRE FEET DATE 03-18-1994 TIME 10:38:19

NARROWS RESERVOIR ACTIVE CAPACITY IS 14,500. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1946	0.	0.	0.	0.	0.	0.	0.	0.	1,450.	1,632.	3,274.	4,603.
1947	5,509.	6,224.	8,016.	15,003.	35,069.	33,119.	21,677.	17,169.	11,178.	7,932.	8,915.	9,664.
1948	11,141.	12,029.	13,510.	17,735.	23,303.	14,937.	3,614.	0.	0.	0.	1,435.	2,252.
1949	3,386.	4,459.	5,834.	12,284.	33,014.	38,244.	27,619.	16,424.	10,725.	10,094.	11,461.	13,047.
1950	14,941.	15,941.	17,409.	24,051.	40,067.	38,077.	30,405.	18,442.	13,502.	11,594.	12,953.	13,803.
1951	15,681.	17,268.	18,519.	22,681.	36,199.	32,595.	19,939.	15,130.	7,380.	6,151.	7,069.	8,310.
1952	10,871.	12,238.	14,376.	23,479.	69,893.	72,100.	63,272.	57,541.	52,425.	48,499.	48,797.	48,745.
1953	50,919.	53,103.	55,649.	58,477.	60,529.	57,934.	46,685.	39,226.	30,702.	28,014.	29,414.	29,732.
1954	31,260.	31,885.	33,886.	35,323.	30,142.	19,728.	12,263.	5,265.	3,195.	2,554.	2,945.	3,535.
1955	4,792.	5,987.	7,236.	10,309.	19,154.	14,498.	5,053.	1,170.	0.	0.	740.	2,181.
1956	3,714.	4,755.	6,427.	11,242.	22,974.	16,757.	6,486.	0.	0.	0.	314.	1,261.
1957	2,518.	3,448.	4,803.	7,835.	22,516.	43,850.	34,876.	31,649.	27,671.	24,954.	26,232.	27,176.
1958	28,337.	29,501.	31,119.	34,540.	63,721.	62,536.	47,868.	36,367.	31,816.	28,775.	29,124.	28,888.
1959	29,757.	31,342.	32,705.	30,890.	29,320.	21,976.	12,687.	7,294.	2,228.	695.	71.	0.
1960	304.	1,200.	2,527.	5,015.	10,983.	5,121.	0.	0.	0.	449.	520.	239.
1961	466.	590.	1,955.	3,902.	2,909.	343.	0.	0.	0.	282.	329.	628.
1962	819.	1,710.	2,510.	11,912.	32,750.	31,718.	21,797.	12,394.	7,330.	7,701.	7,641.	7,223.
1963	7,036.	8,636.	10,626.	12,361.	17,475.	14,308.	3,480.	77.	0.	0.	306.	0.
1964	301.	587.	1,748.	5,328.	22,142.	23,455.	11,901.	2,444.	0.	0.	526.	1,051.
1965	3,170.	4,012.	5,256.	9,298.	29,022.	45,499.	42,424.	39,102.	33,975.	31,660.	31,999.	32,999.
1966	33,916.	35,138.	36,881.	43,703.	46,292.	39,430.	28,216.	17,558.	13,113.	11,853.	12,101.	11,752.
1967	14,529.	15,714.	17,675.	19,753.	35,242.	42,930.	33,888.	23,812.	18,629.	15,631.	16,070.	16,304.
1968	17,432.	18,368.	20,088.	23,008.	41,778.	50,109.	39,442.	35,261.	24,299.	22,220.	22,633.	23,880.
1969	25,043.	26,714.	28,027.	38,769.	64,328.	61,117.	50,907.	42,254.	37,248.	38,399.	38,774.	39,471.
1970	40,672.	42,408.	43,304.	43,429.	56,359.	53,443.	43,122.	31,557.	24,324.	23,946.	24,340.	24,984.
1971	26,198.	28,449.	30,572.	37,231.	51,283.	46,788.	33,995.	23,474.	17,783.	17,535.	18,147.	18,742.
1972	20,824.	21,530.	24,239.	28,028.	30,104.	24,989.	10,158.	970.	0.	1,828.	2,139.	2,474.
1973	3,018.	3,873.	5,191.	7,085.	40,938.	43,143.	34,301.	23,900.	16,817.	14,605.	15,230.	15,950.
1974	17,851.	18,287.	19,715.	22,004.	37,307.	29,227.	18,342.	7,309.	2,430.	1,828.	2,280.	1,752.
1975	2,412.	3,082.	4,643.	5,997.	20,356.	33,107.	26,637.	14,412.	7,122.	4,427.	5,817.	6,409.
1976	6,804.	7,517.	8,446.	11,729.	21,618.	14,762.	3,065.	0.	0.	0.	0.	0.
1977	0.	689.	1,763.	1,977.	0.	0.	0.	0.	0.	0.	0.	0.
1978	0.	0.	2,357.	8,264.	29,058.	37,215.	26,329.	17,144.	12,011.	10,735.	12,054.	13,221.
1979	14,688.	15,664.	17,131.	15,136.	36,339.	36,276.	26,280.	18,931.	11,247.	9,583.	10,434.	11,178.
1980	12,822.	14,073.	15,417.	20,518.	50,023.	60,773.	52,002.	41,963.	39,267.	37,877.	39,085.	40,017.
1981	40,755.	41,704.	42,893.	45,638.	44,236.	37,690.	27,292.	19,304.	16,922.	18,139.	19,162.	20,122.
1982	21,906.	23,300.	24,860.	30,194.	62,137.	72,100.	63,948.	55,424.	49,708.	51,616.	53,903.	54,873.
1983	56,462.	58,470.	60,085.	63,559.	72,100.	72,100.	67,867.	60,461.	50,297.	40,420.	42,499.	45,461.
1984	47,562.	48,993.	47,722.	55,243.	72,100.	72,100.	64,857.	59,063.	51,586.	47,543.	43,056.	46,365.
1985	48,188.	50,165.	52,128.	60,762.	72,100.	66,540.	57,600.	45,521.	41,108.	42,257.	44,112.	45,485.
1986	47,057.	49,524.	52,156.	62,201.	72,100.	72,100.	63,560.	52,961.	46,916.	48,229.	49,374.	51,088.
1987	53,167.	54,959.	57,320.	61,840.	61,299.	54,866.	46,582.	39,707.	34,861.	33,208.	34,764.	36,433.
1988	38,291.	39,456.	41,396.	46,067.	52,538.	45,870.	34,634.	26,086.	21,969.	21,420.	21,829.	23,256.
1989	24,485.	25,945.	28,633.	30,316.	26,834.	20,338.	10,459.	5,619.	2,781.	1,299.	1,810.	2,299.
1990	2,790.	3,482.	4,525.	10,665.	10,494.	7,631.	399.	0.	0.	0.	158.	122.
1991	545.	1,142.	2,566.	5,603.	13,392.	16,496.	7,184.	526.	0.	0.	835.	1,391.
1992	2,169.	2,805.	4,596.	5,670.	1,125.	0.	0.	0.	0.	417.	1,102.	1,704.
1993	2,563.	3,590.	5,491.	10,864.	40,499.	46,197.	35,755.	28,053.	22,450.	0.	0.	0.

TABLE 3.

SCOFIELD RESERVOIR STORAGE WITH NARROWS RESERVOIR ACRE FEET DATE 03-18-1994 TIME 10:45:20

NARROWS RESERVOIR ACTIVE CAPACITY IS 5,400. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1946	0.	0.	0.	0.	0.	0.	0.	0.	1,450.	1,632.	3,274.	4,603.
1947	5,509.	6,224.	8,016.	15,029.	35,107.	33,214.	21,771.	17,262.	11,271.	8,023.	9,007.	9,755.
1948	11,232.	12,121.	13,602.	17,827.	23,395.	15,028.	3,703.	0.	0.	0.	1,435.	2,252.
1949	3,386.	4,459.	5,834.	12,284.	33,238.	39,870.	29,234.	18,026.	12,313.	11,673.	13,040.	14,626.
1950	16,520.	17,520.	18,979.	25,630.	41,644.	39,646.	31,963.	19,989.	15,037.	13,121.	14,480.	15,330.
1951	17,208.	18,795.	20,046.	24,208.	37,724.	34,317.	21,646.	16,822.	9,051.	7,807.	8,725.	9,966.
1952	12,527.	13,894.	16,032.	25,135.	72,100.	72,100.	63,272.	57,541.	52,425.	48,499.	48,797.	48,745.
1953	50,919.	53,103.	55,649.	58,477.	60,529.	58,232.	46,982.	39,521.	30,996.	28,307.	29,707.	30,026.
1954	31,553.	32,178.	34,179.	35,616.	30,435.	20,019.	12,550.	5,547.	3,472.	2,830.	3,220.	3,810.
1955	5,067.	6,262.	7,511.	10,584.	19,429.	14,770.	5,320.	1,431.	0.	0.	740.	2,181.
1956	3,714.	4,755.	6,427.	11,242.	22,974.	16,757.	6,486.	0.	0.	0.	314.	1,261.
1957	2,518.	3,448.	4,803.	7,835.	22,516.	46,301.	37,313.	34,072.	30,082.	27,359.	28,637.	29,580.
1958	30,741.	31,906.	33,523.	36,944.	67,514.	67,088.	52,397.	40,875.	36,304.	33,252.	33,601.	33,365.
1959	34,234.	35,819.	37,182.	35,367.	33,791.	26,418.	17,081.	11,628.	6,498.	4,926.	4,303.	3,723.
1960	4,026.	4,923.	6,250.	8,737.	14,691.	8,770.	270.	0.	0.	449.	520.	239.
1961	466.	590.	1,955.	3,992.	2,909.	343.	0.	0.	0.	282.	329.	628.
1962	819.	1,710.	2,510.	11,912.	32,985.	33,921.	23,982.	14,558.	9,466.	9,818.	9,758.	9,340.
1963	9,153.	10,753.	12,743.	14,478.	19,587.	16,400.	5,533.	2,087.	1,012.	0.	306.	0.
1964	301.	587.	1,748.	5,328.	22,142.	23,455.	11,901.	2,444.	0.	0.	526.	1,051.
1965	3,170.	4,012.	5,256.	9,298.	29,022.	46,671.	43,589.	40,262.	35,129.	32,811.	33,151.	34,151.
1966	35,068.	36,290.	38,033.	44,854.	47,442.	40,908.	29,684.	19,015.	14,558.	13,291.	13,538.	13,190.
1967	15,967.	17,152.	19,112.	21,191.	36,677.	45,001.	35,946.	25,857.	20,661.	17,655.	18,094.	18,328.
1968	19,457.	20,392.	22,112.	25,032.	43,799.	53,319.	42,635.	38,437.	27,459.	25,370.	25,784.	26,730.
1969	28,193.	29,864.	31,177.	41,919.	70,081.	68,088.	57,846.	49,164.	44,131.	45,268.	45,642.	46,340.
1970	47,541.	49,276.	50,173.	50,297.	63,221.	60,953.	50,593.	38,991.	31,721.	31,323.	31,717.	32,360.
1971	33,575.	35,826.	37,948.	44,607.	58,651.	54,127.	41,291.	30,727.	24,992.	24,720.	25,332.	25,926.
1972	28,008.	28,714.	31,423.	35,211.	37,278.	32,121.	17,212.	7,911.	3,111.	4,912.	5,223.	5,557.
1973	6,101.	6,956.	8,274.	10,167.	44,012.	46,583.	37,720.	27,297.	20,193.	17,967.	18,592.	19,313.
1974	21,213.	21,650.	23,077.	25,365.	40,664.	32,565.	21,651.	10,575.	5,646.	5,015.	5,467.	4,939.
1975	5,599.	6,269.	7,830.	9,184.	23,532.	37,364.	30,863.	18,603.	11,269.	8,540.	9,931.	10,523.
1976	10,917.	11,630.	12,559.	15,842.	25,721.	18,832.	7,060.	0.	0.	0.	0.	0.
1977	0.	689.	1,763.	1,977.	0.	0.	0.	0.	0.	0.	0.	0.
1978	0.	0.	2,357.	8,264.	29,058.	39,493.	28,591.	19,388.	14,237.	12,949.	14,268.	15,435.
1979	16,902.	17,878.	19,345.	17,350.	38,549.	38,731.	28,717.	21,350.	13,646.	11,970.	12,821.	13,565.
1980	15,209.	16,460.	17,804.	22,905.	52,407.	66,261.	57,464.	47,402.	44,685.	43,284.	44,491.	45,423.
1981	46,161.	47,111.	48,299.	51,044.	49,637.	43,066.	32,631.	24,605.	22,188.	23,386.	24,409.	25,369.
1982	27,153.	28,547.	30,107.	35,441.	67,378.	72,100.	63,948.	55,424.	49,708.	51,616.	53,903.	54,873.
1983	56,462.	58,470.	60,085.	63,559.	72,100.	72,100.	67,867.	60,461.	50,297.	40,420.	42,499.	45,461.
1984	47,562.	48,993.	47,722.	55,243.	72,100.	72,100.	64,857.	59,063.	51,586.	47,543.	43,056.	46,365.
1985	48,188.	50,165.	52,128.	60,762.	72,100.	66,596.	57,656.	45,577.	41,163.	42,313.	44,168.	45,540.
1986	47,113.	49,580.	52,212.	62,256.	72,100.	72,100.	63,560.	52,961.	46,916.	48,229.	49,374.	51,088.
1987	53,167.	54,959.	57,320.	61,840.	61,299.	54,866.	46,582.	39,707.	34,861.	33,208.	34,764.	36,433.
1988	38,291.	39,456.	41,396.	46,067.	52,538.	45,870.	34,634.	26,086.	21,969.	21,420.	21,829.	23,256.
1989	24,485.	25,945.	28,633.	30,316.	26,834.	20,338.	10,459.	5,619.	2,781.	1,299.	1,810.	2,299.
1990	2,790.	3,482.	4,525.	10,665.	10,494.	7,631.	399.	0.	0.	0.	158.	122.
1991	545.	1,142.	2,566.	5,603.	13,392.	16,496.	7,184.	526.	0.	0.	835.	1,391.
1992	2,169.	2,805.	4,596.	5,670.	1,125.	0.	0.	0.	0.	417.	1,102.	1,704.
1993	2,563.	3,590.	5,491.	10,864.	40,802.	48,323.	37,869.	30,155.	24,540.	0.	0.	0.

TABLE 4.

SCOFIELD RESERVOIR SHORTAGES WITH NARROWS RESERVOIR - ACRE FEET DATE 03-18-1994 TIME 10:39:24

NARROWS RESERVOIR ACTIVE CAPACITY IS 14,500. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL SHORTAGE
1946	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1947	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1948	0.	0.	0.	0.	0.	0.	0.	3,292.	1,362.	323.	0.	0.	4,978.
1949	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1950	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1951	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1952	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1953	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1954	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1955	0.	0.	0.	0.	0.	0.	0.	0.	4,200.	1,492.	0.	0.	5,692.
1956	0.	0.	0.	0.	0.	0.	0.	246.	4,525.	925.	0.	0.	5,695.
1957	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1958	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1959	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	509.	509.
1960	0.	0.	0.	0.	0.	0.	3,054.	3,514.	566.	0.	0.	0.	7,134.
1961	0.	0.	0.	0.	0.	19.	1,688.	645.	100.	0.	0.	0.	2,452.
1962	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1963	0.	0.	0.	0.	0.	0.	0.	0.	827.	2,864.	0.	34.	3,725.
1964	0.	0.	0.	0.	0.	0.	0.	0.	3,169.	1,967.	0.	0.	5,135.
1965	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1966	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1967	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1968	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1969	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1970	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1971	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1972	0.	0.	0.	0.	0.	0.	0.	0.	3,678.	0.	0.	0.	3,678.
1973	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1974	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1975	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1976	0.	0.	0.	0.	0.	0.	0.	5,432.	2,879.	933.	200.	500.	9,944.
1977	900.	0.	0.	0.	1,442.	2,250.	3,295.	1,487.	1,161.	275.	27.	29.	10,866.
1978	23.	19.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	43.
1979	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1980	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1981	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1982	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1983	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1984	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1985	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1986	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1987	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1988	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1989	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1990	0.	0.	0.	0.	0.	0.	0.	3,136.	964.	243.	0.	0.	4,344.
1991	0.	0.	0.	0.	0.	0.	0.	0.	2,593.	2,597.	0.	0.	5,190.
1992	0.	0.	0.	0.	0.	4,004.	1,691.	1,033.	447.	0.	0.	0.	7,087.
1993	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
GRAND TOTAL													76,471.

TABLE 5.

SCOFIELD RESERVOIR SHORTAGES WITH NARROWS RESERVOIR - ACRE FEET DATE 03-18-1994 TIME 10:51:05

NARROWS RESERVOIR ACTIVE CAPACITY IS 5,400. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL SHORTAGE
1946	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1947	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1948	0.	0.	0.	0.	0.	0.	0.	3,204.	1,362.	323.	0.	0.	4,890.
1949	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1950	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1951	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1952	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1953	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1954	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1955	0.	0.	0.	0.	0.	0.	0.	0.	3,941.	1,492.	0.	0.	5,433.
1956	0.	0.	0.	0.	0.	0.	0.	246.	4,525.	925.	0.	0.	5,695.
1957	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1958	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1959	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1960	0.	0.	0.	0.	0.	0.	0.	3,246.	566.	0.	0.	0.	3,813.
1961	0.	0.	0.	0.	0.	19.	1,688.	645.	100.	0.	0.	0.	2,452.
1962	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1963	0.	0.	0.	0.	0.	0.	0.	0.	0.	1,857.	0.	34.	1,891.
1964	0.	0.	0.	0.	0.	0.	0.	0.	3,169.	1,967.	0.	0.	5,135.
1965	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1966	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1967	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1968	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1969	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1970	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1971	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1972	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1973	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1974	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1975	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1976	0.	0.	0.	0.	0.	0.	0.	1,479.	2,879.	933.	200.	500.	5,990.
1977	900.	0.	0.	0.	1,442.	2,250.	3,295.	1,487.	1,161.	275.	27.	29.	10,866.
1978	23.	19.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	43.
1979	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1980	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1981	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1982	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1983	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1984	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1985	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1986	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1987	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1988	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1989	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1990	0.	0.	0.	0.	0.	0.	0.	3,136.	964.	243.	0.	0.	4,344.
1991	0.	0.	0.	0.	0.	0.	0.	0.	2,593.	2,597.	0.	0.	5,190.
1992	0.	0.	0.	0.	0.	4,004.	1,601.	1,035.	447.	0.	0.	0.	7,087.
1993	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
GRAND TOTAL													82,829.

TABLE 6.

NARROWS RESERVOIR ACTIVE STORAGE - ACRE FEET DATE 03-18-1994 TIME 10:37:12

NARROWS RESERVOIR ACTIVE CAPACITY IS 14,500. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1946	0.	0.	0.	0.	0.	0.	0.	0.	14,500.	14,417.	14,365.	14,293.
1947	14,192.	14,094.	14,029.	14,500.	14,500.	14,500.	12,866.	11,042.	10,066.	9,984.	9,940.	9,868.
1948	9,767.	9,665.	9,580.	9,834.	12,340.	12,903.	11,202.	9,168.	8,097.	7,922.	7,846.	7,765.
1949	7,677.	7,591.	7,532.	8,691.	13,136.	14,491.	12,882.	10,992.	9,973.	9,862.	9,775.	9,685.
1950	9,547.	9,434.	9,351.	9,899.	12,864.	13,962.	12,332.	10,438.	9,486.	9,367.	9,388.	9,313.
1951	9,211.	9,111.	9,036.	9,774.	12,944.	14,085.	12,489.	10,689.	9,700.	9,641.	9,603.	9,537.
1952	9,453.	9,373.	9,311.	9,908.	14,500.	14,500.	13,316.	11,678.	10,793.	10,727.	10,709.	10,636.
1953	10,538.	10,442.	10,371.	10,642.	12,855.	14,500.	12,961.	11,176.	10,221.	10,129.	10,108.	10,066.
1954	10,015.	9,977.	9,951.	10,813.	12,465.	12,761.	10,998.	9,038.	8,047.	7,938.	7,877.	7,783.
1955	7,683.	7,585.	7,511.	7,738.	10,177.	10,961.	9,269.	7,432.	6,372.	6,201.	6,091.	5,976.
1956	5,859.	5,745.	5,669.	6,494.	9,544.	10,182.	8,499.	6,483.	5,428.	5,261.	5,177.	5,066.
1957	4,955.	4,861.	4,802.	5,031.	7,522.	12,593.	11,346.	9,590.	8,642.	8,607.	8,609.	8,541.
1958	8,457.	8,379.	8,337.	8,796.	13,780.	14,500.	12,895.	11,065.	10,049.	9,917.	9,847.	9,759.
1959	9,667.	9,569.	9,481.	9,695.	11,440.	11,980.	10,264.	8,306.	7,272.	7,146.	7,060.	6,936.
1960	6,798.	6,689.	6,598.	6,890.	9,417.	10,066.	8,112.	6,099.	5,047.	4,926.	4,855.	4,772.
1961	4,661.	4,554.	4,455.	4,728.	5,860.	5,759.	3,844.	1,868.	850.	757.	700.	615.
1962	530.	497.	462.	1,341.	6,090.	8,053.	6,702.	4,978.	4,083.	4,004.	3,944.	3,838.
1963	3,701.	3,587.	3,474.	3,539.	6,524.	7,483.	5,873.	4,109.	3,071.	2,913.	2,827.	2,703.
1964	2,618.	2,539.	2,454.	2,575.	5,568.	7,335.	5,894.	4,140.	3,102.	2,943.	2,857.	2,809.
1965	2,765.	2,711.	2,643.	2,902.	5,877.	8,757.	7,469.	5,955.	5,294.	5,380.	5,420.	5,397.
1966	5,356.	5,320.	5,353.	6,432.	8,635.	8,962.	7,158.	5,340.	4,365.	4,336.	4,269.	4,193.
1967	4,092.	3,994.	3,910.	4,032.	7,049.	9,451.	7,986.	6,189.	5,249.	5,158.	5,099.	5,041.
1968	4,988.	4,940.	4,896.	5,076.	7,714.	10,484.	8,889.	7,140.	6,226.	6,186.	6,153.	6,082.
1969	5,995.	5,912.	5,855.	6,512.	12,929.	14,119.	12,581.	10,726.	9,786.	9,772.	9,777.	9,756.
1970	9,731.	9,682.	9,662.	9,837.	13,384.	14,500.	12,904.	10,993.	10,013.	9,947.	9,933.	9,965.
1971	10,026.	9,962.	9,916.	10,256.	12,989.	14,005.	12,318.	10,402.	9,417.	9,342.	9,310.	9,292.
1972	9,286.	9,267.	9,434.	10,145.	12,062.	12,454.	10,612.	8,630.	7,563.	7,485.	7,454.	7,396.
1973	7,328.	7,260.	7,218.	7,425.	11,278.	12,929.	11,327.	9,422.	8,457.	8,366.	8,322.	8,277.
1974	8,252.	8,203.	8,152.	8,363.	11,961.	12,531.	10,742.	8,773.	7,730.	7,607.	7,535.	7,440.
1975	7,355.	7,273.	7,188.	7,235.	8,903.	13,481.	12,271.	10,461.	9,490.	9,447.	9,437.	9,421.
1976	9,403.	9,376.	9,324.	9,541.	12,275.	12,708.	10,916.	8,883.	7,815.	7,640.	7,520.	7,396.
1977	7,272.	7,170.	7,071.	7,360.	7,334.	7,222.	5,292.	3,302.	2,270.	2,116.	1,996.	1,872.
1978	1,748.	1,635.	1,554.	2,049.	5,470.	9,207.	7,693.	5,916.	4,943.	4,739.	4,700.	4,610.
1979	4,518.	4,430.	4,339.	4,535.	7,842.	9,308.	7,629.	5,735.	4,733.	4,632.	4,560.	4,492.
1980	4,424.	4,360.	4,292.	4,742.	8,238.	12,259.	10,794.	8,936.	7,993.	7,925.	7,897.	7,841.
1981	7,779.	7,717.	7,704.	8,458.	10,340.	11,005.	9,219.	7,266.	6,261.	6,213.	6,171.	6,087.
1982	5,978.	5,872.	5,788.	6,353.	10,996.	13,224.	11,785.	9,961.	9,095.	9,305.	9,498.	9,584.
1983	9,630.	9,659.	9,740.	10,024.	12,378.	14,500.	14,043.	12,396.	11,573.	11,665.	11,766.	11,880.
1984	11,955.	12,011.	12,058.	12,355.	14,500.	14,500.	13,252.	11,498.	10,593.	10,653.	10,720.	10,787.
1985	10,840.	10,850.	10,864.	12,428.	14,500.	14,500.	12,947.	11,077.	10,106.	10,073.	10,098.	10,102.
1986	10,106.	10,125.	10,229.	11,183.	14,500.	14,500.	12,940.	11,082.	10,137.	10,138.	10,173.	10,135.
1987	10,032.	9,927.	9,842.	10,720.	12,329.	12,620.	10,836.	8,884.	7,865.	7,746.	7,670.	7,577.
1988	7,494.	7,416.	7,352.	7,781.	10,484.	10,938.	9,143.	7,201.	6,188.	6,083.	6,053.	6,003.
1989	5,949.	5,876.	5,864.	6,980.	8,546.	8,877.	7,108.	5,159.	4,172.	4,046.	4,095.	4,003.
1990	3,908.	3,823.	3,746.	4,597.	6,200.	6,655.	4,925.	2,938.	1,909.	1,757.	1,639.	1,551.
1991	1,464.	1,384.	1,306.	1,420.	4,259.	6,020.	4,413.	2,579.	1,554.	1,403.	1,368.	1,309.
1992	1,216.	1,117.	1,092.	1,809.	2,534.	2,462.	589.	0.	0.	0.	0.	0.
1993	0.	0.	5.	433.	5,697.	7,517.	5,946.	4,091.	3,124.	0.	0.	0.

TABLE 7.

NARROWS RESERVOIR ACTIVE STORAGE - ACRE FEET DATE 03-18-1994 TIME 10:44:16

NARROWS RESERVOIR ACTIVE CAPACITY IS 5,400. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1946	0.	0.	0.	0.	0.	0.	0.	0.	5,400.	5,342.	5,290.	5,218.
1947	5,117.	5,019.	4,954.	5,400.	5,400.	5,400.	3,840.	2,082.	1,165.	1,116.	1,072.	1,000.
1948	899.	797.	692.	967.	3,489.	4,112.	2,488.	528.	0.	0.	0.	0.
1949	0.	0.	0.	1,160.	5,400.	5,400.	3,864.	2,041.	1,082.	1,004.	917.	806.
1950	689.	576.	492.	1,042.	4,022.	5,178.	3,620.	1,792.	899.	813.	834.	759.
1951	657.	557.	483.	1,221.	4,406.	5,400.	3,874.	2,139.	1,207.	1,179.	1,141.	1,076.
1952	991.	912.	849.	1,448.	5,400.	5,400.	4,288.	2,715.	1,885.	1,850.	1,832.	1,759.
1953	1,661.	1,565.	1,494.	1,765.	3,994.	5,400.	3,934.	2,215.	1,318.	1,259.	1,238.	1,196.
1954	1,145.	1,107.	1,081.	1,944.	3,611.	3,966.	2,282.	397.	0.	0.	0.	0.
1955	0.	0.	0.	227.	2,681.	3,521.	1,900.	132.	0.	0.	0.	0.
1956	0.	0.	0.	825.	3,887.	4,565.	2,934.	969.	0.	0.	0.	0.
1957	0.	0.	0.	229.	2,732.	5,400.	4,213.	2,511.	1,610.	1,602.	1,604.	1,536.
1958	1,452.	1,374.	1,332.	1,791.	5,400.	5,400.	3,868.	2,104.	1,148.	1,049.	979.	891.
1959	799.	701.	613.	828.	2,589.	3,194.	1,560.	0.	0.	0.	0.	0.
1960	0.	0.	0.	293.	2,833.	3,532.	1,913.	0.	0.	0.	0.	0.
1961	0.	0.	0.	274.	1,417.	1,359.	0.	0.	0.	0.	0.	0.
1962	0.	0.	0.	879.	5,400.	5,400.	4,074.	2,374.	1,500.	1,432.	1,373.	1,286.
1963	1,129.	1,016.	903.	968.	3,959.	4,938.	3,353.	1,614.	741.	596.	510.	386.
1964	301.	221.	137.	258.	3,257.	5,043.	3,624.	1,892.	873.	727.	641.	592.
1965	549.	494.	426.	685.	3,667.	5,400.	4,143.	2,657.	2,021.	2,121.	2,161.	2,138.
1966	2,097.	2,062.	2,095.	3,173.	5,383.	5,400.	3,629.	1,843.	897.	885.	817.	742.
1967	641.	543.	459.	581.	3,606.	5,400.	3,972.	2,209.	1,300.	1,226.	1,167.	1,109.
1968	1,057.	1,008.	964.	1,145.	3,791.	5,400.	3,850.	2,143.	1,267.	1,248.	1,215.	1,144.
1969	1,057.	973.	916.	1,574.	5,400.	5,400.	3,933.	2,142.	1,259.	1,277.	1,282.	1,261.
1970	1,236.	1,187.	1,167.	1,342.	4,904.	5,400.	3,877.	2,034.	1,112.	1,079.	1,065.	1,098.
1971	1,159.	1,095.	1,049.	1,390.	4,137.	5,211.	3,596.	1,747.	821.	780.	748.	730.
1972	723.	705.	872.	1,583.	3,516.	3,966.	2,201.	293.	0.	0.	0.	0.
1973	0.	0.	0.	208.	4,075.	5,400.	3,860.	2,013.	1,100.	1,038.	994.	949.
1974	924.	875.	824.	1,036.	4,647.	5,265.	3,539.	1,627.	637.	544.	472.	376.
1975	292.	209.	124.	172.	1,855.	5,400.	4,256.	2,505.	1,587.	1,572.	1,562.	1,546.
1976	1,528.	1,502.	1,449.	1,667.	4,414.	4,899.	3,174.	1,205.	195.	53.	0.	0.
1977	0.	0.	0.	290.	280.	238.	0.	0.	0.	0.	0.	0.
1978	0.	0.	0.	496.	3,920.	5,400.	3,920.	2,176.	1,233.	1,046.	1,007.	916.
1979	825.	736.	645.	842.	4,157.	5,400.	3,756.	1,897.	926.	843.	771.	703.
1980	636.	571.	503.	954.	4,457.	5,400.	3,993.	2,187.	1,292.	1,250.	1,222.	1,166.
1981	1,104.	1,042.	1,029.	1,784.	3,678.	4,390.	2,666.	771.	0.	0.	0.	0.
1982	0.	0.	0.	566.	5,220.	5,400.	4,025.	2,260.	1,446.	1,884.	1,877.	1,963.
1983	2,010.	2,039.	2,120.	2,404.	4,771.	5,400.	5,014.	3,429.	2,658.	2,779.	2,880.	2,994.
1984	3,069.	3,125.	3,172.	3,469.	5,400.	5,400.	4,224.	2,535.	1,687.	1,778.	1,845.	1,912.
1985	1,966.	1,975.	1,989.	3,553.	5,400.	5,400.	3,920.	2,116.	1,205.	1,204.	1,230.	1,233.
1986	1,237.	1,257.	1,360.	2,315.	5,400.	5,400.	3,913.	2,122.	1,236.	1,269.	1,304.	1,266.
1987	1,163.	1,058.	973.	1,852.	3,476.	3,827.	2,122.	247.	0.	0.	0.	0.
1988	0.	0.	0.	429.	3,147.	3,654.	1,929.	55.	0.	0.	0.	0.
1989	0.	0.	0.	1,117.	2,694.	3,072.	1,364.	0.	0.	0.	49.	0.
1990	0.	0.	0.	852.	2,463.	2,950.	1,264.	0.	0.	0.	0.	0.
1991	0.	0.	0.	115.	2,957.	4,730.	3,136.	1,316.	304.	162.	127.	67.
1992	0.	0.	0.	717.	1,444.	1,385.	0.	0.	0.	0.	0.	0.
1993	0.	0.	5.	433.	5,400.	5,400.	3,850.	2,015.	1,066.	0.	0.	0.

TABLE 8.

NARROWS RESERVOIR RELEASES TO COTTONWOOD CANYON - ACRE FEET DATE 03-18-1994 TIME 10:35:35

NARROWS RESERVOIR ACTIVE CAPACITY IS 14,500. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	SHORTAGE
1946	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1947	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1948	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1949	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1950	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1951	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1952	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1953	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1954	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1955	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1956	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1957	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1958	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1959	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1960	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1961	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1962	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1963	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1964	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1965	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1966	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1967	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1968	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1969	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1970	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1971	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1972	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1973	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1974	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1975	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1976	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1977	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1978	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1979	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1980	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1981	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1982	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1983	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1984	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1985	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1986	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1987	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1988	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1989	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1990	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1991	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1992	124	113	124	0	0	0	1800	562	0	56	25	18	2,822.	2,578.
1993	40	53	124	0	0	0	1800	1900	971	124	120	124	5,257.	143.
GRAND TOTALS													256,479.	2,721.

TABLE 9.

NARROWS RESERVOIR RELEASES TO COTTONWOOD CANYON - ACRE FEET DATE 03-18-1994 TIME 10:43:10

NARROWS RESERVOIR ACTIVE CAPACITY IS 5,400. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	SHORTAGE
1946	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1947	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1948	124	113	124	0	0	0	1800	1900	498	0	44	43	4,646.	754.
1949	36	27	65	0	0	0	1800	1900	971	124	120	124	5,167.	233.
1950	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1951	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1952	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1953	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1954	124	113	124	0	0	0	1800	1900	446	50	59	30	4,647.	753.
1955	23	15	51	0	0	0	1800	1900	108	0	10	10	3,916.	1,484.
1956	6	0	49	0	0	0	1800	1900	932	0	36	13	4,736.	664.
1957	13	20	65	0	0	0	1800	1900	971	124	120	124	5,137.	263.
1958	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1959	124	113	124	0	0	0	1800	1583	10	31	33	0	3,819.	1,581.
1960	0	0	53	0	0	0	1800	1861	0	29	49	42	3,833.	1,567.
1961	13	6	25	0	0	0	1306	0	0	37	63	39	1,489.	3,911.
1962	39	79	90	0	0	0	1800	1900	971	124	120	124	5,247.	153.
1963	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1964	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1965	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1966	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1967	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1968	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1969	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1970	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1971	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1972	124	113	124	0	0	0	1800	1900	331	80	89	66	4,627.	773.
1973	56	45	82	0	0	0	1800	1900	971	124	120	124	5,222.	178.
1974	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1975	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1976	124	113	124	0	0	0	1800	1900	971	124	53	0	5,209.	191.
1977	0	11	25	0	0	0	215	0	0	0	0	0	251.	5,149.
1978	0	0	43	0	0	0	1800	1900	971	124	120	124	5,082.	318.
1979	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1980	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1981	124	113	124	0	0	0	1800	1900	791	106	78	40	5,075.	325.
1982	16	6	40	0	0	0	1800	1900	971	124	120	124	5,101.	299.
1983	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1984	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1985	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1986	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1987	124	113	124	0	0	0	1800	1900	270	39	44	31	4,445.	955.
1988	42	35	60	0	0	0	1800	1900	78	48	90	74	4,127.	1,273.
1989	70	40	112	0	0	0	1800	1378	37	20	120	81	3,658.	1,742.
1990	29	28	47	0	0	0	1800	1223	0	0	2	36	3,164.	2,236.
1991	37	33	46	0	0	0	1800	1900	971	124	120	124	5,155.	245.
1992	98	15	99	0	0	0	1332	0	0	56	25	18	1,642.	3,758.
1993	40	53	124	0	0	0	1800	1900	971	124	120	124	5,257.	143.
GRAND TOTALS													230,252.	28,948.

Robert J. Murdock, P.E.
2964 East 3135 South
Salt Lake City, Utah 84109

Phone (801) 487-0258
April 5, 1994

Regional Director
Bureau of Reclamation
125 South State St.
Salt Lake City, Utah 84111

Re: Draft EIS Narrows Project - Comments

Dear Sir,

At the hearing on the Narrows Project Draft EIS held in Price March 30, 1994 I made a statement and submitted written notes associated with the statement. These comments and information are in addition to that presented March 30, 1994.

At the hearing March 30 I referred to an operation study of the Narrows Project and Scofield Reservoir that I have performed. Several others that had access to my study also referred to it. I feel it proper to include the result of my study to support the comments that have been made that refer to it. Attached are tables that are the result of the study.

My study is a monthly operation study showing end of month figures in 9 tables. Some months on Table 1 list the annual high or low that occurred during the month but not at its end. Table 1 lists the historic active storage contents of Scofield Reservoir. The 0s in 1946 and 1993 are beyond the period of record used and figures on other tables for similar months should be disregarded.

Tables 2 & 3 are also the active storage contents of Scofield Reservoir assuming the Narrows Reservoir at the indicated capacity was operating concurrently with Scofield Reservoir. The same historic bypass of prior rights and storage releases were made from Scofield Reservoir. Flood releases and spills from Scofield Reservoir were retained to the extent there was capacity to hold them.

On Tables 2 & 3 the months showing 0 are months when the active storage pool of Scofield Reservoir was empty at the end of the month and the historic active storage release was not fully satisfied. Tables 4 & 5 show the amounts of water that was historically released from Scofield Reservoir that would not have been available for release if the Narrows Project were in operation. These figures are not the historic water shortages of the Price River below Scofield Reservoir. The amounts shown on Tables 4 & 5 should be added to the historic water supply shortages of the Price River indicated by several at the hearing.

Tables 6 thru 9 show the operation result at the Narrows Reservoir. Two significant things to note. One, the larger reservoir has almost no shortage to Sanpete, but the size of the reservoir used for the study greatly exceeds (about 4,500 acre-feet) the water right approval for the reservoir. Second, there are significant shortages to Sanpete with the smaller reservoir. The shortage exceed 11 percent.

The historic active storage contents record of Scofield Reservoir begins several years before 1946. I started with 1946 because it was the year Scofield was enlarged to its present capacity. The starting contents I used for Scofield Reservoir was from the historic record. I assumed the Narrows Reservoir to be full at the start of the study the same as was done for the DEIS. Assuming it less than full at start would show less benefit to Sanpete and a greater negative impact upon Scofield Reservoir and the Price River.

COMMENTS:

1. The reduction of historic active storage releases shown on Tables 4 & 5 are significant reductions of water supply. During many of these years there was already great shortage with water going to more essential uses such as the municipal treatment plant and the power plant. During many years the Narrows induced shortages to Scofield Reservoir will directly impact water supply for drinking water, fire protection and generation of electricity at Castle Gate. The DEIS did not adequately evaluate these negative impacts.

2. The DEIS is in error in many of the points it analyses because it fails to use the full available hydrologic record that is available. It uses a shorter period of data that give different results than if the longer period were used. The operation study starts with Scofield Reservoir about 6,000 acre-feet higher than it would have been October 1959 if the full record were used. The DEIS operation study starts with the Narrows Reservoir full. It is in error because it fails to show the impacts of filling the Narrows Reservoir. These two errors impact Scofield Reservoir about 23,000 acre-feet.

3. The DEIS fails to adequately address negative impacts to the flat water fishery of Scofield Reservoir. My operation study indicate the average surface area of Scofield Reservoir will be reduced 302 acres or 253 acres with Narrows Reservoir at 14,500 and 5,400 acre-feet active storage respectfully. With the Recommended Plan 2/3 of what is gained at the Narrows site is lost at Scofield. As per DEIS page 3-38,9 the loss would be 9,060 angler days per year not 4,500. With the Small Reservoir Plan 450 angler days per year more are lost at Scofield than gained at the Narrows.

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4. Winter releases to Cottonwood Creek amount to 720 acre-feet per year. When Wales Reservoir can not store this water its benefits are lost to the project area. An operation study of the Wales Reservoir in conjunction with the winter releases from the Narrows Reservoir is needed to evaluate the lost benefits to either irrigation or the fishery of Cottonwood Creek.

5. The HEP studies should be done before the DEIS is prepared to properly evaluate and present the affects to impact and mitigation lands.

6. There is no information in the DEIS to indicate that a safe dam can be built upon the proposed site, or to indicate that adequate materials exist within reasonable haul distances to build the dam. There are no drill logs, no test pit logs, no water pressure tests of drill holes, no soil tests, no water table data for dam site or reservoir basin, no detail surface geology study of the dam site, no profiles, nothing. The DEIS does say the dam site is on the North Horn formation. This is the same formation that is the cause of 104 landslides in nearby Cottonwood Canyon as recorded in the DEIS page 3-18. The North Horn formation is notorious for landslides and instability throughout the Wasatch Plateau. Is the dam site the result of a landslide? The DEIS is wholly inadequate in providing assurance that a safe dam can be built at the proposed site.

7. The DEIS proposes to narrow the channel of Gooseberry Creek below the dam site. This is a bad idea. The size of the channel is the result of infrequent large snow melt floods. Most snow melt runoff will be retained in the Narrows Reservoir. However, the big snow melt floods will fill the reservoir and spill for days at nearly the same flow rate as they have historically run in the channel. A smaller channel will be gutted, Lower Gooseberry Reservoir will get an unnecessary load of sediment and the stream channel fishery benefits will be lost. Who is going to remove the sediment from Lower Gooseberry Reservoir and rebuild the smaller channel each time it happens?

The proposed project has not been planned well. It proposes many features that have no water rights approved for the use and improperly sizes the proposed reservoir with respect to the approver water rights. The past fights of this project have revolved around water rights and I would think the planners would be sensitive to get those aspects of the plan right this time, but they have not.

It is planned for very expensive supplemental irrigation ONLY in Sanpete County, and will cause water shortages for irrigation, culinary, fire protection, and power plant use in Carbon County. It will damage existing fisheries. The DEIS does not adequately address the negative impacts.

The proposed project ignores extensive resources of water in Sanpitch Valley that are being very very poorly used while at the same time seeks to take part of a short supply of water away from Carbon County that is making good and critical use of it. There has got to be a better plan whereby the small increase of water supply can be developed with added storage, and the project structured in such a way that it will not negatively impact the water supply of either county but give them both some improvement and added stability of water supply. It can be done.

Sincerely,

Robert J. Murdock, P.E.

cc: Richard Lee

Robert J. Murdock, P.E.
2964 East 3135 South
Salt Lake City, Utah 84109
Phone (801) 487-0258
December 12, 1994

Robert L. Morgan, State Engineer
Division of Water Rights
1636 West North Temple, Suite 220
Salt Lake City, Utah 84116

Re: Operation study of Scofield and Narrows Reservoirs

Dear Bob,

Enclosed is a print out of data related to my operation study of Scofield Reservoir with the proposed Narrows Reservoir at an active capacity of 10,000 acre-feet as per your request at our meeting with Sheldon Talbot at CUWCD office last Friday. A couple of things I do not remember talking about Friday is that the evaporation is calculated based upon the average first of month and last of month contents. The end of month is calculated by a loop that cuts off when the error is less than 1 acre-foot. Also, when Scofield storage is empty no flow is retained in the Narrows Reservoir. The prior direct flow rights are passed through.

Table 11 is the same as Table 1 you already have. Table 12 is program print out that should replace the copied scratch sheet you got Friday of the historic unused releases and spills from Scofield Reservoir. Table 13 is the flow reduction below Narrows Reservoir which is the reduction of flow into Scofield Reservoir. The program used a minimum in stream flow in Gooseberry Creek below the Narrows dam of 60 acre-feet per month. The few negative numbers on Table 13 indicate the natural flow was less than 60 acre-feet for those months and this amount of water was drawn from Narrows Reservoir storage to increase the in stream flow to the minimum.

Table 14 is the reduction of evaporation from Scofield Reservoir with the Narrows Reservoir. The negative numbers on this table indicate an increase of evaporation loss with the Narrows Reservoir because the program retained historic unused spills and flood releases and during years of excessive flooding the program had Scofield Reservoir higher than it had been historically because the program has no flood management criteria for Scofield. It only tries to maximize the water available for use from the two reservoirs. I believe the other tables are self explanatory. Call if you have any questions.

Sincerely,

Robert J. Murdock, P.E.

cc: Sheldon Talbot
Richard Lee

TABLE 12

HISTORIC UNUSED SCOFIELD RES RELEASE & SPILL - ACRE FEET DATE 12-10-1994 TIME 17:37:12

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1946	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1947	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1948	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1949	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1950	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1951	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1952	0.	0.	0.	0.	18,020.	25,930.	1,100.	0.	0.	0.	0.	0.
1953	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1954	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1955	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1956	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1957	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1958	0.	0.	0.	5,580.	2,990.	5,970.	0.	0.	0.	0.	0.	0.
1959	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1960	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1961	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1962	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1963	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1964	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1965	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1966	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1967	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1968	0.	0.	0.	0.	700.	13,930.	0.	0.	0.	0.	0.	0.
1969	0.	200.	9,080.	6,400.	3,700.	1,500.	0.	0.	0.	0.	0.	0.
1970	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1971	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1972	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1973	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1974	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1975	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1976	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1977	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1978	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1979	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1980	0.	0.	1,400.	6,550.	5,300.	17,750.	0.	0.	0.	0.	0.	0.
1981	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1982	0.	0.	0.	0.	6,000.	20,000.	0.	0.	0.	0.	0.	380.
1983	2,260.	8,150.	10,020.	5,800.	0.	20,000.	3,000.	0.	0.	0.	0.	0.
1984	0.	0.	10,000.	19,220.	5,000.	5,000.	0.	0.	0.	0.	0.	0.
1985	0.	0.	0.	6,400.	8,100.	0.	0.	0.	0.	0.	0.	0.
1986	0.	0.	8,460.	9,000.	8,600.	7,000.	0.	0.	0.	0.	0.	0.
1987	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1988	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1989	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1990	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1991	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1992	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1993	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TABLE 13

FLOW REDUCTION INTO SCOFIELD RESERVOIR - ACRE FEET DATE 12-10-1994 TIME 17:33:33

NARROWS RESERVOIR ACTIVE CAPACITY IS 10,000. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1946	0.	0.	0.	0.	0.	0.	0.	0.	0.	109.	69.	51.
1947	23.	15.	59.	462.	30.	130.	353.	220.	104.	99.	77.	51.
1948	23.	11.	19.	276.	2,537.	707.	274.	0.	0.	0.	44.	43.
1949	36.	27.	65.	1,160.	4,476.	1,249.	377.	154.	61.	70.	33.	13.
1950	6.	-0.	40.	550.	2,996.	1,247.	353.	147.	125.	60.	141.	50.
1951	22.	13.	49.	739.	3,202.	1,290.	388.	243.	89.	121.	82.	59.
1952	39.	33.	62.	599.	4,259.	130.	804.	409.	198.	117.	102.	51.
1953	26.	16.	53.	272.	2,246.	1,668.	448.	260.	125.	90.	100.	81.
1954	73.	75.	98.	863.	1,684.	440.	211.	73.	79.	67.	59.	30.
1955	23.	15.	51.	228.	2,467.	917.	269.	185.	0.	0.	10.	10.
1956	6.	-1.	49.	826.	3,077.	766.	273.	0.	0.	0.	36.	13.
1957	13.	20.	65.	229.	2,516.	5,200.	728.	280.	124.	143.	122.	56.
1958	39.	36.	82.	459.	5,016.	181.	381.	214.	65.	49.	51.	36.
1959	31.	15.	37.	215.	1,776.	680.	252.	70.	32.	47.	33.	-0.
1960	-14.	-16.	53.	294.	2,554.	777.	0.	0.	0.	45.	49.	42.
1961	13.	6.	25.	274.	1,155.	0.	0.	0.	0.	54.	63.	39.
1962	39.	79.	90.	880.	4,768.	2,073.	588.	280.	151.	83.	60.	18.
1963	-13.	-1.	11.	66.	3,007.	1,069.	323.	233.	0.	0.	34.	0.
1964	39.	33.	39.	122.	3,013.	1,873.	491.	243.	0.	0.	34.	76.
1965	80.	58.	56.	260.	2,996.	2,991.	658.	496.	392.	253.	160.	100.
1966	83.	78.	157.	1,079.	2,230.	449.	141.	189.	72.	134.	53.	49.
1967	23.	15.	39.	123.	3,040.	2,521.	485.	216.	113.	76.	61.	66.
1968	72.	64.	80.	181.	2,662.	2,777.	363.	271.	145.	130.	87.	53.
1969	37.	30.	67.	658.	3,987.	130.	447.	188.	139.	166.	125.	103.
1970	99.	64.	104.	176.	3,580.	766.	390.	134.	99.	116.	106.	157.
1971	185.	49.	78.	342.	2,764.	1,166.	296.	125.	91.	105.	88.	106.
1972	118.	94.	291.	712.	1,949.	534.	130.	49.	65.	97.	89.	66.
1973	56.	45.	82.	208.	3,882.	1,792.	374.	130.	107.	86.	76.	79.
1974	99.	64.	73.	213.	3,628.	712.	184.	62.	25.	52.	48.	29.
1975	39.	30.	39.	49.	1,695.	4,714.	772.	231.	106.	137.	110.	108.
1976	106.	87.	71.	219.	2,764.	577.	181.	0.	0.	0.	0.	0.
1977	0.	11.	25.	290.	0.	0.	0.	0.	0.	0.	0.	0.
1978	0.	0.	43.	496.	3,439.	3,850.	434.	235.	78.	-38.	81.	33.
1979	33.	24.	33.	197.	3,331.	1,587.	269.	117.	48.	64.	49.	56.
1980	56.	49.	56.	451.	3,520.	3,322.	507.	173.	127.	107.	92.	68.
1981	62.	51.	111.	755.	1,911.	799.	176.	68.	55.	122.	78.	40.
1982	16.	6.	40.	566.	4,670.	1,263.	539.	214.	209.	398.	313.	210.
1983	171.	142.	205.	285.	2,386.	897.	1,533.	405.	263.	277.	221.	238.
1984	200.	169.	171.	298.	2,081.	130.	739.	293.	177.	243.	187.	191.
1985	178.	123.	138.	1,565.	2,005.	130.	434.	174.	110.	148.	145.	127.
1986	128.	133.	228.	955.	3,247.	130.	426.	187.	135.	182.	155.	86.
1987	21.	8.	39.	880.	1,641.	434.	189.	80.	50.	56.	44.	31.
1988	42.	35.	60.	430.	2,732.	588.	166.	79.	46.	65.	90.	74.
1989	70.	40.	112.	1,117.	1,592.	453.	175.	57.	59.	37.	169.	32.
1990	29.	28.	47.	853.	1,625.	561.	195.	0.	0.	0.	2.	36.
1991	37.	33.	46.	115.	2,856.	1,857.	312.	149.	0.	0.	85.	64.
1992	31.	15.	99.	718.	739.	0.	0.	0.	0.	72.	25.	18.
1993	40.	53.	129.	428.	5,281.	1,927.	363.	142.	71.	0.	0.	0.

TABLE 15

SCOFIELD RESERVOIR STORAGE WITH NARROWS RESERVOIR - ACRE FEET DATE 12-16-1994 TME 17:40:37

NARROWS RESERVOIR ACTIVE CAPACITY IS 10,000. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1946	0.	0.	0.	0.	0.	0.	0.	0.	1,450.	1,632.	3,274.	4,603.
1947	5,509.	6,224.	8,016.	15,014.	35,086.	33,161.	21,718.	17,210.	11,219.	7,972.	8,955.	9,704.
1948	11,181.	12,070.	13,551.	17,775.	23,344.	14,977.	3,653.	0.	0.	0.	1,435.	2,252.
1949	3,386.	4,459.	5,834.	12,284.	33,014.	38,500.	27,874.	16,676.	10,975.	10,343.	11,709.	13,296.
1950	15,190.	16,190.	17,649.	24,300.	40,316.	38,324.	30,651.	18,686.	13,744.	11,834.	13,193.	14,043.
1951	15,922.	17,508.	18,759.	22,921.	36,439.	32,833.	20,175.	15,364.	7,612.	6,381.	7,299.	8,540.
1952	11,100.	12,467.	14,605.	23,708.	70,485.	72,100.	63,272.	57,541.	52,425.	48,499.	48,797.	48,745.
1953	50,919.	53,103.	55,649.	58,477.	60,529.	58,056.	46,807.	39,347.	30,823.	28,134.	29,534.	29,853.
1954	31,380.	32,005.	34,007.	35,443.	30,263.	19,848.	12,381.	5,381.	3,309.	2,668.	3,058.	3,648.
1955	4,905.	6,100.	7,349.	10,422.	19,267.	14,609.	5,163.	1,277.	0.	0.	740.	2,181.
1956	3,714.	4,755.	6,427.	11,242.	22,974.	16,757.	6,486.	0.	0.	0.	314.	1,261.
1957	2,518.	3,448.	4,803.	7,835.	22,516.	43,850.	34,876.	31,649.	27,671.	24,954.	26,232.	27,176.
1958	28,337.	29,501.	31,119.	34,540.	63,721.	63,224.	48,552.	37,048.	32,494.	29,451.	29,801.	29,564.
1959	30,433.	32,018.	33,381.	31,567.	29,996.	22,647.	13,350.	7,946.	2,870.	1,330.	707.	127.
1960	430.	1,327.	2,654.	5,142.	11,110.	5,245.	0.	0.	0.	449.	520.	239.
1961	466.	590.	1,955.	3,902.	2,909.	343.	0.	0.	0.	282.	329.	628.
1962	819.	1,710.	2,510.	11,912.	32,750.	31,718.	21,797.	12,394.	7,330.	7,701.	7,641.	7,223.
1963	7,036.	8,636.	10,626.	12,361.	17,475.	14,308.	3,480.	77.	0.	0.	306.	0.
1964	301.	587.	1,748.	5,328.	22,142.	23,455.	11,901.	2,444.	0.	0.	526.	1,051.
1965	3,170.	4,012.	5,256.	9,298.	29,022.	45,499.	42,424.	39,102.	33,975.	31,660.	31,999.	32,999.
1966	33,916.	35,138.	36,881.	43,703.	46,292.	39,430.	28,216.	17,558.	13,113.	11,853.	12,101.	11,752.
1967	14,529.	15,714.	17,675.	19,753.	35,242.	42,930.	33,888.	23,812.	18,629.	15,631.	16,070.	16,304.
1968	17,432.	18,368.	20,088.	23,008.	41,778.	50,226.	39,559.	35,377.	24,414.	22,335.	22,748.	23,695.
1969	25,158.	26,828.	28,141.	38,884.	66,902.	64,888.	54,660.	45,991.	40,970.	42,113.	42,488.	43,185.
1970	44,386.	46,122.	47,018.	47,143.	60,069.	57,636.	47,294.	35,707.	28,453.	28,063.	28,457.	29,100.
1971	30,315.	32,566.	34,688.	41,347.	55,395.	50,883.	38,066.	27,520.	21,803.	21,541.	22,153.	22,747.
1972	24,829.	25,535.	28,244.	32,033.	34,104.	28,964.	14,087.	4,834.	86.	1,913.	2,224.	2,558.
1973	3,102.	3,958.	5,276.	7,170.	41,023.	43,227.	34,384.	23,983.	16,899.	14,687.	15,312.	16,033.
1974	17,933.	18,370.	19,797.	22,086.	37,389.	29,308.	18,423.	7,388.	2,508.	1,906.	2,358.	1,829.
1975	2,490.	3,160.	4,720.	6,075.	20,433.	33,183.	26,713.	14,487.	7,196.	4,501.	5,891.	6,483.
1976	6,878.	7,591.	8,519.	11,803.	21,691.	14,835.	3,137.	0.	0.	0.	0.	0.
1977	0.	689.	1,763.	1,977.	0.	0.	0.	0.	0.	0.	0.	0.
1978	0.	0.	2,357.	8,264.	29,058.	37,215.	26,329.	17,144.	12,011.	10,735.	12,054.	13,221.
1979	14,688.	15,664.	17,131.	15,136.	36,339.	36,276.	26,280.	18,931.	11,247.	9,583.	10,434.	11,178.
1980	12,822.	14,073.	15,417.	20,518.	50,023.	61,602.	52,826.	42,784.	40,084.	38,693.	39,901.	40,833.
1981	41,571.	42,520.	43,709.	46,454.	45,051.	38,501.	28,097.	20,103.	17,715.	18,930.	19,952.	20,912.
1982	22,696.	24,090.	25,650.	30,985.	62,926.	72,100.	63,948.	55,424.	49,708.	51,616.	53,903.	54,873.
1983	56,462.	58,470.	60,085.	63,559.	72,100.	72,100.	67,867.	60,461.	50,297.	40,420.	42,499.	45,461.
1984	47,562.	48,993.	47,722.	55,243.	72,100.	72,100.	64,857.	59,063.	51,586.	47,543.	43,056.	46,365.
1985	48,188.	50,165.	52,128.	60,762.	72,100.	66,565.	57,625.	45,545.	41,132.	42,282.	44,137.	45,509.
1986	47,081.	49,549.	52,181.	62,225.	72,100.	72,100.	63,560.	52,961.	46,916.	48,229.	49,374.	51,088.
1987	53,167.	54,959.	57,320.	61,840.	61,299.	54,866.	46,582.	39,707.	34,861.	33,208.	34,764.	36,433.
1988	38,291.	39,456.	41,396.	46,067.	52,538.	45,870.	34,634.	26,086.	21,969.	21,426.	21,829.	23,256.
1989	24,485.	25,945.	28,633.	30,316.	26,834.	20,338.	10,459.	5,619.	2,781.	1,299.	1,810.	2,299.
1990	2,790.	3,482.	4,525.	10,665.	10,494.	7,631.	399.	0.	0.	0.	158.	122.
1991	545.	1,142.	2,566.	5,603.	13,392.	16,496.	7,184.	526.	0.	0.	835.	1,391.
1992	2,169.	2,805.	4,596.	5,670.	1,125.	0.	0.	0.	0.	417.	1,102.	1,704.
1993	2,563.	3,590.	5,491.	10,864.	40,499.	46,197.	35,755.	28,053.	22,450.	0.	0.	0.

TABLE 16

SPILLS OF SCOFIELD RESERVOIR (: 72,100 A.F.) - ACRE FEET DATE 12-10-1994 TIME 17:35:56

NARROWS RESERVOIR ACTIVE CAPACITY IS 10,000. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1946	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1947	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1948	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1949	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1950	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1951	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1952	0.	0.	0.	0.	0.	14,282.	0.	0.	0.	0.	0.	0.
1953	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1954	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1955	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1956	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1957	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1958	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1959	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1960	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1961	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1962	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1963	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1964	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1965	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1966	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1967	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1968	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1969	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1970	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1971	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1972	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1973	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1974	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1975	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1976	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1977	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1978	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1979	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1980	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1981	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1982	0.	0.	0.	0.	0.	4,673.	0.	0.	0.	0.	0.	0.
1983	0.	0.	0.	0.	14,555.	30,084.	0.	0.	0.	0.	0.	0.
1984	0.	0.	0.	0.	18,441.	15,745.	0.	0.	0.	0.	0.	0.
1985	0.	0.	0.	0.	8,054.	0.	0.	0.	0.	0.	0.	0.
1986	0.	0.	0.	0.	23,571.	1,665.	0.	0.	0.	0.	0.	0.
1987	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1988	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1989	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1990	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1991	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1992	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1993	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TABLE 17

SCOFIELD RESERVOIR SHORTAGES WITH NARROWS RESERVOIR - ACRE FEET DATE 12-10-1994 TIME 17:41:53

NARROWS RESERVOIR ACTIVE CAPACITY IS 10,000. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL SHORTAGE
1946	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1947	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1948	0.	0.	0.	0.	0.	0.	0.	3,254.	1,362.	323.	0.	0.	4,939.
1949	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1950	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1951	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1952	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1953	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1954	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1955	0.	0.	0.	0.	0.	0.	0.	0.	4,093.	1,492.	0.	0.	5,586.
1956	0.	0.	0.	0.	0.	0.	0.	246.	4,525.	925.	0.	0.	5,695.
1957	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1958	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1959	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1960	0.	0.	0.	0.	0.	0.	2,931.	3,514.	566.	0.	0.	0.	7,012.
1961	0.	0.	0.	0.	0.	19.	1,688.	645.	100.	0.	0.	0.	2,452.
1962	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1963	0.	0.	0.	0.	0.	0.	0.	0.	827.	2,864.	0.	34.	3,725.
1964	0.	0.	0.	0.	0.	0.	0.	0.	3,169.	1,967.	0.	0.	5,135.
1965	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1966	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1967	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1968	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1969	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1970	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1971	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1972	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1973	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1974	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1975	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1976	0.	0.	0.	0.	0.	0.	0.	5,361.	2,879.	933.	200.	500.	9,873.
1977	900.	0.	0.	0.	1,442.	2,250.	3,295.	1,487.	1,161.	275.	27.	29.	10,866.
1978	23.	19.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	43.
1979	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1980	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1981	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1982	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1983	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1984	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1985	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1986	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1987	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1988	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1989	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1990	0.	0.	0.	0.	0.	0.	0.	3,136.	964.	243.	0.	0.	4,344.
1991	0.	0.	0.	0.	0.	0.	0.	0.	2,593.	2,597.	0.	0.	5,190.
1992	0.	0.	0.	0.	0.	4,004.	1,601.	1,035.	447.	0.	0.	0.	7,087.
1993	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
GRAND TOTAL													71,946.

TABLE 18

NARROWS RESERVOIR ACTIVE STORAGE - ACRE FEET DATE 12-10-1994 TIME 17:39:22

NARROWS RESERVOIR ACTIVE CAPACITY IS 10,000. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1946	0.	0.	0.	0.	0.	0.	0.	0.	10,000.	9,928.	9,876.	9,804.
1947	9,703.	9,605.	9,540.	10,000.	10,000.	10,000.	8,398.	6,602.	5,651.	5,581.	5,538.	5,465.
1948	5,364.	5,263.	5,157.	5,432.	7,945.	8,533.	6,865.	4,861.	3,817.	3,656.	3,580.	3,500.
1949	3,412.	3,326.	3,266.	4,426.	8,877.	10,000.	8,423.	6,561.	5,567.	5,468.	5,382.	5,271.
1950	5,154.	5,041.	4,957.	5,506.	8,477.	9,601.	8,002.	6,136.	5,208.	5,102.	5,123.	5,049.
1951	4,946.	4,847.	4,772.	5,510.	8,686.	9,851.	8,285.	6,513.	5,547.	5,500.	5,462.	5,397.
1952	5,312.	5,232.	5,170.	5,768.	10,000.	10,000.	8,848.	7,237.	6,375.	6,322.	6,304.	6,231.
1953	6,133.	6,037.	5,966.	6,237.	8,457.	10,000.	8,493.	6,736.	5,804.	5,726.	5,705.	5,663.
1954	5,612.	5,574.	5,548.	6,410.	8,069.	8,390.	6,660.	4,730.	3,766.	3,672.	3,611.	3,517.
1955	3,416.	3,319.	3,245.	3,472.	5,918.	6,730.	5,074.	3,270.	2,238.	2,084.	1,974.	1,859.
1956	1,742.	1,628.	1,552.	2,377.	5,435.	6,100.	4,453.	2,471.	1,446.	1,296.	1,212.	1,101.
1957	990.	897.	838.	1,067.	3,567.	8,665.	7,448.	5,718.	4,792.	4,770.	4,772.	4,704.
1958	4,619.	4,542.	4,500.	4,958.	9,949.	10,000.	8,427.	6,625.	5,633.	5,514.	5,445.	5,357.
1959	5,264.	5,166.	5,079.	5,293.	7,045.	7,612.	5,930.	4,004.	2,999.	2,888.	2,802.	2,678.
1960	2,540.	2,411.	2,340.	2,633.	5,167.	5,845.	3,929.	1,952.	933.	831.	760.	677.
1961	586.	459.	360.	634.	1,776.	1,713.	0.	0.	0.	0.	0.	0.
1962	0.	0.	0.	879.	5,629.	7,595.	6,248.	4,528.	3,636.	3,559.	3,499.	3,393.
1963	3,256.	3,142.	3,029.	3,094.	6,080.	7,042.	5,436.	3,676.	2,641.	2,485.	2,399.	2,275.
1964	2,191.	2,111.	2,026.	2,148.	5,141.	6,912.	5,474.	3,724.	2,689.	2,533.	2,446.	2,398.
1965	2,354.	2,300.	2,232.	2,491.	5,468.	8,350.	7,065.	5,554.	4,896.	4,983.	5,024.	5,000.
1966	4,959.	4,924.	4,957.	6,035.	8,239.	8,569.	6,768.	4,953.	3,980.	3,953.	3,886.	3,810.
1967	3,709.	3,612.	3,527.	3,649.	6,667.	9,072.	7,610.	5,816.	4,878.	4,788.	4,729.	4,671.
1968	4,619.	4,570.	4,526.	4,707.	7,345.	10,000.	8,409.	6,663.	5,752.	5,714.	5,681.	5,610.
1969	5,523.	5,440.	5,382.	6,040.	10,000.	10,000.	8,492.	6,663.	5,745.	5,743.	5,748.	5,727.
1970	5,702.	5,653.	5,633.	5,808.	9,361.	10,000.	8,436.	6,554.	5,597.	5,544.	5,530.	5,563.
1971	5,624.	5,560.	5,514.	5,854.	8,593.	9,634.	7,979.	6,091.	5,130.	5,069.	5,037.	5,019.
1972	5,012.	4,994.	5,161.	5,872.	7,796.	8,213.	6,404.	4,452.	3,476.	3,413.	3,382.	3,324.
1973	3,256.	3,188.	3,146.	3,353.	7,213.	8,888.	7,316.	5,439.	4,497.	4,420.	4,375.	4,330.
1974	4,306.	4,256.	4,205.	4,417.	8,021.	8,614.	6,856.	4,913.	3,894.	3,785.	3,713.	3,618.
1975	3,533.	3,450.	3,366.	3,413.	5,088.	9,690.	8,508.	6,722.	5,772.	5,740.	5,729.	5,713.
1976	5,695.	5,669.	5,616.	5,834.	8,573.	9,028.	7,263.	5,256.	4,209.	4,047.	3,927.	3,803.
1977	3,679.	3,577.	3,478.	3,767.	3,748.	3,664.	1,774.	0.	0.	0.	0.	0.
1978	0.	0.	0.	496.	3,920.	7,669.	6,168.	4,403.	3,440.	3,242.	3,203.	3,113.
1979	3,022.	2,933.	2,842.	3,038.	6,348.	7,825.	6,157.	4,275.	3,284.	3,188.	3,117.	3,049.
1980	2,981.	2,917.	2,849.	3,299.	6,797.	10,000.	8,552.	6,708.	5,778.	5,717.	5,689.	5,633.
1981	5,571.	5,509.	5,496.	6,250.	8,136.	8,814.	7,046.	5,108.	4,118.	4,077.	4,035.	3,951.
1982	3,842.	3,736.	3,652.	4,217.	8,863.	10,000.	8,584.	6,781.	5,933.	6,152.	6,345.	6,431.
1983	6,478.	6,507.	6,588.	6,871.	9,230.	10,000.	9,574.	7,954.	7,153.	7,257.	7,358.	7,472.
1984	7,548.	7,604.	7,650.	7,947.	10,000.	10,000.	8,783.	7,057.	6,175.	6,249.	6,316.	6,382.
1985	6,436.	6,446.	6,459.	8,023.	10,000.	10,000.	8,479.	6,637.	5,690.	5,670.	5,696.	5,699.
1986	5,703.	5,723.	5,826.	6,781.	10,000.	10,000.	8,471.	6,642.	5,721.	5,735.	5,770.	5,732.
1987	5,629.	5,524.	5,439.	6,318.	7,933.	8,250.	6,499.	4,578.	3,586.	3,481.	3,405.	3,312.
1988	3,230.	3,152.	3,087.	3,516.	6,227.	6,709.	4,549.	3,040.	2,057.	1,968.	1,938.	1,888.
1989	1,834.	1,762.	1,750.	2,866.	4,439.	4,801.	3,071.	1,160.	209.	104.	153.	60.
1990	0.	0.	0.	852.	2,463.	2,950.	1,264.	0.	0.	0.	0.	0.
1991	0.	0.	0.	115.	2,957.	4,730.	3,136.	1,316.	304.	162.	127.	67.
1992	0.	0.	0.	717.	1,444.	1,385.	0.	0.	0.	0.	0.	0.
1993	0.	0.	5.	433.	5,697.	7,517.	5,946.	4,091.	3,124.	0.	0.	0.

TABLE 19

NARROWS RESERVOIR RELEASES TO COTTONWOOD CANYON - ACRE FEET DATE 12-10-1994 TIME 17:38:14

NARROWS RESERVOIR ACTIVE CAPACITY IS 10,000. AC.FT.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	SHORTAGE
1946	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1947	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1948	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1949	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1950	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1951	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1952	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1953	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1954	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1955	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1956	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1957	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1958	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1959	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1960	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1961	124	113	124	0	0	0	1653	0	0	37	63	39	2,153.	3,247.
1962	39	79	90	0	0	0	1800	1900	971	124	120	124	5,247.	153.
1963	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1964	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1965	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1966	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1967	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1968	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1969	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1970	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1971	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1972	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1973	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1974	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1975	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1976	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1977	124	113	124	0	0	0	1800	1724	0	0	0	0	3,885.	1,515.
1978	0	0	43	0	0	0	1800	1900	971	124	120	124	5,082.	318.
1979	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1980	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1981	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1982	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1983	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1984	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1985	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1986	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1987	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1988	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1989	124	113	124	0	0	0	1800	1900	971	124	120	124	5,400.	0.
1990	89	28	47	0	0	0	1800	1223	0	9	2	36	3,224.	2,176.
1991	37	33	46	0	0	0	1800	1900	971	124	120	124	5,155.	245.
1992	98	15	99	0	0	0	1332	0	0	56	25	18	1,642.	3,758.
1993	40	53	124	0	0	0	1800	1900	971	124	120	124	5,257.	143.
GRAND TOTALS													247,646.	11,554.

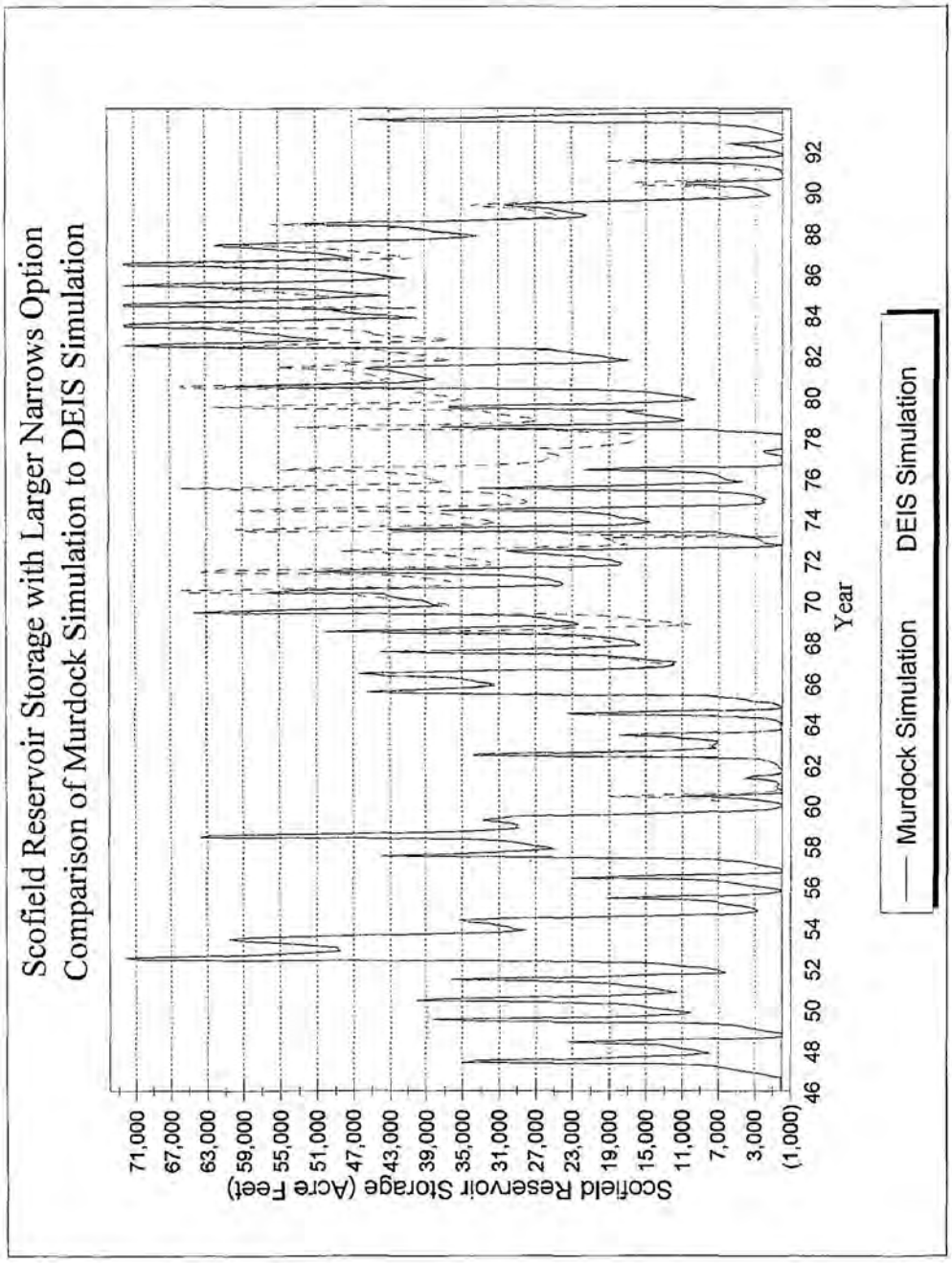
Scofield Reservoir Storage with Larger Narrows Option
Comparison of Murdock Simulation to DEIS Simulation
Scofield Reservoir Storage (Acre Feet)
71,000
67,000
63,000
59,000
55,000
51,000
47,000
43,000
39,000
35,000
31,000
27,000
23,000
19,000
15,000
11,000
7,000
3,000
(1,000)
46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82 84 86 88 90 92
Year
Murdock Simulation
DEIS Simulation

EXHIBIT "F"

51-53 **REVIEW OF THE NARROWS DRAFT EIS**

Exhibit H

-Wetland, Riparian and Related Resource Impacts-

PREPARED FOR

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PO Box 509
Helper, Utah

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Western Wetland Systems
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May 1998

NARROWS PROJECT-REVIEW OF WETLAND, RIPARIAN AND RELATED RESOURCE IMPACTS

TABLE OF CONTENTS

NARROWS PROJECT-REVIEW OF WETLAND, RIPARIAN AND RELATED RESOURCE IMPACTS

EXECUTIVE SUMMARY

The Narrows Project 1998 Draft EIS (the "DEIS") indicates that impacts to wetland and riparian resources are significant environmental issues that will be addressed in the DEIS and that losses in terms of both acres, and functions and values would be identified and mitigated. The DEIS also states that it will comply with all federal regulations including the Clean Water Act. This report reviews the existing wetland and riparian data to identify the adequacy of the impact assessment provided in the DEIS. The discussion below is divided into five main sections:

- Adequacy of the DEIS-Defined Project Area of Influence,
- Impact Assessment Adequacy-Acres,
- Impact Assessment Adequacy-Functions and Values,
- Adequacy of Proposed Compensatory Mitigation, and
- Clean Water Act Compliance.

Technical details supporting the summaries can be found in report Sections 2.0 to 6.0.

Adequacy of the DEIS-Defined Project Area of Influence

The DEIS indicated that the Narrows Project area of influence for wetland and riparian resources was restricted to the Narrows Basin where direct impacts would occur through fill and inundation. However, it appears that indirect impacts through changes in hydrology or land use extend beyond the restricted area used in the DEIS impact analysis. Clean Water Act guidelines state that all wetland impacts must be identified in an adequate impact analysis for a 404 permit. The guidelines require identification of all direct impacts (fill, inundation), a description of all wetlands and waters of the US subject to changes in hydrologic regulation and an identification of the downstream and secondary effects of dams on all waters of the US.

Based on data in the BOR files and the hydrologic and land use changes indicated in the DEIS, WWS identified the following wetlands, riparian habitats and other waters of the US either within the proposed Narrows Reservoir or immediately downstream of the proposed Narrows Dam:

- More than 100 acres of wetlands within the Narrows Basin that would be inundated.
- A minimum of 34 acres of riparian wetlands and waters of the US along Gooseberry and

Cottonwood Creeks that would be affected by Narrows Project flow depletions of 51 to 91% or augmentation by more than 100%. An estimated 50 additional acres of wetlands along Middle Gooseberry Creek would be affected if the stream were to downcut or laterally erode.

- Extensive wetlands are associated with lower Gooseberry Reservoir, including 17-23 acres of aquatic bed/shallow marsh within the reservoir. Operation of the Narrows Project would reduce Gooseberry Creek inflows by 91% requiring changes in reservoir operation. Even if the area was determined to be a non-jurisdictional wetland, it is still a waters of the US and impacts to aquatic bed and vegetated shallow wetlands would be significant impacts.

- Scofield Reservoir is a waters of the US. Changes in operation as a result of the Narrows Project would convert 250 acres of a shallow littoral zone to a barren mudflat.

- There is no data in the DEIS on riparian community composition or width along 6 miles of Fish Creek. This is in spite of an estimated project 20% depletion in average annual flows with a 17 to 25 % depletion of flows during the critical spring period. There is no data in the DEIS on the upper Price River riparian community in spite of a 33 to 100 % depletion during the critical spring period.

In contrast to the above list, the DEIS states that only 100 acres of wetlands were in the project area of influence. This number ignored the riparian wetlands outside of the Narrows Basin. Adding these wetlands into the project area of influence means that there are at least another 100 acres of wetlands (for a total of 200 acres not including Fish Creek and the upper Price River) within and immediately downstream of the Narrows dam that have the potential to be affected by the project but which were not considered in the DEIS.

Secondary effects of the project clearly would continue downstream on the Price River and within the Project service area in the Sanpete Valley. More than 20 adult Colorado River squawfish have been found in the lower Price River. The Colorado River squawfish is an endangered species that is dependent upon spring flooding for long term survival. The proposed project would divert from 25 to 30% of the spring peaks in some years. The Sanpete Valley wetlands support the only population of the spotted frog in the Sevier GMU. The DEIS incorrectly excludes the Sanpete Valley wetlands from its area of influence. Consequently, the DEIS presents an impact analysis based on an incomplete definition of the Project area of influence.

Impact Assessment Adequacy-Acres

The complexity of riparian systems requires that multiple variables be considered in evaluating the potential impacts of a proposed project. Riparian impact assessments need to address changes in:

- Hydrologic support (magnitude, timing and duration of both spring peaks and summer base flows),

- Riparian vegetation parameters (dominant species and communities, required hydrologic regimes, drought or inundation tolerances)
- Channel morphology responses as a result of changes in sediment regime or flows, and
- Relationships among flow changes, riparian vegetation responses and channel morphology.

None of these variables or their interactions were addressed in the impact assessment provided in the DEIS. Instead, the impact assessment was based on a ***single*** modeled average monthly water table value. Additionally, impacts were only considered for Middle Gooseberry and Cottonwood Creeks. Thus, the impact analysis in the DEIS is incomplete.

Middle Gooseberry and Cottonwood Creeks. Even if the DEIS impact assessment included consideration of the key variables, data in supporting documents does not support the DEIS statement of no impact. May through early June are important hydrologic periods for riparian species in terms of providing alluvial aquifer recharge and plant establishment. The Middle Gooseberry Creek analysis identified that the average May monthly water table would only drop 0.5 to 0.9 feet, and therefore it was insignificant and would cause no riparian impacts. Data in supporting documents identifies that water table decreases will actually range up to 1.4 feet and average close to a foot in May followed by water table reductions of 0.5 feet during the early summer.

All of the dominant riparian species along Middle Gooseberry Creek, as listed in the BOR file data, require a water table at or above the surface at least during the spring, with moisture retained in the rooting zone throughout the growing season. The proposed water table depletions would result in the loss of all of the dominant riparian species. These species would likely be replaced by species such as clover, dandelion, yarrow, thistles, musk thistle and sagebrush.

The DEIS contends that Middle Gooseberry Creek would naturally narrow as sediment is deposited and plant species expand into the new floodplain. However, the Project would be releasing "hungry water" (devoid of sediment and highly erosive as it attempts to adjust to a new sediment regime downstream of a dam) into an area in which the water table reductions would result in mortality of the dominant riparian wetland species. In contrast to statements in the DEIS that the stream would naturally adjust by narrowing, the loss of the herbaceous riparian vegetation and their associated high sediment stabilization abilities, would result in stream widening and/or down cutting. Stream down cutting would be particularly damaging along Middle Gooseberry Creek as it would then allow the stream to serve as a drain for the adjacent wetland complex resulting in impacts to more than 50 acres of wetlands.

The DEIS impact assessment for Cottonwood Creek was also limited and based upon an inaccurate definition of the dominant discharge. The dominant discharge is equivalent to the effective

discharge, which by definition varies with changes in flow duration or sediment transport. Increased flow durations would result in sediment mobilization at a lower discharge than currently occurs. As such, the dominant discharge methodology in the DEIS is flawed and the potential for stream degradation requires re-examination. The effective discharge and the duration of the effective discharge must be identified to evaluate riparian and stream channel impacts to Cottonwood Creek. Even if the stream channel did not degrade, riparian vegetation would still be lost by inundation.

Other Headwater Streams and Basins. The impact assessment presented in the DEIS did not address the downstream effects of the Narrows Reservoir on: (1) the wetlands and waters of the US associated with Lower Gooseberry and Scofield Reservoirs; (2) lower Gooseberry Creek; (3) Fish Creek; and (4) the upper Price River. According to the DEIS, substantial changes in hydrologic support would occur at all of these sites, including depletion of critical spring flows from Fish Creek and the upper Price River by 25 to 100%, with May flows reduced to 0 in the upper Price River in some years.

There was also no assessment in the DEIS of the impacts of associated features on wetland resources. These activities include campground construction along the northwest margin of the proposed Narrows Reservoir, a projected increase of 46,400 recreation visitor days in the Gooseberry Creek area as a result of the project, relocation of State Road 264, temporary construction roads or rehabilitation of the Narrows Tunnel near Cottonwood Creek.

Valley Streams. The DEIS did not address impacts to the lower Price River in spite of acknowledging that the Project would cause depletions of 18 to 23% of the spring flow peaks. Spring peak flow depletions would substantially affect cottonwood and native willow recruitment potential, favor tamarisk expansion and adversely affect the potential for Colorado River squawfish regeneration.

Non-Riparian Wetlands-Sanpete Valley. An interagency Conservation Agreement to prevent the spotted frog from being listed as a threatened or endangered species was signed by the BOR in 1998. Within the Sevier River GMU, the spotted frog only occurs in five locations, all within the Narrows Project service area, and any loss would be considered significant. Currently, breeding frogs occur adjacent to the San Pitch River immediately below agricultural fields that would receive supplemental Project water. The DEIS states that changes in water quality would adversely affect the spotted frog, but did not discuss if the project would change water quality or what the impacts might be. Concentrations of boron and selenium, contaminants known to affect wildlife reproductive success, have been found in the project area at or near wildlife standards. Potential effects of these two contaminants on the spotted frog and the "surveys, studies, habitat enhancement, habitat acquisition and mitigation" identified in the Agreement need to be completed and discussed in the DEIS for it to be in compliance with the Agreement that the lead agency has signed.

The DEIS also did not address impacts of 16.8 miles of new pipeline and regulating pond construction (with 28 stream crossings) or the required diversion dam on Cottonwood Creek.

NARROWS PROJECT-REVIEW OF WETLAND, RIPARIAN AND RELATED RESOURCE IMPACTS

Impact Assessment Adequacy-Functions and Values

The DEIS stated that wetland impact assessment would take into account wetland functions and values, but that "because the primary function of wetlands is wildlife habitat, the procedure known as HEP [a single species wildlife assessment model] was used to evaluate the wetland values." The statement contrasts with the conclusions of the National Research Council in 1995 that the use of HEP is not appropriate for wetlands functional assessment. The DEIS selection of the HEP analysis also contrasts with previous Project studies which concluded that the riparian wetlands in the project area were most valuable for sediment stabilization, sediment retention, nutrient transformation, flood flow alteration, ground water discharge, production export to aquatic systems, aquatic life/diversity, general wildlife diversity and abundance, and wildlife breeding habitat.

In the DEIS, the only site for which even a HEP analysis was completed was the Narrows Basin. However, this analysis ignored descriptions of highly organic soils, a relatively high number of wetland plant species and high interspersion of habitats. These characteristics suggest that, in addition to the nine functions listed above, that the site provides two additional functions and values--preservation of biodiversity and uniqueness/heritage values.

No assessment was made in the DEIS of the functions and values provided by riparian wetlands along Gooseberry or Cottonwood Creeks. Sediment stabilization, nutrient transformation and food export/breeding habitat functions were identified in previous studies as highly valuable functions performed by the riparian wetlands along Gooseberry Creek. Changes in these functions need to be assessed. This is particularly important as the Project would result in the loss of the native riparian species currently of high value in sediment stabilization.

Adequacy of Proposed Compensatory Mitigation

The DEIS proposes two types of compensatory mitigation for wetland and riparian losses. The first type is to replace the wetlands inundated in the Narrows Basin (2 proposed locations) on a 1:1 basis through either creation of new wetlands in the Gooseberry Creek Basin, restoration of wetlands along Mud Creek or enhancement of existing wetlands in the Manti Meadows. The second type is identified in the DEIS as a measure to mitigate for adverse effects to fisheries in Middle Gooseberry Creek.

Only one of the four proposed mitigation sites for the Narrows Basin wetlands that would be inundated appears reasonable. The Manti Meadows site should be discarded as it would replace loss of a unique high elevation basin providing 11 distinct functions and values (none of which is waterfowl habitat), by low elevation waterfowl habitat. The two sites within the Gooseberry Creek Basin (next to the proposed Narrows Reservoir and the lower Gooseberry Reservoir) are dominated by sagebrush. Wetland creation on these sites would likely result in a water loss through seepage alone of 5,184 to 6,192 acre-feet per year for the Narrows Reservoir and lower Gooseberry Reservoir sites, respectively. This is more water than is available in the upper Gooseberry Creek Basin. Use

of these sites for mitigation would also defeat the project purpose by requiring more water than the project proposed to deliver.

Based on existing data, Mud Creek appears to be physically suitable for wetland mitigation, but the ability of the proposed mitigation to replace all 11 lost functions and values of the Narrows Basin wetland is doubtful. The likelihood of mitigation success at Mud Creek according to the proposed plan of simply removing grazing is questionable as the soils indicate additional hydrologic support would be necessary. The mitigation costs presented in the DEIS also appear to be underestimated by 70 %.

The proposed use of instream structures in Middle Gooseberry Creek to raise the water table would not maintain riparian vegetation and would promote channel widening and/or degradation, thereby increasing the project impacts. Studies indicate that medium stage check dams (which would be required to raise the spring water table by up to 1.4 feet) are poorly suited to meandering streams such as Middle Gooseberry Creek and typically result in bank erosion. There is no evidence in the DEIS to support the proposed benefits of instream structures in Middle Gooseberry Creek. Conversely, results from recent studies evaluating the effectiveness of instream structures in Utah suggest that the mitigation would cause as much damage as the project itself.

No mitigation is proposed for any of the other potential impacts to wetlands, riparian habitats or other waters of the US.

Clean Water Act Compliance

The project as described in the DEIS segments the action and violates the Clean Water Act requirements for (1) consideration of only single and complete projects and (2) provision of sufficient data to address the significant degradation clause of the 404(b)(1) guidelines which, among other things, requires consideration of secondary effects and downstream effects of dams.

In the DEIS, wetlands were identified only in portions of the Narrows Basin. However, there are an estimated minimum 100 additional acres of wetlands, vegetated shallows and other waters of the US outside of the Narrows Basin subject to substantial (i.e., 30 to 100%) changes in hydrologic support. This violates the minimum delineation guidelines which require the entire area of influence for a proposed project to be identified and examined for wetlands.

The Narrows Basin wetland delineation is 10 years old and under current COE policy appears to have expired. Further, there is a discrepancy between the 140 acres of wetland mapped in 1988 and the 104 acres of wetlands identified in the DEIS. The rationale for exclusion of silver sage areas dominated by hydrophytic species and bisected by small drainages is also not clearly explained.

Section 404(b) of the Clean Water Act requires that individual permits comply with the 404(b)(1) guidelines developed by the EPA (40 CFR 230.1-230.80). These guidelines require:

- Determination of direct effects on all special aquatic sites including wetlands, vegetated shallows and riffle and pool complexes,
- Description of downstream flows and effects on special aquatic sites where there are changes in hydrologic regulation,
- Determination of the downstream and other secondary effects of dams on all waters of the US,
- Identification of the cumulative project effects of both direct (fill, inundation) and indirect (changes in water quantity and quality) impacts,
- Provision of mitigation plans in sufficient detail to ensure that the mitigation is capable of being implemented, will be effective in meeting goals once implemented and is not based upon unproven methods or methods with variable success, and
- That a permit be issued only in the absence of practicable alternatives that would have a lesser impact and that the project can not be defined so narrowly so as to eliminate other alternatives.

The DEIS fails to address the first four items by ignoring potential impacts to more than 100 acres of wetlands, vegetated shallows and other waters of the US downstream of the proposed Narrows Dam that would be subject to dramatic changes in hydrologic support. The DEIS also fails to address secondary effects associated with the project in the Sanpete Valley that could adversely affect the spotted frog, and potential impacts to both riparian vegetation and the endangered Colorado River squawfish in the lower Price River.

The mitigation plans in the DEIS are insufficient to assesses mitigation success. When site details are reviewed, it appears that only one of the five proposed mitigation sites has any chance of increasing or enhancing wetland acreage. Of the 4 mitigation sites proposed for the Narrows Basin, only one (Mud Creek) contains both suitable soils for wetlands and the ability to provide in-basin mitigation. The ability of the Mud Creek site to compensate for all 11 functions and values of the Narrows Basin is questionable. The Middle Gooseberry Creek mitigation proposes an technique that is not suited to a meandering stream and that would likely result in stream degradation not mitigation.

The DEIS also improperly uses mitigation to justify the preferred alternative. It does this by not disclosing the huge impacts associated with flow depletions downstream of the proposed Narrows Dam. Instead it pretends that it will mitigate the impacts away. In fact, the DEIS rejects three practicable alternatives to the Project because of environmental impacts that appear to be greater than the mitigated preferred alternative. For example the Direct Diversion alternative was dismissed because it would impact 60 acres of wetlands and degrade Cottonwood Canyon for a net total of 60-

80 acres of wetlands as compared to the mitigated preferred alternative of 100 acres of wetlands. However, the unmitigated preferred alternative has more than 200 acres of impacts and will also likely also degrade Cottonwood Canyon. Practicable alternatives with less than this amount of impact cannot be dismissed without violating the 404(b)(1) guidelines and mitigation can not be used to "buy down" the impacts of an alternative so that it will seem to have less impact than others.

Conclusions

The overall goal of this report is to identify if the DEIS conclusion of "no net effect" on wetlands and riparian resources is supportable. Review of existing data found that there was no support for a conclusion of "no net effect", that the area of influence was defined to exclude wetland and riparian resources subject to substantial changes in hydrologic support, that substantial degradation of wetland and riparian resources as a result of the project was likely, that the proposed compensatory mitigation was likely to have limited or no success in replacing lost acres, functions and values, and that mitigation was used inappropriately to justify the preferred alternative.

NARROWS PROJECT-REVIEW OF WETLAND, RIPARIAN AND RELATED RESOURCE IMPACTS

1.0 INTRODUCTION

The draft environmental impact statement (the "DEIS") for the Narrows Project indicates that the Project's purpose is to develop a supplemental water supply for the Sanpete Valley in northern Sanpete County by diverting water from the Price River drainage to Cottonwood Creek in the San Pitch/Sevier River drainage. To accomplish this, a new dam and reservoir on Gooseberry Creek (Narrows Reservoir) would be constructed. Ancillary features of the Project include rehabilitation of the Narrows Tunnel, construction of 16.8 miles of new water distribution pipelines, relocation of 2.6 miles of state roads, construction of access roads, addition of recreation facilities and supply of supplemental irrigation water to 15,420 acres of farmland. The project would reduce total annual flows by 51 to 91 % in Gooseberry Creek. The project would also reduce critical spring flows by 17 to 25% in Fish Creek and by 70 to 100% in the upper Price River. Conversely the project would augment flows by 100% in Cottonwood Creek and increase salinity in the San Pitch River. Although not identified as project features, inflows to the existing lower Gooseberry Reservoir from Gooseberry Creek would be changed by 91% and Scofield Reservoir operation would change in relation to the Narrows Reservoir operation.

A final environmental impact statement (FEIS) for the Narrows Project was prepared in 1995, but was rescinded. A revised DEIS was released on March 13, 1998 (Federal Register, Vol 63, no. 49, p. 12502-12503). Significant environmental issues identified in the 1998 DEIS, Section 1.6 included effects on wetland-dependent threatened and endangered species, wetland resources, and aquatic and riparian resources. The purpose of this report is to evaluate the wetland, riparian and related wildlife resource impact assessments completed by the Bureau of Reclamation (BOR) and presented in the newly released 1998 DEIS to determine if they adequately address all of the Project wetland and riparian-related issues. This report analyzes the wetland and riparian impacts associated with the Narrows Project, identifies potentially related effects on listed and sensitive wildlife species, and evaluates the previous wetland assessment for compliance with current Clean Water Act guidelines. Compliance with Clean Water Act guidelines is particularly important as the DEIS identified on page 2-1, that one of the five Project alternative selection criteria was that "the project must comply with all statutory and regulatory requirements including Section 404 of the Clean Water Act". The report also discusses whether or not the existing data supports the conclusion of no net wetland or riparian impacts and identifies areas where more information is needed to properly evaluate impacts.

2.0 METHODS

This report is based upon review and analysis of existing file data, aerial photography and the newly released 1998 DEIS. No new data was collected and no field site visits were made. The following data were obtained from the BOR and its contractors in the preparation of this report:

NARROWS PROJECT-REVIEW OF WETLAND, RIPARIAN AND RELATED RESOURCE IMPACTS

- Aerial photographs (2) from upper Gooseberry Creek to lower Gooseberry Reservoir taken on July 31, 1985 (infrared, non-stereo, final enlarged scale 1:7920)
- Vegetation overlays for the Narrows Basin prepared by a private contractor in 1988 and by Mt. Nebo in 1992
- HEC analysis data, including cross section profiles, cross section locations and data printouts (Franson and Noble 1991b)
- Stage-discharge relations developed for the IFIM study (Hardy, Addley and Associates 1993 and 1997)
- Landslide stability analysis results (Franson and Noble 1991a)
- HEP analysis summary provided in Mt. Nebo (1992)
- Mitigation details provided in the Section 404 wetland permit submitted to the COE on March 13, 1998 by Franson and Noble
- Spotted frog survey results and conservation concerns in the Sanpete Valley (Hovingh 1991)
- 1989 memo from Snyder to Hutchinson regarding the status of wetland resource assessment for the Narrows Project

For this review, the hydrologic data provided in the 1998 DEIS and/or BOR files was used to assess riparian and wetland impacts. However, selected review of daily USGS gage data was necessary to assess changes in flow timing and the adequacy of the hydrologic data used in the DEIS for its wetland and riparian impact assessment.

The following questions regarding riparian and wetland impacts provided the focus for the existing data review. The report section discussing these questions is identified in parentheses following the italicized subheaders separating the questions. The report is organized so that a summary of baseline conditions within the entire direct and indirect Project area of influence is provided first in section 3.0. This summary was compiled by Western Wetland Systems (WWS) based solely on the information provided in the sources listed above. Subsequent sections (sections 4.0-6.0) evaluate the adequacy of the existing data in evaluating project impacts and the degree to which the analysis presented in the DEIS was supported by the baseline data in the BOR files.

Baseline Conditions (Section 3.0)

- What areas would be subject to direct Project impacts? What areas would be subject to indirect impacts through changes in land use or hydrologic support? What wetlands, riparian habitats and waters of the US occur within both the direct and indirect project area of influence?

- What types of riparian vegetation occur along Cottonwood and Gooseberry Creeks?

- Is there any data available for other wetlands potentially affected by changes in land use or hydrologic support in the Gooseberry Creek Basin, along the Price River or wetlands in the Sanpete Valley service area?

NARROWS PROJECT-REVIEW OF WETLAND, RIPARIAN AND RELATED RESOURCE IMPACTS

- What physical data (soils, stream morphology, water quality) is available to help characterize the nature of Project impacts?

Adequacy of Wetland and Riparian Analyses (Section 4.0)

- What are the salient points of the modeled hydrographs that pertain to riparian vegetation?
- How would the types of riparian vegetation that occur along Gooseberry and Cottonwood Creeks respond to proposed changes in spring peaks and summer baseflows? How similar would effects be to those observed on other nearby streams (e.g., Sixth Water, Diamond Fork, Duchesne River) for which the proposed operation would be similar and for which data exists on project effects?
- Is there existing channel and floodplain data (from the IFIM and HEC studies) that can be used to more accurately characterize the likely channel and riparian responses to flow changes?
- Have all sites and features been reviewed both for the presence of wetlands and potential direct (i.e., fill) and indirect (i.e., hydrologic, land use changes or water quality) impacts?
- Should analyses for other wetlands, riparian habitats and waters of the US in the Gooseberry Creek Basin, along the Price River or in Sanpete Valley be included in the DEIS?
- Are there links between sensitive fish and wildlife species and wetland/riparian impacts that may have been missed in the DEIS?

Adequacy of Wetland and Riparian Mitigation (Section 5.0)

- How were mitigation sites selected? Is there any data on their physical site characteristics that suggests the mitigation would be successful?

Clean Water Act, Section 404 Compliance (Section 6.0)

- Does the wetland analysis presented in the DEIS meet current Section 404 wetland permit guidelines?

Conclusions (Executive Summary)

- Does the existing data support the DEIS general conclusion of no net effect?

3.0 BASELINE CONDITIONS

3.1 Narrows Project Area of Influence

The DEIS indicated that the Narrows Project area of influence for wetland and riparian resources was restricted to the Narrows Basin where direct impacts would occur through fill and inundation. However, it appears that indirect impacts through changes in hydrology or land use extend beyond the restricted area used in the DEIS impact analysis. Table 1 provides a summary of wetland and riparian areas, as identified by WWS based on the BOR file data, within the entire area either potentially directly or indirectly affected by Project construction and operation. In contrast to the statement in the DEIS on p. 3-56 that the "Narrows Basin was identified as the area that would be most significantly impacted by the proposed project", WWS included all wetland and riparian habitats in the project area of influence that could be affected by changes in quality or quantity of hydrologic support. No distinction was made by WWS in defining the area of influence as to the nature or magnitude of the impacts. WWS used the revised definition of the area of influence because Clean Water Act guidelines state that all wetland impacts must be identified in an adequate impact analysis for a 404 permit. The guidelines require identification of all direct impacts (fill, inundation), a description of all wetlands and waters of the US subject to changes in hydrologic regulation and an identification of the downstream and secondary effects of dams on all waters of the US (see also section 6.3).

Wetland and riparian resources potentially affected by the Project occur in two different major watersheds (Price River watershed and the San Pitch/Sevier River watershed) and a variety of hydro-geomorphic settings including: high elevation, steep gradient headwater streams; high elevation low-gradient headwater streams; high elevation basins and small ponds; low elevation valley rivers; and low elevation seeps and springs. For the purposes of this analysis, wetlands and riparian habitats are discussed below in three main groups separated according to similarities in elevation, the overall nature of the hydrologic support and the type of Project impacts. The three main groups are:

- **High elevation (mostly > 6,000' in elevation), headwater streams (first through third order) and their associated basins.** This includes Upper, Middle and Lower Gooseberry Creek, Fish Creek, and the upper Price River in the Price River drainage, and Cottonwood Creek in the San Pitch/Sevier River drainage. Large basins in this area include the Narrows Basin, lower Gooseberry Reservoir Basin, and the Scofield Reservoir area. Table 3-2 in the DEIS indicates that the Project would change the hydrology in these headwater streams by 25 to 100%.

  Within this broad group, there are large differences in stream pattern, gradient, bed and bank material and specific hydrologic regimes that affect current functions and values and which would influence individual system responses to changes in hydrology.

- **Mid to Low elevation (<6,000' in elevation), valley streams**. This includes the Price River

below Helper and the San Pitch River. Table 3-2 in the DEIS indicates that the Project would deplete critical spring flows on the lower Price River by 18 to 23% in May and June. The DEIS identified no flow changes for the San Pitch River but indicated that water quality could worsen.

- **Non-riparian wetlands in the Sanpete Valley**. The DEIS on p. 3-3 indicates that the Project would increase spring discharge in this area and potentially adversely affect water quality. This area also contains numerous intermittent streams that would be crossed by new pipeline construction.

3.2 Headwater Streams and Basins

3.2.1 Wetland and Riparian Vegetation

Descriptions of wetland and riparian vegetation associated with the four headwater streams in the Project area are sparse to non-existent in the DEIS and supporting documents. Typically, riparian and wetland descriptions are limited to one or a few sentences scattered among Mt Nebo (1992), Snyder (1989), the 1994 FWCA Report and the Fishery and Visual Resources sections of the 1998 DEIS. The most extensive wetland description can be found in Mt. Nebo (1992) in which a diverse group of wetlands within the Narrows Basin are described in less than a single page, indicating a dramatic lack of assessment of this important resource.

Based on WWS' review of the BOR file data and aerial photographs, it appears that there is sufficient information to provide a more complete description of baseline conditions. An accurate baseline description is extremely important as this provides the basis for the subsequent impact analysis. Without knowing the current riparian and wetland conditions, it is impossible to accurately state how the Project would impact these resources.

Gooseberry and Cottonwood Creeks

The above sources describe the riparian vegetation along Cottonwood and Gooseberry Creeks as consisting of narrow bands of vegetation (3-6' in width). The dominant riparian community along Gooseberry Creek is identified as sedge meadow that includes four species of sedges (*Carex* spp.), one rush (wiregrass, *Juncus arcticus*) and a grass (tufted hairgrass, *Deschampsia caespitosa*) (see Table 2). The only place the vegetation along Cottonwood Creek is mentioned is in the 1994 FWCA Report and this is limited to a single sentence identifying willows in the riparian area. No acreage is provided in the DEIS for the wetland communities along Cottonwood and Gooseberry Creeks and the source of the three to six feet of width is unclear. These communities were not mapped and appear not to have been examined in any way by a riparian wetlands specialist.

To provide a gross estimate of the extent of riparian wetlands along these creeks, WWS used several existing sources of information to identify the width of riparian wetlands. The acres of riparian

wetlands within the Project area of influence were then identified by multiplying the stream length by the best available data on actual riparian and stream channel width. The stream channel acreage was included as these areas are also regulated under Section 404 of the Clean Water Act as "waters of the United States."[1] The ensuing acreage figure was used in lieu of any other data on riparian wetlands to identify the wetlands within the impact area of influence, but can only be considered a preliminary estimate. As section 6.0 describes, the Clean Water Act, Section 404 guidelines mandate that all wetlands within the Project area be identified and that consideration of impacts prior to alternative selection can not be negated by mitigation, particularly mitigation relying on future analyses or unproven methods. Therefore, for this review it was necessary to identify, even if only in a preliminary manner, the potential wetland acres that could be affected.

The BOR files contained aerial photographs only for Upper and Middle Gooseberry Creeks and cross sections were surveyed only on Middle Gooseberry Creek. Because wetlands had previously been mapped only in the Narrows Basin, WWS prepared a preliminary map of wetlands along Middle Gooseberry Creek. The preliminary WWS map shows an extensive series of wetlands along Middle Gooseberry Creek, with numerous small ponds, and oxbows. Wetland width along Middle Gooseberry Creek varies from 100 to more than 2000 feet with a total area exceeding 50 acres. Some wetlands appeared to be supported by hillside drainages and seeps. The large scale and lack of stereo aerial photographs in the BOR files limited the ability to separate the likely extent of hillslope seepage vs. stream support of wetlands. For this reason, WWS mapped an interpolated 2-year floodplain on a subset of 10 HEC cross sections and developed an average riparian wetland width from this data. The 2-year floodplain was used as the 1987 COE manual defines wetlands within riparian zones as those areas that are flooded, on average, once every two years. The 2-year floodplain required interpolation as the stage-discharge data developed for the HEC analysis did not include this flow. Thus, two wetland acreages were developed for Middle Gooseberry Creek--a total wetland acreage that includes some areas supported by hillslope seepage and an estimate of the jurisdictional wetland acres directly supported by streamflow. Both estimates will require refinement to accurately characterize impacts and mitigation needs.

Only a small portion of lower Gooseberry Creek immediately below lower Gooseberry Reservoir was visible in the 1985 BOR file aerial photographs on the Project and there were no photographs for any of the other riparian areas. In lieu of adequate data, the general three to six foot width listed in the DEIS as characterizing riparian areas was used to estimate the wetland extent along lower Gooseberry and Cottonwood Creeks. As such, this is likely an underestimate of the wetland acreage and will need to be refined.

Based on this preliminary estimate, there are a minimum of 34 acres of riparian wetlands and waters

[1] The Army Corps of Engineers has jurisdiction over all waters of the United States, which includes wetlands, and "other waters" such as rivers, intermittent streams, mudflats and sandflats. Thus, wetlands, which by definition are vegetated, are a subset of the "waters of the US".

of the US along Middle and Lower Gooseberry and Cottonwood Creeks that would be directly affected by changes in streamflow. There is an estimated 50 additional acres of wetlands along Middle Gooseberry Creek that would be affected if the stream were to downcut or laterally erode, thereby acting as a "drain" for the adjacent wetland complex.

Gooseberry Creek Basin Areas

The DEIS describes three main communities in the Narrows Basin: Vasey Sagebrush (342.8 acres), Silver Sagebrush (160.8 acres) and Wetlands (104.3 acres). Three types of wetlands are identified: wet meadows, sedge meadows and willow thickets. Wet meadows occur in topographic depressions and seeps. Dominant species include the same four sedges listed above, wiregrass and tufted hairgrass. Sedge meadows occur along Gooseberry Creek and its tributaries. These communities are noted as being similar in structure and composition to the wet meadows and the distinction made by Mt. Nebo (1992) between wet and sedge meadows is unclear. The DEIS lumps the two communities together to calculate a total Narrows Basin wet and sedge meadow acreage of 65.7 acres. Average per cent cover of herbaceous species in wet and sedge meadows is 92% indicating dense vegetation. Average vegetation height is 8 inches, but ranges up to 12 inches (date of measurements unknown).

The third wetland plant community in the Narrows Basin is the willow thicket (38.6 acres). These primarily occur in scattered areas along the upper reaches of the Narrows Basin. Three willow species dominate this community type: Booth willow (*Salix boothii*), Drummond willow (*Salix drummondiana*) and Wolf willow (*Salix wolfii*). Mean cover shrub within the willow thickets is 72% with 39% herbaceous or ground cover (Mt Nebo 1992). Individual thickets can cover several acres and often contain small standing water areas (<1 acre) formed by beavers. This results in a high interspersion of small ponded areas surrounded by willows.

The total wetland acreage identified by Mt. Nebo (1992) differs from the original 1988 wetland study (results provided in Snyder 1989). In this study, a total of 140 acres of wetlands were identified in the Narrows Basin of which 51.8 acres were willow thickets, 29.4 acres riparian sedge meadows and 58.8 acres wet meadows. The original study provided no details of species composition or topographic position. There is no information on file explaining why the two estimates of wetland acreage differ.

Lower Gooseberry and Scofield Reservoirs

The DEIS provides no information about wetlands associated with these sites. The fishery and visual resources sections of the DEIS suggested that 250 acres of shallow water areas in Scofield Reservoir would be converted to barren mudflats and it is likely that there would be a loss of vegetated wetlands associated with the conversion.

Extensive wetlands are visible in the 1985 aerial photographs of lower Gooseberry Reservoir, but the DEIS did not quantify the extent of the surrounding wetlands. The DEIS indicates that 30 to 40% of the reservoir consists of shallow water less than three feet in depth with dense vegetation and

NARROWS PROJECT-REVIEW OF WETLAND, RIPARIAN AND RELATED RESOURCE IMPACTS

Table 1. Summary of Wetlands, Riparian Habitats and other Waters of the US Within the Narrows Project Area of Influence.

Area	Proposed Project Feature	Area of Influence	Wetland/Riparian in Area of Influence (acres)		Impacts listed in DEIS		Comments
			Total	By Type	Direct (Fill)	Indirect	
HIGH ELEVATION, HEADWATER STREAMS AND BASINS (>6,000' elevation)							
Price River Basin							
Upper Gooseberry Creek and Basin	Narrows Reservoir and Dam	627 acres + 5.3 miles stream	104.3 (Mt. Nebo 1992) 140 (Snyder 1989)	65.7 sedge and wet meadow 38.6 dense willow scrub	100 acres inundated or filled	See below	Total wetland acreage may be underestimated Delineation > 10 yrs old and does not comply with guidelines
	Narrows campground	Unknown	Not identified in DEIS and no data on file to estimate impacts		Unknown	Increased recreation use not addressed	Associated features that need to be added to DEIS
	State Rd. 264 Relocation and construction access roads	Unknown	Not identified in DEIS and no data on file to estimate impacts		Unknown; wetlands within most likely route	Not addressed	

Middle Gooseberry Creek	91% of average annual flow diverted	3 miles of stream and bordering riparian	Not identified in DEIS; estimated based on BOR file data as a minimum of 15.7 acres within the 2-yr floodplain and > 50 acres overall	Unspecified channel alteration	Identified as insignificant in DEIS	Potentially significant impacts ignored in DEIS. Clean Water Act mandates consideration of downstream effects of dams and this was not done.
Lower Gooseberry Reservoir	Not part of project, but Gooseberry Crk inflows to be reduced by 91%	57 acres shallow reservoir; unknown area of bordering wetlands	Not identified in DEIS; estimated based on BOR file data as 17-23 acres shallow water and aquatic wetlands with an unknown amount of bordering wetlands	None	Not addressed in DEIS	
Lower Gooseberry Creek	Diversion of 51% of average annual flow	3 miles of stream and bordering riparian	Not identified in DEIS; estimated based on BOR file data as a minimum of 14.7 acres	None	Identified as insignificant in DEIS	
Fish Creek	Diversion of 20% of average annual flow and up to 25% of spring peaks	3 miles of stream and bordering riparian	Not identified in DEIS; estimated based on BOR file data as a minimum of 8.1 acres	None	Not addressed in DEIS	
Scofield Reservoir	Reservoir reoperation to increase annual drawdowns an average of 9'	Unknown	250 acres shallow water littoral zone (a waters of the US) to be converted to barren mudflat	None	Not addressed in DEIS	
Upper Price River	Diversion of 64-100% of May flow and 30% of June flow	Unknown	No information	None	Not addressed in DEIS	

NARROWS PROJECT-REVIEW OF WETLAND, RIPARIAN AND RELATED RESOURCE IMPACTS

San Pitch/Sevier River Drainage						
Cottonwood Creek	100% flow augmentation	4.9 miles of stream and bordering riparian	Not identified in DEIS; estimated based on BOR file data as a minimum of 3.6 acres	Diversion dam	Identified as insignificant in DEIS	Analysis presented in DEIS is flawed.
	Narrows Tunnel Rehabilitation	Unknown	Not identified in DEIS	Unknown	Disposal of spoils not addressed	Associated feature that must be addressed
MID TO LOW ELEVATION, VALLEY RIPARIAN WETLANDS						
Price River	Diversion of 25-30% of spring peaks in some years	Unknown	No information	None	Not addressed in DEIS	Potentially significant effects on listed Colorado River squawfish. Potential to increase tamarisk and reduce native riparian species
San Pitch River	Flow changes unspecified; salinity to increase	Unknown	No information	None	Not addressed in DEIS	
NON RIPARIAN WETLANDS-SAN PITCH/SEVIER RIVER DRAINAGE						
San Pitch Valley Service Area	Pipeline, diversion dam and regulating pond construction	16.8 miles with a 30' right-of-way	Not identified in DEIS; no BOR file data to estimate minimum # of acres	Minimum of 28 stream crossings	Unknown effects on existing streams	Associated feature that must be addressed in DEIS
	Supplemental water supply	15,420 acre service area	DEIS identified no wetlands to be converted / NA	None	Potential water quality effects identified as insignificant	Selenium and boron values at wildlife thresholds have already been measured in the service area Contains only known spotted frog population in Sevier GMU

algal growths. Aquatic beds were clearly visible in the 1985 aerial photograph of the reservoir. It appears that from 17-23 acres of aquatic bed/shallow marsh occurs within the reservoir. The degree to which the aquatic bed and bordering wetlands would be considered jurisdictional is unknown, but the reservoir appears to have been placed in a historic wetland basin and at least a portion of the area is likely jurisdictional wetland. Even if the area was determined to be a non-jurisdictional wetland, the site is still a waters of the US.

Fish Creek and the Upper Price River

There is no data either in the DEIS or in the BOR files on riparian community composition or width along Fish Creek. This is surprising as Table 3-2 in the DEIS indicates a 20% depletion in average annual flows with a 17 to 25 % depletion of flows during the critical spring period. There is no data in the DEIS or in the BOR files on the upper Price River riparian community even though Table 3-2 in the DEIS indicates a 33 to 100 % flow depletion during the critical spring period.

Total Wetlands in the Headwaters Streams Area of Influence

The DEIS identified only 100 acres of wetlands within what it defined as the Project area of influence. This number ignored the riparian wetlands outside of the Narrows Basin. Adding these wetlands into the Project area of influence results in at least another 100 acres of wetlands in the headwater areas above 6,000 feet in elevation (for a total of more than 200 acres) that have the potential to be affected by the Project but which were not considered in the DEIS. Thus, the DEIS presents an impact analysis based on an incomplete definition of the Project area of influence.

3.2.2 Geomorphology and Soils

Geomorphic and soils data is critical for evaluating both potential channel responses to flow changes and the likely success of mitigation measures. The geomorphic and soils data provided in the DEIS and/or supporting files is extremely limited. The best descriptions for sites in the Gooseberry Creek Basin can be found in the fishery section of the DEIS where channels widths of 11 feet and 4 feet are described for Upper Gooseberry Creek and its tributaries, respectively. There is no standard channel morphology information in the DEIS (e.g., bankfull width and depth, width and depth at various flood flows, degree of entrenchment/confinement, slope, sinuosity, bed composition or particle size, bank height and composition) on Middle Gooseberry Creek, Lower Gooseberry Creek, Fish Creek or the upper Price River. Much of this information should have been gathered as part of the HEC-analysis and presented in the DEIS. In particular, local slope, particle size, bed and bank roughness are all critical to proper input of the HEC model variables. The HEC analysis input uniform roughness values suggesting that local data was not collected.

The channel form for Middle Gooseberry Creek observed on the BOR's 1985 file aerial photographs is meandering. The channel has a relatively wide floodplain and moderate to high sinuosity typical of a Rosgen type "C" channel. Photographs taken by the BOR contractor during cross section surveying in 1991 depict mostly stable stream banks covered by dense herbaceous vegetation. Some stream bank degradation (sloughing, cut banks) is depicted in lower portions of Middle Gooseberry

Creek. Overall, the Middle Gooseberry Creek banks appear well vegetated, stable, and comprised of fine-textured sediments.

The only channel bed description in the entire Gooseberry Creek drainage can be found on page 3-89 of the DEIS where it is stated that "there are limited deposits of recent alluvial sand and gravel" within the active channel of Gooseberry Creek and its tributaries. The dominant material contributing to the channel bed and banks is unknown, but the Narrows Basin soils description suggests fine-textured materials in the banks. Scattered photographs taken by the BOR contractor during cross section surveying depict a few sites with large cobble along the banks but most photographs show fine-textured material overlaying cobbles. Bed composition is unknown, but is critical to evaluating the potential success of instream structures (see further discussion in section 5.2).

Soils in upper Gooseberry Creek within the Narrows Basin are variously described in the DEIS as generally consisting of "silty sand with some fine to coarse gravel" (p. 3-89), as " a mixture of clay, silt and sand with minor amounts of organic deposits" (p. 3-89) or as mollisols, "dark-colored, rich in bases" and within either cryoboroll or cryoaquoll great group (p. 3-93). Mollisols are one of 11 major soil groups (referred to as soil orders according in soil taxonomy). Mollisols are defined as having thick (10" or more) surface layers rich in organic matter which develop under grasslands or areas dominated by grasses and grass-like plants. Cryoaquaolls are "histic" meaning that they contain a high amount of organic matter. The NRCS Soil Survey for Carbon County does not include the Narrows Basin and there is no citation for the soils descriptions or documentation in the BOR files as to how the soils were classified. If accurate as described, it means that much of the wetland area in the Narrows Basin is underlain by organic soils which increase the wetland's potential to provide nutrient transformation, biodiversity and uniqueness/heritage functions (see further discussion in section 4.2).

Cottonwood Creek is described in the DEIS as well-confined, moderately to deeply entrenched with relatively steep side slopes (slopes of 2:1 to 2.5:1). Channel slopes range from 0.03 to 0.07. The channel bed is characterized as being relatively well-armored by cobbles and boulders, with a median, or d50 particle size, of 6 to 8 inches. This information is critical for identifying at what flow particles will begin to move and how increased flow durations in Cottonwood Creek would affect sediment transport and channel erosion. However, the DEIS did not use this information in the Cottonwood Creek impact analysis.

3.3 Valley Streams

The DEIS contains no data on riparian wetlands along the Price or San Pitch Rivers even though the Project would have continuing downstream project effects. Downstream effects of spring flow depletions on the Price River are particularly important as more than 20 adult Colorado River squawfish, with at least one ripe female, have been found in the lower Price River. The Colorado River squawfish is an endangered species that is dependent upon spring flooding for long term

survival (FWS 1992).

3.4 Non-Riparian Wetlands in Sanpete Valley

The Project description on page S-1 of the DEIS specifies that the Project consists of "construction of features and facilities to develop a supplemental water supply" on 15,420 acres of land that is currently used to produce alfalfa and grass hay. Although the Project would prohibit wetland conversion, the quality of water supporting the existing wetlands could change. The only description of wetlands within the Project service area can be found in Hovingh (1991). Here, the Project area is described as containing numerous alluvial fan springs. Wetland complexes at the springs were described as consisting of "numerous springs, slow moving water, some high shrubs... and associated wetlands." Hovingh (1991) identified two potential water sources for the springs--high elevation recharge and irrigation return flows--but there is no data on which of the two sources of water support the wetlands.

Understanding the nature of water support and how it might change under project operation is extremely important. The areas outlined to receive project water contain the only known spotted frog population in the Sevier River Geographic Management Unit (GMU). The population was recently found to be genetically distinct from other populations in Utah (Hovingh, pers. comm.). The 1998 spotted frog Conservation Agreement identified the population as being critical to the preservation of the species in the Sevier River GMU. The population consists of 25 egg masses in five different locations, suggesting five females each producing five egg masses (Hovingh, pers. comm). This population size is well under the population goal of 1000 individuals (requiring at least 100 breeding females) identified in the 1998 Spotted Frog Conservation Agreement.

4.0 ADEQUACY OF WETLAND AND RIPARIAN IMPACT ANALYSES

4.1 Project Impacts-Acres

4.1.1 Introduction

The DEIS stated that it would assess wetland and riparian impacts in terms of both acres of wetlands lost and the functions and values of those wetlands. Page 3-59 stated that impacts would be considered significant if project implementation would "result in **any** loss of wetland acreage (extent) or function" and that "loss of acreage and function [would be considered] **prior** to implementation of mitigation measures" [emphases added]. The discussion below evaluates the adequacy of the DEIS impact assessment in terms of acres (this section). The adequacy of the functions and values assessment is provided in section 4.2. Evaluation of the role of mitigation and whether or not it is properly sequenced can be found in section 5.0.

4.1.2 Factors Affecting Riparian Vegetation

Hydrologic Factors and Riparian Responses

The magnitude, timing and duration of flows are key factors controlling riparian vegetation establishment and maintenance (Padgett et al. 1989, Stromberg et al. 1991, Scott et al. 1993, Patton and McKee 1995). Spring peak flows are necessary for alluvial aquifer recharge. They are also necessary for continued establishment of a number of riparian species by creating areas where seeds can germinate. The timing of spring peaks is especially critical for those species for which seeds, such as willows and cottonwoods, are only viable for a couple of weeks following dispersal (Scott et al. 1993). A spring flood that occurs either before or after the dispersal period will not result in recruitment that year. Failure to recruit new individuals is a factor in long term riparian decline for most willow shrub, cottonwood forest and other communities dependent upon seedling establishment for long term persistence.

The duration and recession rate of spring floods are also critical to riparian species establishment. Peak flows need to slowly recede, to ensure seedlings are not subject to either drought stress or inundation. Removal of spring peaks or modification of early summer flows--either through depletion or augmentation--not only reduces native species establishment, but it also provides a competitive advantage to non-native invasive species that have less exacting establishment and maintenance requirements and which often respond favorably to flow stabilization associated with the removal of spring peaks (Graf 1982). Two local examples are discussed below, but it should be noted that there is an extensive body of literature on this issue (e.g., Rood and Mahoney 1990, Hill et al. 1991, Stromberg and Patten 1993, Scott et al. 1993, Scott et al. 1994, Auble et al. 1995) and that local examples are provided to allow a comparison between the project impacts listed in the DEIS with actual impacts observed in nearby locations.

The first local example is that of the Diamond Fork, in central Utah, a stream in which the natural hydrograph has been modified so that peak flows in most years occur during the summer and not during the spring (i.e., it is an augmented flow stream). As a result, the previously dominant woody species have established in only 2 years since 1915-the year in which the hydrograph was first altered as result of irrigation deliveries (Gecy and Gecy 1998). The Central Utah Water Conservancy District recently acknowledged that the past history of irrigation releases has resulted in substantial long term riparian decline through inundation of establishing seedlings (CUWCD 1998).

The second example is that of the Duchesne River, from which flow is diverted for irrigation deliveries. Here, native species establishment is hampered by either reduction of peak flows in most years or by rapid spring flow depletion during flood years. For example, in 1997, the river dropped four feet in a 10-day period that coincided with the cottonwood and willow dispersal period, resulting in high seedling mortality and no net establishment following the spring flood (WWS 1998). In both cases, modification of the natural hydrograph led to riparian decline and channel narrowing, if it occurred, was not sufficient to offset the loss of most of the former riparian width.

Just as important to riparian vegetation maintenance is the summer base flow level. Riparian vegetation is dependent on the alluvial aquifer. While upland vegetation can tolerate drought, riparian vegetation requires access to a water table throughout the entire growing season (Stromberg et al. 1994) . Consequently, changes in either water table recharge flows (such as spring floods) or the growing season water table can result in mortality. Tolerance of individual species to water table depletions varies. For example, Patton and McKee (1995) identified that some species of cottonwoods could adjust to water table depletions of up to a foot; but that adverse to lethal effects could be expected for herbaceous species with water table reductions of 0.5 foot, even if only for two to four weeks.

Summer flow augmentation can also adversely affect riparian vegetation. With augmented flow, both establishing seedlings and mature plants can suffer mortality through inundation. The extent of mortality depends upon the species. Some species, such as water sedge, tufted hairgrass and Booth's willow, prefer a high water table throughout the growing season. These species are often identified as obligate or facultative wetland species (see Table 2 for a list of species in the project area and definitions of wetland status). Other species are restricted to areas in which there is only short duration or no seasonal flooding. A common response to flow depletion is almost always a replacement of the plant community type from one dominated by obligate wetland species to one dominated by facultative or upland species with a general increase in non-native, invasive species (Harris et al. 1987, Smith et al. 1990, Stromberg et al. 1994).

Geomorphic Factors and Riparian Responses

Topographic position and local site conditions (e.g., soils, floodplain morphology) provide an additional set of factors affecting current riparian vegetation distribution (IHI 1995, Scott et al. 1994). Similar factors affect how riparian vegetation responds to flow changes. Channel narrowing with subsequent vegetative encroachment is widely touted as a common response to stream flow depletion. However, the response to channel narrowing is extremely variable, can range from narrowing to lateral degradation and in most cases, is accompanied by a loss of most of the total riparian width (IHI 1995). Channel narrowing in response to flow depletions more commonly occurs along steep gradient streams (IHI 1995) and has been observed along Sixth Water (a tributary to Diamond Fork) with removal of high flows; in this case, channel narrowing has been accompanied by a loss of 80% of the former riparian width for a net loss of riparian wetlands (WWS 1996). In contrast, Duchesne River flow depletion has led to channel narrowing in only one-third of the channel length; the remaining stream has responded to flow depletions by widening (Brink and Schmidt 1996). Regardless of whether the stream widened or narrowed, most of the original riparian width has been lost (WWS 1998).

Sediment Transport as a Key Factor

A very important factor in riparian and channel responses to flow changes is how the proposed action will affect sediment transport. In most cases, channel degradation and/or lateral erosion has been observed below dams as sediment is trapped and the erosivity of the flows below the dam increases (Williams and Wolman 1984). Aggradation can also occur below dams, but in most cases

where aggradation occurs, it adversely affects fish habitat by filling in pools, changing pool-riffle ratios, and adversely affecting spawning habitat (Hill et al. 1991, McBain and Trush 1997).

Changes in sediment transport are often ignored in riparian and aquatic impact assessments, yet can be the key to understanding downstream effects of dams (Ligon et al. 1995). Instead, surrogate measures are used to address how flow changes will affect the channel. The dominant discharge is representative of the range of flows that define the channel (Andrews 1980). Since the 1940's there have been various attempts to quantify the dominant discharge. Three methods have been developed: use of a set flow recurrence interval, estimated at 1.5 years (Wolman and Miller 1960), identification of the bankfull discharge (Wolman and Miller 1960) , and calculating the effective discharge--or the range of flows that move the most sediment over a period of time (Andrews 1980). Research conducted since 1960 has indicated that:

- The bankfull discharge can only be used as an estimate of the dominant discharge in a stable stream and not one with a currently altered or to be altered flow regime.

- The 1.5 or any other set recurrence interval flow can not be used to identify the dominant discharge (Pickup 1976, Andrews 1980, Nash1994) as the recurrence interval of the dominant discharge can vary from less than 1 year (upper Missouri River) to more than 3 years (Sevier River). Averaging "less than 1 year" to "more than 3 years" to get a dominant discharge equivalent to a 2-year recurrence interval flow is not valid.

- The effective discharge can provide the most reliable identification of the dominant discharge (Andrews 1980, Nash 1994).

Effective discharge is defined as the modal value within a sediment transport curve calculated from flow durations (based on daily values) and the sediment transport rate (Andrews 1980; Andrews, pers. comm.). Thus the dominant discharge is a function not only of the magnitude of flows, but also the frequency distribution of flows, their duration and how they affect the sediment transport rate. Both reductions in sediment supply and increases in flow duration will cause the effective discharge to occur at a lower flow.

4.1.3 Riparian Wetland Assessment Methods

As described above, the factors affecting riparian vegetation and the range of responses to stream flow changes have been well documented. Numerous methods have been developed to use what is known about riparian responses to predict the effects of flow changes. Three methods are described below, all of which were developed prior to 1997, and thus available to the BOR to use in the riparian wetland impact assessment in the DEIS. The methods differ in their approach, but they all identify both spring peaks and flow durations as critical assessment hydrologic variables and require an identification of the vegetation along the stream to be affected.

The first method was developed by the BOR for the Animas-LaPlata project (Patton and McKee 1995). For this project, the BOR developed an intensive GIS modeling approach to assess the impacts of flow depletions associated with the Animas-LaPlata project. Three basic premises of the model were:

- Riparian vegetation is dependent on ground water and any significant change in the water table would have adverse effects,
- Certain riparian vegetation species are dependent on the magnitude, duration and timing of flood flows, and
- Modification to either factor would cause riparian impacts.

The method required both an accurate identification of hydrologic changes and identification of responses of key plant species and communities to changes in various flow parameters. Associated with the model was an understanding that species would respond differently to flow changes and that differences in responses needed to be included in the assessment. In other words, a blanket generalization about riparian impacts could not be made without identifying the dominant species and their likely responses to a range of hydrologic parameters. Two model shortcomings, however, included a lack of accurate hydrologic characterization and an overdependence on computer modeling at the expense of accurate site characterization.

A method developed by the USGS National Riparian Ecology Research Center (NRERC) uses an approach similar to the Instream Incremental Flow Methodology in which hydraulic analysis along surveyed cross sections is used to identify changes in habitat parameters (Bovee 1982). The NRERC method simply extends the analysis to the floodplain. The method identifies the mapped position of riparian vegetation community types relative to inundation duration (per cent of time any point is inundated) based upon daily discharge data. Impacts are then assessed by comparing the new flow duration with the current duration as it relates to the specific type of vegetation. This method does not address changes in flood frequency and the authors acknowledge that this factor still needs to be considered in impact analyses. However, implementation of this analysis along the Gunnison River, Colorado identified that major riparian changes were masked by simple evaluation of average annual or even average monthly flows.

The Wetland Hydrologic Index model developed by the COE (Davis 1996) provides an index of hydrologic change that is based upon surveyed wetland elevations, daily flows and exceedances, and riparian community types. This model focuses on the per cent of time during each month that the water table would be reduced below a level necessary to support riparian wetlands. The assessment combines a detailed hydrologic analysis based on daily values with a qualitative assessment of community response. Of the three approaches discussed here, this approach is the least time-consuming, but still requires daily flows to calculate flow durations under both pre and post project conditions.

Although none of the three models discussed here address all the important factors affecting riparian vegetation, they all acknowledge:

- The importance of both spring floods and flow durations as key assessment variables,
- The need to evaluate impacts based on daily flows and not annual or monthly averages,
- The importance of plant species and community types in evaluating potential impacts, and
- The need to address potential geomorphological change in the impact assessment, particularly if sediment supply or flow durations are to be substantially changed.

4.1.4 Narrows Project Impact Assessment

Middle Gooseberry and Cottonwood Creeks

As described above, the complexity of riparian systems requires that multiple variables be considered in evaluating impacts. There has been no perfect impact assessment model developed, but there are methods to assess changes in the key factors affecting riparian vegetation. At a minimum, riparian impact assessments need to address changes in

- Hydrologic support (magnitude, timing and duration of both spring peaks and summer base flows),
- Riparian vegetation parameters (dominant species and communities, required hydrologic regimes, drought or inundation tolerances)
- Channel morphology responses as a result of changes in sediment regime or flows, and
- Relationships among flow changes, riparian vegetation responses and channel morphology.

None of these variables or their interactions were addressed in the impact assessment in the DEIS. Instead, the impact assessment was based on a single modeled average monthly water table value. Additionally, impacts were only considered for Middle Gooseberry Creek.

The Middle Gooseberry Creek analysis identified that the average May monthly water table would only drop 0.5 to 0.9 feet, and therefore it was insignificant and would cause no riparian impacts. The analysis ignores clearly documented evidence that riparian vegetation is affected by changes in the magnitude, timing and duration of flows, and that established methods are available to assess the impacts of changes in these parameters. The analysis also ignores clearly documented evidence of channel degradation and erosion and riparian decline downstream of dams.

However, even if the DEIS impact assessment included consideration of the key variables, data in

supporting documents (Franson and Noble 1991b) does not support the DEIS statement of no impact. Estimated water table reductions of one-half foot or less would occur on only one of 23 transects. Water table decreases range up to 1.4 feet and average close to 1 foot in May followed by water table reductions of 0.5 feet during the early summer. May through early June are important hydrologic periods for riparian species in terms of providing alluvial aquifer recharge and plant establishment (see section 4.1.2). Although peak flows can occur between April 17 to June 10, they mostly occur in mid-May. For example, in 1968, the year the DEIS uses to represent an "average year", flows at the Gooseberry Creek near Scofield gage peaked at 214 cfs on May 22 and remained above 80 to 100 cfs for 30 consecutive days and above 150 cfs for half of that time period.[2]

The dominant riparian vegetation along Middle Gooseberry Creek, as identified from BOR files, is listed in Table 2.[3] The dominant vegetation includes three obligate (OBL) wetland sedge species, one facultative wetland (FACW) sedge species, one facultative wetland (FACW) grass and one obligate (OBL) wetland rush. Table 2 provides a summary of rooting characteristics and preferred hydrologic regimes of these species as developed from published literature (e.g., Padgett et al. 1989, Manning et al. 1989, Manning and Padgett 1995, Aquatic and Wetland Company 1997). All of the dominant riparian species require a water table at or above the surface at least during the spring, with moisture retained in the rooting zone throughout the growing season.

Based on the data presented in Table 2 and looking simply at individual species responses to average water table declines of 0.5, 1.0 and 1.4 feet, without considering any other factors (as was done in the DEIS), would lead to the following predicted impacts. These impacts are based on species-specific rooting characteristics and required hydrologic regimes. Because looking strictly at average monthly water table drops mask the importance of peak flows in alluvial aquifer recharge and also ignores the effects of cumulative monthly water table drops (i.e., extended drought periods following removal of a key recharge event), the predicted responses are likely underestimated.

Riparian impacts based upon responses of the dominant riparian species in the project area, as summarized in Table 2, would be as follows:

- A water table decline of 0.5 feet during the critical month of May would result in the loss of

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[2] The average monthly flow for May 1968 provided in the DEIS is 82.1 cfs, reflecting lower flows during the early part of May. As noted earlier, use of an average monthly flow masks the biological importance of recurrent peak flows above 200 cfs. To go from a May average of 82 to 38 cfs means the critical spring peaks lasting almost a month will be removed. This very important fact is not disclosed in the DEIS.

[3] The dominant species were identified during the period 1988-1991 and wetland mapping was done in 1988. There has been no documented review of the site by a botanist for at least 7 years and no review by a wetland specialist since 1988. Therefore, it is unknown if the data on file accurately represents current conditions. In lieu of more recent data, the species listed in Mt. Nebo (1992) as dominant species were used in this report.

Table 2. Characteristics of the Dominant Riparian Species along Gooseberry Creek.

Species	Habitat	Wetland Indicator Status	Habit	Preferred Hydrology
Carex aquatilis (Water sedge)	wet and boggy meadows; typically organic soils	OBL; high value for streambank stabilization	tufted perennial, long rhizomes	Occupies continually wet sites and prefers standing water up to3" in depth; can tolerate water table depth up to 6 inches
Carex microptera (Small wing sedge)	wet meadows and fens; organic soils	FAC	densely tufted ; no or very short rhizomes; requires seed establishment to spread	Requires water table within the rooting zone during growing season
Carex nebrascensis (Nebraska sedge)	wet meadows, particularly abundant along moving water	OBL; very high value for streambank stabilization	perennial, strongly rhizomatous	Requires soil saturation early in the growing season with water table within 12 inches of surface; most roots in upper 4-8 inches
Carex rostrata (Beaked sedge)	swampy meadows, pond and meandering stream margins; not found on other stream types; soils mostly organic	OBL;high value for stream bank stabilization	perennial, long rhizomes	Requires seasonally saturated hydrologic regime with water table within 9 inches

Table 2 (Continued)

Species	Habitat	Wetland Indicator Status	Habit	Preferred Hydrology
Deschampsia ceaspitosa (tufted hairgrass)	wet meadows, high elevation meandering streams and ponds	FACW;medium to high value for streambank stabilization--not as much value as above sedges	tufted perennial, short rhizomes; requires seed establishment to spread	Requires seasonal saturation but can tolerate water table decreases below 18 inches **late** in growing season
Juncus arcticus (wiregrass)	seeps and springs, meandering stream and pond margins; mostly mollisols and organic soils	OBL; high value for streambank stabilization	perennial, stout creeping rhizomes	

Wetland indicator status based on Reed (1988) and reflects the frequency with which the species occurs in wetlands. Obligate (OBL) species are found 99-100% of the time in wetlands, Facultative Wetland (FACW) species are found from 67 to 99% of the time in wetlands and Facultative (FAC) species occur equally often in wetlands as in uplands.

water sedge, beaked sedge, and adversely affect Nebraska sedge.

- A water table decline of 1.0 feet during the critical month of May, would result in the loss of water sedge, beaked sedge, Nebraska sedge, small wing sedge and adversely affect tufted hairgrass and wiregrass.

- A water table decline of 1.0 feet during the critical month of May followed by continued water table declines of 0.5 during June[4] and 0.3 feet during the remaining growing season would result in the loss of all of the dominant riparian species along Middle Gooseberry Creek. These species would likely be replaced by species such as clover, dandelion, yarrow, thistles and sagebrush. The loss of the native species could also provide for the expansion of the noxious weeds already existing in the area, particularly musk thistle.

The DEIS contends that the stream would naturally narrow as sediment is deposited and plant species expand into the new floodplain. The DEIS neglects to mention that sediment supply downstream from a dam is limited, and the sediment source for this supposed natural deposition, unless it comes from instream bank erosion, is unclear. Even if a supply of sediment were available, the capability of species to expand into the new floodplain area needs to be considered. The species with the greatest potential for expansion through vigorous vegetative growth require a high water table (see Table 2); conversely, the species with the greatest tolerance to water table changes (tufted hairgrass, small wing sedge) establish only by seed and may not rapidly colonize the area.

In essence, the Project would be releasing "hungry water" (devoid of sediment and highly erosive as it attempts to adjust to a new sediment regime downstream of a dam) into an area in which the water table reductions would result in mortality of the dominant riparian wetland species and there would be insufficient time for the species to colonize the newly exposed channel bed. Thus, in contrast to statements in the DEIS on p.2-13 that the stream would naturally adjust by narrowing, the loss of the herbaceous riparian vegetation and their associated high sediment stabilization abilities, would likely result in stream widening and/or downcutting. Stream downcutting would be particularly damaging along Middle Gooseberry Creek as it would then allow the stream to serve as a drain for the adjacent extensive wetland complex.

For Cottonwood Creek, the DEIS used a different impact analysis. Here, riparian impacts were assessed based on changes in dominant discharge. The DEIS states on page 3-83 that "the generally accepted value of dominant discharge is the peak discharge having a recurrence interval of about two years." As discussed in section 4.1.2, this is not a valid definition for the dominant discharge. The dominant discharge is best defined by the effective discharge. The effective discharge, by definition, changes with changes in flow duration or sediment transport. Increased flow durations would result in sediment mobilization at a lower discharge than currently occurs. As such, the dominant

[4] It appears that the June water table decline might be even greater as the Project Operations Study indicates that flows of 1 cfs and not 8.4 cfs would occur in June in an "average" year.

discharge argument in the DEIS is flawed and the potential for stream degradation requires re-examination. The effective discharge and the duration of the effective discharge must be identified to evaluate riparian and stream channel impacts.

It is also important to identify the potential responses of the riparian vegetation to increased flows. Some willows require high water tables throughout the growing season (such as wolf's willow) while others tolerate water level changes and spring flooding but do not survive under prolonged inundation (such as coyote willow). Even if the stream channel did not degrade, riparian vegetation could still be lost by inundation.

The contrast in the impact assessment methods used in the DEIS for Gooseberry Creek and for Cottonwood Creek is troublesome. The Cottonwood Creek analysis identifies that no riparian impacts would occur because the 2-year flood would not change; conversely, the Gooseberry Creek analysis identifies that no impacts would occur in spite of a substantial change in the 2-year flood and elimination of almost all flood peaks. No explanation is provided for the circular logic applied in the DEIS.

Other Headwater Streams and Basins

Although 51% of the total annual flow will be depleted from lower Gooseberry Creek, primarily during the critical spring period, there was no assessment of potential riparian impacts. The existing data suggests that an estimated minimum of 15 acres of riparian wetlands and waters of the United States would potentially be affected by loss of spring peak flows along this creek.

Lower Gooseberry Reservoir is currently operated by the US Forest Service as a relatively stable reservoir without annual drawdowns. The stable operation, combined with the reservoir location within an apparent historic wetland basin supports an extensive wetland and aquatic bed complex, of which at least some are likely jurisdictional wetlands, and the rest are waters of the US. Both inflows and outflows to the basin and its wetland system will be changed by the project. Project impacts to these wetlands were not identified in the DEIS.

Also not discussed in the DEIS were impacts to the wetland resources associated with the operation of Scofield Reservoir. As a water supply reservoir built in the 1940's, it is doubtful that any of the area would be classifiable as jurisdictional wetland, but the reservoir is still a waters of the US that is within the downstream effects area of the proposed Narrows Dam. Impacts to shallow water wetland habitat also need to be considered in the Fish and Wildlife Coordination Act Report.

Table 3-2 of the DEIS shows that the project would also deplete critical spring flows from Fish Creek and the upper Price River by 25 to 100%, including dropping the average May flows to 0 in some years. Riparian resources along these creeks were completely ignored in the DEIS and supporting documents and there is no way to estimate potential acres of wetlands affected. Complete spring peak removal would adversely affect riparian resources.

There was no assessment in the DEIS of the effects of associated features on wetland resources.

These include campground construction along the northwest margin of the proposed Narrows Reservoir, a projected increase of 46,400 recreation visitor days in the Gooseberry Creek area as a result of the project, relocation of State Road 264, temporary construction roads, and rehabilitation of the Narrows Tunnel near Cottonwood Creek.

The DEIS also fails to assess impacts to wetlands in the Narrows Basin outside of the reservoir margin. However, it is unlikely that campground construction could completely avoid the wetlands and small drainages rimming the proposed northwest reservoir boundary. Likewise, the State Road 264 relocation would either have to fragment existing aspen groves or fill wetlands along the proposed reservoir eastern margin adjacent to the current Road 264 location. These wetlands were not delineated in the 1988 mapping. It is likely that this area was originally identified as outside the project area of influence as clear stream channels and wetland vegetation are visible similar to those areas delineated as wetlands in 1988. The lack of a secondary recreational impact assessment is unclear as the DEIS identifies that recreational use in the area is "already crowded", and any increases in recreational use would require mitigation to avoid further wetland impacts. There is no information available to assess the impacts of temporary construction roads and the rehabilitation of the Narrows Tunnel. Analyses of the potential impacts to these wetlands should have been include in the DEIS.

Valley Streams

There is no data in the DEIS or the BOR files on riparian wetlands along the Price or San Pitch wetlands and no description of how the proposed depletions or water quality changes would affect wetlands. Of particular importance would be depletion of 18 to 23 % of the spring flow peaks along the lower Price River. Spring peak flow depletions would substantially affect cottonwood and native willow recruitment potential and favor tamarisk expansion. Although cottonwood can occur up to 8,500 feet in elevation, the BOR data on file did not mention this species as occurring within the headwater basin. Tamarisk is typically restricted to areas below 5,000 to 6,000 feet in elevation. Thus the greatest potential for tamarisk expansion at the expense of native willows and cottonwoods is below Helper.

The effects of spring peak flow depletion on the endangered Colorado River squawfish are extremely important. The FWS identified that one of the primary sources of the species' decline is a change in the "timing, duration and magnitude" of spring flows as a result of dams and water diversions (FWS 1992). These hydrologic changes affect the squawfish at all stages of its life history. As adults, squawfish occupy seasonally inundated riparian floodplains and backwaters in the spring and early summer. During the mid to late summer, squawfish migrate into the main stem channel. Spawning occurs in the spring and lasts four to six weeks. Critical to successful regeneration is the ability of larval squawfish to migrate from shallow backwater nursery areas into the main river. This is generally accomplished during the declining limb of the spring flood peak. Further modification of the Price River spring peak could have dramatic effects on the squawfish long term reproductive success. Although the importance of spring floods to squawfish reproduction were identified in 1992 and the information available to the BOR, the project effects on Price River spring peaks were ignored in the DEIS.

NARROWS PROJECT-REVIEW OF WETLAND, RIPARIAN AND RELATED RESOURCE IMPACTS

Non-Riparian Wetlands-Sanpete Valley

According to the DEIS, the proposed Narrows Project would construct 16.8 miles of new pipelines, a diversion dam in Cottonwood Creek, and a number of regulating ponds. The DEIS does not provide wetland information for any of these features. Yet, the new pipelines would cross 28 streams. Regardless of whether or not these crossings contain jurisdictional wetlands, they are all waters of the US. The diversion dam location is also not specified and the DEIS is unclear as to whether a new diversion dam would be required or if an existing facility would be rehabilitated. Either scenario would impact waters of the US, and would require a Section 404 and/or streambed alteration permit, but was not disclosed in the DEIS.

Of equal or greater concern are the project impacts on the spotted frog. An interagency Conservation Agreement (Agreement) was signed by the BOR on March 16, 1998. The purpose of the agreement is to implement measures that will prevent the spotted frog from being listed as a threatened or endangered species. The Agreement identifies that conservation measures within of each of five distinct GMU's are necessary to the overall species viability and individual population goals are set for each GMU. Within the Sevier River GMU, the spotted frog only occurs in five locations, all within the Narrows Project service area. Currently, breeding frogs occur adjacent to the San Pitch River immediately below agricultural fields that would receive supplemental project water (Hovingh, pers. comm.).

The Agreement identified that the major threats to the spotted frog within the Sevier River GMU were loss of habitat due to agricultural practices, and water development for municipal and agricultural purposes. Because of the isolated nature of occupied habitat, any loss would be considered significant. The Agreement also identified "surveys, studies, habitat enhancement, habitat acquisition and mitigation" as necessary actions for water development projects. The DEIS proposes none of these.

In contrast to the requirements specified in the Agreement, potential impacts to the spotted frog in the Sanpete Valley were cursorily dismissed. The DEIS identified in section 3.1 (threatened and endangered species) that changes in water quality would affect the spotted frog, but did not discuss if the project would change water quality or what the impacts might be. In section 3-17, selected ground water well concentrations were displayed and the DEIS states that "the data gathered showed no significant concentrations of trace of toxic elements in the ground water." Table 3-30 displays the ground water results. Concentrations of boron and selenium, contaminants known to affect wildlife reproductive success, have been found at or near the standards for wildlife. Although the state of Utah does not have a wildlife standard for boron, nearby states have adopted a standard of 500 ppb as a level at which adverse effects could be expected. Boron concentrations of 450 ppb are listed as occurring in the project area. Likewise, the wildlife standard for selenium is 5 ppb and selenium concentrations of 5 ppb have been identified in the area. Impacts to spotted frog reproduction would prevent population from reaching its target goal of 1000 individuals from the estimated 25 in the area. Potential effects of these two contaminants on the spotted frog and the "surveys, studies, habitat enhancement, habitat acquisition and mitigation" identified in the Agreement need to be completed and discussed in the DEIS for it to be in compliance with the

Agreement that the lead agency has signed.

Hovingh (pers. comm.) has suggested that the source of water supporting the breeding frogs along the San Pitch River be investigated as part of the necessary impact analysis for this DEIS. If hydrologic support originates from a deep mountain aquifer, the project would likely not change the water quality in the springs supporting the frog. Conversely, if the water comes from return flows from adjacent agricultural fields, impacts could occur. Relationship of the known spotted frog locations to areas receiving Project water and identification of the ground water support sources need to be included in the "surveys and studies" portions of the Agreement and presented in the DEIS.

4.2 Project Impacts-Functions and Values

The DEIS stated that wetland impact assessment would take into account wetland functions and values, but that "because the primary function of wetlands is wildlife habitat, the procedure known as HEP [a single species wildlife assessment model] was used to evaluate the wetland values."(page 3-50, DEIS). This is curious as the COE implementing regulations (33CFR 320.4[b]) identify that wetland functions include fish and wildlife habitat, maintenance of ground water supplies, purification of water, and prevention of flooding. The National Research Council (1995), at the direction of the White House Office on Environmental Policy, identified eight major functions typically performed by wetlands, including three hydrologic functions, three biogeochemical functions, one habitat maintenance and one food web support function. The National Research Council identified that the use of HEP was not appropriate for wetlands functional assessment as it was "too narrowly focused on fish and wildlife to be used in routine regulatory assessments of wetlands". Additionally, the previous wetland evaluation of the Narrows Basin (the only site for which a functional assessment has been performed) identified that the highest functions and values of the Basin wetlands were for sediment stabilization, sediment retention, nutrient transformation, flood flow alteration, ground water discharge, production export to aquatic systems, aquatic life/diversity, general wildlife diversity and abundance, and wildlife breeding habitat (Snyder 1989). Of nine functions rated high by Snyder (1989), only two were associated with wildlife.

The only site for which even a HEP analysis was completed was the Narrows Basin. In support of the HEP approach, Mt. Nebo (1992) describes wetland communities in the Narrows Basin as being "common to high elevation, mountain areas", containing few species, and therefore not unique. Yet, of the 150 species listed as occurring in the Narrows Basin project area, 65 species (43%) occur in wetland and riparian habitats. This represents a relatively high number of species, considering the fact that only limited field work was conducted in the project area. Of these species, 12 are indicative of high elevation boggy conditions and the DEIS (p. 3-93) describes organic and histic soils in at least portions of the Narrows Basin. High elevation wetlands underlain by deep organic soils have been identified as unique and deserving of special protection by the Grand Junction office of the COE (COE 1997). There is no data on file to check the soils characterization provided in the DEIS, but if correct, it indicates some unique wetland qualities. The organic soils, relatively high number of wetland plant species and high interspersion of habitats, suggests that two other functions and values provided by the Narrows Basin wetland complex are preservation of biodiversity and

uniqueness/heritage values.

Mt. Nebo also identified that the area was overgrazed in the 1880's with grazing controls added in 1908. The significance of this statement, which is repeated several times in the DEIS, is unclear. Much of the western United States was overgrazed in 1880, but many areas currently support high quality wetlands. According to the DEIS, grazing is still allowed in much of the project area, with a rest-rotation system used on land under USFS administration. The current effects of grazing on wetland and riparian habitats in the project area are unknown. The vegetation section states on p. 3-56 that "cattle and sheep grazing is still allowed in the area" but does not discuss the current condition. The land resources section (3.11, p. 3-76) of the DEIS in discussing current grazing allotments states that "range conditions and grazing were discussed earlier in the vegetation section". Neither section states the current condition of the vegetation and the actual nature of current grazing impacts. What is surprising is that the HEP analysis results presented in Mt. Nebo (1992) provide a picture vastly different from an overgrazed situation. Here the average cover of wet meadow vegetation is 92% with an average height of 8 inches and a maximum height of 12 inches. No date is given for any of the studies, but it would be very unusual for an overgrazed site to reach stubble heights any where close to 8 to 12 inches at any time during the growing season. The current and past grazing use of the area seems to be used to support a conclusion of no special significance, rather than an actual assessment of the site's functions and values.

The DEIS provided no assessment of the functions and values provided by riparian wetlands along Gooseberry or Cottonwood Creeks. Therefore, the degree to which functions and values would be impaired by the proposed flow changes cannot be determined. As indicated in previous descriptions, Gooseberry Creek is meandering to highly meandering, and bordered by dense vegetation, up to 2000 feet in width. Snyder (1989) identified sediment stabilization, nutrient transformation and food export/breeding habitat functions as being highly valuable functions performed by the riparian wetlands. Changes in these functions need to be assessed. This is particularly important as the Project would result in the loss of the native riparian species currently of high value in sediment stabilization.

Likewise there was no assessment of functions and values provided by other wetlands or waters of the US that would be affected by substantial changes in hydrologic support or water quality. Yet, the littoral zone and aquatic bed complex of lower Gooseberry Reservoir likely provides high wildlife habitat value and 250 acres of a shallow littoral zone in Scofield Reservoir would be converted to a barren mudflat. Threatened and endangered species habitat is provided by the Price River riparian wetlands and the Sanpete Valley wetlands support the only population of the spotted frog in the Sevier GMU. Changes in these functions and values as a result of the project must be addressed for the DEIS to be in compliance with its own statement that impacts would be considered significant if project implementation would "result in **any** loss of wetland acreage (extent) or function".

5.0 ADEQUACY OF PROPOSED COMPENSATORY MITIGATION

The DEIS proposes two types of compensatory mitigation for wetland and riparian losses. The first is to replace the wetlands inundated in the Narrows Basin on a 1:1 basis through either creation of new wetlands in the Gooseberry Creek Basin, restoration of wetlands along Mud Creek or enhancement of existing wetlands in the Manti Meadows. The second measure is identified in the DEIS as a measure to mitigate for adverse effects to fisheries in Middle Gooseberry Creek. The adequacy of each mitigation type is discussed separately below. No mitigation is proposed for any of the other potential impacts to wetlands, riparian habitats or other waters of the US.

5.1 Narrows Basin Wetlands

The DEIS proposes four alternatives to mitigate for loss of 100 acres of wetlands in the Narrows Basin. These are:

- Create wetlands within most of a 86 acre[5] parcel west of lower Gooseberry Reservoir in an area currently dominated by an upland sagebrush community. Creation would be accomplished by re-contouring and supply of irrigation water.

- Create 72 acres of wetlands adjacent to the proposed Narrows Reservoir in an area currently dominated by an upland sagebrush community. Creation would be accomplished by re-contouring and release of water from Fairview Lakes.

- Enhance wetlands within a portion of a 160 acre parcel along Mud Creek primarily by removing cattle. Some stream channel improvements and contouring to produce a series of bermed wetland cells would also be done.

- Create up to 72 acres of wetlands in Manti Meadows by providing return flows to an existing low elevation wetland in the San Pitch watershed. The goal would be to enhance waterfowl habitat.

None of the alternatives by itself provides for a 1:1 mitigation ratio. As previously discussed, the Project will impact a minimum of 200 acres of wetlands (just considering the headwaters basin) and not the 100 acres identified in the DEIS. The total proposed mitigation acreage, prior to assessing feasibility, is 230 acres wetland creation and 160 acres of wetland enhancement. To meet current mitigation guidelines, creation must be done to at least a 1:1 ratio and enhancement should be done according to a 3:1 or greater ratio. To meet current guidelines and mitigate for the actual impacts, a 1:1 mitigation using creation would require using portions of all three proposed creation sites (2

[5] The DEIS provides contrasting numbers for wetland mitigation on pages 2-19 and 2-34. These numbers differ by up to 60 acres. So as to not overestimate the wetland mitigation potential the lower set of numbers provided on page 2-34 was used.

sites in the Gooseberry Creek drainage plus the Manti Meadows site). Enhancement acres could be used to reduce the total created wetland acreage, but would need to be done at a 3:1 ratio. The DEIS states on p. 2-15 that "the actual mitigation that is implemented could be a combination of alternatives". However, Appendix D which lists the wetland mitigation costs associated with the Project identifies that only one site would be considered and included in the Project mitigation costs. The inconsistency in statements is confusing and very important if the DEIS commits to mitigation than is not adequately funded.

A larger concern than the mitigation ratio is that only one of the proposed mitigation sites (near Mud Creek) appears reasonable. The Manti Meadows site should be discarded as it would provide out-of-kind mitigation in a completely different watershed and geomorphic setting than the impact area. It would replace loss of a unique high elevation basin providing 11 distinct functions and values, none of which is waterfowl habitat, by low elevation waterfowl habitat. Also the enhancement value of return flows is questionable, particularly since levels of boron and selenium at or near the wildlife threshold values occur in the project area.

The two sites within the Gooseberry Creek Basin (next to the proposed Narrows Reservoir and the lower Gooseberry Reservoir) are dominated by sagebrush. There is no soils data for either of these two sites but sagebrush typically occurs on coarse-textured soils. Permeabilities of greater than 0.2 inches per hour (0.4 feet per day) are not uncommon in areas dominated by sagebrush. Wetland creation on these sites would result in a water loss through seepage alone of 5,184 to 6,192 acre-feet per year[6] for the Narrows Reservoir and lower Gooseberry Reservoir sites, respectively. This is more water than is available in the upper Gooseberry Creek Basin. Use of these sites for mitigation would also defeat the project purpose by requiring more water than the project proposes to deliver.

Based on photographs supplied by the BOR contractor, Mud Creek is a heavily overgrazed site with some existing wetlands and mesic pasture adjacent to the creek. Mud Creek itself has high cut banks and the stream appears to act as a drain for the adjacent pasture. Soils here are described by the NRCS (1988) as a mixture of Silas and Brycan loams. Brycan loam is a well drained soil with a potential natural community of big sagebrush and bluebunch wheatgrass. Wetlands would not develop in Brycan soils without substantial water loss or use of a clay liner.

Silas loam is somewhat poorly drained with a potential natural community of silver sagebrush, sedges, and wiregrass. Water table depths range between 20-25 inches below the soil surface in spring and 35 to 45 inches below the soil surface during the summer, indicating that additional water would be necessary in some areas to raise the water table to levels able to support a wetland community. Simple removal of grazing would not cause wetlands to appear in areas where the water

[6] Acre-feet of seepage calculated by: 0.4 ft/day *times* 180 days *times* # of acres in the proposed mitigation site. A six month season during which water would be supplied (May-October) was assumed in the seepage calculation as seepage occurs whenever water is supplied regardless of evapotranspiration rates.

table is more than 12 to 18 inches below the surface in the spring. Additionally, the Silas loam is a mineral soil with a seasonally fluctuating water table that would not support the species occurring in the Narrows Basin which require permanently saturated conditions and organic soils.

Thus, while soils in portions of the Mud Creek site could support wetlands and would provide some sediment stabilization functions, the ability of the mitigation to replace all eleven lost functions and values of the Narrows Basin wetland is doubtful. If the goal is to replace all functions and values of the Narrows Basin wetlands, this site would not be suitable.

The likelihood of mitigation success at Mud Creek according to the proposed plan of removing grazing with some recontouring and no other measures is questionable. One of the immediate responses often seen following removal of grazing in an overgrazed site is severe proliferation of noxious weeds (Aarft 1994). Mitigation development would require a strong weed control plan and allocation of O&M costs for weed control. The mitigation measure of raising the water table in a cut bank stream through the use of check dams has had limited success and is poorly suited to some stream types and flow regimes (see further discussion below).

The mitigation cost breakdown for Mud Creek provided in Appendix D provides only for land acquisition ($110,000) and fencing ($26,000). There is no allocation of costs for weed control, planting if the site does not recover sufficiently to at least provide sediment stabilization, re-contouring to create a series of berms and swales, installation of check dams, or design. It also does not account for the mandatory COE 5-year mitigation monitoring requirement. The earthwork cost alone to create berms and swales across the property ($7-10 per cubic yard of material moved) could increase the mitigation costs by up to $200,000. Weed control, planting contingencies measures and monitoring would add another $40,000. Without more details of the proposed plan the actual mitigation costs can not be identified, but it appears that the DEIS grossly underestimates the mitigation costs by almost 70 per cent, without including design and channel structure costs.

Overall, the DEIS overstates the availability of mitigation sites as only one of the four sites could both support some wetlands and at least provide some measure of in-kind mitigation by mitigating within the Scofield Reservoir Basin. The DEIS also dramatically underestimates the costs to develop a successful mitigation and misrepresents the true costs of the project.

5.2 Middle Gooseberry Creek

The DEIS states that it will mitigate for adverse effects to the Middle Gooseberry Creek fisheries through the use of "man-made improvements" to narrow the channel and increase the depth of flow. Page 3-53 of the DEIS states that the "intent will be to create a stream channel that ...will have the same depth of flow as under baseline conditions" and p. 3-59 states that the "project plan includes channel modification in the middle segment of Gooseberry Creek to keep the flow levels up ...[and not reduce] the depth of flow in the stream". This would require raising the water table by up to 1.4 feet. Medium stage check dams would be necessary to accomplish this. However, medium stage check dams are poorly suited to meandering streams and typically result in bank erosion instead of

their intended goal (Rosgen and Fittante 1986). In fact, an extensive study of the success rate of instream structures in Utah streams (URMCC 1995) concluded that projects that used structures strictly to change a stream's character following changes in flows or sediment regime typically fail. The study also found a high failure rate in projects that used structures without consideration of stream dynamics and morphology. This is important, as the Narrows Dam will substantially change stream dynamics and trap sediment. The URMCC study found similar results as Rosgen and Fittante (1986) in that stream morphology dramatically effected the success of instream structures and that use of structures in low gradient, meandering streams had poor documented success. Finally, the URMCC (1995) noted that while use of instream structures to promote fish habitat has had mixed success, the "overall effectiveness of structures on riparian condition has not been positive."

Instead of mitigating for fish habitat impacts, the proposed measure would not maintain riparian vegetation and would promote channel widening and/or degradation, thereby increasing the fishery impacts. There is no evidence to support the proposed benefits of instream structures in Middle Gooseberry Creek. Conversely, the evidence points to the mitigation causing as much damage as the project itself.

6.0 CLEAN WATER ACT, SECTION 404 COMPLIANCE

The DEIS identified on page 2-1, that one of the five alternative selection criteria was that "the project must comply with all statutory and regulatory requirements including Section 404 of the Clean Water Act". Statutory and regulatory requirements of the Clean Water Act encompass a vast body of statutes, Memorandum of Understanding, Regulatory Guidance Letters (RGL), legal decisions, and Executive Orders, all of which can not be summarized here. Four key statutory or regulatory requirements that specifically apply to the impact assessment and proposed mitigation developed for this project include the guidance given by the Sacramento District of the COE regarding minimum standards for delineation (October 4, 1994 and September 9, 1997), the 1990 Regulatory Guidance Letter on the expiration dates for wetland delineations (RGL 90-6), the 404(b)(1) guidelines (40 CFR. 230.1-230.80), and the 1989 *Memorandum of Understanding (MOA) between the Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation under the Clean Water Act Section 404(b)(1) Guidelines*.

6.1 Minimum Delineation Standards

Specific local COE District written instructions regarding delineation standards, in addition to the requirements listed in the 1987 COE delineation manual currently in use, have been developed twice since 1994 by the Sacramento District of the COE (October 4, 1994 and September 9, 1997 letters to all individuals involved in wetland delineation). In 1994, the Sacramento District developed a list of minimum requirements for wetland delineation that include completed and detailed data sheets, a delineation map and a narrative describing the wetlands and the justification for the boundary. The delineation map needs to accurately identify the entire project boundary, the different wetland types present, and typically be of a scale of 1 inch=100 to 200 feet (1"=400' being the maximum acceptable unless there are extenuating circumstances). Delineation maps using a photographic base

must have been corrected for distortions. Additionally, delineations that inaccurately identify the entire project area of influence are unacceptable.

In 1997, this policy was updated to incorporate by reference and expand upon the previous guidance. This guidance stated that in addition to the previously identified minimum requirements, data sheets included with a valid delineation must include identification of dominant vegetation according to the "50/20" rule, a soil profile description horizon by horizon, and a description of hydrologic indicators. Data points for which data sheets are provided must be identified on the wetland delineation map and sufficient data points must be examined to ensure that the data sheets accurately characterize the wetland boundary.

In sum, the current minimum delineation requirements include the following:

- Accurate identification of the entire project area of influence.
- Data sheets with vegetation identified according to the 50/20 rule, soil profile and hydrologic indicator descriptions. A narrative justifying the wetland boundary location must be provided.
- The location of data points must be mapped on a delineation map with a scale less than 1"=400'; photobase maps must be corrected for distortion
- The wetland delineation map must accurately identify the location of the different wetland types present.

Status of compliance: WWS reviewed the 1988 wetlands delineation map which consisted of a single overlay on one enlarged 1985 aerial photograph, but the report detailing how the delineation was done was not available in time for this review. In 1988, wetlands were delineated only in portions of the Narrows Basin and there are an estimated additional 100 acres outside of the Narrows Basin subject to substantial (i.e., 30 to 100%) changes in hydrologic support. The DEIS also ignores impacts of ancillary project features (road relocation, recreational facilities, access roads, water pipelines) that include, at a minimum, 28 stream crossings. This violates the minimum delineation guidelines that state the entire project area of influence must be identified and examined for wetlands.

The Narrows Basin wetland delineation was apparently conducted by a private contractor for the BOR in the 1980's (exact date unknown) and is at least 10 years old. The mapping identified 140 acres of wetlands in the Basin, but did not include any of the silver sagebrush (*Artemisia cana*) community as being wetland. However, the silver sagebrush community is most pronounced near tributary junctions, shows up in nine mapped polygons as containing moist to wet soils often with small drainages (1985 infrared aerial photograph map base) and is apparently underlain by mollisols with aquic moisture regimes. As identified by Mt Nebo (1992), the community also is dominated by hydrophytic species. Both of the two dominant shrub species, silver sagebrush and shrubby

cinquefoil (*Potentilla fruiticosa*) occur in wetlands. Two of the five dominant herbaceous species, small wing sedge and silverweed (*Potentilla anserina*) are wetland indicator species. Silverweed is an obligate wetland species, meaning that 99 to 100% of the time it is found in wetlands. Data sheets and narrative reports justifying the wetland boundaries mapped in 1988 were not located by the BOR in time for review so the justification for excluding silver sage areas bisected by drainages is unknown.

6.2 Length of Time Jurisdictional Determinations Valid

Regulatory Guidance Letter 90-6 issued by the COE specified that jurisdictional delineations performed before 1990 were valid for only two years, with post-1990 delineations valid for three years from the date they were approved in writing. The RGL also stated that oral approval of delineations would cease to be valid. Exceptions would only be made for unusual circumstances. RGL 94-1 extended RGL 90-6 until December 31, 1999. Jurisdictional determinations made prior to 1994 would remain valid for three years but the COE could extend the three year period to five years, "unless new information warrants a new jurisdictional determination." Starting in 1994, new delineations would remain valid for five years.

Status of compliance--Wetlands within only a portion of the project area were delineated in 1988. It appears that there is no written statement by the COE in any of the BOR files regarding the delineation and no identification of extenuating circumstances that would allow an extension of the delineation acceptance past 1990. Thus it can only be assumed that the DEIS was released based upon an outdated delineation. Even if the COE extended the delineation from 1988 to 1998, new information regarding the project's area of influence and a discrepancy between the acreage delineated in 1988 and the acreage used in the DEIS mandates a reexamination of the delineation.

6.3 404(b)(1) Guidelines

Section 404(b) of the Clean Water Act requires that individual permits comply with the 404(b)(1) guidelines developed by the EPA (40 CFR 230.1-230.80). These guidelines require that a permit be issued only in the absence of practicable alternatives that would have a lesser impact and that a proposed project can not be defined so narrowly so as to eliminate other alternatives. The burden of proof is on the applicant as the presumption is that the project is not the least-damaging practicable alternative when special aquatic sites including wetlands, are affected. Although not part of the 404(b)(1) guidelines, 33 CFR 320.4.a.1 requires that water supply and conservation be considered in evaluating the effects of water projects.

There are a number of factual findings required under 40 CFR 230.11-.12 that are used to determine if the project would result in a ***"significant degradation of the waters of the United States"*** (230.10[c]). The Factual Findings require a determination of direct effect on all special aquatic sites including wetlands, vegetated shallows and riffle and pool complexes, as well as the downstream effects of the project on all waters of the US. The need to consider downstream effects of a dam through flow depletion was upheld in *Riverside Irrigation District v. Andrews*, 758 F.2d 508 (10th

Cir. 1985) which identified that the COE needed "to consider all effects, direct and indirect, of the discharge for which authorization is sought".

Mitigation requirements are identified in 40 CFR 230.10(d) which specifies that mitigation plans must provide sufficient detail to ensure that the mitigation is capable of being implemented and will be effective in meeting goals once implemented. As a result of this clause, mitigation can be rejected if it relies too heavily on future analyses, unproven methods or methods in which success has been highly variable.

Status of compliance: Factual findings necessary to address the significant degradation clause of the 404(b)(1) guidelines have not been provided in the DEIS, particularly sections 230.11(b) which require a description of downstream flows and effects on special aquatic sites where there are changes in hydrologic regulation; 230.11(g) assessment of the cumulative project effects of both direct (fill, inundation) and indirect (changes in water quantity and quality) impacts; and 230.11(h) consideration of secondary effects associated with dams.

The lack of factual findings in the DEIS concerning changes in hydrologic regulation and downstream effects of dams demonstrates that the DEIS does not comply with the 404(b)(1) guidelines. More than 100 acres of wetlands, vegetated shallows and other waters of the US downstream of the proposed Narrows Dam would be subject to dramatic changes in hydrologic support (see sections 3.2, 3.3 and Table 1). Failure to address these impacts is a violation of 230.10(c). The DEIS also fails to address secondary effects associated with the Project in the Sanpete Valley that could adversely affect the spotted frog (see section 4.1.4, Valley Streams subheader).

The DEIS also rejects practicable alternatives that have much less impact on wetlands, such as Alternative C--Water Conservation Without Development of Other Water Supplies, because it doesn't meet one of the project purposes that of "developing Gooseberry Creek water". This violates the guidelines by defining the project so narrowly so as to exclude other alternatives. It also violates 33 CFR 320.4.a.1 which states that water supply and conservation must be considered in evaluating the effects of water projects.

The DEIS also improperly uses mitigation to justify the preferred alternative. If the preferred alternative really is the least damaging alternative, then mitigation can be used to compensate for unavoidable impacts. However, the DEIS uses mitigation to "buy down" the impacts of the preferred alternative in violation of section 230.10(d). It does this by not disclosing the huge impacts associated with flow depletions downstream of the proposed Narrows Dam. Instead it pretends that it will mitigate the impacts away. In fact, three practicable alternative were dismissed because of environmental impacts that the DEIS indicated would be greater than the mitigated preferred alternative. For example the Direct Diversion alternative was dismissed because it would impact 60 acres of wetlands and degrade Cottonwood Canyon for a net total of 60-80 acres of wetlands as compared to the mitigated preferred alternative of 100 acres of wetlands. However, the unmitigated preferred alternative has more than 200 acres of impacts and will also likely also degrade

Cottonwood Canyon. Practicable alternatives with less than this amount of impact can not be dismissed according to the 404(b)(1) guidelines and mitigation can not be used to buy down the impacts of an alternative so that it will seem to have less impact than others.

The proposed mitigation plans in the DEIS are also are insufficient to assess success as is required by 40 CFR 230.10(d). The Middle Gooseberry Creek mitigation proposes a technique that has had variable success, is not suited for a meandering stream and would likely result in further stream degradation. Of the four mitigation sites proposed for the Narrows Basin, only one contains both suitable soils for wetlands and some ability to provide mitigation in the same watershed. There is insufficient detail in the mitigation plan to assess the ability of the site to replace the lost functions and values of the Narrows Basin.

6.4 1989 Mitigation MOA

The 1989 MOA between the COE and EPA regarding mitigation requirements under the Section 404(b)(1) guidelines identified a specific sequence in which mitigation must be approached. The first step is to identify the wetlands within the project area (both direct and indirect), then look at measures to avoid impacts. Wetland identification and impact avoidance is always the first step. For activities in which there remains unavoidable impacts, minimization of impacts must then be considered. Only then can project impacts be addressed through compensatory mitigation. The MOA emphasized that compensatory mitigation could not be used as a method to reduce the impacts of an alternative to allow its selection under the least environmentally damaging practicable alternative requirement of the 404(b)(1) guidelines (section 230.10[a]).

Status of compliance: The DEIS inappropriately uses mitigation to justify the preferred alternative in violation of the 1989 MOA sequencing requirements. See discussion above.

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Section 1

CARBON WATER COMMITTEE

P.O. Box 509
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Members

Carbon Water Conservancy District

Price City

Helper City

Wellington City

Carbon County Commission

Price River Distribution System

Carbon Canal Company

Utah Power

May 14, 1998

HAND DELIVERED

Mr. Michael A. Schwinn
Chief, Utah Regulatory Office
U.S. Army Corps of Engineers
1403 South 600 West, Suite A
Bountiful, Utah 84010

RE: Written Comments on: (1) the Application by the Sanpete Water Conservancy District for a Department of the Army permit under Section 404 of the Clean Water Act (Public Notice No. 199250255) (the "§ 404 Application"); and (2) the March 1998 Draft Environmental Impact Statement (the "DEIS") for the proposed Narrows Project.

Dear Mr. Schwinn:

51-54 The following comments on the § 404 Application and the DEIS for the proposed Narrows Project are submitted on behalf of the Carbon Water Committee. We appreciate the opportunity to submit these comments and request that the U.S. Army Corps of Engineers carefully consider these and the other public comments submitted on the § 404 Application and the DEIS.

The Carbon Water Committee represents a broad spectrum of governmental entities and agricultural, municipal, and industrial water users in Carbon County. The members of the Carbon Water Committee are the Carbon County Commission, Price City, Helper City, Wellington City, the Price River Water Improvement District, the Price River Distribution System, the Carbon Canal Company, Utah Power & Light Company, and the Carbon Water Conservancy District. However, the Carbon Water Conservancy District is not participating in the Committee's review of the § 404 Application and the DEIS or the preparation of the Committee's comments on the § 404 Application and the DEIS.

After careful review of the § 404 Application and the DEIS, we believe that the § 404 Application should be denied. The DEIS is fundamentally flawed and does not comply with the goals and requirements of the National Environmental Policy Act ("NEPA"), the Environmental Protection Agency's § 404(b)(1) guidelines, or current State of Utah and Bureau of Reclamation policy. Further, the Narrows Project is contrary to

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the public interest. For these reasons, as more completely described in our comments, the Carbon Water Committee urges the Army Corps of Engineers to deny the § 404 Application.

Pursuant to 33 C.F.R. § 327.4(b), the Carbon Water Committee hereby requests that a public hearing on the application for the 404 permit be held in Price, Utah. A public hearing is necessary to highlight the adverse impacts that the Narrows Project would have on the natural environment and the economy of Carbon County, and demonstrate that the Project is contrary to the public interest.

EXECUTIVE SUMMARY

The purpose of the National Environmental Policy Act, or NEPA, is to ensure that federal agencies make informed decisions concerning proposed projects with significant impacts on the natural and human environment. To that end, the statute, its implementing regulations, and numerous federal decisions on NEPA emphasize that before an agency can make an informed decision concerning a proposed project, the agency must first take a hard look at the project. It is clear that the DEIS fails to comply with this most fundamental requirement and thus violates NEPA and the § 404(b)(1) guidelines.

The DEIS is merely a repackaged version of the legally flawed Final EIS for the Project that was issued in January of 1995. The previous application for a § 404 Permit by the Sanpete Water Conservancy District (the "SWCD") relied on that Final EIS, which was followed by the Bureau's Record of Decision on the Project issued in May 1995. The Bureau rescinded the Record of Decision for the Final EIS in September 1995, then subsequently announced in February of 1996 that it would prepare a new EIS to "supersede the contractor-prepared Final EIS." (See 61 Fed. Reg. 4790 (Feb. 8, 1996). However, the Bureau merely adopted and repackaged the incomplete data and unsupported editorializing in favor of the Project found in the discredited, contractor prepared Final EIS.[1] Consequently, the comments that the Carbon Water Committee and other public and private entities submitted to the Corps in February and March of 1995 on the Final EIS and the SWCD's previous § 404 application, and in the scoping process on the new DEIS have largely been ignored.

The principal shortcomings of the DEIS are as follows. It mischaracterizes and fails to adequately document a need and purpose for the proposed Narrows Project. It fails to identify and analyze a range of practicable alternatives to the Project, including the most obvious alternative of water conservation. The DEIS also fails to conduct a cost / benefit analysis of the Project, even though the Bureau applied financial considerations to summarily reject the

[1] Even a cursory review of the Draft EIS reveals much that is identical to that in the rescinded Final EIS. This repackaging is particularly evident in Chapter 3, which is entitled "Affected Environment/Predicted Effects," and is a critical part of the document. However, except for being re-arranged under different headings and printed with a different font, much of the discussion in Chapter 3, even to the point of misspellings and typos, is identical to Chapter 3 in the Final EIS. Further, except for listing the "The Utah Water Data Book," a general pamphlet prepared by the Utah Division of Water Resources, the bibliography of the DEIS lists the same documents as the bibliography for the Final EIS, indicating that no new studies or investigations were conducted in connection with the DEIS.

identified alternatives to the Project that it purported to study. The DEIS is based on out-dated, incomplete data and it fails to adequately identify and analyze potential impacts of the Project. Specifically, the DEIS inaccurately estimates Project impacts on wetlands, stream flows, water quality, aquatic and reservoir fisheries, recreation, and agricultural, municipal, and industrial water use in the Price River system. It also fails to examine possible Project impacts on the endangered Colorado Squawfish, which is found in the Price River, and on other fisheries, riparian, and recreational resources of the lower Price River. The DEIS also fails to examine possible Project impacts on the Spotted Frog, which is found in Sanpete County and is the subject of the January 1998 interagency conservation agreement that was signed by, among others, the Bureau of Reclamation.

Further, the DEIS purports to determine the financial benefits of using Project water in Sanpete County without identifying the actual costs of the water to those persons using the water, or the adverse impacts caused by transferring this water out of the Price River system. The DEIS also proposes questionable mitigation measures, in probability of occurrence and effectiveness, in connection with the Project's acknowledged impacts on wetlands, stream and reservoir fisheries, recreation, water quality, and wildlife. Nor does the DEIS attempt to reconcile the Bureau's inconsistency in requiring an over $2 million reconstruction on the foundation of Scofield Reservoir to withstand a 7.5 magnitude earthquake, while advocating construction of the Narrows Reservoir, approximately 17 miles away and closer to a potentially active fault, to withstand only a 5.5 magnitude earthquake. The DEIS ignores the obvious conflict between the Project and the policies of the Bureau that emphasize water conservation, protection of the environment, and integrated resource management on a watershed basis. The DEIS likewise ignores the obvious conflict between the Project and the policies of the State of Utah that emphasize water conservation and reducing the extremely high per capita consumption of water in the State.

In simple terms, the Project makes no sense. It is estimated to cost $17.3 million of public funds, but it will not result in any new land being put into production. Instead, it will provide only supplemental irrigation water to reduce annual irrigation water shortages by approximately 11% in the Project area and allow some persons to harvest a third crop of alfalfa each year. In addition, the Project is a transbasin diversion that will move water from existing high-value beneficial uses, including support of wetlands and a high quality trout fishery, to supplemental irrigation, a low-value use. The Project would be environmentally destructive and would adversely impact agricultural, municipal, and industrial water users in the Price River system.

In making public interest determinations pursuant to the § 404(b)(1) guidelines, the Corps balances the benefits that are reasonably expected to accrue from the proposal against reasonably foreseeable detriments. See 33 C.F.R. § 320.4(a). The modest benefits of the Project are far outweighed by its fiscal, environmental, and socioeconomic costs. Consequently, the § 404 Application should be denied.

DISCUSSION

1. The DEIS fails to establish a need for the Narrows Project.

The federal regulations that implement the requirements of NEPA require an EIS to identify the need for the project that is under consideration and reasonable alternatives to the project. See 40 C.F.R. § 1502.13. Concerning this requirement, the Bureau of Reclamation's own handbook on implementing NEPA states in part:

> This section [of the EIS] should briefly describe why the action is needed and what the action is designed to accomplish. It should provide a brief history leading to current conditions and anticipated future conditions. . . . Care must be taken to ensure an objective presentation and not a justification.

See United States Department of Interior, Bureau of Reclamation, National Environmental Policy Act Handbook § 4-9 (October 1990) (emphasis added). Further, in a letter, dated April 2, 1991, from Brooks Carter, Chief of the Utah Regulatory Office, to Mr. Richard M. Noble of Franson-Noble & Associates, Mr. Carter emphasized that the purpose and need for the proposed Narrows Project needed to be established for the Corps to conduct its review of the Project under the §404(b)(1) guidelines:

> With respect to the proposed Narrows Project and anticipated wetland losses, the 404(b)(1) guidelines require an analysis of alternatives which would avoid impacts to wetlands. This analysis should also include a clear justification for the project.

(Emphasis added). A copy of the April 2, 1991 letter is attached to these comments as Exhibit "A." Contrary to the direction of the above-referenced CEQ regulations, the Bureau's guidance, and the Corps' explicit directive on this matter, the DEIS summary of the purpose and need for the Narrows Project is not an objective presentation, but rather a subjective justification for construction of the Project.

> The DEIS fails to establish a need for additional agricultural water in northern Sanpete County.

In Section S.4 ("Summary of Project Purpose and Need") and Section 1.3 ("Purpose and Need"), the DEIS indicates that the purpose of the Project is to provide water for agricultural and municipal use in northern Sanpete County. Specifically, the purpose of the Project is to provide 4,920 acre-feet of water for the supplemental irrigation of 15,420 acres of land, and 480 acre-feet of water for lawn-watering in four towns in Sanpete County. In other words, the DEIS indicates that the purpose of the Project is to satisfy certain needs for agricultural and municipal water in northern Sanpete County. The DEIS also states that other purposes of the Project are to improve existing water conveyance facilities in Sanpete County and to meet a need for additional outdoor recreation facilities. However, the statements in the DEIS on the reasons for the Project are simply undocumented generalizations that do not establish a need for the Project.

The DEIS acknowledges that the bulk of the water that would be stored and diverted by the Project will be used to reduce late-season irrigation shortages of between 19 and 30 percent (averaging about 15,000 acre-feet per year) on land within the proposed delivery area for Project water. See DEIS at 1-9. However, the DEIS provides no documentation to establish that there is any need for supplemental irrigation or that the Project is a sensible way to meet such need. Consequently, the DEIS fails to establish that there is a need for agricultural water in northern Sanpete County.

As a threshold matter, to establish the existence of irrigation shortages that need to be reduced by the Project, the DEIS should have identified: (1) the specific lands that would be served by the Project which experience late-season shortages of irrigation water; (2) the water rights and water sources, and quantities of water under the rights and sources, that are used to provide irrigation water to these lands; (3) credible, up-to-date studies showing how much water is actually available under the water rights and water sources each year; (4) the irrigation practices, and their relative efficiencies, used on the specific lands; (5) credible, up-to-date studies documenting irrigation shortages on the identified lands; (6) the findings of these studies; and (7) the negative consequences (i.e., social and economic costs) of the shortages.

However, no such information is provided in the DEIS. It does state that there are over 23,000 acres in the Project area and, based on soil, drainage, and topographic conditions, 15,420 of the 23,000 acres are eligible to receive Project water. See DEIS at 1-9. However, the DEIS does not identify the location of the 15,420 acres.[2] Nor does it identify the water rights and sources of water used on such lands and/or summarize any credible studies concerning the claimed irrigation shortages on the 15,420 acres that would receive Project water, or the negative impacts of the shortages. The only reference to any study in this Section of the DEIS is in the last paragraph of Section 1.3.2, which alludes to "25 of 33 years studied" but fails to provide any more information. See DEIS at 1-9. This paucity of information makes it impossible to determine whether there are annual irrigation shortages in the area that would receive water under the Project and, if such shortages exist, whether they have such a negative effect as to justify expending over $17 million of public funds to reduce such shortages.

Consequently, the DEIS fails to comply with one of the threshold requirements of NEPA and the Bureau's own guidance with respect to analyzing whether there is even a need for the Project.

The DEIS fails to establish a need for additional municipal water in northern Sanpete County.

The DEIS indicates that that the Project would serve a need for municipal water in northern Sanpete County by initially providing 480 acre-feet of water per year for lawn-watering in the towns of Fairview, Mount Pleasant, Spring City, and Moroni. See DEIS at S-4. However,

[2] Since the DEIS indicates that 15,420 of the 23,000 acres are eligible to receive Project water, based on soil, drainage, and topographic conditions, the specific location of the 15,420 acres should be identified in the DEIS.

the DEIS fails to provide or summarize credible data to establish that there is a need for such water, or that the Project is a sensible mechanism to meet these needs. This discussion in the DEIS contains a little more information than in its claims of late-season shortages of irrigation water in the unidentified Project area. However, the information presented is simply not relevant to the issue of whether additional water for lawn-watering is needed in the four identified towns. Further, although individual homeowners may choose to use culinary water to irrigate their lawns, it is not proper to characterize a perceived need for water for individual lawn-watering as a need for municipal water.

Section 1.3.1 ("Additional Municipal Water Supply") of DEIS contains a number of charts and graphs summarizing certain per capita uses of culinary and secondary water use. Specifically, Figure 1-1 shows the per capita culinary water use per day in 1990 in the United States and in the western states, including Utah, in 1990. Further, Tables 1-1 and 1-2 (undated) show per capita culinary and secondary water use along the Wasatch Front. These charts are interesting, but contain no information on municipal water use in Sanpete County. Further, these charts contain no information on the municipal water that the DEIS states is used for lawn-watering in Fairview, Mount Pleasant, Spring City, and Moroni. Instead, the DEIS bases this purported need for municipal water on its earlier, undocumented contention that irrigation water shortages exist in the Project area.

The DEIS should have provided information to show whether there is a need for water for lawn watering in each these towns. Specifically, it should have contained information that identifies: (1) the water rights or sources of water used by each of the 4 towns; (2) the total quantity of water that is available to each of the 4 towns under its water rights and sources of water; (3) the amount of each town's available supply that is used for indoor use; (4) the amount of each town's available supply that individual homeowners use for irrigation of their lawns; (5) how the water that individual homeowners use to water their lawns is applied to the lawns, i.e., flood irrigation or sprinkler systems; (6) the need in each of the 4 towns for additional water for outdoor, lawn-watering use; (7) the impacts (i.e., social and economic costs) of the need for additional for lawn-watering; and (8) whether the current and future projected needs for water for lawn irrigation could be met through pricing strategies, restricting or alternating lawn-watering, using sprinkler systems, and using certain landscaping practices such as xeriscaping. Finally, the DEIS should have evaluated the identified present and projected future needs in connection with the State of Utah's stated policy of reducing the extremely high per capita consumption of water by 25% by 2050. See Utah Division of Water Resources, The Utah Water Data Book 8 (December 1997).

The DEIS provides no such information and/or analysis. Further, its above-referenced discussion of Mt. Pleasant's irrigation system is far too general to establish a current need for additional water supplies for lawn-watering in the 4 towns, or a future need for municipal water in those towns. Among other things, it assumes that each town's municipal water use is identical to the others. Thus, the DEIS fails to identify water rights and sources of water for each town, the water delivery system used by each town, what portion of each town's supply of water is used for indoor and outdoor purposes, and what type of actual demand exists for this use of water. Finally, it is not appropriate to characterize a perceived need for water for lawn-watering

as a need for municipal water. Consequently, this discussion in the DEIS fails to show a need for another purported purpose of the Project and, consequently, fails to comply NEPA and the Bureau's own guidance.

The DEIS fails to establish that there is a need for additional recreational facilities.

The DEIS indicates that a third purpose of the Project would be to satisfy a need for improved and additional recreation and fishery opportunities in Sanpete County. However, the DEIS fails to specify and document these needs or identify why the Project would be the best means of meeting these needs. Instead, the DEIS merely speaks in generalities on this subject. For example, it states that "the demand for recreation is increasing rapidly in the project area" and quotes the following language from the 1992 State Comprehensive Outdoor Recreation Plan (SCORP):

> As Utah's population continues to grow, so does the demand for recreation facilities and opportunities. Obviously, the recreation system in place in 1970 or even 1980 is no longer adequate in the 1990s.

See DEIS at 1-12. The DEIS also refers to a statement in the 1986 Land and Resource Management Plan for the Manti-LaSal National Forest that demand for recreational sites is expected to triple over the next 50 years. However, other than providing general statements such these, the DEIS fails to identify any studies or plans identifying current recreational uses and/or needs in Sanpete County, or establish that these needs would only be satisfied by the construction of a dam and reservoir like proposed Narrows Project. Consequently, the DEIS discussion of the recreation needs to be met by the Narrows Project is included as just another justification for the Project, not an objective presentation, and it fails to comply with the requirements of NEPA.

The DEIS estimates of current and future demands for water for municipal uses reveals that the true purpose of the Narrows Project is to allow the Sanpete Water Conservancy District (the "SWCD") to obtain public funds to essentially purchase water for future municipal purposes at low-cost irrigation water rates. The Project would provide 480 acre-feet of municipal water, barely 17% of the projected future municipal shortages. See DEIS at 1-9, 2-5. The DEIS expressly acknowledges that water developed by the Project will be increasingly used for municipal purposes in the future. See DEIS Table 2-1, footnote 1 at 2-5. Thus, the DEIS anticipates that the objective of reducing late-season irrigation shortages will be sacrificed to meet increasing municipal demand.

Use of the irrigation need to finance municipal water development is inconsistent with the SRPA. The DEIS states that the SWCD plans to obtain 65% of the estimated Project costs of $17.3 million from funds under the Small Reclamation Projects Act of 1956 ("SRPA"), as amended. See DEIS at 2-24. When first enacted, the SRPA provided funding only for irrigation projects, but has been amended to allow multipurpose projects so long as commercial irrigation is one of the purposes of the project. Stated another way:

> Loans cannot be made [under SRPA] solely for a municipal water project even if most of the water will be used for irrigation of lawns and gardens. Such use is not considered to be irrigation within the intent of this Act.

See United States Department of Interior, Bureau of Reclamation, Loans Under the Small Reclamation Projects Act of 1956 at 3 (September 1988). Further, under SRPA, the irrigation component of a project receives a no-interest loan, while other components must pay interest on the amounts loaned for such components. The interest rate on non-irrigation components, such as water for municipal use, is based on the market yield interest rate on certain long-term federal government obligations that have a similar term to the respective loan repayment period. Consequently, by portraying the principal purpose of the Project to be the provision of supplemental irrigation water, the DEIS facilitates funding the bulk of Project costs through a no-interest loan when in fact the Project water is ultimately intended for municipal uses. It is inappropriate for the Project to be advocated for one purpose when ultimately intended for another.

Another reason for the recitation in the DEIS concerning the municipal water and recreational facilities needs that will be satisfied by the Narrows Project is suggested by language in the three sentence Section B.3 ("Costs and Financing") in the DEIS. This is the only section in the DEIS that discusses the estimated costs of the Narrows Project. It indicates that 65% of the estimated Project costs of approximately $17.3 million will be financed under the SRPA ($11,245,000) and that the remaining 35% of the total costs ($ 6,055,000) "includes costs already incurred by the [Sanpete Water Conservancy District] and funding provided by the State of Utah." See DEIS at 2-24.

As a matter of clarification, no money at this time has been appropriated for the Project under the SRPA. Further, no money has been earmarked for or provided by the State of Utah for the Narrows Project. The State rarely has the financial resources to provide funding for irrigation components of Bureau-related projects. However, state funds might be available to provide funding for other water uses, including water developed in conjunction with recreational facilities and for municipal purposes. Consequently, the municipal water and recreational facilities components of the Narrows Project appear to be added to the Project more for the purpose of acquiring funding than for fulfilling actual current needs.

Conclusion.

The Army Corps of Engineers will not issue a § 404 permit for a project that is contrary to the public interest. See 33 C.F.R. § 320.4(a)(1). As its regulations indicate, its public interest review requires examining a wide range of factors:

> Evaluation of the probable impact which the proposed activity may have on the public interest requires a careful weighing of all those factors which become relevant in each particular case. The benefits which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments.

Id. Further, a component of the public interest review is "[t]he relative extent of the public and private need for the proposed structure or work." 33 C.F.R. § 320.4(a)(2)(1). The DEIS does not adequately demonstrate a "public and private need" for the Narrows Project. Consequently, the Narrows Project is not in the public interest.

2. The DEIS violates NEPA by failing to analyze reasonable alternatives to the Project and inadequately discussing the alternatives it purports to have studied. The DEIS also violates the "practicable alternatives" requirement of the § 404(b)(1) guidelines.

The goal of NEPA is to ensure that federal agencies make informed decisions concerning proposed projects with significant impacts on the natural and human environment. Before an agency can make an informed decision concerning a proposed project, the agency must first take a hard look at the project. A crucial aspect of this hard look is the analysis of reasonable alternatives. This requirement is also emphasized by the federal regulations that implement NEPA. For example, 40 C.F.R. § 1502.14 states that the analysis of reasonable alternatives "is the heart of the environmental impact statement," and that agencies must "[r]igorously explore and objectively evaluate all reasonable alternatives" to a proposed project. See § 1502.14(a).

The DEIS fails to seriously consider a range of reasonable alternatives to the proposed Narrows Project and thus violates NEPA. This fundamental flaw demonstrates that the Bureau has not taken a "hard look" at the Project and cannot make the informed decision on the Project that is required by NEPA. This failure also violates the threshold requirement in the § 404(b)(1) guidelines that an applicant for a § 404 permit adequately consider practicable alternatives to the proposed project. Since this threshold requirement has not been satisfied, the § 404 Application should be denied.

Under EPA's § 404(b)(1) guidelines:

> [N]o discharge of dredged or fill material should be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences.

40 C F R § 230.10(a) Further, the § 404(b)(1) guidelines provide that an alternative is practicable if:

> it is available and capable of being done taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the applicant which could be reasonably obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered.

See 40 C.F.R. § 230.10.(a)(2); see also 40 C.F.R. § 230.3(q) (defining "practicable").

The DEIS indicates that the principal purpose of the Narrows Project is to reduce annual irrigation water shortages in northern Sanpete County. This would be accomplished by providing 4,920 acre-feet per year for the supplemental irrigation of 15,420 acres (approximately 4" per acre). Consequently, the threshold question in reviewing the § 404 Application is whether the applicant has adequately considered practicable alternatives to the Narrows Project that might provide an equivalent quantity of water with less adverse impacts on aquatic ecosystems. Clearly, the § 404 Application and the DEIS on which it relies cannot satisfy this basic requirement.

As a threshold matter, the selection criteria identified in the DEIS for determining what alternatives to the proposed Project should be studied demonstrates that the alternatives analysis in the DEIS is a sham and nothing more than a justification of the proposed Project. Specifically, the selection criteria are as follows:

> 1. The project must include irrigation water supply as a project purpose and provide expected project benefits for at least the duration of the loan repayment period.
>
> 2. The project must provide additional water supply to north San Pete County at the time of season when it is needed.
>
> 3. The project must comply with all statutory and regulatory requirements and guidelines including section 404 of the Clean Water Act and the Endangered Species Act.
>
> 4. The project must be financially feasible.
>
> — loan repayment must use 100% of the irrigation amortization capacity and be repaid within 40 years or less;
>
> — loan factor for the project must be 0.5 or less (SRPA does not require proof of economic feasibility, *i.e.*, a benefit - cost analysis);
>
> 5. The project must divert and store water under a legal claim of right and priority in full compliance with state law.

See DEIS at 2-1. This selection criteria do not focus on ways to meet the purported purposes and needs of the Project. Rather, they artificially constrain possible alternatives by requiring, among other things, that every alternative must be financially feasible under Small Reclamation Project Act standards (which the DEIS is quick to note does not require proof of economic feasibility). The selection criteria also require that an alternative "must divert and store water under a legal claim of right." See DEIS at 2-1. These are not relevant and objective criteria. They demonstrate that the Bureau has abandoned any objectivity that it may have had at one time concerning the Project and has simply adopted the views of the Sanpete Water Conservancy District that

because it has unused water rights in the Gooseberry Creek drainage that it feels entitled to use in a dam and reservoir project, it is the Bureau's duty to ensure that such a project is built.

The DEIS acknowledges that it only studied 3 alternatives in any detail – the proposed Project, a smaller version of the Project, and the no-action alternative. See DEIS at S-3 to S-4. The DEIS also acknowledges that it briefly considered then rejected 10 "nonviable" alternatives. Consequently, the DEIS actually examines only two alternatives in any detail, and the only difference between these involves the size of the reservoir that would be constructed.

The discussion in the DEIS concerning the reasonable alternatives that it summarily rejected demonstrates how its inclusion in its selection criteria of the requirement that an alternative project "must divert and store water under a legal claim of right" allowed the Bureau to easily reject these alternatives and rationalize analyzing only the large reservoir and small reservoir options in any detail. For example, in discussing the Mammoth Damsite Alternative and the Valley Damsite Alternative, the DEIS rejected these alternatives based on this water right criteria. Specifically, the DEIS indicated:

> Conditions set forth in the 1984 Compromise Agreement and the approved water right dictate site location and storage capacity of the project reservoir. If those conditions are not met, water-rights relative to the project would be forfeited.

See DEIS at 2-47, 2-49. However, the existence of a contract concerning water rights owned by the proponent of a project or between persons that may be affected by a proposed project has no bearing on the plain legal requirement that reasonable alternatives must be studied in an EIS. The Council on Environmental Quality ("CEQ"), which adopted the federal regulations implementing NEPA, has emphasized that "reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant." (Emphasis added). Interpreting this mandate, the CEQ has plainly stated that reasonable alternatives which are outside the legal jurisdiction of the lead agency must be analyzed in an EIS. See Council on Environmental Quality, Questions and Answers about the NEPA Regulations No. 2b (March 16, 1981). See also § 1502.14(c) (the EIS must "include reasonable alternatives not within the jurisdiction of the lead agency.").

Likewise, an applicant for a 404 permit cannot avoid considering practicable alternatives to a proposed project simply because the applicant might not have water rights for each alternative at the time it is studied. It is possible that after studying an alternative to a proposed project, the applicant might reasonably conclude that the cost of obtaining water rights for the alternative is so high that the alternative is not practicable under the 40 C.F.R. §230.10.(a)(2) standard. However, this conclusion must follow an objective analysis, and cannot be a presumption that is used as an excuse for not studying a particular alternative. Consequently, the existence of the 1984 Agreement or any other agreements relative to water use does not excuse the failure to adequately consider practicable alternatives to the Project.

The Corps itself has consistently emphasized this specific point in letters from Brooks Carter, the then Chief of the Utah Regulatory Office to Richard M. Noble, of Franson-Noble & Associates, Inc. (the preparers of the previous Draft EIS, Final EIS, and 1995 § 404 Application) dated October 7, 1992, and July 21, 1994. The Corps also emphasized this point in a letter dated December 30, 1997 from Michael Schwinn, the current Chief of the Utah Regulatory Office, to Kerry Schwartz, of the Bureau, concerning the Corps' review of the Preliminary DEIS. Specifically, the October 7, 1992 letter to Mr. Noble states in part:

> We have completed our review of the Narrows Draft Environmental Assessment Report (DEAR) and the Draft Small Reclamation Loan Application Report (DSRLAR).
>
> Only two alternatives are presented for consideration: Alternative A (the no action alternative) and Alternative C (the proposed plan). Other alternatives have been dismissed on the basis such alternatives would involve a breach of contract as per the 1984 Compromise Agreement. Our decision to issue or deny a permit will be based on the effect of the project upon the aquatic ecosystem, whether or not the project is in the public interest and an analysis of practicable alternatives. A range of alternatives, therefore, becomes critical in that decision making process. We cannot accept an alternatives analysis that is so narrowly defined by the 1984 compromise Agreement as to preclude consideration of other, less damaging practicable alternatives nor to allow our decisions to be prejudiced by such an agreement.
>
> . . . .
>
> The documents, in our opinion, too quickly dismiss water conservation and efficiency improvements. Approximately 40 percent of the project area is still under flood irrigation and serviced by open ditches and canals. There is obviously considerable room for additional water savings that have not been quantified. Indeed, the documents state that receipt of project water would be contingent upon additional water conservation measures being implemented. We see no reason such measures cannot be addressed and the water savings quantified as an alternative.

(Emphasis added). The July 21, 1994 letter to Mr. Noble is consistent with the above and provides in part:

> Reference is made to your letter dated June 30, 1994 in which you asked whether or not the Narrows Draft Environmental Impact Statement contained the information necessary for the Corps to conduct its own 404 (b)(1) Guidelines analysis.
>
> After a second review of the DEIS, we have concluded that the document only partially addresses the information necessary for the Corps § 404 (b)(1) analysis. The major flaw of the DEIS is in the development and analysis of the alternatives. The DEIS unreasonably restricts the scope of alternatives to that which was

> identified in the 1984 Compromise Agreement. It is the Corp's responsibility under the Guidelines to consider all practicable alternatives that address the basic and overall purpose and need of the project as it is determined by the Corps. As stated in earlier correspondence (see our letter dated October 7, 1992), the Corps cannot restrict its own alternatives analysis to so narrow a field as that given by the 1984 Compromise Agreement.

(Emphasis in letter). This position is also expressed in a letter dated July 20, 1994 from Mr. Carter to Robert D. Williams of the U.S. Fish & Wildlife Service that provides in part:

> We have completed our review of the Draft Coordination Act Report for the Draft Environmental Impact Statement for the Narrows Project. It would be premature at this time for the Corps to comment on the adequacy of the mitigation either proposed by the proponent or recommended by the Service and the Utah Division of Wildlife Resources; the presumption being that the preferred alternative and the impacts identified in the DEIS are a given. Furthermore, we are not prepared at this point to accept the project proponent's overall purpose and need of the project nor will we restrict ourselves to so narrow a range of alternatives as the proponent's reliance on the 1984 Compromise Agreement would dictate.

Finally, the December 30, 1997 letter from Mr. Michael Schwinn to Mr. Kerry Schwartz of the Bureau stated in part:

> Converting the remainder of north Sanpete County to sprinkler irrigation and replacing open ditches and canals with pipelines is estimated to save approximately 8,000 acre feet per year. To understand what this means in reducing the shortage, it should be compared to the Proposed Action and the smaller reservoir alternative, i.e., the proposed plan will reduce shortages from 30 percent to approximately 19 percent of the time. What will the shortage be reduced to with conservation measures.
>
> On page 2-52 it states that one reason this alternative was not considered further is because irrigation supplies would still be inadequate. However, we note that irrigation supplies under the proposed plan are still inadequate. It becomes a matter of degree to which the shortages are reduced and we are not prepared to concur that conservation measures alone are not a practicable alternative.

Copies of the October 7, 1992, July 21, 1994, July 20, 1994, and December 30, 1997 letters are attached to these comments as Exhibit "B," Exhibit "C," Exhibit "D," and Exhibit "E" respectively.

Further, the above-quoted statement from the DEIS that "If those conditions [in the 1984 Agreement concerning use of the water rights covered by the Agreement] are not met, water-rights relative to the project would be forfeited" is wrong. Under Utah law, all or a portion of a perfected water right may be subject to forfeiture if it is not used for five successive years. See Utah Code Ann. § 73-1-4. The water rights that the SWCD would like to use in the Project are

not perfected water rights. Rather, they are approved change applications. Consequently, these water rights are not subject to forfeiture under Utah law. Further, it appears there are no Utah statutes or decisions providing for the forfeiture of any kind of a water right, perfected or unperfected, simply because the use differs from that described in an agreement. Finally, it appears that under the change application process administered by the Utah State Engineer's Office, it would be possible to change the point of diversion, place of use, and/or nature of use of the SWCD's water rights.

In sum, the existence of the 1984 Agreement does not excuse the failure to study practicable alternatives to the Project, and the cursory rejection of these alternatives on the basis that they would involve a use of water that is different than discussed under the 1984 Agreement violates the 404(b)(1) guidelines, as well as the NEPA requirement that an EIS consider reasonable alternatives to a proposed project.

The DEIS failed to adequately analyze conservation measures as a reasonable alternative to the Project.

As noted earlier in this discussion, the range of alternatives to be identified and analyzed under NEPA depends on the nature of the proposal. See Council on Environmental Quality, Questions and Answers about the NEPA Regulations No. 1b (March 16, 1981). The DEIS indicates that the primary purpose of the Project is to reduce annual irrigation shortages on presently irrigated lands in northern Sanpete County. Thus, to satisfy NEPA, the DEIS should have identified and adequately considered alternatives to the Narrows Project that would satisfy that purpose. Its failure to do so is exemplified by its dismissal of conservation of existing water supplies as an alternative to the Project. Implementation of conservation measures that could likely decrease present shortages by reducing the quantities of water that are wasted each year in irrigation practices is likely a less damaging, practicable alternative to the Narrows Project that warrants a full, detailed evaluation. Consequently, the possibility of a range of water conservation measures as a practicable alternative to the Project warranted a detail, careful evaluation, rather than a cursory one page discussion and rejection in the DEIS.

The DEIS indicates that 60 to 75 percent of the irrigated land within the area that would be served by the Project currently use some form of water conservation. It also acknowledges that implementation of only a few conservation measures relative to this water use would save almost twice the quantity of irrigation water that would be delivered if the Project were built. Specifically, the DEIS states:

> Using estimates of present levels of efficiency which are based on existing conveyance facilities and on-farm irrigation systems, there is an average annual shortage of about 15,000 acre-feet of irrigation water. It is estimated that placing the remainder of canals and ditches in pipelines and converting the remainder of the on-farm systems to sprinkler irrigation would conserve about 8,000 acre-feet of water per year.

See DEIS at 2-46 (emphasis added).[3] The DEIS then fails to analyze this seeming practicable alternative to determine whether it is "capable of being done taking into consideration cost, existing technology, and logistics in light of overall project purposes." 40 C.F.R. ▪ 230.10(a)(2). Instead, the DEIS rejects the conservation alternative because it would not completely eliminate the average annual irrigation water shortages in the area. It states:

> [A]fter conservation measures have been implemented to the maximum extent possible, there would still be a shortage of about 19 percent or 7,000 acre-feet per year and a need for the 4,920 acre-feet of irrigation water that would be developed by the project.

See DEIS at 2-31. In other words, the DEIS rejected the conservation alternative because it would not completely eliminate these irrigation shortages in the Project area. However, this rejection appears inconsistent with the statement on page 2-4 of the DEIS that:

> The Project water is needed to reduce irrigation water shortfall on lands within the project area. These shortages average more than 15,000 acre feet per year on irrigated lands eligible to receive project water. All of the project's irrigation supply, about 4,920 acre feet of water, would be used on 15,420 acres of land to supplement existing irrigation water. This supply, coupled with water conservation measures, would reduce average irrigation shortages to about six percent, or 2,200 acre-feet per year. Average shortages of about five percent are considered optimal for irrigation projects.

See DEIS at 2-4 (emphasis added). In other words, the DEIS statement that some amount of average shortages "are considered optimal for irrigation projects," conflicts with its assertion that conservation of existing supplies was rejected as a reasonable alternative to the Project because it would not completely eliminate water shortages. Otherwise, the DEIS should have also rejected the proposed Project, since it too would not completely eliminate these irrigation shortages.

Assuming for discussion that the above estimates from page 2-31 of the DEIS are accurate, the fact that conservation measures alone would not eliminate annual irrigation water shortages in the Project area is no reason to so quickly reject this alternative. After all, the Narrows Project is intended to provide 4,920 acre-feet of supplemental irrigation water to apply to late-season water shortages, but is not intended to completely eliminate these shortages. Consequently, the DEIS should have analyzed whether the conservation alternative was reasonable in light of the costs of implementing conservation measures, existing technology, logistics, and the overall purpose of the Narrows Project. Since conservation measures: (1) would likely cost far less than the estimated $17.3 million of public funds required to construct the Narrows Project; (2) could be implemented using accepted basic technology; (3) would save

[3] This estimate is based on savings that could be realized by conservation in the Project area, which comprises less than 10% of the irrigated cropland in Sanpete County. See Table 3-22 at 3-75. The DEIS makes no effort to determine if implementing conservation measures on other lands could provide additional water that would reduce the shortages identified in the DEIS for the Project area.

almost twice as much water as the Project would provide; and (4) would not adversely impact the natural environment as the Narrows Project certainly will, implementation of these measures appears to be a practicable alternative deserving of detailed study and consideration in the DEIS.

The failure of the DEIS to adequately study the possible alternative of conservation measures makes no sense, particularly in light of the present emphasis by the Bureau on the importance of water conservation in every water management program. For example, in its Strategic Plan dated June 1992, the Bureau states that conservation is a guiding principle in managing and developing water resources: "Water conservation is a key element in improving the use and management of the Nation's water resources to more effectively meet present and future needs." See Reclamation's Strategic Plan 5 (June 1992). Further, the Blueprint for Reform: The Commissioner's Plan for Reinventing Reclamation (November 1, 1993), states that the Bureau will emphasize "conservation and improvements in the efficiency of use of already developed water" and that "promoting conservation will be given priority in our program activities." See Blueprint 1, 2. These Bureau policies are embodied in current water conservation guidelines issued by the Bureau in December 1996. See Reclamation Policy for Administering Water Conservation Plans Pursuant to Statutory and Contractual Requirements (December 10, 1996).

The failure of the DEIS to adequately study the possible alternative of conservation measures also runs counter to the following long-standing policy of the State of Utah encouraging conservation of existing supplies:

> The state supports and promotes the conservation and wise use of all water for all beneficial purposes. Water conservation will be given proper and careful consideration in feasibility investigations at all levels and for all projects. It will be examined as both a supplement and an alternative to project proposals. Sponsors for irrigation projects are encouraged to prepare a conservation plan approved by the local soil conservation district. Sponsors for culinary projects are encouraged to design a conservation plan to be approved by the presiding official of the community or district to be served by the project. All project sponsors will be advised to seek assistance from appropriate individuals or organizations to help develop the conservation plan and implement applicable conservation practices and programs for their water projects.

See State of Utah Department of Natural Resources, Division of Water Resources, Utah State Water Plan at 17-1 (January 1990) (quoting 1982 policy of Utah Division of Water Resources) (emphasis added). Further, in the recently issued publication entitled "The Utah Water Data Book," the Utah Division of Water Resources states:

> The Division of Water Resources believes that water conservation measures can reduce water demand in Utah by as much as 25 percent between the years 1995 and 2050.

Utah Division of Water Resources, The Utah Water Data Book 8 (December 1997). Further, in its list of recommendations to meet water demands of the 21st century, the Division states:

> Water conservation should play an important role in meeting Utah's future water demands. Stretching existing water supplies is less expensive and the right thing to do. Water suppliers should implement a strong water conservation program to make their already developed supplies go further.

Id. at 13. Finally, in 1998, the Utah Legislature passed H.B. 418, which enacts a new provision of the Utah Code (§ 73-10-32) to require water conservancy districts and other water retailers to develop water conservation plans concerning water that is used for domestic and culinary use. Specifically, § 73-10-32 requires all water conservancy districts to prepare and adopt, or update if one has already been adopted, a water conservation plan "to help conserve water, and limit and reduce its per capita consumption so that adequate supplies of water are available for future needs." The statute identifies a number of practices to consider in a water conservation plan, including use of water efficient systems, residential and commercial landscapes that require less water to maintain, water reuse systems, and water rate structures designed to encourage more efficient use of water.

In light of the above-referenced policies of both the Bureau and the State of Utah emphasizing the importance of water conservation, the failure of the DEIS to perform any credible analysis of the possibility of water conservation being a reasonable, or practicable, alternative to the Project is illogical and further emphasizes the lack of objectivity in the document. Another indication of the bias for the proposed Project in the DEIS is the terse, additional ground given for rejecting the conservation alternative because it: "Doesn't develop Gooseberry Creek water in accordance with purpose and need of project." See DEIS at 2-47. This reinforces that the Bureau's purpose in the DEIS is to ensure that the Sanpete Water Conservancy District can develop its water rights, rather than objectively evaluate reasonable alternatives in reducing the purported water shortages in northern Sanpete County.

The failure of the DEIS to study implementation of conservation measures as a reasonable alternative to the Project under NEPA, and/or as a practicable alternative under the 404(b)(1) guidelines, also runs counter to the Sanpete Water Conservancy District's repeated commitments to implementation of conservation practices. Specifically, in response to a request made by legal counsel for the Carbon Water Committee, pursuant to the Utah Government Records Access Management Act, for a copy of the policy referred to in the DEIS statement that "SWCD has adopted a policy that would require all recipients to implement conservation practices in order to be eligible for project water," see DEIS at Appendix F ("Environmental Commitments") ¶ 15, SWCD's legal counsel responded as follows:[4]

[4] SWCD's legal counsel did not provide a copy of the requested policy. Consequently, it appears that the DEIS statement that that "SWCD has adopted a policy that would require all recipients to implement conservation practices in order to be eligible for project water," is misleading.

> SWCD's conservation policy is based on the requirements of the Small Reclamation Projects Act and, in particular, the requirements of Section 210(b) of the Reclamation Reform Act of 1982. Under the act's express requirements, any water sales contracts will require that irrigators implement conservation measures and improve the overall efficiency of their irrigation systems to be eligible to receive project water.
>
> SWCD has already implemented extensive water conservation measures and those measures will continue. SWCD is well aware of the conservation requirements mandated by the Bureau of Reclamation under the RRA and has adopted and repeatedly committed to these requirements in numerous public and interdisciplinary team meetings.

Consequently, to be consistent with the above-referenced "extensive conservation measures" that SWCD's legal counsel indicate have been already implemented, the DEIS should have discussed the specific conservation measures that Sanpete has already adopted and the additional measures it has considered or is planning to implement.

Further, in light of the statement of SWCD's legal counsel that its conservation policy "is based the Small Reclamation Projects Act and, in particular, the requirements of Section 210(b) of the Reclamation Reform Act of 1982," the DEIS should have identified the measures that the Bureau has recommended be included in water conservation plans developed pursuant to the Reclamation Reform Act of 1982, and examined whether implementation of some or all of these measures by the SWCD would effectively reduce or eliminate the water shortages that the DEIS indicates the Project is intended to reduce.

Specifically, in December 1996, the Bureau issued Reclamation Policy for Administering Water Conservation Plans Pursuant to Statutory and Contractual Requirements, which discusses the water conservation plans that all water districts are encouraged to adopt pursuant to the Reclamation Reform Act of 1982. In this document, the Bureau recommended that the following elements be included in every water district's conservation plan:

(1) Description of the district;

(2) Inventory of water resources;

(3) Water management problems, opportunities, and goals;

(4) Existing water conservation measures;

(5) Fundamental water conservation measures;

(6) Additional water conservation measures;

(7) Selected measures and projected results;

(8) Environmental review;

(9) Implementation schedule and budget;

Further, the document recommends that the following additional factors to be considered in developing water conservation plans involving the use of water for agricultural purposes and the use of water for municipal and domestic purposes:

Agricultural Water Conservation Measures

A. On-Farm Program Incentives – Facilitate and/or provide financial incentives and assistance for on-farm water use efficiency improvements (*e.g.*, lease, low interest loans, or water charge rebates for on-farm conservation measures).

B. Drought/Water Shortage Contingency Plan – Develop a drought/water shortage contingency plan for the district that outlines policies and procedures for operation and allocation during water supply shortages.

C. Water Transfers – Facilitate voluntary water transfers that do not unreasonably affect the district, the environment, or third parties.

D. Conjunctive Use – Where appropriate, increase conjunctive use of surface and groundwater within the district, and work with appropriate entities to develop a groundwater management plan.

E. Land Management – Facilitate potential alternative uses for lands with exceptionally high water duties, or whose irrigation contributes to significant problems (*e.g.*, drainage that precludes attainment of water quality standards).

F. Operational Practices and Procedures – Evaluate potential district operational policy and institutional changes that could allow more flexibility in water delivery and carry-over storage.

G. Distribution System Scheduling – Implement a program of distribution system scheduling based on area-wide crop demand modeling or advanced ordering requirements.

H. On-Farm Irrigation Scheduling – Facilitate the delivery of crop water use and on-farm water delivery information to district customers for on-farm irrigation scheduling.

I. Pump Efficiency Evaluations – Coordinate the evaluation of district and private pumps with local utilities, evaluating both energy and water efficiency.

J. Distribution Control – Modify distribution facilities and controls to increase the flexibility of water deliveries (*e.g.*, automate canal structures, institute variable turn off times, etc.).

K. Reuse Systems – Construct district operational spill reuse systems.

L. Reduction of Conveyance Losses – Line distribution ditches and canals or convert to pipe.

M. Construction, Lining or Covering of Regulatory Reservoirs. Construct, line, or cover small regulatory reservoirs within the distribution system.

Municipal and Industrial Water Conservation Measures

A. Residential and Governmental Audit and Incentive Programs – Provide interior and exterior water audits and incentive programs for single-family residential, multi-family residential, and governmental/institutional customers.

B. Commercial and Industrial Audit and Incentive Programs – Conduct commercial and industrial water conservation audits, water use reviews, and incentive programs.

C. Landscape Programs – Provide landscape water conservation audit and incentive programs for new and existing customers.

D. Distribution System Audit Program – Conduct distribution system water audits, leak detection, and repair at regular intervals.

E. A Drought/Water Shortage Contingency Plan – Develop a drought/water shortage contingency plan for the district that outlines policies and procedures for operation and allocation during water supply shortages.

F. Wastewater Reclamation and Recycling Programs – Design and implement wastewater reclamation and recycling programs.

G. Plumbing Regulations. Enforce applicable Federal, State, and local requirements for the sale and installation of water-efficient plumbing products.

H. Fixture Replacement Programs – Implement programs to retrofit low consumption toilets and/or high efficiency showerheads in existing buildings.

I. Conjunctive Use – Where appropriate, increase conjunctive use of surface and groundwater within the district, and work with appropriate entities to develop a groundwater management plan.

The DEIS failed to examine whether any or a combination of the above conservation measures might be an effective means to reduce or eliminate the agricultural and municipal water shortages that the DEIS claims require the Project to be built. This failure underscores the Bureau's

inability to take a hard look at the proposed Project and reasonable alternatives to the Project. It further demonstrates that the DEIS fails to comply with the requirements of the § 404(b)(1) guidelines and the requirements of NEPA.

The § 404(b)(1) guidelines state that "no discharge of dredged or fill material should be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem." See 40 C.F.R. § 230.10(a). Conservation measures are a practicable alternative to the Narrows Project. Consequently, the application for the 404 permit for the Project must be rejected.

There are reasonable and potentially practicable alternatives to the Project, in addition to conservation measures.

There are a number of reasonable and potentially practicable alternatives to the Project, in addition to conservation measures that might provide additional water supplies for northern Sanpete County, that were summarily rejected in the DEIS. These alternatives include: the use of presently undeveloped water in northern Sanpete County, the use of water from the Central Utah Project or use of funds pursuant to Sections 206 and/or 207 of the Central Utah Project Completion Act, the retirement of some irrigated acreage in Sanpete County, not growing a third crop of hay each year on certain land in Sanpete County, and combing conservation measures with retiring irrigated land and not growing a third crop of hay each year.

The DEIS failed to adequately study the development of existing groundwater as a reasonable alternative to the Project.

The DEIS should have fully analyzed whether existing and presently undeveloped ground water in Sanpete County can be developed to supply the need for supplemental irrigation water. According to a USGS study, Sanpete County has ample undeveloped ground water supplies. See U.S. Geological Survey (Department of Interior) Ground-Water Hydrology of the San Pitch River Drainage Basin, Sanpete County, Utah, Geological Survey Water-Supply Paper 1896 (1971). Consequently, this alternative to the proposed Narrows Project should have been fully considered. However, the DEIS spent less than one-page in dismissing this possibility. As justification for this quick rejection, it offers a quote, without documentation, from an appropriation policy of the Utah State Engineer indicating that he considers the ground water in north Sanpete County to be fully appropriated. See DEIS at 2-51.

The DEIS failed to adequately study use of water from the Central Utah Project or funding pursuant to Sections 206 and/or 207 of the Central Utah Project Completion Act as a reasonable alternative to the Project.

Another alternative considered "nonviable" in the DEIS was the use of water from the Central Utah Project ("CUP") to supply the needs of Sanpete County. The DEIS states that the Central Utah Water Conservancy District ("CUWCD") has dropped all plans to deliver CUP water to Sanpete County. This raises the question of why Sanpete County would remain in the CUWCD and continue to pay taxes to the CUWCD to fund completion of a project that will not deliver water to Sanpete County. If Sanpete County withdrew from the CUWCD, it could be

reimbursed pursuant to § 206 of the Central Utah Project Completion Act for ad valorem taxes previously paid to the CUWCD and use this money to enhance its existing supplies. See Pub. L. No. 102-575, § 206 (1992). Further, rather than seeking funding under the Small Reclamation Projects Act and the State of Utah for the Narrows Project, the Sanpete Water Conservancy District could seek funding under § 207 of the CUP Completion Act for the above referenced conservation measures that the DEIS indicates would produce almost twice the amount of supplemental irrigation water supplied by the Project.

The DEIS failed to adequately study the possible retirement of irrigated land as a reasonable alternative to the Project.

Another possible alternative to the proposed Project that the DEIS failed to adequately consider was ceasing agricultural production on certain lands in the Project area to reduce late-season irrigation shortages. The discussion in the DEIS on this alternative comprised only one paragraph and is as follows:

> The retirement of irrigated lands is one means to reducing overall water demands but is not considered to be a conservation measure. A considerable amount of irrigated acreage would need to be retired to balance the agricultural demand with available supplies. Since the economy of Sanpete County is primarily agricultural, retirement of the required acreage would have significant economic impacts and is opposed by the Utah Department of Agriculture. Further, this alternative does not meet the purpose and needs of the project described in Chapter 1.

See DEIS at 2-53. The DEIS then provided two bullet points stating that this alternative was eliminated from consideration because it "would not meet the funding requirements of the SRPA [Small Reclamation Projects Act]" and "would not provide additional water supplies to north Sanpete County at the time the water is needed." Id. However, the DEIS included no data or analysis to support any of these conclusory statements.

As a preliminary matter, the DEIS statement that the retirement-of-irrigated-acreage alternative was eliminated from consideration because it "would not meet the funding requirements of the SRPA" indicates the Bureau illogically believes that the purpose of the Project and any reasonable alternative must be for the Sanpete Water Conservancy District to obtain funding under the Small Reclamation Projects Act. In such case, the Bureau has plainly lost sight of the fact that there is no need for the SWCD to receive this subsidy if there are other reasonable means for reducing the demand for late-season deliveries of irrigation water. Further, the Bureau appears to have missed the point that no additional water supplies are needed if the demand for supplemental irrigation water is reduced.

The DEIS indicated that retirement of irrigated acreage was rejected as a reasonable alternative because "a considerable amount of irrigated acreage would need to be retired to balance the agricultural demand with available supplies." However, data supplied elsewhere in the DEIS undermines this claim. For example, the DEIS discussion on the need to reduce late-season shortages of irrigation water indicates that, under existing supplies of water, 1.94 acre-feet

of water are currently available for each of the 15,420 acres in the project area that would be eligible to receive project water. See DEIS at 1-9. Consequently, the need for the 4,920 acre-feet of water that would be provided each year by the Project for supplemental irrigation use could be eliminated by retiring 2,536 acres of currently irrigated land (4,920 ÷ 1.94 = 2,536). That acreage represents a little more than 10% of the 23,000 acre Project area, or 16.4 % of the 15,420 acres of land in the Project identified in the DEIS to receive supplemental irrigation supplies under the Project. Further, the retirement of some agricultural lands would appear to reduce early-season water demands and thus free up existing water supplies for late-season use.

The DEIS also rejected this alternative because of the purported "significant economic impacts" of retiring such lands. However, the DEIS failed to provide any analysis to support its claim that the retirement of a portion of the irrigated land in the Project area would have "significant economic impacts." The DEIS also indicated that the retirement of irrigated acreage is "opposed by the Utah Department of Agriculture," but likewise provided no data or documentation in support of this claim. In any event, opposition to an alternative that is practical and feasible from a technical and economic perspective is not a basis under NEPA for failing to evaluate the alternative.

The excuses given in the DEIS for not studying the retirement of certain irrigable lands in the proposed Project area are no more than unsupported conclusions that fail to comply with the requirements of NEPA and point to the need for the preparation of a new, DEIS by an entity that can perform the objective analysis required under NEPA.

The DEIS failed to study not growing a third crop of hay each year as a reasonable alternative to the Project.

The DEIS indicates that the Project would divert and store water that could be used to reduce late-season shortages of irrigation water. Stated another way, the purpose of the Project is to grow a third crop of hay on certain lands. Consequently, another reasonable alternative to the Project that the DEIS should have studied is not growing a third crop of hay on the lands that are slated to receive Project water. The DEIS should have assessed whether not growing a third crop of hay on certain lands was a reasonable way to eliminate or reduce the demand for late-season supplemental irrigation water. Further, the DEIS should have compared the impacts of not growing a third crop of hay on less than 10% of the irrigated land in northern Sanpete County with the impacts of constructing and operating the Project. Such analysis would likely have identified the annual on-farm income in the Project area from hay and alfalfa crops, determined the value of the late-season crops each season in the area, and then determined the benefits derived from late-season crops as compared against the economic and environmental costs of the Project. However, the DEIS failed to study this obvious alternative.

The DEIS failed to study combining conservation measures, retirement of irrigated land, and/or not growing a third crop of hay each year as a reasonable alternative to the Project.

Another reasonable alternative to the Project that should have been studied in the DEIS was the possible combination of conservation measures, retirement of irrigated lands, and/

incentives to farmers in the Project area to not grow a third crop of hay each year. This alternative appears to be a sensible, low-cost, economically efficient way to reduce late-season irrigation shortages without the acknowledged environmental impacts of the Project.

The failure of the DEIS to analyze reasonable alternatives to the Project is particularly egregious in light of a recent study by the U.S. Geological Survey ("USGS") indicating that dam and reservoir construction is invariably accompanied by high environmental costs. Specifically, the USGS publication, Dams and Rivers, provides an excellent discussion of the downstream effects of dams and the relative merits and resource tradeoffs that should be considered in assessing possible dam projects. See U.S. Geological Survey, Dams and Rivers Circular No.1126 (June 1996). In the publication, the USGS examines a number of dam and reservoir projects in the western United States and concludes that these projects have had significant downstream impacts on, among other things, fisheries, water quality, and recreation. Consequently, the DEIS should not have so quickly restricted its alternatives analysis to a large reservoir and a smaller version reservoir project.

In sum, each of the "nonviable" alternatives purportedly studied in the DEIS is dismissed based on conclusory statements that afford the reader and the Army Corps of Engineers no substantive information on which to compare the alternative with the proposed action. Further, the DEIS failed to study obvious reasonable alternatives to the Project such as the retirement of some irrigable lands in the Project area, or the combination of conservation measures, retirement of lands, and providing incentives to not grow late-season crops. These failures are critical flaws in the DEIS that violate NEPA and the § 404(b)(1) guidelines, merit denial of the § 404 Application, and require preparation of a new DEIS.

3. The § 404 Application and the DEIS fail to adequately identify the wetlands that would be impacted by the Narrows Project and the functions and values of such wetlands, and propose questionable mitigation measures.

The discussion in the § 404 Application and the DEIS on the wetlands that would be impacted by the Narrows Project is fundamentally flawed and does not comply with the requirements of the § 404(b)(1) guidelines or NEPA. As a threshold matter, the DEIS unlawfully restricts the geographical scope of its wetlands analysis. It then relies on an invalid wetlands delineation, using outdated methodology, to identify only those wetlands that would be flooded by the Narrows Reservoir. However, there are additional wetlands in the Narrows Basin that clearly would be impacted by ancillary construction and subsequent recreational and other uses in that area. Further, there are wetlands along Middle and Lower Gooseberry Creek, and Cottonwood Creek, and in the Sanpete Valley, including the 28 drainages that would be crossed by pipelines used to convey Project water to regulating ponds for eventual delivery that are simply ignored by the DEIS. The DEIS assessment is so flawed and incomplete that the only remedy is for a new, thorough wetlands analysis to be completed.

Having failed to identify all of the wetlands that would be impacted by the Project, the DEIS compounds these errors by failing to identify the functions and values of the wetlands in the Narrows Basin it states will be flooded by the Narrows Reservoir. This makes it impossible

to assess whether the mitigation measures suggested in the DEIS would actually mitigate the harms to wetlands caused by the Narrows Project.

The DEIS illegally restricts the scope of its assessment of what wetlands would be impacted by the Project.

The wetlands assessment in the DEIS is fundamentally flawed from the start because it only discusses impacts to those wetlands in the so-called Narrows Basin that would be flooded by construction and operation of the Narrows Reservoir. The DEIS acknowledges wetlands other than those that would be flooded by the Reservoir would be affected by the Project. See DEIS at 3-56. Nonetheless, it does not attempt to identify such wetlands, or identify their functions and values. The DEIS rationalizes this failure to assess as follows:

> The Narrows Reservoir basin was identified as being the area that would be most significantly impacted by the proposed project. For this reason, the basin was studied in greater detail than the other areas associated with the project.

See DEIS at 3-56. However, there is nothing in the regulations implementing NEPA or in the § 404(b)(1) guidelines that allow the preparer of an EIS or § 404 application to fail to identify the potential impacts to wetlands in one part of a project simply because the "most significant impact" of the project will occur in another location. Consequently, the DEIS is legally inadequate from the start because it fails to identify all of wetlands that would be impacted by the Narrows Project.

The DEIS relies on an expired wetlands delineation to identify wetlands within the reservoir basin (the "Narrows Basin") of the Narrows Project that would be affected by construction of the Narrows Reservoir.

A threshold step in analyzing what wetlands might be impacted by a proposed project is to identify those wetlands. To that end, the U.S. Army Corps of Engineers has adopted and updated regulations and policies specifying and refining the current procedures that must be followed in delineating wetlands. It is obvious that the DEIS does not comply with these requirements.

The DEIS fails to even identify the standards and methodology used in identifying wetlands in the Narrows Basin that would be flooded by the Narrows Reservoir. Instead, it simply indicates that "a wetlands delineation for the reservoir was completed following the procedures outlined in the COE manual." See DEIS at 3-50. No more information concerning this wetlands delineation is provided in the DEIS. Further, the Bureau was not able to locate the delineation documents until three weeks after being requested to do so by Western Wetland Systems, who reviewed portions of the DEIS and documents used by the Bureau in its DEIS preparation on behalf of the Carbon Water Committee. The Bureau's inability to timely locate such critical information underscores its lack of oversight and independence in the preparation, review, and release of the DEIS. This inability also violates 40 C.F.R. § 1502.18(d), which provides that material which is used in the preparation of an EIS must be circulated with the EIS

"or be readily available on request," and Bureau policy. See United States Department of Interior, Bureau of Reclamation, National Environmental Policy Act Handbook § 4-17 (October 1990) (acknowledging requirements of 40 C.F.R. § 1502.18); see also Council on Environmental Quality, Questions and Answers about the NEPA Regulations No. 25b (March 16, 1981) ("Care must be taken in all cases to ensure that material incorporated by reference and the occasional appendix that does not accompany the EIS, are in fact available for the full minimum public comment period").

Although the Bureau could not timely locate the actual wetlands delineation referred to on page 3-50 of the DEIS, it appears that, in approximately 1988, a private contractor performed a wetlands delineation for only the area that would be flooded by the Narrows Reservoir. In such case, the delineation is no longer valid. As more particularly described on page 33 of the Western Wetland Systems report submitted with these comments,[5] under the Army Corps of Engineer's Regulatory Guidance Letters 90-6 and 94-1, a jurisdictional delineation is valid for a limited period of time, not exceeding 5 years. The delineation for the Narrows Basin was completed approximately 10 years ago. Consequently, it is invalid. Further, the entire DEIS wetlands discussion, which relies on the invalid delineation, is also invalid. The only remedy for this critical flaw is for a new, thorough jurisdictional delineation to be completed in accordance with current COE policies on the data, content, mapping, etc., that must be included in a wetlands delineation.

The DEIS and the § 404 Application statements that 100 acres of wetlands will be flooded by the Narrows Reservoir is inconsistent with a 1992 study identifying approximately 140 acres of wetlands in the Narrows Basin.

The DEIS states that there are approximately 100 acres of wetlands in the Narrows Basin will be flooded by the Narrows Reservoir. See DEIS at 3-53. However, as discussed on page 7 of the Western Wetland Systems report submitted with these comments, a 1992 study by Mt. Nebo, which was in the Bureau's files on the Project, identified approximately 140 acres of wetlands in the Narrows Basin. Consequently, the DEIS discussion on wetlands in the Narrows Basin that will be impacted by the Narrows Reservoir is premised on a significant quantitative error that undermines and renders inaccurate the entire DEIS discussion.

The DEIS did not adequately assess impacts to the wetlands that it indicated would be flooded by the Narrows Reservoir because it did not adequately identify the functions and values of these wetlands.

After wetlands are identified that may be impacted by a proposed project, the next step is to determine whether and, if so, how they will be impacted by the project. Then, the functions and values of the wetlands that will be impacted must be determined. The DEIS made an inadequate functions and values determination. This error further multiplies the mistakes made in

[5] The Western Wetland Systems report, entitled "Review of the Narrows Draft EIS - Wetland, Riparian and Related Resource Impacts," is attached to these comments as Exhibit "H."

the DEIS and makes it impossible for the DEIS to adequately identify the actual impacts to the wetlands in the Narrows Basin that would be flooded by the Narrows Reservoir.

The DEIS relies on the so-called Habitat Evaluation Procedure ("HEP") in purporting to identify the functions and values of the wetlands that would be flooded by the Narrows Reservoir. It rationalizes the use of HEP as follows: "Because the primary function of wetlands is wildlife habitat, the procedure known as HEP was used to evaluate the wetland species." See DEIS at 3-50. That is the extent of the function and values discussion in the DEIS. However, as more fully discussed on page 26 of the Western Wetland Systems Report submitted with these comments, the use of HEP has several shortcomings with respect to assessing impacts to the Narrows Basin wetlands. First, the DEIS use of HEP conflicts with 33 C.F.R. § 320.4[b] of the COE's regulations, which indicate that wetland functions include fish and wildlife habitat, maintenance of groundwater supplies, water purification, and flood prevention.

The DEIS reliance on HEP also conflicts with findings of the National Research Council in 1995 that the use of the HEP procedure is not appropriate for assessing wetlands functions because HEP is too narrowly focused on fish and wildlife. Perhaps even more important, the DEIS use of HEP ignores a study in the Bureau's files on the Project stating that the highest functions and values of the Narrows Basin wetlands are for sediment stabilization, sediment retention, nutrient transformation, flood flow alteration, ground water discharge, production export to aquatic systems, aquatic life/diversity, general wildlife diversity and abundance, and wildlife breeding habitat. In this study only 2 of the 10 identified functions and values involved wildlife. See Western Wetland Systems at 26-27. Therefore, by focusing only on wildlife values, the DEIS fails to account for the Project's obvious impacts on a number of critical functions and values performed by the wetlands that will be flooded by the Narrows Reservoir.

The DEIS fails to identify wetlands in the vicinity of the Narrows Basin that would be affected by development and recreation in connection with the Narrows Reservoir.

The DEIS improperly focused on only those wetlands in the Narrows Basin that would be flooded by the Narrows Reservoir in assessing impacts to wetlands in that vicinity. It is obvious that activities in connection with construction of the Narrows Dam and Reservoir would impact wetlands in addition to those that will be flooded by the filling of the Reservoir. However, the DEIS fails to identify the wetlands that would be affected by these activities.

The DEIS also claims that the Narrows Reservoir will become an important recreational facility, and indicates that new campgrounds, boat docks and facilities, shoreline fishing, other dispersed recreation, and construction of cabins and other private and public facilities will accompany this recreational use of the area. However, the DEIS makes no attempt to identify wetlands in the Narrows Basin that would be impacted by these uses of the area. This failure violates NEPA.

The DEIS fails to identify wetlands and aquatic resources outside the Narrows Basin that would be affected by the Narrows Project.

There are a number of locations outside of the Narrows Basin that the DEIS acknowledges would be directly impacted by the Project, and appear to include wetlands but were not discussed in the DEIS. There can be no justification for the failure of the DEIS to identify wetlands outside of the Narrows Basin in areas that the DEIS acknowledges will be directly impacted by the Project. These areas, along Middle and Lower Gooseberry Creek, Gooseberry Reservoir, and Cottonwood Creek, are more fully discussed in the Western Wetland Systems report submitted with these comments.

The DEIS recognizes that the relocation of SR-264 will impact over 700 acres. Specifically, the DEIS states that "construction of the Narrows Project and its associated recreation facilities would cause the loss of 237 acres of "Roaded Natural Appearing" dispersed recreation on National Forest lands and 466 acres on private lands." See DEIS at 3-63. However, there is no attempt in the DEIS to determine what portion of this 700+ acres consists of wetlands, and no attempt to explain the failure to conduct such a determination.

The DEIS states that there will be approximately 46,400 visitor days of new recreational use in the area of the Project, and indicates that direct impacts from the Project will occur in areas 8 to 10 miles in all directions from the Reservoir:

> This growth in recreational use would be a direct effect of the project and would require more intensive management in the area surrounding it (approximately the area 8-10 miles in each direction). Significant increase in facilities to support and manage for this increase would be needed.
>
> . . .
>
> The amount of dispersed use within 8-10 miles of the reservoir is already at a level considered to be crowded during holidays and big game hunting seasons. The additional attraction of the new flat-water fishery in this area is expected to increase dispersed use to a point that the FS [U.S. Forest Service] would need to place restrictions on areas available for this type of use.
>
> Along with increased dispersed use in the area, nearby developed recreation facilities will be impacted. Gooseberry Campground and the Lower Gooseberry Reservoir units are immediately adjacent to the proposed reservoir, as is the Scenic Byway and snowmobile parking area. Skyline Drive, Flat Canyon Campground, and the limited facilities at Beaver Dam and Boulger Reservoirs are also within reasonably close proximity.

See DEIS at 3-63 (emphasis added). Since the DEIS concedes that the Project would have direct and significant impacts on areas land use over 8 to 10 miles in each direction of the Reservoir, its

failure to identify wetlands, riparian areas, and other waters of the United States in these areas and assess impacts to these resources violates the § 404(b)(1) guidelines and NEPA.

Among other areas, the reduction of flows in the middle 3 miles of Gooseberry Creek by 90% will plainly affect riparian and wetland areas. Further, the DEIS indicates that the Narrows Project will cause reductions in the amount of water stored in Scofield Reservoir, causing approximately 250 acres of shallow water areas to be converted into barren mudflats. This effect, and the loss of vegetated wetlands associated with this conversion should also have been discussed in the DEIS. However, the DEIS ignores the Project's downstream impacts on these resources.

As more fully discussed on pages 6-11 of the Western Wetland Systems report submitted with these comments, there are wetlands downstream from the Project along Middle Gooseberry Creek, Gooseberry Reservoir, Lower Gooseberry Creek, Cottonwood Creek, and Fish Creek that clearly would be impacted by the Project. Among other things, increased flows of 100% to 300% in Cottonwood Creek during the irrigation season will occur and are expected to widen the stream channel, erode the stream banks, and also adversely impact jurisdictional waters of the United States. The sediment generated by the scouring of Cottonwood Creek each year at the beginning of the irrigation season also will likely affect downstream streams and wetlands. However, the DEIS ignores the downstream effects of the Project on all of these resources.

Further, the § 404 Application for the Project acknowledges that construction of the Upper Cottonwood Creek pipeline will "disturb" 160 square feet of wetlands and that the discharge structure at the end of the pipeline "will result in a permanent impact to the riparian area near Cottonwood Creek." See § 404 Application at 3. As a preliminary matter, it is not clear whether the discharge structure already exists or needs a § 404 permit to be constructed. This information should be provided. In any event, the size of the wetlands disturbed by the discharge structure is not stated.

The DEIS and the § 404 Application indicate that after Project water is released into Cottonwood Creek, it will be diverted into two pipelines totaling 16 miles in length; the East Bench Pipeline (2.5 miles long) and the Oak Creek Pipeline (13.5 miles long). Both the EIS and the § 404 Application state that the East Bench Pipeline and the Oak Creek Pipeline will cross a total of 28 drainages along the east side of the Sanpete Valley,. However, neither document provides any details concerning where the pipelines will cross the 28 drainages or the size and types of wetlands impacted in each crossing. Consequently, both documents fail to specify the location and size of the wetlands that will be impacted by construction of the 16 miles of pipeline, and fail to identify the functions and values of these wetlands.

The § 404 Application also indicates that 12 regulating ponds will be constructed to receive water through laterals from the East Bench and Oak Creek pipelines, and water will then be delivered to "water subscribers." However, the Application does not identify the location of the 12 regulating ponds or whether construction of these ponds would impact wetlands. The Application also fails to describe the types of facilities that would be used to deliver water, whether such facilities already exist or need to be constructed, and whether there are wetlands

that would be impacted by the construction and/or use of these water delivery facilities. This is critical information, yet the DEIS and the § 404 Application simply ignore these issues.

Since these wetlands in the Sanpete Valley are not even identified in the DEIS, the potential impacts on these wetlands, among others, are not discussed in the DEIS. Clearly, construction of the discharge structure in Cottonwood Creek, the East Bench Pipeline, the Oak Creek Pipeline, the 28 stream crossings that must be made in constructing the two pipelines, the12 regulating ponds and laterals to those ponds, and the water conveyance facilities that are actually used to deliver Project water are integral parts of the Narrows Project. Consequently, to comply with NEPA and the § 404(b)(1) guidelines, the DEIS must fully discuss the location of all of the above, and the identified the wetlands potentially impacted by construction and operation of these facilities. The failure of the DEIS to include this critical information plainly violates NEPA. It also violates the 404(b)(1) guidelines which require that projects must not be segmented for analysis purposes, and that the downstream impacts of a project cannot be ignored.

4. **The § 404 Application and the DEIS fails to adequately discuss the measures that may be taken to mitigate impacts to those wetlands identified in the DEIS as being adversely affected by the Narrows Project.**

The discussion in the § 404 Application and in the DEIS of measures that might be taken to mitigate the Project's impacts on wetlands is incomplete and fundamentally flawed at the outset by its failure to identify all of the wetlands that would be impacted by the Project and its failure to determine the functions and values of the 100 acres of wetlands that it acknowledged would be flooded by the Narrows Reservoir. Consequently, no mitigation measures are proposed for the Project's acknowledged impacts on jurisdictional waters or wetlands outside of the Reservoir basin.

The DEIS discussion of the four proposed mitigation measures reveals that the Bureau has failed to follow the three-step sequencing relative to mitigation that is required under current policy as indicated by the 1990 Memorandum of Agreement between U.S. Army Corps of Engineers ("COE") and the U.S. Environmental Protection Agency ("EPA") on this subject. The DEIS discussion also reveals that the proposed mitigation is being used to, in effect, "buy-down" the obvious impacts of the Narrows Project, which the DEIS clearly advocates as the preferred alternative. This is improper and violates NEPA and the 404(b)(1) guidelines.

Under the 404(b)(1) guidelines, mitigation plans must provide sufficient detail to ensure that proposed mitigation is capable of being implemented. Under NEPA, an EIS must address the probability of the mitigation being implemented. See Council on Environmental Quality, Questions and Answers about the NEPA Regulations No. 19b (March 16, 1981) ("to ensure that environmental effects of a proposed action are fairly assessed, the probability of the mitigation measures being implemented must also be discussed"). Nonetheless, the DEIS fails to address the probability of the proposed mitigation being implemented.

The DEIS fails to discuss the costs of three of the four mitigation measures proposed, and identifies only a portion of the costs associated with one proposed mitigation measure. The failure to identify and discuss the costs of the proposed mitigation measures has the effect of masking the true costs of the Project. It also violates the policy of the State of Utah that "mitigation of adverse environmental impacts should be considered as part of any project and should be reflected in project construction, operation, and maintenance costs." See Utah State Water Plan at 14-4.

For these reasons, and as more particularly discussed in these comments and the Western Wetland System report submitted with these comments, the DEIS discussion of possible mitigation measures is legally inadequate and does not comply with the requirements of NEPA or the § 404(b)(1) guidelines.

Background: the four mitigation measures proposed in the DEIS.

The DEIS and the § 404 Application propose the following four measures to mitigate impacts to the 100 acres of wetlands that both documents state will be flooded by the Narrows Reservoir:

(1) purchase of private land adjacent to Mud Creek (upstream of Scofield Reservoir) followed by enhancement of degraded wetlands on this land;

(2) purchase of private land to the west of Lower Gooseberry Reservoir followed by creation of wetlands on this land;

(3) release water from Fairview Lakes and the Narrows Reservoir onto land adjacent to the Narrows Reservoir to create new wetlands

(4) manage return flows from Project water to create wetlands near the Manti Meadows Waterfowl Management Area.

For the reasons summarized below and more fully discussed on pages 28-31 of the Western Wetland System's report submitted with these comments, there are significant problems with each of the four proposed mitigation measures. Further, no measure or combination of these measures would adequately compensate for the flooding of 100 acres of wetlands by the Narrows Reservoir, or the Project's impacts on other wetlands that the DEIS failed to identify.

The DEIS discussion of the four sites it proposes for possible mitigation of the Project's adverse impact on wetlands in the Narrows Basin is confusing and inconsistent.

As a threshold matter, the DEIS is confusing and inconsistent in its discussion of the respective sizes of the four sites it proposes for possible mitigation of the Project's flooding of wetlands in the Narrows Basin. Specifically:

(1) Page 2-19 states that the first site, private land adjacent to Mud Creek, is 220 acres in size. However, page 2-34 states that this site is 160 acres in size.

(2) Page 2-19 states that the second site, private land to the west of Lower Gooseberry Reservoir, is 120 acres in size. However, page 2-34 states that this site is 86 acres in size.

(3) Page 2-19 states that the third site is land adjacent to the proposed Narrows Reservoir that might be used to create up to 100 acres of new wetlands. In contrast, page 2-34 states that up to 72 acres of wetlands might be created in this area.

(4) Page 2-10 states that the fourth site would involve the creation of up to 100 acres of wetlands at the Manti Meadows Waterfowl Management Area. In contrast, page 2-34 indicates that up to 72 acres of new wetlands may be created.

Page 3-54 of the DEIS also discusses the four possible mitigation measures, but fails to provide acreages for 2 of the 4 sites. However, in contrast to the statements on pages 2-19 and 2-34 indicating that there is no priority of alternatives, page 3-54 states that restoring and creating wetlands next to Mud Creek is the proposed mitigation, with the other sites being alternative mitigation. In addition, the descriptions of the mitigation that would be undertaken on the four proposed sites is different in each of the three portions of the DEIS, and in the § 404 Application.

The above-referenced internal inconsistencies in the DEIS and between the DEIS and the § 404 Application make it very difficult to understand just what mitigation is being proposed, as well as the costs of the proposed measures. These textual inconsistencies also underscore the Bureau's lack of oversight throughout the NEPA process, and lack of commitment to objectively analyzing the Project and preparing a readable, coherent DEIS. It plainly should not be the responsibility of the reader of the DEIS to sift through conflicting information to discern what the proposed mitigation is before beginning to analyze whether it might be effective.

The proposed mitigation measures do not follow the sequencing required under EPA and COE policy.

As a threshold matter, the discussion of proposed mitigation in the DEIS fails to follow current COE and EPA policy on mitigation, which is summarized in the Memorandum of Agreement Between the Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines (effective Feb. 7, 1990) [hereinafter Mitigation MOA]. Specifically, the Mitigation MOA provides that mitigation should involve the three step sequence of: (1) avoiding the impact to wetlands; (2) modifying the project to minimize unavoidable impacts; and (3) compensating for unavoidable impacts that occur after all practicable project modifications have been accomplished. The Corps itself has emphasized this specific point in a letter dated July 30, 1991 from Brooks Carter, Chief of the Utah Regulatory Office to Mr. Patrick Collins of Mt. Nebo

Scientific. The letter responds to Mr. Collins' request for information on the Corps' mitigation policy and states in part:

> The sequence of events; avoidance, minimization and mitigation, may only be interrupted under the following circumstances: the discharge is necessary to avoid environmental harm, or the discharge is expected to result in an environmental gain or insignificant environmental loss. In other words, one may not proceed directly to compensatory mitigation without adequately demonstrating that a practicable alternative to developing in a wetland does not exist.

A copy of the July 30, 1991 letter is attached to these comments as Exhibit "F." In contrast, the DEIS never mentions whether avoidance or minimizing unavoidable impacts to wetlands was ever considered. Further, the DEIS plainly did not demonstrate that a practicable alternative to developing in a wetland did not exist.

The proposed mitigation fails to take into account wetland values and functions.

Contrary to the requirements of the Mitigation MOA, the DEIS assumes that compensatory mitigation is the only appropriate mitigation step for the Narrows Project. The goal of compensatory mitigation, however, is to replace lost wetland functions or values, not just to replace wetlands acre for acre. The Mitigation MOA specifically provides that mitigation for wetlands losses "should provide, at a minimum, one for one functional replacement (i.e. no net loss of values), with an adequate margin of safety to reflect the expected degree of success associated with the mitigation plan." Mitigation MOA at 5 (emphasis added). Therefore, even if compensatory mitigation is appropriate in this case, and there is every reason in this case to assume that it is not appropriate, the four proposed measures are so vague that it is not possible to determine whether they satisfy the standards for compensatory mitigation outlined in the Mitigation MOA.

> It is doubtful that the first proposed mitigation measure, purchasing private land adjacent to Mud Creek to enhance degraded wetlands and create new wetlands, would be able to be implemented and, even if implemented, it would not compensate for the functions and values of the flooded wetlands in the Narrows Basin.

Under one of the proposed mitigation measures, approximately 160 to 220 acres of private land (depending on which section of the DEIS is read) adjacent to Mud Creek would be purchased. The DEIS describes this as a former wetland that has been severely damaged by cattle grazing and indicates that after the land was purchased, cattle would be removed from the land, the land would be fenced to prevent their return, and the degraded wetland would naturally restore itself. The DEIS also indicates that some stream channel work would be performed to create additional wetlands adjacent to the stream, and some earth work to create swales and berms might be necessary to create cells of new wetlands. The DEIS indicates that water for these wetlands would be provided from Mud Creek or from small springs that exist in the area.

As a preliminary matter, it is doubtful that the SWCD can obtain the Mud Creek property that the DEIS proposes as the first mitigation site. The owner of this property has indicated that he does not want to sell the property. Under the Utah Water Conservancy District Act, the SWCD is granted the authority to purchase real property within or without its boundaries. Further, under the Act, the SWCD is also granted certain powers to condemn real property. However, there is no language in the Act or in any Utah case law indicating that a water conservancy district has the authority to condemn real property located outside of its boundaries. Consequently, it appears that the SWCD is without authority to acquire the Mud Creek property unless its current owner, who indicates that he does not want to sell the property, changes his mind. As a result, even if the proposed mitigation at the Mud Creek site could be implemented, it appears that the property is not available for such purposes.

Another flaw in the proposed mitigation concerning the Mud Creek site is the assumption in the DEIS that there is water in Mud Creek and in nearby springs that is available to be used on the property for wetland purposes. However, under Utah law, before water may be diverted and used for a particular purpose, an approved water right for the intended diversion and use must be obtained through the Utah Division of Water Rights. The DEIS did not identify any water rights that the SWCD has that would allow it to divert water from Mud Creek and nearby springs to use for irrigation of wetlands. Further, based on the limited water supplies in the area, it is doubtful that the SWCD could obtain any water rights for this purpose. Consequently, the DEIS assumption that there is available water for the SWCD's use in creating wetlands on the Mud Creek site is a fundamental flaw that further undermines this proposed mitigation measure.

Another critical flaw in the first mitigation measure is the assumption that simply removing livestock from the property and/or applying some water to the Mud Creek property will create and sustain wetlands. As more fully discussed on page 29 of the Western Wetland Systems report that is submitted with these comments, the soils that underlie the Mud Creek site are quite porous. Further, the depth of the water table in that area ranges from 20 to 25 inches below the soil surface in the spring and 35 to 45 inches below the soil surface in summer. The effect of this is that simply removing livestock (and grazing) from the property will not automatically create wetlands. Consequently, assuming that water rights could be obtained by the SWCD for this use, it would be necessary to provide a significant amount of water to the ground to raise the water table to create wetlands. Further, water loss through seepage alone could total 5,184 to 6,192 acre-feet per year. Finally, the use of this water would potentially create additional impacts on the Price River system that were not addressed but should have been addressed in the DEIS.

The DEIS also fails to identify how many acres of wetlands might be enhanced or created at the Mud Creek site. None of the pages in the DEIS that propose this measure (2-19, 2-34, and 3-54) make any mention of the amount of wetlands that would be enhanced or created at the Mud Creek site. Based on the very limited discussion of this measure in the § 404 Application, it appears that no effort has been made so far to even identify what wetlands currently exist at the Mud Creek site, let alone speculate on how many new wetlands might be created. The failure to make this basic assessment of the Mud Creek site further demonstrates the failure of the DEIS to comply with the § 404(b)(1) guidelines and NEPA.

There is another basic flaw with the DEIS proposal involving the Mud Creek site. As discussed above, the DEIS failed to adequately assess the functions and values of the 100 acres of wetlands that would be flooded by the Narrows Reservoir. The DEIS likewise fails to identify the functions and values that newly-created wetlands along Mud Creek would have. Consequently, it is not possible through reading the DEIS to determine whether newly-created wetlands along Mud Creek would be equivalent to those of the wetlands that would be flooded by the Narrows Reservoir. However, as discussed in the Western Wetland Systems report on page 30, created wetlands along Mud Creek would not provide the same functions and values that were identified for the Narrows Basin in the 1992 study of the area. Consequently, this first proposed mitigation measure would not comply with the 1:1 functional value mitigation required under the Mitigation MOA.

The DEIS discussion of the Mud Creek site is also incomplete concerning the potential costs of this measure. The DEIS indicates that the purchase of this property would cost approximately $110,000 (220 acres at $500 per acre). See DEIS at Appendix D (1994 Fish and Wildlife Coordination Act Report at 22). The DEIS does not identify any other costs associated with this proposed mitigation measure. However, there clearly would be other costs incurred by the SWCD that would extend beyond the transactional costs involved in obtaining the property, if that was possible. For example, the DEIS indicates that some stream channel work would be performed to create additional wetlands adjacent to the stream, and some earth work to create swales and berms might be necessary to create cells of new wetlands. The costs of these activities should have been identified. The costs of the fencing that the DEIS indicated would be installed also should have been identified. The costs of obtaining water rights for this measure also should have been identified. The DEIS also indicates that the wetland area would be maintained by the SWCD under a memorandum of agreement with the Utah Division of Wildlife Resources. The long-term costs incurred by the SWCD pursuant to this memorandum of agreement should have been identified.

The § 404 Application is likewise silent as to the costs of the first proposed mitigation measure. Unlike the DEIS, it indicates that before the proposed mitigation could be undertaken at the Mud Creek site, a number of steps would first need to be completed, including: (1) a wetland delineation mapping of the site: (2) investigation of ground water levels; (3) installation of a temporary check dam with piezometers to see whether check dams could raise water levels; (4) excavation of test pits to determine soil type and stratification; and (5) design mitigation measures. The costs of these activities were not identified. This discussion in the § 404 Application reveals two very important things. First, none of the actual on-the-ground investigations that must be undertaken to determine whether the Mud Creek area might be a suitable mitigation site have been performed and, thus, there is no scientific basis to support any conclusion that the Mud Creek area might be a suitable mitigation site. Second, the DEIS discussion of the costs of mitigation at the Mud Creek area is incomplete and misleading.

Finally, the DEIS is also too vague in specifying monitoring plans to ensure that wetlands enhancement and creation at the Mud Creek site would be completed and effectively maintained over time. Instead, it merely states that the wetland area would be maintained by the SWCD

under a memorandum of agreement with the Utah Division of Wildlife Resources. Such a general statement is unacceptably vague and another indication of the inadequacies in the DEIS discussion of the Mud Creek site.

> It is doubtful that the second proposed mitigation measure, purchasing private land to the west of Lower Gooseberry Reservoir to create wetlands, would be able to be implemented and, even if implemented, it would not compensate for the functions and values of the flooded wetlands in the Narrows Basin.

The second mitigation measure proposed in the DEIS is the purchase of private land (page 2-19 - 120 acres; page 2-34 - 86 acres) to the west of Lower Gooseberry Reservoir for the creation of new wetlands (the "Lower Gooseberry site"). The DEIS describes this as private land that is presently irrigated to provide pasture for sheep grazing. It indicates that after the land is purchased, water would be diverted from an existing diversion structure on Cabin Hollow Creek and transported through an open ditch to the site. Then, through a number of openings in the open ditch, water would be turned onto the site to flow around swales, berms, and other earthwork and create wetlands.

As a preliminary matter, it is unclear whether the SWCD would be able to purchase all of the land to the west of Lower Gooseberry Reservoir that is covered by the proposed mitigation. At the public hearing on the DEIS on April 23, 1998 in Mt. Pleasant, the owner of a portion of this property stated that his family has owned the property for several generations and that the family has no intention of selling the property. Since the property is located within the boundaries of the SWCD, the SWCD might be able to obtain the property through an eminent domain action. However, the law is not clear whether a water conservancy district can condemn real property for mitigation measures. The SWCD may not wish to incur the expenses and loss of good-will in such a condemnation action. Consequently, it appears that the second mitigation measure might not be able to be implemented.

Another flaw in the proposed mitigation concerning the Lower Gooseberry site is the assumption in the DEIS that there is water in Cabin Hollow Creek that is available to be used on the property for wetland purposes. As previously discussed, under Utah law, before water may be diverted and used for a particular purpose, an approved water right for the intended diversion and use must be obtained through the Utah Division of Water Rights. The DEIS did not identify any water rights that the SWCD has that would allow it to divert water from Cabin Hollow Creek to use for the irrigation of wetlands at the Lower Gooseberry site. Further, based on the limited water supplies in the area, it is doubtful that the SWCD could obtain any water rights for this purpose. Consequently, the DEIS is mistaken in assuming that there is available water from Cabin Hollow Creek for the SWCD to use to create wetlands at the Lower Gooseberry site. This mistake further undermines the DEIS discussion of this proposed mitigation measure.

Another basic mistake in the DEIS discussion of proposed mitigation at the Lower Gooseberry site is the assumption that simply removing sheep grazing from the property and applying some water to the property will create and sustain wetlands. As more fully discussed on page 29 of the Western Wetland Systems report that is submitted with these comments,

sagebrush is the dominant vegetation in this area. Sagebrush typically occurs on coarse-textured soils that are very permeable, and it is not uncommon for such permeability to be as high as 0.2 inches of water per hour, or 4.8 inches per day. In such case, assuming that water rights were obtained by the SWCD for this use, seepage from irrigation of the Lower Gooseberry site (86-120 acres depending on which section of the DEIS is believed) could result in losses of water in amounts greater than the 5,400 acre-feet stored and diverted by the Project. Further, in addition to loss of water through seepage, water would be lost through evaporation and seepage in transmission from Cabin Hollow Creek through the open ditch to the site, and from evaporation at the site. Consequently, under a water-budget assessment alone, it is clear that the second proposed mitigation measure is unworkable. Finally, the use of this water would potentially create additional impacts on the Price River system that were not but should have been addressed in the DEIS.

The DEIS also fails to identify how many acres of wetlands might be created at the Lower Gooseberry site. The pages in the DEIS that propose this measure (2-19, 2-34, and 3-54) state that the site is either 86 or 120 acres in size. However, no mention is made in the DEIS or the § 404 Application of the actual acreage of wetlands that would be created under this proposed mitigation. The lack of assessment is not acceptable under the § 404(b)(1) guidelines or NEPA.

Since the DEIS fails to assess how many acres of wetlands might be created at the Lower Gooseberry site, it also fails to identify the functions and values of the wetlands that might be created. Consequently, even if the DEIS had adequately identified the functions and values of the 100 acres of wetlands that would be flooded by the Narrows Reservoir, it is not possible by reading the DEIS to determine whether newly-created wetlands in the Lower Gooseberry site would provide equivalent functions to the wetlands that would be flooded by the Narrows Reservoir. However, it appears that newly-created wetlands in the Lower Gooseberry site would not provide the same functions and values that were identified for the Narrows Basin in the 1992 study of the area. Consequently, this proposed mitigation would not comply with the 1:1 functional values mitigation required under the Mitigation MOA.

The § 404 Application and the DEIS discussions of the proposed mitigation at the Lower Gooseberry site completely ignore the potential costs of this measure, which at a minimum clearly would involve: (1) the costs to purchase or condemn, if possible, the 86-120 acres; (2) the costs to obtain water, if possible, to irrigate sagebrush; (3) the costs of performing the earthwork and recontouring necessary to facilitate wetland creation; and (4) the costs of monitoring and maintaining the created wetlands. The true costs of the Project are masked by failing to include this important information.

As with its discussion of the mitigation proposed for the Mud Creek site, the DEIS discussion of the mitigation proposed for the Lower Gooseberry site is woefully inadequate in describing how wetlands creation at the Lower Gooseberry site would be monitored and maintained. Instead, the DEIS only states that the wetland area "would be maintained by SWCD under a MOA with the UDWR, COE, and the FS." See DEIS at 2-19, 2-34. This vague generality fails to comply with the requirements of the § 404(b)(1) guidelines and NEPA.

There are several basic flaws with the third proposed mitigation measure, which involves the use of Fairview Lakes water to enhance and create new wetlands adjacent to the Narrows Reservoir and, even if implemented, this measure would not compensate for the functions and values of the flooded wetlands in the Narrows Basin.

The third mitigation measure proposed in the § 404 Application and the DEIS would involve water releases from the Fairview Lakes through a new outlet to land that is adjacent to the Narrows Reservoir. The DEIS indicates that the outlet would be designed to begin to release water into an open ditch system when water in Fairview Lakes reached a certain level in the spring, and stop releases sometime in the fall. Further, "some recontouring would be performed to ensure that soils become saturated." See DEIS at 2-19. The DEIS indicates that up to 72 or 100 acres of wetlands (depending on which section of the DEIS is read) would be created under the third proposed mitigation measure. The DEIS does not identify the ownership of the land that covered by the third proposed mitigation measure. However, the DEIS elsewhere indicates that the majority of the land that would be flooded by the Narrows Reservoir is privately owned. See DEIS at 3-76.

A basic flaw in the third proposed mitigation measure is the assumption in the DEIS that the SWCD has the authority to regulate and manage water releases from Fairview Lakes. The SWCD has no water rights for Fairview Lakes. Rather, the water rights covering the water in Fairview Lakes are owned by the Cottonwood-Gooseberry Irrigation Company (the "Company"). These rights allow storage in the Fairview Lakes, then diversion through the Fairview Canal to the Fairview Tunnel and into Cottonwood Creek for rediversion and the irrigation of land in the Sanpete Valley. Further, no one may use these water rights to create wetlands adjacent to the Narrows Reservoir without first obtaining the approval of the Utah Division of Water Rights of a change application to make that use of the rights. Consequently, the DEIS is mistaken in assuming that there is available water from the Fairview Lakes for the SWCD to use to create wetlands adjacent to the Narrows Reservoir.

Since the DEIS proposes using water that is currently used for irrigation of crops in the Sanpete Valley for the irrigation of wetlands adjacent to the Narrows Reservoir, it should have discussed the environmental and socioeconomic impacts of the proposed change of use of water. The DEIS should also have discussed whether a § 404 Permit would be necessary to install the new outlet of Fairview Lakes that would be used to release water into the open ditch system and to the areas to be irrigated for wetland creation.

Another flaw in the DEIS discussion of the possibility of creating new wetlands adjacent to the Narrows Reservoir is the assumption that periodic water releases from Fairview Lakes will be sufficient to create and maintain wetlands. As mentioned above, the DEIS simply indicates that a new outlet to Fairview Lakes will be installed to release water from Fairview Lakes into an open ditch system when Lake levels reach a certain point in the spring, and to stop releases sometime in the fall. As a preliminary matter, it is questionable that periodic water releases that are based only on Lake levels and/or the season of the year will provide enough water to create and sustain wetlands. It appears impractical to rely on water releases that are governed by factors

other than the water required to create and maintain a wetlands to accomplish this purpose. The DEIS should have discussed this operational inconsistency.

Another flaw in the DEIS discussion of this third proposed mitigation measure is its failure to identify how much water would be needed to create 72 to 100 acres of wetlands in the area adjacent to the Narrows Reservoir. This should have been discussed, as well as the impacts to the Price River system from such water use.

As more fully discussed on page 29 of the Western Wetland Systems report that is submitted with these comments, sagebrush is the dominant vegetation in this area. Sagebrush typically occurs on coarse-textured soils that are very permeable, and it is not uncommon for such permeability to be as high as 0.2 inches of water per hour, or 4.8 inches per day. In such case, assuming that water rights were obtained by the SWCD for this use, seepage from irrigation of the 72 to 100 acres adjacent to the Narrows Reservoir could result in seepage losses of water in amounts greater than the 5,400 acre-feet stored and diverted by the Project. Further, in addition to loss of water through seepage, water would be lost through evaporation and seepage in transmission from Fairview Lakes through the open ditch to the site, and from evaporation at the site. Consequently, under a water-budget assessment alone, it is clear that the third proposed mitigation measure is unworkable.

The DEIS fails to identify the functions and values of the wetlands that might be created adjacent to the Narrows Reservoir. Consequently, even if the DEIS had adequately identified the functions and values of the 100 acres of wetlands that would be flooded by the Narrows Reservoir, it is not possible by reading the DEIS to determine whether newly-created wetlands adjacent to the Reservoir would provide equivalent functions to the wetlands that would be flooded by the Narrows Reservoir. However, it appears that newly-created wetlands in the Lower Gooseberry site would not provide the same functions and values that were identified for the Narrows Basin in the 1992 study of the area. Consequently, it appears that this proposed mitigation would not comply with the 1:1 functional values mitigation required under the Mitigation MOA.

The DEIS discussion of the third proposed mitigation measure ignores the potential costs of this measure, which at a minimum clearly would involve: (1) the costs to purchase or condemn, if possible, the 72-100 acres; (2) the costs to obtain water from the Cottonwood-Gooseberry Irrigation Company, if possible, to create wetlands; (3) the costs of installing the new outlet at Fairview Lakes; (4) the costs of establishing the open ditch system to convey water for wetlands irrigation; (5) the costs of performing the earthwork and recontouring necessary to ensure saturation of soils and subsequent wetland creation; and (6) the costs of monitoring and maintaining the created wetlands. By failing to include this information, the DEIS presents an incomplete picture of the actual costs of the Project. Further, the failure renders the DEIS summary of the costs of the Project on Table 2-5 on page 2-25 misleading.

As with its discussion of the mitigation proposed for the Mud Creek site and the Lower Gooseberry site, the DEIS discussion of the third mitigation measure is similarly inadequate in describing measures to be taken by the SWCD to ensure that wetlands adjacent to the Narrows

Reservoir would be created and perpetually maintained. However, the DEIS states only that the wetland area "would be maintained by the UDWR under a MOA with the SWCD." See DEIS at 2-19, 2-34. This statement is simply too vague to comply with the requirements of the § 404(b)(1) guidelines or NEPA.

Another significant problem with the DEIS discussion of the third proposed mitigation measure is its failure to assess how the 72 to 100 acres of wetlands that might be created adjacent to the Narrows Reservoir would be impacted by the development and recreational use that already occurs in the area, and which will be further stimulated by the construction and operation of the Narrows Reservoir. The DEIS states that there will be approximately 46,400 visitor days of new recreational use in the area of the Project, and that direct impacts from the Project will occur in areas 8 to 10 miles in all directions from the Reservoir. Therefore, the DEIS should have discussed the potential, significant impacts to the wetlands that would be created adjacent to the Narrows Reservoir, an area of very heavy use, in its assessment of this proposed mitigation measure.

The DEIS discussion of the fourth proposed mitigation measure, involving the creation of wetlands near the Manti Meadows Waterfowl and Management Area, is confusing and contradictory, and this measure would not provide in-kind mitigation for the flooded wetlands in the Narrows Basin.

The fourth mitigation measure proposed in the § 404 Application and the DEIS involves the creation of wetlands near the Manti Meadows Waterfowl and Management Area ("Manti Meadows"). This discussion is very confusing and contradictory. It is also clear that this proposed mitigation would not provide in-kind mitigation for the flooded wetlands in the Narrows Basin.

Pages 2-19 and 2-34 of the DEIS indicate that this proposed mitigation would involve making return flows from the Narrows Project available to the UDWR for use at Manti Meadows. This arrangement would rely on "diverting Six Mile Creek water which flows into Gunnison Reservoir and delivering it to the Manti Meadows through existing facilities." See DEIS at 2-19 and 2-34. Page 2-19 indicates that this would result in the creation of up to 100 acres of wetlands. By contrast, page 2-34 indicates that this measure would create up to 72 acres of wetlands.

However, beyond those brief descriptions, pages 2-19 and 2-34 of the DEIS are unacceptably vague in describing this proposed mitigation. For example, these pages fail to identify, among other things, how much water would be involved in the water exchange involving Narrows Project return flows and water from Six Mile Creek, who owns the water rights to the water from Six Mile Creek that would be covered by the exchange, what are the "existing facilities" that would be used in this process, where the return flow/exchange water would actually be used, and how the return flow/exchange water would be used to create wetlands, how the wetlands would be maintained, the costs of this proposed mitigation measure, and the impacts of this process.

Further, the descriptions of the fourth proposed mitigation measure on pages 2-19 and 2-34 of the DEIS conflict with the description of the measure on page 3-55 of the DEIS. In contrast to the descriptions on pages 2-19 and 2-34, page 3-55 describes the measure as follows:

> This mitigation alternative would be to enlarge the existing wetlands at Manti Meadow by excavating uplands on the north and east sides and some excavation towards the west to create approximately 100 acres of wetlands.
>
> The SWCD would have primarily [sic] responsibility for implementation of the wetland measures described above. The SWCD would be responsible for any funding and acquiring all lands and rights-of-way. The SWCD would provide and transplant any planting needed.

The description of the fourth proposed mitigation measure on page 3-55 of the DEIS is so different from the description of the same measure on pages 2-19 and 2-34 that it is impossible to determine which is being proposed. Further, both descriptions are so incomplete as to give the impression that the Bureau never gave any careful consideration to this measure, or commitment to describing it in an intelligible manner in the DEIS.

Finally, as discussed on page 29 of the Western Wetland Systems report submitted with these comments, creating wetlands by whatever process near the Manti Meadows would fail to provide in-kind mitigation for the 100 acres of wetlands that would be flooded by the Narrows Reservoir. The Manti Meadows are located in a completely different watershed and geomorphic area than the impact area of the Project. Wetlands in the Manti Meadows would provide low-elevation waterfowl habitat. However, the wetlands that would be flooded by the Narrows Reservoir are in a high-elevation area, with other distinct functions and values, including sediment stabilization, sediment retention, nutrient transformation, flood flow alteration, ground water discharge, production export to aquatic systems, aquatic life/diversity, general wildlife diversity and abundance, and wildlife breeding habitat. Consequently, created wetlands in the area of the Manti Meadows could not compensate for the flooding of wetlands by the Narrows Reservoir.

In sum, the § 404 Application and the DEIS do not comply with the requirements of the federal regulations and the Mitigation MOA concerning mitigation of the adverse impacts to the wetlands in the area of the Narrows Reservoir that will be caused by construction of the Project. Since the DEIS fails to identify all of the wetlands that may be impacted by the Narrows Project, it cannot satisfy the legal requirement that mitigation measures for project impacts on wetlands be fully considered. Further, under the § 404(b)(1) guidelines, "no discharge shall be permitted unless appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem." See 40 C.F.R. § 230.10(d). Therefore, the § 404 Application should be denied.

5. The DEIS acknowledges that the Project will adversely impact water quality in Gooseberry Creek, lower Gooseberry Reservoir, and Scofield Reservoir but fails to propose specific measures to mitigate these impacts.

The DEIS acknowledges that construction and operation of the Narrows Reservoir will result in decreased flows in Gooseberry Creek, and these decreased flows will adversely impact water quality in Middle Gooseberry Creek, lower Gooseberry Reservoir, and Scofield Reservoir. See DEIS at 3-43. Among other things, the DEIS indicates that the average annual inflow to Lower Gooseberry Reservoir from Gooseberry Creek will be reduced by 72%, thus increasing dissolved oxygen levels and increasing the potential for fish kills. Further, the reduced spills from Scofield Reservoir caused by the Project will increase fish kills and increase the previously estimated Project depletions to the Colorado River System from 5,557 to 5,709 acre-feet per year. See DEIS at 3-45.

The DEIS states that implementation of two mitigation measures will alleviate these impacts on water quality. The mitigation measures would involve: (1) narrowing the channel in Gooseberry Creek between the Narrows Dam and the Gooseberry Reservoir; and (2) reducing phosphorous loading through improvements to segments of tributary streams upstream of Scofield Reservoir. See DEIS at 3-49. However, as discussed below, the proposed mitigation measures will not compensate for the Project caused harm to water quality in Gooseberry Creek, lower Gooseberry Reservoir, and Scofield Reservoir.

Narrowing the channel of middle Gooseberry Creek is not an effective mitigation measure.

The DEIS indicates that under the first proposed mitigation measure, the channel in Middle Gooseberry Creek (between Gooseberry Reservoir and the Narrows Dam) would be narrowed. The DEIS indicates that the reduced flows in middle Gooseberry would cause this condition to eventually occur naturally, but that this process would be expedited through utilization of "certain man-made improvements." See DEIS at 3-49. It does not describe these "improvements." Rather, it attempts to compensate for this ambiguity by indicating that the design of these improvements would be developed by the Sanpete Water Conservancy District in conjunction with the Forest Service, the Fish and Wildlife Service, the Army Corps of Engineers, and the Utah Division of Wildlife Resources The DEIS also indicates that "where the stream passes through private land a right-of-way corridor adjacent to the stream would be acquired to protect the stream banks and protect water quality," and that fencing would be used to protect the stream from livestock. The DEIS also suggests that this measure would improve water quality by reducing the amount of nutrient flow into Lower Gooseberry Reservoir. However, no data is provided concerning the quantities and types of nutrients affected by this measure, or the specific effect this measure would have on water quality in Lower Gooseberry Reservoir. See DEIS at 3-49.

The description of this proposed mitigation measure is so general that it suggests the Bureau did not take a hard look at the obvious water quality impacts from the Project and how to mitigate those impacts. The DEIS cites to no reports or data to support its theory that narrowing

Gooseberry Creek will offset the Project's negative impacts on water quality. "Certain man-made improvements" are not part of the natural stream geomorphology in the area, and their placement might only increase erosion along the sides of the creek. Further, a narrower channel in Middle Gooseberry Creek will be susceptible to flooding or sediment loading during the spring in the occasional years of large snow-melt. As more fully discussed on pages 30-31 of the Western Wetland Systems report submitted with these comments, Middle Gooseberry Creek is a meandering creek, and studies indicate that placing man-made structures in meandering creeks frequently fails to promote channel narrowing and instead results in bank erosion and channel widening and/or degradation.

In addition, the DEIS does not specify the size of the real property it indicated would be acquired to constitute the right-of-way corridor that would be managed to protect water quality or whether the property is available for purchase. However, based on comments made by Mr. John Mason at the public hearing on the DEIS held on April 23, 1998 in Mt. Pleasant, it appears that this property is not for sale. Consequently, it appears that this aspect of the proposed mitigation measure could not be implemented.

The DEIS was too general in theorizing that fencing certain segments along Middle Gooseberry Creek would protect the stream from livestock and thereby compensate for the Project's impacts on water quality. In the absence of more details about this component of this proposed mitigation measure, it is not possible to evaluate the effect of this activity.

Finally, the DEIS failed to identify the potential costs of installing, maintaining, and monitoring the effectiveness of the "certain man-made improvements" in Middle Gooseberry Creek. The DEIS failed to identify the potential costs in obtaining the real property that would constitute the right-of-way corridor used to protect water quality. The DEIS also failed to identify the potential costs of maintaining the property and monitoring the effectiveness of its use. The DEIS also failed to identify the costs of fencing and related management in protecting the stream from livestock. The failure to identify and discuss the costs of the proposed mitigation measures has the effect of masking the true costs of the Project. It also violates the policy of the State of Utah that "mitigation of adverse environmental impacts should be considered as part of any project and should be reflected in project construction, operation, and maintenance costs." See Utah State Water Plan at 14-4.

The second measure proposed to mitigate Project impacts on water quality, measures proposed to reduce phosphorous loading in Scofield Reservoir, are too vaguely described and are likely not effective.

The DEIS indicates that the purpose of the second proposed water quality mitigation measure would be to reduce the phosphorous loading of Scofield Reservoir. Under this measure, certain improvements would be made to approximately 9.5 miles of stream segments on tributary streams above Scofield Reservoir. The DEIS indicates that the improvements would consist of stream bank stabilization, "primarily through riparian plantings." Also, the stream banks would be fenced "to reduce the amount of sediment and animal waste and hence the amount of phosphorous into the reservoir." See DEIS at 3-49.

However, the DEIS discussion of this proposed mitigation measure is simply too vague. It fails to identify the specific stream segments that would be "improved" or the streams on which the segments are located. It also provides no details concerning what types and quantities of sediments this measure would prevent from reaching Scofield Reservoir.

The DEIS cites to a study funded under a Clean Lakes Phase II grant concerning water quality issues involving Scofield Reservoir, and indicates that the study concluded that reducing phosphorous loading of Scofield Reservoir was the most effective way to reduce water quality problems in the Reservoir. Consequently, the DEIS should have indicated the sources of the phosphorous loading to the Reservoir (Fish Creek, Pondtown Creek, Mud Creek, etc.) and identified which of these sources would contain the stream segments proposed for improvement under the second mitigation measure. Consequently, although reducing the inflow of phosphorous to Scofield Reservoir may help to lessen the Project's negative impacts on water quality in the Reservoir, the discussion of the second mitigation measure is so vague that it is impossible to determine whether this measure would have a chance of being effective.

Further, the DEIS does not state who owns the property that is crossed by the 9.5 miles of stream segments that would be "improved," or whether the property is available for purchase. Consequently, it is unclear whether this measure could even begin to be implemented.

The DEIS also fails to discuss the potential costs of purchasing and managing this property, including the 9.5 miles of fencing that appear to be required. Further, the DEIS fails to identify the long-term costs of monitoring the management of the stream segments and the water quality in Scofield Reservoir that would be necessary under this proposed mitigation measure. The failure to identify and discuss the costs of the proposed mitigation measures prevents an understanding of the actual costs of the Project. It also violates the policy of the State of Utah that "mitigation of adverse environmental impacts should be considered as part of any project and should be reflected in project construction, operation, and maintenance costs." See Utah State Water Plan at 14-4.

The probability and effectiveness of all proposed mitigation measures should have been discussed in the DEIS.

The uncertainty as to whether the above-discussed proposed mitigation measures might be implemented in the first instance and, if so, whether they might be effective highlights a problem that occurs throughout all discussions of proposed mitigation measures in the DEIS, since it frequently is unclear whether the measure being discussed will actually be implemented or is merely being discussed to appear to comply with NEPA. This is particularly the case when property is proposed to be purchased, or other actions outside the jurisdiction of the Bureau are proposed. The CEQ's guidance on the federal regulations implementing NEPA indicates that an EIS must discuss the probability that proposed mitigation measures will be implemented:

> All relevant, reasonable mitigation measures that could improve the project are to be identified, even if they are outside the jurisdiction of the lead agency . . . . to

> ensure that environmental effects of a proposed action are fairly assessed, the probability of the mitigation measures being implemented must also be discussed. Thus, the EIS and the Record of Decision should indicate the likelihood that such measures will be adopted or enforced by the responsible agencies.

See Council on Environmental Quality, Questions and Answers about the NEPA Regulations No. 19b (March 16, 1981). The failure of the DEIS to indicate the probability of whether the land referenced above may be purchased for water quality mitigation violates these requirements. The failure to address this issue also undermines the DEIS conclusion that the known adverse water quality impacts of the Narrows Project will be mitigated by the proposed mitigation measures.

The DEIS assumes that the water quality impacts of the Narrows Project will be caused solely by reduced stream flows below the Narrows Dam. However, water quality will also be affected by other factors. For example, since the Narrows Project will cause reduced stream flows and a reduced quantity of water in Scofield Reservoir, it is likely that the temperature of the Reservoir water will increase, particularly in the summer months. Higher water temperatures, in turn, will likely affect the quality of the stored water. However, the DEIS fails to analyze this possibility. Further, construction of the Narrows Dam, relocation of State Road 264 (SR-264), and the anticipated recreational use of the Narrows Reservoir with its direct impacts 8 to 10 miles in all directions of the Narrows Project will likely have significant impacts on water quality. These potential impacts should have been identified and analyzed in the DEIS. See 40 C.F.R. § 1502.16 (requiring both direct and indirect effects to be analyzed). Consequently, the failure to analyze these impacts violates NEPA and renders the DEIS legally flawed.

Health concerns related to impaired water quality in Scofield Reservoir.

Another concern related to impaired water quality in Scofield Reservoir from the Project that the DEIS failed to discuss is the potential for health problems among persons whose drinking water comes from the Reservoir. Dr. Max Morgan, a physician in Carbon County for over twenty-two years, noticed that in the drought year of 1992, when Scofield Reservoir was at a very low level, there was a significant increase in the numbers of patients he treated for gastroenteritis, abdominal cramping, vomiting, and bloody diarrhea. Further, the records for that year at Castleview Hospital indicated an increase in the number of patients being treated for hepatitis. Dr. Morgan conducted an informal study of this situation among other physicians in the area, who confirmed that they also had an increase in patients with gastrointestinal disorders in 1992. Dr. Morgan believes that there is a correlation between low water levels in Scofield Reservoir and gastrointestinal disease caused by either residual bacterial coliforms in the highly concentrated bottom water used for drinking water or the superchlorination that is necessary to render the water safe. He submitted comments to the Bureau on the prior DEIS for the Project in which he discussed these conclusions and his concern that further reductions in the level of Scofield Reservoir from the Project could adversely impact the health of persons in Carbon County. These concerns were also raised in the scoping letters the Bureau invited concerning this DEIS. The failure of the DEIS to address this issue violates the requirement in the federal

regulations implementing NEPA that an EIS analyze both the direct and indirect effects of a proposed action. See 40 C.F.R. § 1502.16.

Conclusion.

Under the § 404(b)(1) guidelines, "no discharge of dredged or fill materials shall be permitted unless appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem." See 40 C.F.R. § 230.10(d). The DEIS acknowledges that the Narrows Project will adversely affect water quality in Middle Gooseberry Creek, lower Gooseberry Reservoir, and Scofield Reservoir. Further the mitigation measures proposed to offset these negative impacts on water quality are so vague that it is unclear what effect they might have. As a result, the § 404 Application should be denied because the Narrows Project fails to comply with the requirements of NEPA and the 404(b)(1) guidelines.

6. **The DEIS acknowledges that the Narrows Project will degrade and destroy spawning habitat for cutthroat and rainbow trout but fails to explain how this loss will be mitigated.**

The DEIS acknowledges that the Project will have significant, negative impacts on stream fisheries, but is vague in describing how these impacts might be mitigated. The DEIS indicates that the intent of the proposed mitigation "is to provide full mitigation for all adverse impacts which would result in no residual impacts." See DEIS at 3-37. But, the DEIS fails to provide any assessment of whether these proposed measures might accomplish this goal.

Specifically, the DEIS indicates that the Project would destroy: (1) 100% of the spawning habitat of the Yellowstone cutthroat in the 1 mile of Gooseberry Creek and the 4.3 miles of the headwater tributaries that join to form Gooseberry Creek; (2) 94% of the spawning habitat, and 45% of the fry habitat, of the Yellowstone cutthroat in the 3 miles of Middle Gooseberry Creek; (3) 16% of the spawning habitat for rainbow trout in Fish Creek; and (4) 41% of spawning habitat for the Yellowstone cutthroat in Lower Cottonwood Creek. See DEIS at 3-38, Table 3-11.

These streams are classified by the Utah Department of Wildlife Resources as Class 2, 3, and 3B waters, all of which are extremely important fisheries. The loss of extensive spawning habitat would likely destroy the self-reproducing populations of cutthroat and rainbow trout that presently inhabit these streams. This would be an irretrievable loss that cannot be mitigated by planting hatchery fish or attempting to improve habitat off site. Consequently, the Narrows Project would have a permanent adverse impact on the stream fisheries contrary to express state policy favoring the preservation of such unique resources.

The DEIS briefly proposes eleven measures that might be implemented to mitigate the Project's impact on stream fisheries. See DEIS at 2-12 to 2-15, 3-38 at Table 3-11. However, the discussion of these measures is too general and does not specify how the measures will compensate for the Project's destruction of the spawning habitat. In fact, only five of the eleven

proposed mitigation measures even mention spawning habitat. Consequently, the probability that these proposed measures will mitigate the destruction of spawning habitat appears very low.

The first proposed mitigation measure that briefly mentions spawning habitat involves year-round releases of 2.6 cfs from the Fairview Lakes into two tributaries of Gooseberry Creek that the DEIS indicates are dry most of the year. See DEIS at 2-12. The DEIS indicates that these water releases would establish a flow of 1.3 cfs in each tributary and create approximately 2.3 miles of spawning habitat for cutthroat trout. However, this discussion merely concludes, without referring to any supporting study or data, that releasing water into periodically dry streams will create and sustain spawning habitat. Another flaw in this DEIS discussion is the assumption that a release of 2.6 cfs from Fairview Lakes into two streams will evenly divide the 2.6 cfs into equal flows in each stream and establish a 1.3 cfs in each stream along its length. Such an assumption ignores the fact that water losses from seepage and evaporation would be high in a periodically dry stream. Thus, a release of 1.3 cfs into a stream will not result in a 1.3 cfs flow along its length.

Another basic flaw with the DEIS discussion of the first proposed mitigation measure is the assumption that the SWCD has the authority to regulate and manage water releases from Fairview Lakes. The SWCD has no water rights for Fairview Lakes. Rather, the water rights covering the water in Fairview Lakes are owned by the Cottonwood-Gooseberry Irrigation Company (the "Company"). These rights allow storage in the Fairview Lakes, then diversion through the Fairview Canal to the Fairview Tunnel and into Cottonwood Creek for rediversion and the irrigation of land in the Sanpete Valley. No one may use these water rights to create wetlands adjacent to the Narrows Reservoir without first obtaining the approval of the Utah Division of Water Rights of a change application to make that use of the rights. Consequently, the DEIS is mistaken in assuming that there is immediately available water from the Fairview Lakes for the SWCD to use to mitigate Project impacts to spawning habitat.

The DEIS also theorized that an unspecified amount of water could be released from Fairview Lakes to create from 72 to 100 acres of wetlands in an area adjacent to the Narrows Reservoir. The DEIS should have discussed whether there is enough water for both proposed mitigation measures, and the specific steps that would be necessary to implement such measures.

The second proposed mitigation measure that mentions spawning habitat involves stabilizing the stream banks along middle Gooseberry Creek. See DEIS at 2-12. As discussed above in the criticism of the measures that the DEIS proposes to mitigate the Project's acknowledged impacts on water quality, this stabilization is supposed to occur naturally or by placement of "man-made improvements" in middle Gooseberry Creek. However, no data supports this action as an effective measure to create spawning habitat. Further, as more fully discussed on pages 30-31 of the Western Wetland Systems report submitted with these comments, Middle Gooseberry Creek is a meandering creek, and studies indicate that placing man-made structures in meandering creeks frequently fails to promote channel narrowing and instead results in bank erosion and channel widening and/or degradation.

The third proposed mitigation measure that mentions spawning habitat involves year-round releases from the Narrows Reservoir to provide flushing flows below the Dam. See DEIS at 2-13. The DEIS discussion of how the measure would mitigate for impacts on spawning is short and vague. It merely states: "These additional releases [of 1 cfs] would be used to provide additional in stream flows or to flush accumulated silt and fine sediments from the streambed to enhance spawning habitat." (emphasis added). However, no reports or data are listed or summarized to support the premise that removal of silt or fine sediments from a stream channel will enhance spawning habitat. No data or reports are listed or summarized to support the DEIS statement that the release of 1 cfs of Reservoir water into Gooseberry Creek would be sufficient to enhance spawning habitat. Further, the DEIS reference to enhancing spawning habitat ignores that it previously acknowledged that the Project would destroy 94% of the spawning habitat of the Yellowstone cutthroat in the 3 miles of Middle Gooseberry Creek. Consequently, there is almost no spawning habitat available for enhancement in the stream.

The fourth proposed mitigation measure mentions habitat and involves making improvements to 15.5 miles of stream segments in the Price River drainage. See DEIS at 2-13. The DEIS indicates that approximately 206 acres of rights-of-way would be acquired, a 200 foot wide corridor would be acquired, and fishery habitat improvements and some minor channel work would be completed. However, it does not provide any details about the actual "fishery habitat improvements" or "minor channel work" that would be completed. The DEIS identifies the 4 stream segments that would be the subject of this proposed mitigation measure. However, it does not identify the specific locations of the rights-of-way and real property that would be obtained, or the costs of acquiring such property. The failure to identify and discuss the costs of this and the other mitigation measures proposed on pages 2-12 to 2-14 of the DEIS misleads the reader of the DEIS about the true costs of the Project. It also violates the policy of the State of Utah that "mitigation of adverse environmental impacts should be considered as part of any project and should be reflected in project construction, operation, and maintenance costs." See Utah State Water Plan at 14-4.

As in its discussions of other proposed mitigation measures, the DEIS discussion of this fourth proposed mitigation measure inadequately describe what steps the SWCD would take to ensure that the acquired property would be managed and monitored to ensure that the goals of this mitigation measure are accomplished and maintained. The DEIS simply indicates that "Memoranda of Understanding would be required between SWCD and the managing agencies." See DEIS at 2-13. This statement is simply too vague to comply with the requirements of the § 404(b)(1) guidelines or NEPA.

Of the 11 mitigation measures proposed in the DEIS, only one mentions Cottonwood Creek. However, the DEIS acknowledges that Lower Cottonwood Creek would be significantly impacted by a 162% increase in the average annual flow of the stream, including an average summer flow increase of 300%. See DEIS at 3-39, Table 3-12. Table 3-12. Specifically, the DEIS indicates that this proposed mitigation involves the release of 2 cfs at the mouth of Cottonwood Creek, which is historically dewatered during the irrigation season. The DEIS indicates that this release of 2 cfs "would support fish habitat and create a fishery for local residents and enhance the wetland and riparian corridor." See DEIS at 2-14 (emphasis added).

However, the DEIS fails to refer to or summarize data or studies that would support its suggestion that merely releasing 2 cfs of water into the mouth of Cottonwood Creek will compensate for the loss of 41% of spawning habitat for the Yellowstone cutthroat in Lower Cottonwood Creek. Consequently, the effect this paucity of discussion on mitigating impacts to Lower Cottonwood Creek is to propose no mitigation at all for Lower Cottonwood Creek. This is unacceptable and violates the clear requirement in the NEPA regulations that mitigation measures be analyzed for all adverse impacts. See 40 C.F.R. §1502.14(f); 1502.16(h).

The proposed mitigation is vague and its potential effectiveness is doubtful.

The brief references in the DEIS to measures intended to mitigate impacts to spawning habitat are too vague to give any real indication of whether they might achieve their purpose and, if so, the long-term effects of these measures, including the types and numbers of fish resulting from these measures. Nor does the discussion of these mitigation measures assess the likelihood that they can or will be implemented as required by the § 404(b)(1) guidelines and the CEQ regulations. Another flaw with these measures is that even if successful, they might constitute less than 1:1 functional value mitigation. Further, the proposed mitigation seeks only to enhance existing habitat. It does not seek to avoid the damage in the first place, or to minimize unavoidable damage, or to replace habitat that would be destroyed by the Project.

Conclusion.

Under the § 404(b)(1) guidelines, fish and wildlife and recreation values are one of the factors considered by the Corps in its public interest determination concerning an application for a 404 permit. See 33 C.F.R. § 320.4(a). The Narrows Project will significantly degrade the cutthroat and rainbow trout fisheries in Gooseberry Creek, Fish Creek, and Lower Cottonwood Creek, and may degrade other fisheries in the lower Price River, which is another indication that the Project is contrary to the public interest.

7. The DEIS acknowledges that the Project will have adverse impacts to fisheries and recreational use in Scofield Reservoir, but fails to discuss measures to mitigate these impacts.

The DEIS underestimates the impact of the Narrows Project on Scofield Reservoir, Scofield State Park, and related recreational activities.

The DEIS acknowledges that the reduced stream flows caused by the Narrows Dam will decrease water quality and increase the potential for fish kills in Scofield Reservoir. The DEIS fails to state or estimate how many fish will be killed as a result. Instead, it simply indicates that reduced flows will cause the Reservoir to operate at a lower level and decrease the average surface area of the Reservoir by about 250 acres. However, no data or methodology is provided to support this figure. See DEIS at 3-36. Further, the DEIS indicates that the reduced surface area "would result in a loss of 5,900 visitor days per year, including fishing." See DEIS at 3-63. The DEIS indicates that this conclusion is based Table 3-16 on page 3-60, which summarizes data compiled by the Bureau on the use of Scofield Reservoir and Joes Valley Reservoir from

1982 to 1990. However, there is nothing on the cited table, which merely summarizes the number of visitor days at each facility, to support the DEIS conclusion that a reduction in the surface area of Scofield by 250 acres would cause a loss of 5,900 visitor days. In contrast, in his reservoir operations study discussed in Section 13 of these comments, Robert J. Murdock concludes that the surface area of Scofield Reservoir will be reduced by an average of approximately 302 acres. Assuming the DEIS rate of lost visitor days is accurate, Mr. Murdock's analysis indicates that the Project would result in the loss of 9,060 angler days per year at the Reservoir.

The DEIS also fails to discuss the potential impacts of the decreased surface area of Scofield Reservoir on the recreational activities other than fishing (e.g. boating, camping, hiking, birdwatching) that occur on or in the vicinity of the reservoir. Nor does the DEIS describe or analyze the effect of the Project's impacts on Scofield Reservoir on businesses that depend on the Reservoir (e.g. tourism, fishing, agriculture, industry, municipal) or Scofield State Park. Scofield Reservoir is the most important shore-line fishery in Utah and the centerpiece of Scofield State Park. Significant sums have been expended over the years on improving the water quality of Scofield Reservoir and upgrading Scofield State Park. However, the DEIS simply overlooks the significant and detrimental impact the Narrows Project will cause to the Park, other than to state:

> Utah Division of Parks and Recreation estimates that this loss [of angler days at Scofield Reservoir] could represent more than $5,000 in revenue loss to the State Park annually without mitigation. More frequent fish kills and accelerated [e]utrophication would also degrade the park. However, water quality mitigation has been provided. While the total inventory of water-based recreation may be increased, some of it will be offset by a downgraded State Park at Scofield.

DEIS at 3-76.

> The DEIS fails to propose measures to mitigate the Project's adverse impact on recreational use of Scofield Reservoir and Scofield State Park.

The DEIS fails to propose measures to mitigate the Project's acknowledged impacts on recreational use of Scofield Reservoir and Scofield State Park. This failure violates the federal regulations implementing NEPA. See 40 C.F.R. §§ 1502.14(f); 1502.16(h). Instead of proposing mitigation measures, the DEIS engages in the following editorializing:

> It should be pointed out that if Scofield Reservoir had not been enlarged to accommodate the Gooseberry Plan, it would have had a much smaller surface area and would have been able to support much less recreation use. Using Reclamation's data, the recreation use of Scofield without enlargement would have been about 26,100 visitor days less. According to UDWR data, there would have been 33,200 angler days less fisherman use.

(Emphasis added). This language is offensive and has no place in the DEIS. As a preliminary matter, there is no data in the DEIS to support the assertion that "Scofield Reservoir had not been enlarged to accommodate the Gooseberry Plan," even though this language is repeated elsewhere in the DEIS. Further, even if Scofield Reservoir had been enlarged "to accommodate the Gooseberry Plan," whatever that means, such a fact is simply not relevant to the objective analysis of potential Project impacts that the Bureau is supposed to be performing in the DEIS. The inclusion of the above-quoted language in the DEIS again underscores the bias in the DEIS and its failure to comply with the requirements of NEPA.

Conclusion.

Under the § 404(b)(1) guidelines, fish and wildlife values are one of the factors considered by the Corps in its public interest determination concerning an application for a 404 permit. See 33 C.F.R. § 320.4(a). The Narrows Project will significantly degrade the reservoir fisheries and reduce recreational opportunities in Scofield Reservoir. It will also reduce recreational use and related income opportunities at Scofield State Park. For these reasons, the proposed Narrows Project is not in the public interest and the § 404 Application should be denied.

8. The DEIS suggestion that impacts to Scofield Reservoir would be somehow mitigated by recreational use of the Narrows Reservoir is wrong and is likely based on an incorrect assumption concerning the amount of water that would be stored in the Narrows Reservoir.

The DEIS suggests that recreational use of the Narrows Reservoir would adequately mitigate the Project's acknowledged impacts on recreational use of Scofield Reservoir and Scofield State Park. Specifically, the DEIS indicates that approximately 46,400 visitor days each year will be spent at the Narrows Reservoir and, of these, 13,700 visitor days each year would be spent on fishing. See DEIS at 3-63. The DEIS provides no methodology concerning this figure. Instead, it indicates that it is "based on use rates of Joe's Valley and Scofield Reservoirs." Further, there is no discussion in the DEIS of the water management plan that would be necessary to identify the costs associated with development of the fishery, whether the fishery could be maintained under the anticipated fishing pressure, and how many fish would be planted under the plan. The DEIS does, however, acknowledge that geographical and seasonal limitations may restrict recreational use of the Narrows Reservoir:

> The higher elevation Narrows Reservoir will have a shorter season of use at +9,000 elevation than will Scofield Reservoir at about 7,600 feet elevation. Greater snow cover will probably occur at 9,000 feet with less opportunity for year-round fishing (ice) as compared to Scofield State Park

See DEIS at 3-63 to 3-64.

The DEIS did not identify how it determined that approximately 13,700 visitor days would be spent fishing at the Narrows Reservoir. However, it appears that such a determination would be based on the surface area of the Reservoir, which the DEIS indicates would be about

604 acres. See DEIS at S-4. Further, it appears that this estimated surface area is based on the proposed Reservoir's capacity of 17,000 acre-feet. However, there would be a fundamental mistake in estimating the fishing and other recreational use of the Reservoir based on an assumed surface size of 604 acres if this figure is based on there being 17,000 acre-feet of water in the Reservoir. The reason for this is that much of the time there will not be 17,000 acre-feet in the Reservoir. This conclusion is based on the plain language of the 1984 Agreement that the DEIS uses as the principal grounds for rejecting reasonable alternatives to the Project.

Specifically, Section IV ("Distribution of Water") of the 1984 Agreement specifies:

> 1. The active capacity of the reservoir for the Narrows Project shall not exceed 10,000 acre-feet to provide for the transmountain diversion to the Sanpitch River System. If requirements are made of Sanpete to release or bypass water for minimum streamflow purposes in Gooseberry Creek below the Narrows Site the active storage capacity of the reservoir for such purposes may be increased as necessary, but shall not exceed 4,500 acre-feet of additional storage capacity. The total active storage capacity shall not exceed 14,500 acre-feet.

See DEIS Appendix A.

In other words, under the 1984 Agreement, the active storage capacity of the Narrows Reservoir may be 10,000 acre-feet plus whatever additional amount of water is required to provide the minimum instream flows in Gooseberry Creek below the Reservoir. Since the dead storage capacity of the Narrows Reservoir is 2,500 acre-feet, the total capacity of the Reservoir would be 12,500 acre-feet plus whatever additional amount of water is required to provide the minimum instream flows in Gooseberry Creek below the Reservoir. The Utah State Engineer's Memorandum Decision issued on January 7, 1985 approving the change applications filed by the SWCD to use its water rights for what became known as the Narrows Project specified that the SWCD release sufficient water from the Narrows Reservoir to maintain a minimum flow of 1 cfs in Gooseberry Creek immediately below the Narrows Dam, and release an additional 0.25 cfs if necessary to maintain a minimum flow of 1.5 cfs in Gooseberry Creek near the Gooseberry campground. One cfs of flow is equivalent to 724 acre-feet per year. Thus, it appears that although the Narrows Reservoir would have a maximum capacity of 17,000 acre-feet, the actual amount of water that would be allowed, under the 1984 Agreement, to be stored in the Reservoir would be closer to 13,000 acre-feet. Therefore, if the DEIS has assumed that recreational use of the Narrows Reservoir would be based on a surface area of 604 acres and based this figure on the assumption that 17,000 acre-feet of water would actually be stored in the Reservoir, the DEIS assumptions of recreational use of the Narrows Reservoir are likely wrong.

9. The DEIS should not have been released before completion of the amended Biological Opinion analyzing potential impacts of the Project on the endangered Colorado Squawfish.

Copies of correspondence in Appendix C of the DEIS, entitled "Biological Opinion," between the Bureau and the U.S. Fish & Wildlife Service ("FWS") concern recent studies by the

Utah Division of Wildlife Resources on the use of the lower Price River by the endangered Colorado Squawfish. The correspondence indicates that a number of Colorado Squawfish have been found in the lower 38 miles of the Price River. The correspondence also indicates that the Bureau and the FWS have engaged in formal consultation pursuant to Section 7 of the Endangered Species Act concerning the potential impact of the Project on the Colorado Squawfish. Further, the DEIS indicates that "Reclamation and SWCD are awaiting issuance of a new biological opinion form [sic] the Service addressing project impacts to be designated critical habitat and the Price River." See DEIS at 3-3. In such case, the DEIS was prematurely released, since it fails to include an analysis of one of the most critical environmental issues facing the Project, that being whether the Project would jeopardize the existence of the Colorado Squawfish.

If the awaited Biological Opinion concludes that the Project might so jeopardize the existence of the Squawfish, the requirements imposed on the Project under the Biological Opinion would need to be evaluated, at a minimum, in relation to the other mitigation measures proposed in the DEIS, and vice versa. However, since the DEIS was released prior to completion of the new Biological Opinion, the only remedy for this premature release is the preparation of a new or supplemental EIS that will be able to integrate and respond to the significant new information in the new Biological Opinion.

The DEIS also indicates that Project depletions to the Colorado River system are now estimated to be 5,709 acre-feet per year. This depletion figure is higher than the 5,557 acre-feet depletion that was used as the basis for the "Final Amended Biological Opinion on the Proposed Narrows Project, Small Reclamation Project Act Loan," dated January 9, 1995. See DEIS Appendix C. In the event that the new Biological Opinion referred to on page 3-1 of the DEIS is not based on the higher depletion figure of 5,709 acre-feet per year, it will be necessary for a new biological opinion to be prepared based on that depletion figure. Release of that document would also necessitate preparation, at a minimum, of a new or supplemental EIS.

10. The DEIS does not comply with the requirements of the January 22, 1998 Conservation Agreement concerning the spotted frog.

As more fully described on pages iv, 13, and 25-26 in the Western Wetland System report submitted with these comments, several agencies, including the Bureau, signed the interagency "Conservation Agreement for Spotted Frog," dated January 22, 1998, to prevent the spotted frog from being listed as a threatened or endangered species. The Agreement indicated, among other things, that the spotted frog occurs in only five locations in the Sevier River GMU. All five of the locations are within the proposed service area for the Narrows Project. The Agreement indicated that the major threats to the spotted frog within the Sevier River GMU were loss of habitat due to agricultural practices, and water development for municipal and agricultural purposes. Further, because of the isolated nature of the spotted frog's habitat, any loss of habitat would be considered significant. The Agreement also indicated that surveys, studies, habitat enhancement, habitat acquisition, and mitigation were necessary actions before proceeding with water development projects. The DEIS includes no information to indicate that any of these

activities have been completed, or even begun, with respect to the Project. These activities should be completed and then discussed in a new or supplemental EIS.

11. The DEIS fails to adequately describe and analyze the social and economic benefits and/or costs of the Narrows Project in northern Sanpete County.

If the Narrows Project is constructed, there will be a transbasin diversion of 5,400 acre-feet per year of water currently used in the Price River drainage, in Carbon County, to the San Pitch River drainage, in Sanpete County. Almost all of the diverted water will be used for the supplemental irrigation of lands that are already under production. Thus, the diverted water will not irrigate any new land. However, the transbasin diversion will affect the amounts of water currently used each year in Carbon County for a variety of agricultural, municipal, and industrial uses. The DEIS discussion of the potential economic benefits and impacts of this transbasin diversion in Sanpete County is either undocumented or based on out-dated information and thus, incomplete.

The discussion in the DEIS of possible economic benefits from the Project is unsupported by data and incomplete

The DEIS mentions that the economic benefit of the 480 acre-feet of Project water that would be used for lawn-watering would be approximately $46,000 per year. It explains that "this benefit is based on foregone agricultural benefits that would be lost if irrigation water were converted to M&I use." See DEIS at 3-72. This rationale is confusing because it suggests that water used for supplemental irrigation has a higher value that water used for municipal and domestic uses.

The DEIS indicates that Project water would average about 0.3 acre-feet (or 4") per acre. The DEIS also indicates that approximately 248 families would use the supplemental irrigation water to harvest a third alfalfa crop each year for a net income increase of $1,300 per family. This is estimated to increase annual net farm income in Sanpete County, in turn, by approximately $322,400 per year, or by 11%. Id. However, the DEIS does not describe how these numbers were determined. Instead, it merely refers to a 1995 farm study. The DEIS further estimates that this water would cost approximately $35.00 per acre foot, but acknowledges that the cost of the water to the 248 families cannot be accurately determined "until project financing has been secured and the project is completed." Further, the DEIS does not discuss the costs associated with the conservation measures it assumes will be implemented by these water users as a condition of receiving Project water. Consequently, the estimated annual benefits of the supplemental irrigation water are overestimated and inaccurate.

A rough estimate of the cost of this water, by itself, assuming that the $ 17.3 million Project costs would be repaid at 0% interest over 50 years, is greater than $ 60 per acre-foot, which is much higher than what most irrigators in Carbon County or Sanpete County currently pay, and can afford to pay, for water. The costs of the assumed conservation measures will further increase the actual cost of the water. In sum, the benefits and costs of the Project to water users in northern Sanpete County are incompletely presented in the DEIS. More financial

information concerning the Project should have been disclosed in the DEIS and is essential if an informed decision on the Project is to be made.

12. The DEIS violates NEPA by failing to analyze the impacts of the Project on Carbon County.

The federal regulations implementing NEPA are quite clear that an EIS must analyze both the direct (primary) and the indirect (secondary) effects of the proposed action. See 40 C.F.R. § 1502.16. The Bureau of Reclamation also emphasizes this requirement in its guidance document, which states in part:

> Secondary impacts are frequently difficult to identify and measure; however, the secondary impacts that can reasonably expected to occur, should Reclamation proceed with its proposal, would need to be addressed. For example, the impacts associated with the construction of a reservoir and the delivery of water may have some of the primary and secondary effects:
>
> . . .
>
> The secondary impacts generally are associated with the intended use of the water and include such things as economic and human population growth inducement, changes in land use (including associated fish and wildlife habitat changes), and potential industrial development. These impacts must be addressed to provide the decisionmaker with a clear understanding of the potential range of impacts associated with the proposal.

See United States Department of Interior Bureau of Reclamation, National Environmental Policy Act Handbook § 4-10.E (October 1990) (emphasis added). There is no such analysis in the DEIS even though it is obvious that the Project will have several significant impacts on Carbon County. In fact, the DEIS suggests that the transbasin diversion of water from Carbon County to Sanpete County will not have any significant effects in Carbon County, and concludes that no mitigation measures are necessary for the impacts that the DEIS identifies.

> The DEIS fails to adequately analyze the social and economic costs of the Project to Carbon County.

The DEIS briefly discusses, without any analysis or supporting data, what appear to be conflicting estimates of the economic impacts to Carbon County that would be caused by the Narrows Project. As a result, it is difficult to determine how its estimates were reached or whether they are accurate. For example, page 3-72 of the DEIS states that the reduced water supply from Scofield Reservoir "would result in the loss of about $31,000 of farm income per year in Carbon County." Further, that for municipal and industrial water users to maintain their water supply at the same level in future as before construction of the Project, these water users would need to purchase 146 shares of Scofield water at a cost of $146,000. Then, page 3-73 of the DEIS indicates that "decreased storage of Scofield Reservoir would cause a loss of $22,000

of economic benefits per year to Carbon. There is no explanation in the DEIS of how these numbers were derived or the relationship among these identified economic impacts.

The above-referenced figures are conflicting and appear to greatly underestimate the economic impacts of reduced flows in the Price River system and the transferring of water from its present agricultural, municipal, and industrial uses in Carbon County. These costs will be quite significant, since water supplies in Carbon County are limited and fully appropriated. Any water shortage in releases from Scofield Reservoir will significantly impact agricultural water users. Primary crops that would have been previously irrigated will not be grown, causing losses in net income. Shortages would also impact municipal water use, restrict growth, and thwart fire protection in Price City, Helper City, and Wellington City. Finally, shortages will significantly impact industrial uses of water in Carbon County. At the public hearing on the DEIS in Price, Utah on April 22, 1998, a representative of Utah Power & Light stated that its Carbon Plant, which employs approximately 100 persons and has an operating budget of $15-20 million, relies in part on water releases from Scofield Reservoir to operate and generate electricity. Consequently, water shortages could force the plant to shut down. Plant shutdowns are a real possibility, and almost occurred in 1992. In that year, releases from Scofield were insufficient to meet the needs of the Carbon Plant and UP&L was able to keep the Plant operating only by leasing 1800 acre-feet of water from local irrigators who agreed to not irrigate their fields.

The DEIS failure to thoroughly analyze the Project's impacts on Carbon is particularly egregious since the benefits of the Project to Sanpete County are so modest. Even though it is estimated to cost approximately $17.3 million of public funds, the Narrows Project will only provide supplemental irrigation water. Further, it is estimated that the Project will only supply the equivalent of an extra 4" each year to 15,000 acres for a net gain of about $1,300 each year for 248 families in the Project area. See DEIS at 3-81.

Balanced against these modest benefits are the several significant environmental and socioeconomic impacts in Carbon County that the DEIS acknowledges, but analyzes as if each impact is totally separate from the others. These impacts include taking land out of agricultural production, restricting growth and interfering with municipal water use in Price City, Helper City, and Wellington City, and impacting operations of the Carbon Plant. However, these are not separate impacts. The failure of the DEIS to analyze the cumulative effect of these and other impacts on stream flows, water quality, wetlands, fisheries, recreation, water availability, and agricultural, municipal, and industrial water use in Carbon County is a major flaw that requires further analysis.

However, rather than thoroughly analyzing the Project's wide-ranging impacts on Carbon County, the DEIS makes the following statements, which indicate that the Bureau has lost any objectivity that it may have at one time had concerning the Project and that the Bureau is incapable of taking the hard look at the Project that is required under NEPA:

> The near doubling in size of Scofield Reservoir in 1946, allowing a full 35,000 acre-feet of additional active storage capacity, was originally accomplished for the purpose of implementing the Gooseberry Project Plan. Therefore, irrigation

> systems in the Price River area are not expected to be any worse off then they would be without the enlarged reservoir.

See DEIS at 3-71. The DEIS also states:

> Implementation of the Proposed Action would cause a reduction in the irrigation release from Scofield Reservoir by an average of 471 acre-feet per year which is about two percent of the average annual supply. However, this reduction is less than the 1,703 acre-feet per year average that would occur if Scofield Reservoir had not been enlarged and water right agreements executed to accommodate the Narrows Project.

See DEIS at 3-72. The DEIS also states:

> Decreased storage of Scofield Reservoir would cause a loss of $22,000 of economic benefits per year to Carbon County. However, the level of economic benefit due to recreation use of Scofield Reservoir would have been nearly $97,000 less if the reservoir had not been enlarged to accommodate the Gooseberry Plan.

See DEIS at 3-73. Finally, the DEIS concludes that no mitigation measures are required in connection with the acknowledged Project impacts on Carbon County. The DEIS rationalizes this conclusion as follows:

> There are no social mitigation measures proposed under the Proposed Action. The enlargement of Scofield Reservoir has already mitigated social and economic impacts on Carbon County.

See DEIS at 3-73. This argumentative rhetoric makes plain that the Bureau is incapable of conducting the neutral analysis of the Project that is required under NEPA. The language once again demonstrates that the DEIS is so biased that the only remedy for this violation of NEPA is the preparation of a new Draft EIS by a contractor that can perform the objective, disinterested analysis required under NEPA.

13. The DEIS relies on a model based on incomplete data to estimate certain of the Project's environmental impacts. Consequently, the DEIS reaches incorrect conclusions regarding these impacts.

The heart of the DEIS is a water model used to estimate the impacts of the Narrows Project on stream flows, water quality, and fisheries, in lower Gooseberry and Scofield Reservoirs, and impacts to the Price River drainage. The model is a simulated reservoir operations study based on stream flow data collected from Gooseberry Creek near Fairview and near Scofield Reservoir for the years 1960 to 1992. The same water model was used in the original Draft EIS and Final EIS for the Project. See DEIS at 3-8 ("All studies are based on hydrologic data from 1960 to 1992 . . . these operation studies were originally prepared by

Franson and Noble . . . .", the SWCD's original EIS contractors). The model estimates Project impacts by deducting the 5,400 acre-feet per year that would be removed from Gooseberry Creek by the transbasin diversion to Sanpete County. However, because the model is based on less accurate methods and significantly less than the total available data record, the conclusions based on the model are incorrect.

A reservoir operations study demonstrates that the water model used for the Draft EIS and the Final EIS is incomplete and underestimates the Project's environmental impacts.

Robert J. Murdock, P.E., performed a reservoir operations study in the spring of 1994 to assess the accuracy of the water model used in the original Draft EIS and Final EIS. Consequently, the conclusions of Murdock's study concerning the model used for the previous documents are equally applicable to the new DEIS. Murdock's study is based on data for the time period from October 1, 1946 to September 30, 1993. The data is from records published by the United States Geological Service and it includes stream gauge records of flows in the Fairview Ditch and Tunnel, Gooseberry Creek near Scofield Reservoir, the Price River below Scofield Reservoir, and historic storage amounts in Scofield Reservoir. This data was supplemented with information from the Price River Commissioner Reports filed with the State Engineer's Office in the Utah Division of Water Rights. In his study, Murdock assumed that the Narrows Reservoir was constructed and full as of 1946 to estimate its downstream impacts. Further, the Narrows Reservoir was assumed to have two different capacities -- 14,500 acre feet (as in the Preferred Plan in the DEIS), and 5,400 acre-feet (the smaller plan). Murdock's data and conclusions are summarized on 9 tables showing the historic storage in Scofield Reservoir, how this storage would be affected by a Narrows Reservoir with active capacities of either 14,500 and 5,400 acre feet, the reductions in releases from Scofield that would be caused by the two different sized Narrows Reservoirs, and the effects of the different sized reservoirs on water releases to Cottonwood Canyon. The two documents summarizing Murdock's study, dated March 18, 1994, and April 5, 1994, respectively, are attached as Exhibit "G" to these comments.

Because it is based on more data collected over a longer period of time, Murdock's study is able to present a more accurate picture of the hydrology of the area and how it will be impacted by the Narrows Project. Murdock's study reaches significantly different conclusions than the DEIS. For example, the DEIS estimates that a Narrows Reservoir with an active capacity of 14,500 acre-feet will cause an average reduction in historical water releases from Scofield Reservoir of 471 acre-feet per year. See DEIS at 3-15, 3-72. In contrast, Murdock's study concludes that the average annual reduction in historical releases will be 1,627 acre-feet per year, a significant difference.

The DEIS estimates that operation of the Narrows Reservoir would cause reductions in the amount of irrigation water released from Scofield Reservoir, by being drained to the bottom of its active storage, in 9 of the 33 years simulated, a very significant impact. See DEIS at 3-13. Murdock concludes that reductions would occur in 14 of the 48 years studied, also approximately 30% of the time. Further, in several of these 14 years, the water shortages would have prevented a large portion of the actual releases from occurring. For example, in 1960, 15,714 acre-feet of water was released from Scofield -- under Murdock's study, shortages would have prevented

7,134 acre-feet of this amount from being released. In 1961, 4,794 acre-feet was released from Scofield -- under Murdock's study, shortages would have prevented 2,452 acre-feet of this amount from being released. In 1977, 12,857 acre-feet was released from Scofield -- under Murdock's study, shortages would have prevented 10,866 acre-feet of this amount from being released. Finally, in 1992, 9,850 acre-feet was released from Scofield -- under Murdock's study, shortages would have prevented 7,087 acre-feet of this amount from being released.

Murdock's study also highlights that the DEIS underestimates the impacts of the Narrows Reservoir in assuming that it would be full starting in 1960, the first year in the DEIS model, since the Reservoir would not instantly fill with water. Consequently, those amounts of water "removed" from the drainage following construction of the Narrows Reservoir are not reflected in the estimated impacts.

As Murdock's study reveals, by ignoring readily available hydrological records concerning stream flows and reservoir storage, and focusing instead on less data for a limited period of time, the DEIS significantly underestimates the impacts of the Narrows Project on the quantity of water stored in and subsequently released from Scofield Reservoir. This is a critical error in the DEIS, and it is exacerbated by the fact that the Price River below Scofield is fully appropriated. The historic releases from Scofield into the Price River are already are barely adequate to provide the water required for current agricultural, municipal, and industrial uses. Consequently, any reduction in the flows into or from the Scofield Reservoir will significantly and adversely impact these uses. Therefore, the nature of these impacts must be accurately determined before an informed decision concerning the Narrows Project can be made as required by NEPA.

14. The DEIS fails to identify or address potential earthquake hazards in the proposed site for the Narrows Project and proposes design standards for the Narrows Dam that conflict with similar standards it recently imposed on Scofield Reservoir at a cost of over $2 million.

The DEIS fails to identify or address potential earthquake hazards in the proposed site for the Narrows Project and proposes design standards for the Narrows Dam that conflict with similar standards the Bureau recently applied, at a cost of over $2 million, to Scofield Reservoir. Consequently, this discussion in the DEIS is flawed and incomplete and demonstrates that the Bureau has not taken a hard look at whether the Narrows Dam may be safely built as proposed in the DEIS.

The discussion in the DEIS on potential earthquake hazards in the vicinity of the Narrows Dam is almost identical to the discussion on this topic in the discredited Final EIS on the Project. As a result, it is very brief in discussing the possibility of an earthquake occurring in the vicinity of the Project, and how the Project would be designed to withstand such an event. It concludes that: "from a geoseismic standpoint, the recommended Narrows Damsite is suitable for construction." See DEIS at 3-92. The DEIS also states: "Geologic evaluation of the Wasatch Plateau indicates that existing faults are not active," but provides no information about who conducted such evaluation or what data was used in the evaluation. See DEIS at 3-89. It

acknowledges that three faults (the West Gooseberry Fault, the Fairview Lakes Fault, and the East Gooseberry Fault) have been mapped in the vicinity of the site of the Narrows Dam. It also acknowledges that the East Gooseberry Fault is only one mile to the east of the Project area but dismisses, without any analysis, the possibility that these faults may become active. Further, the DEIS indicates that the Project will be designed to withstand an earthquake with a magnitude of 5.5:

> Faults which occur in the site vicinity are believed to be inactive. However, design of project facilities would be based on a "maximum credible earthquake" (MCE). Preliminary studies indicate that the appropriate MCE would be of a magnitude of 5.5. Further review of the appropriate MCE would be performed prior to the final design of the dam.

See DEIS at 3-92 (emphasis added). These conclusions in the DEIS are very different than those relied on by the Bureau in recently expending over $2 million to reconstruct the foundation of Scofield Dam, approximately 17 miles away, because of the Bureau's concerns about possible earthquake activity in the area with a magnitude that would far exceed the MCE of 5.5 referred to in the DEIS.

Specifically, there are a number Bureau studies in connection with Scofield Dam indicating that the Bureau believed that an earthquake with a MCE of up to a 7.5 magnitude was possible in the area. These studies include: (1) Bureau of Reclamation, Division of Design, Technical Memorandum No. SO-222-1, Analyses of Geotechnical Concerns of Scofield Dam from the Safety Evaluation of Existing Dams Report (October 1983); (2)) Bureau of Reclamation, Division of Design, Technical Memorandum No. SAR-1632-8, Seismotectonic Analysis for SEED [Safety Evaluation of Existing Dams] Report (February 21, 1984); (3) Bureau of Reclamation, Division of Geotechnical Engineering and Geology Division, Decision Memorandum No. SC-3620-1, Modification Decision Analysis (July 19, 1990); (4) Bureau of Reclamation, Geotechnical Engineering and Geology Division, Technical Memorandum No. FD-3620-1, Evaluation of Structural Modification Alternatives for Scofield Dam (September 16, 1992); and (5) Bureau of Reclamation, Safety of Dams Program, Scofield Dam Modification Report (June 1995).

The Bureau's Technical Memorandum No. SO-222-1 (October 1983) identified the following MCEs for the area near Scofield Dam:

Tectonic Structure	MCE	Epicentral distance (km)
Wasatch Fault	7.5	60
Pleasant Valley Graben	7	1
Intermountain Seismic Belt	5	0

Further, the Bureau's Technical Memorandum No. SAR-1632-8 (February 21, 1984) identified three major faults near Scofield Dam: (1) the Pleasant Valley Fault zone; (2) the North Gordon Fault Zone; and (3) the Joes Valley fault zone. Among other things, this Technical

Memorandum indicated that the Pleasant Valley fault zone is 5 to 8 kilometers wide and extends from north of Fish Creek (which is where Scofield Dam is located) approximately 55 kilometers to the south. Further, the Pleasant Valley Fault was estimated to have a MCE of a 6.5 to 7 magnitude with an epicentral distance of 1.2 kilometers. The Bureau's memorandum also estimated a 7 to 7.5 MCE for the Joes Valley Fault with an epicentral distance of 23 kilometers, and a MCE of 7.5 for the Wasatch Fault with an epicentral distance of sixty kilometers.

The Bureau's Decision Memorandum No. SC-3620-1 (July 19, 1990) identified a MCE of 6.5 for the site of Scofield Dam, a MCE of 7.5 for the Pleasant Valley Fault at a distance of 1.3 km, and a MCE for the Joes Valley Fault at a distance of 22 km. The Bureau's Technical Memorandum No. FD-3620-1 made the same findings, and specifically recognized the liquifaction potential from a possible MCE of a 7.0 magnitude from the Pleasant Valley Fault zone at a distance of 1.3 km. The same potential MCEs are identified in the Bureau's June 1995 Safety of Dams Modification Report.

The result of the above-referenced studies was that the Bureau required significant construction work on the foundation of Scofield Dam, at a cost of over $2 million, to withstand an earthquake with a MCE of 6.5 at the Scofield Dam site, of 7.0 at the Pleasant Valley Fault zone, and of 7.5 at the Joes Valley Fault zone.

In light of the above-referenced studies undertaken by the Bureau, as well as its requiring significant reconstruction of the foundation of Scofield Dam to withstand nearby earthquakes with MCEs of up to 7.5, the statements in the DEIS that "faults which occur in the site are believed to be inactive," and that the Narrows Dam would only need to be designed to withstand a MCE of a 5.5 magnitude conflict with the Bureau's own existing data. These statements also underscore that the Bureau has failed to take the objective, hard look at the Narrows Project that is required under NEPA.

Further, the DEIS fails to include any data that would indicate that a hard look has been taken concerning the actual construction of the Narrows Dam, or that adequate materials exist within reasonable haul distances to build the dam. There are no drill logs, no test pit logs, no water tests of drill holes, no soil tests, and no water table data for the damsite or reservoir basin. Further, the DEIS fails to indicate whether a detailed surface geology study of the damsite has even been made. It does state that the proposed damsite is located on the North Horn formation. See DEIS at 3-89. This is the same formation on which 104 landslides in nearby Cottonwood Canyon have occurred. Further, the North Horn formation is well-recognized as being involved in landslides and instability throughout the Wasatch Plateau. However, the DEIS never provides any information to indicate that a dam can be safely built upon the proposed Narrows damsite. Instead, without providing any more details, the DEIS simply indicates that "a geologic study performed by the SWCD indicates that there is low potential for reservoir-induced landslide activity in the reservoir basin." See DEIS at 3-89.

15. The DEIS fails to address the effect of the Project caused depletions to the Colorado River on the Salinity Control Project for the Price and San Rafael Rivers.

Page 1-13 of the DEIS indicates that the Narrows Project would operate in cooperation with a number of existing projects including, among others, the Price-San Rafael Unit, Colorado Salinity Control Program. Page 1-13 also indicates that the purpose of the Salinity Control Project is to reduce salt contribution to the Colorado River system by about 161,000 tons per year. Elsewhere, the DEIS states that the Narrows Project will cause depletions to the Colorado River system of 5,709 acre-feet per year. It appears that one effect of such depletion would be to reduce the amount of water in the River system that would be available to dilute salts that would be contributed to the River system, thus conflicting with the goals of the Salinity Control Program. Since the DEIS raised the issue of its relationship to the Salinity Control Program, the DEIS should have discussed whether Narrows Project depletions would conflict with the goals of the Salinity Control Program and, if so, proposed mitigation measures that might resolve such conflict.

16. The DEIS fails to reconcile the obvious conflict between the Narrows Project and the policies of the State of Utah concerning water conservation and water projects.

Under 40 C.F.R. § 1502.16(c), the DEIS should have discussed the possible conflict between the proposed Project and the following State of Utah policies on water conservation:

> The state supports and promotes the conservation and wise use of all water for all beneficial purposes. Water conservation will be given proper and careful consideration in feasibility investigations at all levels and for all projects. It will be examined as both a supplement and an alternative to project proposals. Sponsors for irrigation projects are encouraged to prepare a conservation plan approved by the local soil conservation district. Sponsors for culinary projects are encouraged to design a conservation plan to be approved by the presiding official of the community or district to be served by the project. All project sponsors will be advised to seek assistance from appropriate individuals or organizations to help develop the conservation plan and implement applicable conservation practices and programs for their water projects.

See State of Utah Department of Natural Resources, Division of Water Resources, Utah State Water Plan at 17-1 (January 1990) (quoting 1982 policy of Utah Division of Water Resources) (emphasis added); see also Utah Division of Water Resources, The Utah Water Data Book 13 (December 1997) ("Conservation should play an important role in meeting Utah's future water demands. Stretching existing water supplies is less expensive and the right thing to do. Water suppliers should implement a strong water conservation program to make their already developed supplies go further."); Utah Code Ann. § 73-10-32 (requiring water conservancy districts and other water retailers to develop water conservation plans concerning water that is used for domestic and culinary use to conserve water and reduce per capita consumption).

The above-referenced statement make clear that the policy of the State of Utah is for water conservation to be examined "at all levels and for all projects" and "as both a supplement and an alternative to project proposals." As described in the DEIS, the proposed Narrows Project plainly conflicts with this policy. The failure of the DEIS to discuss this conflict between the Project and the policies of the State of Utah is another example of the failure of the DEIS to comply with the requirements of NEPA. The conflict between the Narrows Project and the policy of the State of Utah on water conservation is another indication that the Project is contrary to the public interest and should not be built. Consequently, the § 404 Application should be denied.

17. The DEIS fails to reconcile the obvious conflict between the Narrows Project and the new policies of the Bureau of Reclamation concerning new water projects.

In its Blueprint for Reform: The Commissioner's Plan for Reinventing Reclamation (November 1, 1993), the Commissioner of the Bureau of Reclamation adopted general principles, including the following:

- We will facilitate changes from current to new uses of water in accordance with state law when such changes increase benefits to society and the environment.
- We will encourage conservation and improvements in the efficiency of use of already developed water and hydroelectric supplies.
- We will promote the sustainable use of the water and associated land resources in an environmentally sensitive manner throughout the 17 Western States.
- We will facilitate integrated water resources management on a watershed basis, stressing interagency cooperation, public participation, and local implementation.

In addition, the Commissioner's Plan states that "promoting conservation will be given priority in our program activities," and that "[f]ederally-funded irrigation water supply projects will not be initiated in the future."

As outlined in the DEIS, the Narrows Project clearly violates these guidelines. The Project's benefits to society are questionable, particularly since its impacts have not been identified and adequately analyzed. It is a transbasin diversion that does not provide new water or result in new lands being placed into production. Instead, it removes water from existing high-value beneficial uses, including support of wetlands and a high quality trout fishery, and moves it to supplemental irrigation, a low-value use. The Project would be environmentally destructive. It does not facilitate integrated water resources management on a watershed basis. Nor does it promote conservation. In fact, the DEIS failed to discuss, in any meaningful way, the role of conservation in advocating the Project.

The failure of the DEIS to address the Bureau's policy favoring conservation measures is contrary to the requirement of the CEQ regulations that an EIS discuss "possible conflicts

between the proposed action and the objectives of Federal, regional, State, and local . . . policies." See 40 C.F.R. § 1502.16(c). Current Bureau policy clearly favors conservation over development of costly new storage and delivery projects. The DEIS should have acknowledged and addressed the Bureau's policy and the conflict that exists between the proposed action and that policy. The conflict between the Narrows Project and the Bureau's policy is another indication that the Project is contrary to the public interest. The Carbon Water Committee believes that the sensible way to resolve this conflict is to not build the Project. Consequently, the § 404 Application should be denied.

CONCLUSION

The DEIS is biased, fundamentally flawed and does not comply with the goals and requirements of NEPA, the § 404(b)(1) guidelines, or current policies of the State of Utah and the Bureau of Reclamation. The DEIS fails to identify and analyze a range of reasonable and practicable alternatives to the Project, including the most obvious practicable alternative of water conservation. The DEIS also fails to adequately identify and analyze potential impacts of the Project on wetlands, stream flows, water quality, aquatic and reservoir fisheries, and agricultural, municipal, and industrial water use in the Price River system. The proposed Narrows Project makes no sense. It is estimated to cost $17.3 million of public funds, but it will not result in any new land being put into production. In addition, it is a transbasin diversion that will move water from existing high-value beneficial uses to supplemental irrigation, a low-value use. The Project would be environmentally destructive and would adversely impact agricultural, municipal, and industrial water users in the Price River system. The Project might bring modest benefits to those irrigators in northern Sanpete County who would be able to grow a third crop of alfalfa or hay with Project water. These modest benefits are far outweighed by the Project's fiscal, environmental, and socioeconomic costs. Consequently, the Project is contrary to the public interest and the § 404 Application should be denied.

Sincerely,

Neil Brienholt, by JEK

Neil Brienholt
Vice-Chairman, Carbon Water Committee

Comparison Between 1998 DEIS and 2010 SDEIS Regarding Comments Submitted in 1998 ("DEIS Comments")

DEIS Comment	Sub-Comment	1998 DEIS Page	2010 SDEIS Page	Other
1. DEIS fails to establish a need for the project. (page 4)		1-5	1-6	The 1998 comment carries forward and was not addressed in the SDEIS.
	Fails to establish need for additional agricultural water in northern Sanpete County. (page 4)	1-9	1-10	The 1998 comment carries forward. While there was some updating of charts and data in the SDEIS, the fundamental substance of the analysis remains the same and the 7 types of information requested on page 5 of the 1998 Comments were not included in the SDEIS.
	Fails to establish a need for additional municipal water in northern Sanpete County. (page 5)	1-6	1-7	The 1998 comment carries forward and was not addressed in the SDEIS. While there was some updating of charts and data, the fundamental substance of the analysis remains the same and the 8 types of information requested on page 6 of the 1998 Comments were not included in the SDEIS.
	Fails to establish a need for additional recreational facilities (and fishery opportunities). (page 7)	1-12	1-16	The 1998 comment carries forward and was not addressed in the SDEIS.
2. DEIS fails to analyze and discuss reasonable alternatives. The DEIS violates the "practicable alternatives" requirement of 404(b)(1) guidelines. (page 9)		2-1	2-1	The 1998 comment carries forward and was not addressed in the SDEIS. For example, our original comment included an objection to the selection criteria (DEIS 2-1) because they artificially constrained the possible alternatives. However, the same selection criteria are included in the SDEIS with the exception of the 5th criterion that originally required the project divert and store water under legal claim of right and priority. In addition, although the SDEIS now includes an additional alternative—the mid-size reservoir—the alternatives analysis is still inadequate for all of the reasons originally raised in our comments on the 1998 DEIS. See also additional comments specific to the SDEIS attached hereto.
	Fails to analyze conservation measures as a reasonable alternative. (page 14)	2-46	2-47	The text of the SDEIS was revised and includes more discussion about current efficiency improvements, however, the 1998 comment carries forward and was not addressed in the SDEIS.

51-56

51-57

DEIS Comment	Sub-Comment	1998 DEIS Page	2010 SDEIS Page	Other
	Fails to study the development of existing groundwater as a reasonable alternative. (page 21)	2-51	2-56	The 1998 comment carries forward and was not addressed in the SDEIS. The only apparent difference between the SDEIS and the DEIS with respect to this issue is that the SDEIS now includes a citation to the State Engineer's policy memorandum that explains the Sevier River Basin was closed to all new appropriations.
	Fails to study use of water from CUP or funding pursuant to Sections 206 and/or 207 of the CUP Completion Act. (page 21)	2-52	2-57	The 1998 comment carries forward and was not addressed in the SDEIS. In particular, our request for clarification as to why Sanpete County would continue to pay taxes to CUWCD when CUWCD allegedly has discontinued any plan to deliver water to Sanpete County is not addressed in the SDEIS.
	Fails to study the alternative of retiring irrigated land. (page 22)	2-53	2-58	While there is now more discussion in the SDEIS on this alternative, the 1998 comment included a calculation to show that 2,536 acres of irrigated land would need to be retired to meet the irrigation needs of the project. The SDEIS was revised and appears to incorporate a similar calculation but relies on different values than those included in the 1998 comment, thus concluding that 2,760 acres of land (not 2,536 acres) would need to be retired from irrigation. *See* SDEIS at 2-58. The agency must explain this difference. In addition, the SDEIS dismisses this alternative by concluding that it requires willing sellers and buyers but there is little indication that local farmers are willing to forego farming on 20% of their land. *See* SDEIS at 2-59. Yet, in other sections of the SDEIS, including the wetlands mitigation analysis, willing buyers and sellers will also be necessary to effectuate the mitigation measure and there are no guarantees or representations that interested parties exist. Nonetheless, the Bureau concludes these mitigation measures are still valid.
	Fails to study not growing a third crop of hay each year. (page 23)			The 1998 comment carries forward and was not addressed in the SDEIS.
	Fails to study combining conservation measures, retirement of irrigated land, and/or not growing a third crop of hay. (page 23)			The 1998 comment carries forward and was not addressed in the SDEIS.

51-58

DEIS Comment	Sub-Comment	1998 DEIS Page	2010 SDEIS Page	Other
3. The § 404 Application and the DEIS fail to adequately identify the wetlands that would be impacted by the Narrows Project and the functions and values of such wetlands, and proposes questionable mitigation measures. (page 24)				The 1998 comment carries forward and was not addressed in the SDEIS.
	DEIS illegally restricts the scope of its assessment of what wetlands would be impacted by the Project. (page 25)	3-50	3-62	The 1998 comment carries forward and was not addressed in the SDEIS. See additional comments specific to the SDEIS attached hereto.
	DEIS relies on an expired wetlands delineation to identify wetlands within the reservoir basin of the Narrows Project that would be affected by construction of the Narrows Reservoir. (page 25)	3-50	3-63	See additional comments specific to the SDEIS attached hereto.
	DEIS and § 404 Application state 100 acres of wetlands will be flooded by the reservoir but this is inconsistent with the 1992 study that identifies approximately 140 acres of impacted wetlands. (page 26)	3-53	3-63	See additional comments specific to the SDEIS attached hereto.

DEIS Comment	Sub-Comment	1998 DEIS Page	2010 SDEIS Page	Other
	DEIS fails to identify the functions and values of the impacted wetlands. (page 26)	3-50	3-62 through 3-65	See additional comments specific to the SDEIS attached hereto.
	DEIS fails to identify wetlands in the vicinity of the Narrows Basin that would be affected by development and recreation in connection with the Narrows Reservoir. (page 27)	3-50	3-62	See additional comments specific to the SDEIS attached hereto.
	DEIS fails to identify wetlands and aquatic resources outside the Narrows Basin that would be affected by the project. (page 28)	3-50 *et seq.*	3-62 *et seq.*	See additional comments specific to the SDEIS attached hereto.
51-59 4. The § 404 Application and DEIS fail to adequately discuss measures that may be taken to mitigate impacts to those wetlands identified in the DEIS as being adversely impacted. (page 30)				The 1998 comment carries forward and was not addressed in the SDEIS. See additional comments specific to the SDEIS attached hereto.
	The DEIS discussion on the four sites for possible mitigation of adverse impacts to wetlands is confusing and inconsistent. (page 31)	2-34 (wetland measures) and 3-50 (wetlands resources)	2-22 (wetland measures) and 3-63 (wetlands resources)	The 1998 comment carries forward and was not addressed in the SDEIS. See additional comments specific to the SDEIS attached hereto.

	DEIS Comment	Sub-Comment	1998 DEIS Page	2010 SDEIS Page	Other
		The proposed mitigation measures do not follow the sequencing required under EPA and Corps policies. (page 32)	2-34 (wetland measures) and 3-50 (wetlands resources)	2-22 (wetland measures) and 3-63 (wetlands resources)	The 1998 comment carries forward and was not addressed in the SDEIS. See additional comments specific to the SDEIS attached hereto.
		Proposed mitigation fails to take into account wetland values and functions. (page 33-41)	2-34	2-22 through 2-27	The 1998 comment carries forward and was not addressed in the SDEIS. See additional comments specific to the SDEIS attached hereto.
51-60	5. DEIS acknowledges the Project will adversely impact water quality but fails to propose specific measures to mitigate these impacts. (page 42)		3-37	3-41	The 1998 comment carries forward and was not addressed in the SDEIS. For instance, the 1998 comment suggested that the water quality section was overly broad. *See* for example DEIS at 3-49 (stating that the channel in Middle Gooseberry Creek would be narrowed and reduced flows in middle Gooseberry would occur but this process would be expedited through utilization of "certain man-made improvements." There is no description of what these "improvements" include). The overly broad descriptions included in the DEIS are also present in the SDEIS. For example, the SDEIS generally provides that a "contractor would be required to comply with applicable Federal and State laws, orders, and regulations concerning the control and abatement of water pollution" but there is no further detail as to what this actually means. *See* SDEIS at 3-55.
		Narrowing the channel of middle Gooseberry Creek is not an effective measure. (page 42)	3-49	3-60	The 1998 comment carries forward and was not addressed in the SDEIS.
51-61		The second mitigation measure, proposed to reduce phosphorous loading in Scofield Reservoir, is too vague and likely not effective. (page 43)	3-49	3-60	The 1998 comment carries forward and was not addressed in the SDEIS. For example, the 1998 comment noted that the DEIS failed to discuss the potential costs of purchasing and managing this property, including the costs associated with installing 9.5 miles of fencing. Likewise, in the SDEIS there is still no analysis of costs or any response to the 1998 comment.

	DEIS Comment	Sub-Comment	1998 DEIS Page	2010 SDEIS Page	Other
51-62		The probability and effectiveness of all proposed mitigation measures should have been discussed. (page 44)	3-49	3-59	The 1998 comment carries forward and was not addressed in the SDEIS.
51-63		Health concerns related to impaired water quality in Scofield Reservoir. (page 45)			The 1998 comment carries forward and was not addressed in the SDEIS. See additional comments specific to the SDEIS attached hereto.
51-64	6. DEIS acknowledges the Project will degrade and destroy spawning habitat for cutthroat and rainbow trout but fails to explain how this loss will be mitigated. (page 46)		Table 3-11	Table 3-11	The 1998 comment carries forward and was not addressed in the SDEIS. It appears the only difference between Table 3-11 in the DEIS as compared to the Table in the SDEIS is an additional commitment that provides that an average of 300 acre-feet of additional water will be released into Gooseberry Creek for flushing flows and replenishing oxygen content in Lower Gooseberry Reservoir. The SDEIS needs to explain where this water will come from and why this would be an effective measure when the impacts to fisheries listed in the Table does not identify oxygen depletion as an issue. In addition, none of the mitigation strategies include any analysis on cost or effectiveness of implementing and monitoring these measures.
51-65	7. DEIS acknowledges that the Project will have adverse impacts to fisheries and recreational use in Scofield Reservoir, but fails to discuss measures to mitigate these impacts. (page 49)		3-35 and 3-60	3-40 and 3-73	The 1998 comment carries forward and was not addressed in the SDEIS. In addition, the SDEIS acknowledges that 237 acres of "Roaded Natural" dispersed recreation will be lost and 466 acres would be lost on private lands (*see* SDEIS at 3-76) but there is no discussion about how these impacts will be mitigated, especially those on private lands since SWCD does not have authority to condemn these properties. The only explanation with respect to "mitigation" is an unsupported statement that these impacts will be offset by the new facilities to be constructed at the proposed reservoir. *See* SDEIS at 3-76. This does not meet the "hard look" standard with respect to these impacts. Moreover, the SDEIS provides no discussion on the mitigation measures necessary to address these particular impacts.

	DEIS Comment	Sub-Comment	1998 DEIS Page	2010 SDEIS Page	Other
51-66	8. The DEIS's suggestion that impacts to Scofield Reservoir would be somehow mitigated by recreational use of the Narrows Reservoir is wrong and is likely based on an incorrect assumption concerning the amount of water that would be stored in the Narrows Reservoir. (page 51)		3-63	3-76	The 1998 comment carries forward and was not addressed in the SDEIS.
51-67	9. DEIS should not have been released before completion of the amended Biological Opinion ("BO") analyzing potential impacts of the Project on the endangered CO Squawfish. (page 52)		3-3	3-4	The B.O. was issued in 2000, thus, in part addressing the 1998 comment. However, the SDEIS states that further study is now required to determine the extent the pikeminnow uses the Price River because the Project will result in depletion of water in the Price River. Yet, even though the SDEIS acknowledges that it cannot draw conclusions about the importance of the Price River until that research is concluded, the agency commits resources in advance of that additional research. *See* SDEIS at 3-4 to 3-5. In addition, the SDEIS references the Recovery Program's directive to study seasonal endangered fish use in the Price River and to develop recommendations for year-round instream flow requirements in the Price River for Colorado pikeminnow. SDEIS at 3-4. It also states that field investigations were completed and approved during 2009. This information should be included in the SDEIS and incorporated into the analysis of the Threatened and Endangered Species section. Finally, the SDEIS should also include a status report and evaluation of the effectiveness of the RIP as briefly mentioned in this section. *See* SDEIS at 3-4.
51-68	10. DEIS does not comply with the requirements of the January 22, 1998 Conservation Agreement concerning the spotted frog. (page 53)			3-3	The SDEIS now provides that the Bureau and SWCD will cooperate in implementing the conservation measures set forth in the Spotted Frog Conservation Agreement but it provides no further explanation as to what these conservation measures will include, how they may impact the proposed action, and what mitigation measures will be taken to conform to this agreement, let alone the costs of doing so.

	DEIS Comment	Sub-Comment	1998 DEIS Page	2010 SDEIS Page	Other
51-69	11. The DEIS fails to adequately describe and analyze the social and economic benefits and/or costs of the Narrows Project in northern Sanpete County. (page 54)		3-68	3-82	The 1998 comment carries forward and was not addressed in the SDEIS. See below.
51-70	12. DEIS fails to analyze impacts on Carbon County. (page 55)		3-68	3-82	The 1998 comment carries forward and was not addressed in the SDEIS. Indeed, the SDEIS does not even include an analysis of the economic impacts for the Proposed Action versus the anticipated impacts for each alternative, including the no action alternative. Instead, the SDEIS only provides a cursory "regional impact analysis." The SDEIS Economic and Social Resources section does not even come close to meeting the "hard look" threshold required under NEPA. For example, there is not attempt to evaluate the economic impacts on Carbon County due to the water depletions it will experience. There is no discussion about the value of the third crop of hay and what the impacts might be if this crop is not grown versus those impacts if it is grown. The total lack of any economic and social impacts analysis violates NEPA.
51-71	13. The DEIS relies on a model based on incomplete data to estimate certain of the Project's environmental impacts. Consequently, DEIS reaches incorrect conclusions regarding these impacts. (page 57)		3-8	3-11	The 1998 comment carries forward and was not addressed in the SDEIS. In fact, the Murdock study referenced in the 1998 comments is not discussed or addressed in the SDEIS at all.

	DEIS Comment	Sub-Comment	1998 DEIS Page	2010 SDEIS Page	Other
51-72	14. DEIS fails to identify or address potential earthquake hazards in the proposed site for the Narrows Project and proposes design standards for the Narrows Dam that conflict with similar standards it recently imposed on Scofield Reservoir at a cost of over $2 million. (page 59)		3-88	3-101	The 1998 comment carries forward and was not addressed in the SDEIS. See additional comments submitted on the SDEIS attached hereto.
51-73	15. The DEIS fails to address the effect of the Project caused depletions to the CO River on the Salinity Control Project for the Price and San Rafael Rivers. (page 62)		1-13	1-19	Text has been added to the SDEIS stating "[t]he Price-San Rafael Rivers Unit more than compensates for the trans-basin diversion of 5,400 acre-feet under the Narrows Project." However, the SDEIS still provides no explanation as to how this trans-basin diversion will affect the efforts to reduce salt contribution to the Colorado River by nearly 161,000 tons annually.
	16. The DEIS fails to reconcile the obvious conflict between the Narrows Project and the Policies of the State of Utah concerning water conservation and water projects. (page 62)				The 1998 comment carries forward and was not addressed in the SDEIS.
	17. DEIS fails to reconcile the obvious conflict between the Narrows Project and the new policies of the Bureau of Reclamation concerning new water projects. (page 63)				The 1998 comment carries forward and was not addressed in the SDEIS.

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Section 3
NARROWS PROJECT ALTERNATIVE

51-74 **Date:** May 29, 2010

To: Richard Lee

From: Michael Brown, Principal Engineer
Bob Long, Senior Hydrogeologist
Steven Humphrey, Staff Hydrogeologist

Project No.: 093-93384

Company: Carbon Water Conservancy District

RE: PRE-FEASIBILITY STUDY OF A MANAGED AQUIFER RECHARGE PROJECT FOR SANPETE COUNTY

1.0 EXECUTIVE SUMMARY

In March 2010 the Bureau of Reclamation (USBR) released the *Narrows Project Supplemental Draft Environmental Impact Statement Narrows Project, Sanpete County, Utah* (SDEIS). This document describes a proposed project consisting of a new water storage reservoir in the upper Gooseberry Creek drainage basin (the Narrows) that would deliver water to the Narrows Tunnel. The proposed Narrows Reservoir would store snowmelt runoff from the high altitude Gooseberry Creek basin. Up to 5,400 AF per year of the stored water would be diverted through the Narrows Tunnel to Sanpete County via Cottonwood Creek primarily for late season irrigation. Water would be diverted from Cottonwood Creek for distribution to local water users.

The SDEIS evaluated and then discarded several alternatives to the proposed action including the development of a Managed Aquifer Recharge (MAR) system. The MAR system would include storage of water from the Gooseberry Basin in an aquifer followed by extraction of the water via wells, in response to demand. Recharge would be achieved using either injection wells or a series of shallow infiltration basins. The USBR eliminated the MAR option based on unsubstantiated technical challenges.

Golder reviewed the USBR's evaluation of the potential for development of a MAR system, which is based primarily on the referenced *Update to the Sanpete County Master Plan* (CH2M Hill, 2008)(Sanpete Update). Golder's review was based on 1) a site visit conducted in October 2009 by Michael Brown and other Golder staff, 2) the SDEIS, 3) the Sanpete Update and 4) many additional documents describing the hydrogeology of the Sanpete Valley as itemized in the references, Section 4.0.

The Sanpete Update contains no cost analysis for a MAR project but does present findings that the option meets the purpose and need of the SDEIS. While our findings concur with those of CH2M Hill in the Sanpete Update that an MAR system could meet the purpose and needs statement of the Narrows SDEIS, we differ with other conclusions and believe that rejection of an MAR system as a potential reasonable alternative was not justified.

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Golder's review of the hydrogeologic information from the area suggests that infiltration to the aquifer is possible and that adequate storage volumes are available within near-surface aquifers to meet the needs of the project. We agree that the financial feasibility of an MAR system that relies on injection wells for recharge may be questionable due to water treatment costs, although a direct evaluation of these cost estimates was not possible because the USBR did not provide a reference to a document that presented MAR system cost analysis or technical water quality or hydrogeologic data evaluations that could lead to these conclusions. Golder's review of local Sanpete Valley hydrogeologic conditions and an assessment of several operating MAR systems in the Southwest that utilize infiltration basins for recharge indicates that a MAR system using infiltration basins appears both feasible and cost effective as an alternative to the proposed Narrows Reservoir Project. Geologic and hydrogeologic information published by the USGS and local water supply well data indicate that the near-surface aquifer near the mouth of Cottonwood Creek, and throughout the northeastern portion of the Sanpete Valley, is hydraulically connected to the deeper aquifer system and does have the capacity to store at least 6,000 acre-feet of water (Robinson, 1971). Water stored in this aquifer unit could be extracted using selected existing wells and new wells for use in late summer irrigation.

Golder reviewed several successful MAR projects in the southwestern U.S. to assess the feasibility of applying similar technology in Sanpete County. The following projects were reviewed from website content, personal communication and published documents:

- Weber Basin – Ogden, Utah (Weber Basin Water Conservancy District (WBWCD), 2010; Rasmussen, pers. comm., 2010; Lowe and others, 2003)
- Sand Hollow Reservoir MAR – Washington County, Utah (Heilweil and others, 2009)
- Avra Valley – Central Arizona Project (Central Arizona Project (CAP), 2010)
- Pima Mine Road – Central Arizona Project (CAP, 2010)
- Lower Santa Cruz – Central Arizona Project (CAP, 2010)
- Aqua Fria – Central Arizona Project (CAP, 2010)
- Hieroglyphic Mountains – Central Arizona Project (CAP, 2010; Harrison, pers. comm., 2010)
- Tonopah Desert – Central Arizona Project (CAP, 2010)Sweetwater Facilities – Tucson, Arizona (Kmiec and Thomure, 2007)
- Vidler Recharge Facility – Harquahala Valley, Arizona (Bushner, 2008)
- Orange County Water District – Orange County, California (Orange County Water District (OCWD), 2008)

A MAR project that meets the Narrows Project objectives would need to store water that is diverted directly from the upper Gooseberry Creek basin. This water would be delivered through the Narrows tunnel at an average rate of approximately 50 cfs for two months. After flowing down Cottonwood Creek it would be infiltrated into the alluvial fan deposits along the margin of the San Pitch river valley at approximately the same rate. Assessment of information from published geologic reports indicates that a

storage volume of at least 6,000 acre-feet would be available for recharge via infiltration basins. This water would then be withdrawn to meet demands using existing and/or new wells. The scale of such a MAR facility in Sanpete County would be comparable to many existing successful recharge projects in the Southwest.

In addition, the MAR option provides the following additional benefits:

- Narrows Dam and Reservoir would not be required and mitigation for impacts of those facilities would not be necessary.
- A reduction in environmental impact to riparian habitat that will be incurred by the construction of the dam and inundation of streams in the upper Gooseberry Creek drainage basin.
- Increased water for natural streams and rivers within the Sanpete Valley riparian areas due to the State Engineer's requirement that some percentage of infiltration waters remain in the aquifer system as a natural resource buffer.
- A significant reduction in evaporative losses when compared to holding water in a reservoir year round.
- Less cost for construction than a Narrow's Large Reservoir option.

Based on our review of existing MAR projects, the alternative action of a MAR project using infiltration basins to recharge an aquifer meets the purpose and need for the Narrows Dam Project, is practicable in construction and operation, is a proven technology and has additional environmental and economic benefits.

Below we first outline our assessment of the technical feasibility and a cost estimate of an MAR system as an alternative to the Narrows Project, followed by point-by point rebuttal to the reasons given in the SDEIS for rejection of the MARS alternative.

2.0 REVIEW OF MAR FEASIBILITY AND COST ESTIMATE

Golder reviewed published data on the stream flow, climate, geologic setting, and hydrogeology of the Sanpete Valley. Geologic maps and area well logs were reviewed to help assess the feasibility of constructing and operating a series of infiltration basins to capture, recharge and store spring snowmelt waters in an aquifer. Climatic records where reviewed to assess relative evaporation rates for the proposed Narrows Large Reservoir project and the MAR alternative.

2.1 MAR Feasibility

USGS gage stream flow data indicate that peak flow rates for Gooseberry Creek occur from late April through early July, primarily as a result of snowmelt. Peak flow rates range from approximately 60 cfs to 114 cfs for a wet year and from approximately 5 cfs to 18 cfs for a dry year (CH2M Hill, 2008). In an average year, peak flow rates range from approximately 30 cfs to 70 cfs. The water required for the alternative recharge project consists of the water available from the upper drainages of the Gooseberry

Creek. Diversion features would need to be constructed to capture and transfer an average flow rate of 50 cfs to the Cottonwood Creek via the Narrows Tunnel. The diversion configuration would be similar to those indentified in the SDEIS, Section 2.3.1, Direct Diversion without Reservoir.

If natural stream flow is available diversion up to the water right of 5,400 acre-feet could be achieved by diverting approximately 50 cfs through the Narrows Tunnel for approximately 54 days. Operation studies done in support of the SDEIS (Section 2.3.2), indicate that such a system would divert 4,671 acre-feet per year, on average. This water would then be conveyed via the proposed East Bench Pipeline from the mouth of the Cottonwood Creek Canyon to series of infiltration basins in the northeastern Sanpete Valley. Assuming the State Engineer allows 90% of the stored water to be recovered (typical of most recharge systems), then 4,203 acre-feet would be available for groundwater withdrawal, which would enable Sanpete Water Conservancy District (SWCD) to develop a late season irrigation and a municipal & industrial (M&I) water supply source for water users in North Sanpete County. New and existing groundwater wells within the northeastern Sanpete Valley would be utilized to withdrawal the 4,203 acre-feet of groundwater in the latter part of the irrigation season. Careful placement of the infiltration basins and recovery wells would avoid impacts to existing groundwater users. The remaining 10 percent (467 acre-feet) would be captured by non-project existing wells, or it would be lost and likely contribute to low flows in the San Pitch River.

The design and size of infiltration basins would depend on the site-specific hydrogeologic conditions and in particular the infiltration rates and depth to groundwater within the alluvial fan deposits of the northern Sanpete Valley. A hydrogeologic investigation and pilot recharge test would be required to determine the subsurface conditions at each basin location and finalize the design of the infiltration basin facility. In the pilot test the natural treatment of the infiltrating water by the soils/geology through which it passes would also be evaluated to ensure that the infiltrating waters will meet appropriate standards. This is a typical procedure in infiltration basin design, and is the approach that was followed for the Weber Basin project in Utah.

The ideal hydrogeologic setting for the recharge facilities (infiltration basins) would be located on the alluvial fan deposits at the base of the Wasatch Plateau in northeast Sanpete Valley. The alluvial fan deposits consist of unconsolidated to semi-consolidated clay, silt, sand, gravel, cobbles and boulders up to 350 feet thick in areas east of Mount Pleasant, coarsening toward the base of the Wasatch Plateau (Robinson, 1971). The aquifer within the alluvial fan deposits in the northeastern portion of the Sanpete Valley is unconfined and the depth to water can range from 10 to 30 feet near the San Pitch River to approximately 100 feet within the alluvial fans to the east. Transmissivity values for the alluvial fan deposits can range from approximately 13,000 gpd/ft to 1,250,000 gpd/ft (1,000 to 20,000 ft²/day), based on ten aquifer tests and specific capacity data from more than 40 wells (Robinson, 1971). Groundwater flow directions in the northeastern Sanpete Valley are primarily westward from the Wasatch Plateau toward the San Pitch River.

2.1.1 MAR Evaporation Comparison

The construction of a MAR project would substantially reduce the amount of evaporation losses that will occur when compared to construction of the proposed Narrows Reservoir Project. The proposed Narrows Reservoir would have an average surface area of 454 acres during the recreation season according to the SDEIS. This would correspond with the primary evaporation period. An annual evaporation rate of approximately 35 in/yr in the vicinity of the Narrows dam site was estimated using the free water surface evaporation (shallow lake) contour map of the United States (NOAA, 1982). Multiplying this estimated evaporation rate by the average area of the proposed Narrows Reservoir gives an estimated average annual evaporation loss of 1,324 acre-feet.

The diversion and storage of water in Narrows Reservoir would decrease flows to Scofield Reservoir, lowering its average level and surface area. The decreased area would result in decreased evaporation. The amount of this decrease can be estimated using the net project increase in evaporation presented in the SDEIS, 370 acre-feet. If the net loss for the Narrows Project is 370 acre-feet, and the Narrows Reservoir loss is 1,324 acre-feet, the Scofield savings must be 954 acre-feet. It is reasonable to assume that this savings would also result if the MAR project is implemented since most of the saving would result from diversions of upper Gooseberry flows, which would be similar to the Narrows Project.

The MAR project infiltration basins would include free water surfaces in the Sanpete Valley that would contribute to evaporation. The total surface area for the MAR infiltration basins would be 100 acres, but the largest free water surface area exposed to the atmosphere at one time would be 80 acres (see infiltration basin design concept below, section 2.1.2) and this would be limited to two months each year, primarily May and June. The ratio of average monthly evaporation for May and June to the average annual evaporation measured at the climate station in Gunnison, Utah was calculated to be approximately 0.33 (WRCC, 2010). This ratio was applied to the annual evaporation estimated from the NOAA contour maps in the northeastern Sanpete Valley area (40 in/yr), resulting a May-June evaporation depth of approximately 13 inches. Multiplying this estimated evaporation depth by the maximum free water surface area of the infiltration basins gives a total volume of approximately 87 acre-feet lost to evaporation during the recharge period.

The net evaporation volume from the MAR Project when compared to existing conditions would be a savings of 868 acre-feet, which is the 954 acre-feet of Scofield savings less the 87 acre-feet loss from the infiltration ponds.

The difference between a MAR project and the proposed Narrows Project is even more significant. The MAR alternative would reduce evaporation by 868 acre-feet whereas the Narrows Project would increase evaporation by 370 acre-feet, resulting in a difference of 1,238 acre-feet of evaporation loss between the projects. This difference is 24% of the expected 5,136 acre-feet average yield of the proposed Narrows Project.

2.1.2 MAR Infiltration Basin Design Concept

A conservative infiltration rate averaging 2 ft per day, typical for a fine to medium-grained alluvial deposit material with no significant confining units below the recharge area, is estimated based on transmissivity and hydraulic conductivities reported for the northeastern Sanpete Valley (Wilberg and Heilweil, 1995; Robinson, 1971). Ten infiltration basins at 10 acres each, totaling an area of approximately 100 acres would be able infiltrate a peak delivery flow of 100 cfs (200 acre-feet per day), whereas the average flow over 54 days is expected to be only 50 cfs. The additional capacity would accommodate expected variations in the peak flow rate. Under more normal operating conditions, when peak flows are not occurring, water would be supplied to six to eight basins at a time, while two to four basins are rotated out for maintenance. An infiltration basin could be rotated out of service every few days for a drying period and maintenance to ensure optimum infiltration rates and limit algal growth. The use of silt fences and riprap would help reduce the fines content of the recharge water.

The infiltration system would be operated to maximize infiltration rates at each basin. Groundwater levels could also be monitored during the recharge period to evaluate the effects of groundwater mounding (during recharge) or depression (during pumping).

Required maintenance of the infiltration basins would consist of a rotating cycle of scraping/turning of the bottom of the basins when infiltration rates decrease below a specified rate. The control of bird and mosquito population may also be necessary to maintain water quality and reduce the impacts to the environment.

2.1.3 MAR Cost Comparisons

An assessment of operational MAR projects across the southwestern United States is presented here to provide an understanding of the feasibility and common use of this technology to meet water resource management goals in the arid southwest states. A specific example of a project of similar scale to the Narrows MAR is reviewed in detail.

The development and construction costs for seven MAR projects are presented in Table 1 to demonstrate the breadth of existing projects currently operating in similar geographic and climatic conditions. Table 1 presents the development and construction costs reported for six Central Arizona Project (CAP) sites and one Utah recharge project. The costs include the construction, land acquisition, design, permitting, and other miscellaneous administrative and oversight fees (Harbor, pers. comm., 2010). The capital costs range from $0.6 million to $16.1 million for capacities ranging from 1,200 to 150,000 acre-feet per year (CAP, 2010; Harrison, pers. comm., 2010; Rasmussen, pers. comm., 2010; Harbor, pers. comm., 2010).

Table 1

Capital Costs and Capacities

Central Arizona Project (CAP) - Recharge Projects

Central Arizona Project (CAP) - Recharge Projects					
Project Name	**Capital Cost[1]**	**Permitted Capacity (acre-feet/yr)**	**Infiltration Capacity (cfs)**	**Acreage of Basins (# of basins)**	**Infiltration Rate (ft/day)**
Avra Valley Completed in 1996	$1,216,600	11,000	12	11 (4)	1-3.5
Pima Mine Road Completed in 1998	$16,093,000	10,000	14	37 (5)	0.7-5.8
Lower Santa Cruz Completed in 2000	$5,428,800	50,000	65	30 (3)	7+
Agua Fria Completed in 2001	$14,332,500	100,000	100	100 (7)	1.21-3.48
Hieroglyphic Mountains Completed in 2002	$7,111,000	35,000	50	38 (3)	3.1-6.8
Tonopah Desert Completed in 2006	$15,210,000	150,000	300	207 (19)	4-5
Utah Recharge Project					
Weber River Basin Completed in 2004	$600,000	1,200	3-8	7 (2)	2-3

[1]Cost estimates updated to 2010 based on the ENR Construction Cost Index.

The Narrows Project includes plans for diversion of up to 5,400 acre-feet per year, which is a relatively small volume of water in comparison with the infiltration capacity of some of the recharge projects listed in the table above. The Agua Fria CAP recharge project is considered to be the most comparable, with a delivery capacity of 100 cfs and infiltration rates ranging from 1.21 to 3.48 ft per day. In the section that follows, we compare the proposed Narrows MAR project with the successful CAP Aqua Fria Recharge Project.

2.1.4 Project Comparison

The Agua Fria Recharge Project (AFRP) was selected for comparison because it is the most similar to the conceptual alternative Narrows Project MAR site. The similar features include the infiltration capacity of 100 cfs and the average infiltration rate. The two projects differ in that the hydrogeologic setting of the AFRP is a river channel, whereas the Narrows MAR Project uses an alluvial fan. The AFRP characteristics are summarized below for use in estimating the cost for operation and maintenance of the recharge facilities:

Agua Fria Recharge Project Components

- 100 acres of settling basins
- Permitted recharge capacity of 100,000 acre-feet per year
- 7 infiltration basins divided by cobble-sized riprap
- 1 basin is 14 feet deep while the remaining are 9 feet deep
- Maximum infiltration capacity of 100 cfs
- Wet/dry cycles range from 2 to 4 weeks
- Infiltration rates for basins range from 1.21 ft/day to 3.48 ft/day

Because the comparable Agua Fria Recharge Project has been successfully implemented for nine years, the feasibility of an alternative MAR option for the Narrows Project is further supported.

2.2 MAR Alternative Cost

Golder developed a planning level cost estimate for a MAR infiltration and recovery system using several sources of information. The cost estimate presented in Table 2 includes new estimates for infiltration facilities, which were developed using the RSMeans® Costworks™ Valuator program (2010 update) (R.S. Means Company, Inc., 2010), and incorporating a cost for installing supplementary recovery wells systems in addition to other costs for project elements that where collected from the SDEIS and the Sanpete Update.

This cost estimate is based on MAR infiltration basin design concept, the geologic and hydrogeologic review of the proposed areas for construction of infiltration basins, and an assumption that existing wells could be used for recovery of 50 percent of the water, and new wells would be constructed for recovery of the remaining 50 percent. The costs for the new wells was assumed to be the same as one half of the wells required for New Ground Water Development, as described in Section 2.3.8.

The MAR project cost is composed of the following major components as published in the SDEIS, with the exception of the Diversion and Conveyance costs as noted:

- Construction of ten Infiltration basins in Sanpete County - $11,872,005
- Diversion of Upper Gooseberry Creek and conveyance to areas of use (Section 2.3.1) - $12,100,000 (a corrected estimate of $15.4 million was used, see below)
- One-half the Groundwater Well Development (Section 2.3.8) for recovery of infiltrated water - $3,250,000

These costs estimates where then reviewed and normalized to 2010 dollars.

Sections 2.3.1 and 2.3.2 of the SDEIS provide a basis for estimating the cost of the Upper Gooseberry diversion and Sanpete conveyance facilities needed for a MAR alternative. However, use of the SDEIS costs estimates requires correction of an error in the SDEIS cost for the Direct Diversion Alternative (Section 2.3.1). The cost quoted for all the features included in the Direct Diversion from Gooseberry Creek Alternative ($12.1M) does not appear to include the cost of the Gooseberry Creek diversion &

pumping plant, an electrical transmission line, a 1000 foot long discharge pipeline, and a 0.8 mi long open canal. This became apparent when reviewing Table 2-5 which lists the four other infrastructure components (the Narrows Tunnel rehabilitation, Upper Cottonwood Creek Pipeline, Oak Creek Pipeline, and East Bench Pipeline) that are part of the alternative but total approximately $13.6 million alone. Other errors may exist but are difficult to assess without access to the complete cost analysis. For the MAR alternative cost estimate we used the costs from Table 2-5 and estimated an additional $1.75 million, based on our experience with similar construction in similar environments, to cover the cost of the diversion, pump station, transmission line, and canal that were not considered in Section 2.3.1.

A cost estimate for the MAR alternative facilities is presented in Table 2 along with a comparison to the proposed Narrows project. The estimated total cost for the MAR alternative of approximately $36.7 million is a planning level estimate for the project, and is comparable in term of accuracy to the costs developed for the proposed Narrows Project.

Table 2
Comparison of Total Project Costs
Proposed Narrows Dam and Reservoir versus a Narrow Project using MAR

Project Element	Proposed Action; Dam and Reservoir SDEIS 2010 Cost	Proposed Action; Dam and Reservoir CH2M Hill 2010 Cost	Alternative Action MAR Project Cost 2010
Narrows Dam and Reservoir	$12,833,157	$57,800,000[1]	
Infiltration Basins and appurtenances			$11,872,005
Recovery Wells			$3,393,000
Gooseberry Creek Diversion & Pumping Plant			$1,000,000
Electrical Transmission Line			$250,000
1000 ft long discharge pipeline			$250,000
Open canal 0.8 mi long			$250,000
Narrows Tunnel Rehab	$4,198,025	$1,555,200[2]	$4,198,025
Upper Cottonwood Creek Pipeline	$706,805		$706,805
Oak Creek Pipeline	$356,013		$356,013
East Bench Pipeline	$8,349,069		$8,349,069
Recreation Area	$1,111,887		
Highway SR-264 Relocation	$3,436,931		
Wetlands, wildlife and fishery mitigation	$4,462,164	$4,462,164	
Reclamation participation (EIS & planning)	$991,824	$991,824	$991,824
SWCD's costs to date	$2,818,000	$2,818,000	$2,818,000
Total Construction Cost	$39,263,874	$67, 600,000	$34,434,823
Estimated interest during construction	$2,639,296	$2,800,000	$2,307,133
Total Project Capital Costs	**$41,900,000**	**$70,400,000**	**$36,700,000**

[1] From the Sanpete Update, pgs 23 and 24. These costs are adjusted to 2010, but they do not include engineering, contract administration, land acquisition, permitting, environmental documentation or mitigation.
[2] This cost is from the Sanpete Update, pg 25. It is significantly different from the cost listed in the SDEIS, Table 2-5. The reason for the difference is not known.

The estimates for the Narrows project range from approximately $40 to $70 million, by the USBR in the SDEIS and CH2M HILL in the Sanpete Update respectively. Neither of these estimates has considered the costs that would likely be necessary to address seismic issues that have been addressed in separate comments from Golder. Because the seismic design criteria used was inadequate, costs are likely to be considerably higher than those shown. As is apparent from Table 2, the estimated costs for the MAR alternative are significantly less than those of the Narrows Dam alternative, even before increases to address seismic issues.

3.0 REBUTTAL

A rebuttal to the elimination of the Carbon County proposed recharge alternative (as presented in the SDEIS in Section 2.3.13.1) is presented here with the reported reason for elimination in italics and the rebuttal following:

- *It is unlikely that an aquifer with a capacity to hold over 4,000 acre-feet of water could be found in northern Sanpete County.*
  - There is no areal or volumetric data presented to support the assertion that 4,000 acre-feet of storage is not available. Golder's review of the published documentation, geologic and hydrogeologic reports and water levels in area water wells indicates that there is approximately 6,249 acre-feet of storage available if the water table rises only one foot over the delineated aquifer system.
  - The area of the alluvial aquifer in the northeastern Sanpete Valley was delineated to estimate the storage volume available for recharge. The aquifer delineation was derived based on the groundwater flow directions presented by Lowe and others (2002), and the SDEIS figures showing "Lands to Receive Project Water". The delineated aquifer system of the northeastern Sanpete Valley is bounded to the south by a groundwater flow divide south of Spring City, where an east to west line divides groundwater moving to the north from groundwater moving to the south. The eastern extent of the delineation is demarked by the change from valley fill to bedrock, where the valley fill laps up along the bedrock highlands. This is also the basis for the northern delineation. The western extent of the delineation was selected as the San Pitch River and the bedrock outcrops in the center of the Valley. The acreage of the delineated aquifer was estimated to be approximately 31,243 acres.

    Porosity values for unconsolidated material range from 20 percent (%) to 30% (Lowe and others, 2002). As a conservative approach, 20% was used. Therefore, if the water table is raised one foot over the 31,243 acres of aquifer, 6,249 acre-feet of water could be stored and would be available for recharge.

    The feasibility of raising the water table by one foot can be examined by reviewing the history of groundwater levels in the Sanpete Valley. Wilberg and Heilweil (1995) originally modeled water levels and calibrated them against water levels in 1970. Lowe and others (2002) present a figure showing water level changes between 1970 and 2000. A substantial area covered by the aquifer delineation has had water level declines from 0 to 7 feet, with some from 7 to 11 feet. Water levels may have declined additionally since 2000, based on the precipitation pattern and increased population growth in Utah. Considering the delineated aquifer could cover a much smaller area than estimated above, the water table could be raised by 10 feet or more in some areas and afford much larger aquifer volumes for storage.

- *Direct diversion of flows (from Gooseberry Creek) would require extensive construction of diversion dams and canals within the reservoir basin, potentially negating the avoidance of impacts by not building the proposed reservoir.*
  - A majority of the Upper Gooseberry basin, which is the source area for water for the proposed project, is already controlled by Fairview Lakes and the existing system of canals and diversions that convey water to the existing tunnel entrance. The areas not already controlled would require a pump station, a canal, a pipeline and appurtenant facilities. However these facilities would be relatively small and would produce far less impacts than the proposed 604 acre Narrows Reservoir.

- *Water would have to be treated to drinking water standards before injection or alternately a large infiltration pond and settling basin, equivalent to a small reservoir, would be required to hold water diverted during spring runoff.*
  - Neither of these stated reasons for elimination of the proposed recharge alternative are valid or relevant for the proposed MAR infiltration basin system. Water treatment would not be required for a MAR system using infiltration basins; case studies in Utah support this. Additionally, a single large infiltration basin and settling basin would not be required or desirable in the design of an efficient distributed MAR infiltration project. The water quality of the Gooseberry Creek snowmelt waters is very good and better than necessary to feed an aquifer infiltration project in Utah. Existing MAR projects in Utah report no adverse water quality issues associated with recharge operations (Heilweil and others, 2009; Rasmussen, pers. comm., 2010). Several existing recharge facilities in the western U.S. have operated successfully without settling basins. For the proposed MAR alternative using infiltration basins, suspended fine particles could be captured or settled out of the melt waters with the use of silt fences and riprap. In addition, the basic operation and maintenance procedures for the infiltration basins would help manage the accumulation and removal of fines from any infiltrated, and later, recovered groundwater.

- *The nature and location of the available aquifers and apparent separation of bedrock and shallow aquifers poses technical problems due to the requirement to inject and remove water from the same aquifer.*
  - These identified *technical problems* are based on two flawed concepts 1) that injection of water via wells is required for a successful project, and 2) that the bedrock and shallow aquifers are hydraulically separate from one another. First, the proposed MAR aquifer recharge project would not require injection wells, but instead would infiltrate the water. Second, based on published geologic and hydrogeologic reports there is no apparent separation of bedrock and shallow aquifers in the area proposed for the construction and operation of MAR infiltration basins. The northeastern Sanpete Valley has been characterized as an unconfined aquifer hydraulically connected to the deep aquifer system (Robinson, 1971). An additional study on the recharge for the Sanpete Valley (Lowe and others, 2002) does not identify or present any confining units in the northeastern portion of the Valley. The published technical data indicate that the proposed MAR facility could successfully recharge directly to the aquifer without significant separation between the shallow and deeper aquifers in this portion of the valley.

- *High drawdown from the proposed high capacity wells could affect adjacent wells and water rights.*
  - This potential problem can be actively managed through thoughtful planning, local hydrogeologic assessment and implementation a master operations plan for the MAR project. Proper assessment and management of the water resource will minimize impacts to existing wells and water rights. Impacts can be mitigated by optimizing

pumping plans, use of selected existing wells for water recovery and by constructing new recovery wells in optimal locations that avoid impacts to other water right holders.

4.0 CONCLUSION

The construction and implementation of a MAR system using infiltration basins appears to meet the purpose and needs of the proposed Narrows Project, is technically feasible and is likely to have a lower net present project cost than the proposed Narrows Project. Golder's review of the geologic and hydrogeologic conditions and a comparison of updated actual construction costs of infiltration facilities in the southwest, indicates that the feasibility of a MAR project in the northeastern part of the Sanpete Valley is well-supported and presents a cost-effective solution for Sanpete County. Other benefits include a significant reduction in the need for mitigation of stream and riparian habitat, enhancing the natural wetland resources in the Sanpete Valley through subsurface recharge, and conserving the stored volume of water by minimizing losses due to evaporation.

A full feasibility study of a MAR project as discussed herein would require field investigations and additional engineering evaluations.

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Golder Associates

Section 4

Michael L. Brown

Principal Water Resources Engineer

QUALIFICATIONS

- Demonstrated management abilities and leadership skills
- More than 35 years experience in water resources engineering for a variety of end users
- Experience dealing with multiple stakeholders during project planning and design

39 YEARS OF EXPERIENCE

EDUCATION

BS, Civil Engineering, Cornell University, Ithaca, New York, 1969

ME, Civil Engineering, Cornell University, Ithaca, New York, 1970

MBA, University of Washington, Seattle, Washington, 2000

REGISTRATIONS

Registered Professional Engineer in: Colorado, Washington, Oregon, Idaho and Nevada.

AFFILIATIONS

American Society of Civil Engineers

United States Society on Dams (USSD)

Dam Decommissioning Committee, USSD

PRESENTATIONS AND PAPERS

Design of the tailings disposal facilities for Battle Mountain Gold Company's Crown Jewel Mine near Oroville, Washington, Shuri, F.S., Brown, M.L., and Schumacher, P.M., Tailings and Mine Waste '98, A. A. Balkema/Rotterdam/Brookfield, 1998.

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The Use of a Network Model to Evaluate the Yield of a Proposed Reservoir; Law, J.E., Brown, M.L., paper presented at Colorado State University, July 1988.

Water Balance in the New Regulatory Environment, A Probabilistic Approach to Heap Leach Water Balance; Brown, M.L., Presented at the 96th Annual Northwest Mining Association Convention, Spokane, WA, December 1990.

Mr. Brown is Principal-in-charge of major engineering projects, especially water resources design projects. His areas of technical specialization are surface water hydrology, hydraulics, water treatment and water resources planning and management. He has served as Project manager for projects such as Blackbird and the Lincoln Fields Residential Area Water Treatment Plant Design. Mr. Brown is currently serving as the Water Resources Market Sector Leader for Golder's US Company, focused on serving clients who supply water or manage water resources.

PROJECT EXPERIENCE HIGHLIGHTS

Water Resource Engineering, Planning and Management

Colorado-Big Thompson Project, Fort Collins, Colorado

CLIENT: Northern Colorado Water Conservancy District

Project manager for hydrologic network modeling of the Upper Colorado River Basin together with the Cache La Poudre River Basin and the existing Colorado-Big Thompson project, in order to estimate the yield which would result from construction of a major dam on the Cache La Poudre River. The Cache La Poudre project is a proposed major municipal water- and pump-storage development on the east slope of the Rocky Mountains.

West Divide Project, Rifle, Colorado

CLIENT: Colorado Water Conservation Board

Project manager for the reformulation of the West Divide project, a planning study for development of supplemental irrigation water, south of Rifle, Colorado. The work included geologic mapping, pre-feasibility design of dams at 12 different sites, cost estimating, water rights evaluations, operation studies, and public meetings.

Water Resource Science

Kettle River Hydrologic Analysis, Republic, Washington

CLIENT: Echo Bay

Hydrology and hydraulic evaluation of Echo Bay's Kettle River tailings facilities. Initial work on Phase I of the project has been followed by an evaluation of Phase II of the project. A central issue of the Phase II work was the evaluation of the magnitude of the 500-year and 100,000-year 24-hour precipitation depths using the State of Washington's new (~1993) guidelines.

Monarch-Greenback, Expert Testimony, Atlanta, Idaho

CLIENT: Hawley Troxell Ennis & Hawley

Served as expert witness in a dispute involving failure of a tailings facility near Atlanta, Idaho, that occurred during the spring of 1997. His testimony addressed hydrologic conditions surrounding the snowmelt runoff that occurred in 1997, specifically whether or not the flood event was extreme, or one that could reasonable have been foreseen. The technical work involved detailed review and analysis of flood flows, snow-course data and other hydrologic parameters.

Water Resource Law and Permitting

Crown Jewel Mine Water Supply System Design, Chesaw, WA

CLIENT: Battle Mountain Gold Company

Project Manager for the Crown Jewel Mine Water Supply System Design and Tailings Disposal Facility (TDF) Design. The water supply work began with basic hydrologic data collection, leading to alternatives assessment regarding potential water supply schemes involving surface water, groundwater and various water rights transfers. The project was complicated by international issues because of proximity to the Canadian border. Ultimately the project facilities included a 600 AF reservoir lined with HDPE for control of leakage. The 70-ft high dam provides off-stream storage for snowmelt runoff which can be used by pumping to the mill, located 4½ miles and 2,500 vertical-feet away on Buckhorn Mountain. The water supply system also included design of the pump station and pipeline for delivery of the water.

Golder Associates

Section 5

Robert E. Long Jr., R.G.

Senior Hydrogeologist

QUALIFICATIONS

- Water Resources Management
- Water Rights Planning
- Demand Forecasting
- Reservoir Water Rights
- Water Supply Development
- Wastewater Reuse
- Groundwater-Surface Water Interaction and Analysis

YEARS OF EXPERIENCE: 26

EDUCATION

B.A., Geology, State University of New York at Buffalo, 1986

Post Graduate Studies:

SUNY Environmental School of Forestry - Forestry

Syracuse University – Engineering, Hydrogeology, Aquatic Chemistry

REGISTRATIONS

Registered Professional Geologist, OR

Registered Professional Geologist And Hydrogeologist, WA

Certified Water Rights Examiner, OR

Mr. Long consults on multi-disciplinary water resource planning projects that include groundwater and surface water sources. Mr. Long has municipal expertise in water rights consulting, transfer and acquisition of new water rights, and long-term planning of surface water, stored water, and groundwater supply. He is a hydrogeologist and project manager with 26-years of professional experience and research in hydrogeologic assessment of water supply, Aquifer Storage and Recovery, and water reuse of municipal and industrial wastewater. His has also consulted on water supply and water resources management issues for industrial, irrigation, and drinking water clients throughout Washington, Oregon and Nevada.

SELECTED PROJECT EXPERIENCE

Water for Irrigation, Streams, and Economy (WISE) Rogue River Basin, OR
Delivered a basin wide (300 Sq. Mile) GIS evaluation and report of water loss from irrigation canals to the geologic terrain using available GIS data and mapping. The estimate quantified the loss from canals and the potential benefit that this recharge makes to basin-wide groundwater users and natural ecosystems. The Water for Irrigation, Streams, and Economy (WISE) project is a study aimed at improving water management in the Rogue River Basin.

Columbia Basin Conservation Inventory and Demand Forecast
Provided strategy and senior review for a Columbia Basin water rights analysis. The project collected geographic and quantitative water rights data on the Colombia River in Washington and Oregon. Both groundwater and surface water diversions where assessed. This study included a comprehensive inventory and review of potential water conservation and storage opportunities, water rights, water use, and long-term water supply and demand for water from the Columbia River.

ASR Feasibility and Implementation City of Portland, Oregon
Managed the pilot testing program and groundwater monitoring database, participated in the water quality evaluation, and reviewed construction of eight production wells for use as ASR wells. Consulted with City staff to fully develop ASR opportunities and support well field expansion options.

Water Rights Master Plan, Clackamas River Water Providers, Oregon
Evaluated all municipal water rights that divert water from the Clackamas River. The resulting Water Rights Master Plan presented each municipality with a strategy for strengthening water use claims on the river. The plan recommended cooperative actions that the water providers could take to maximize certification of permits.

Water Management and Conservation Plan City of Banks, Oregon
Project manager for the City's Water Management and Conservation Plan. This small city relies on groundwater wells and headland springs for water supply. The WMCP evaluates the supply and demand and available water rights to develop a strategy for managing these sources and improving conservation of water.

Water Rights Master Plan City of Dallas, Oregon
Provided expert assistance in developing a strategy to retain existing water right permits and to certify the use of surface water and dam reservoir permits held by the City. This project included water right master planning for reservoir rights in the Oregon Coast Range.

Water Right Master Plan, Monrovia Nursery Dayton, Oregon
Provided an expert evaluation of water rights held by this 1500-acre container nursery. The water right evaluation included review of groundwater and surface water permits and certificates, source development, and groundwater quality assessment.

Section 6

MEMORANDUM

Date June 18, 2008

To: Central Utah Water Conservancy District.
Attention: Heath Clark, P. E., Project Manager.

From Carl H. Carpenter, P. E., Retired Consultant.

Subject: Review comments on the Draft Sanpete County Water Resources Master Plan Update, dated June 2008.

Thank you for the opportunity to review the Draft Sanpete County Water Resources Master Plan Update, dated June 2008. Following are some suggested corrections and additions to the report.

1. Page 18, 4th line from the top of the page. The statement should say, Carbon "and Emery Counties."
2. Page 19, 5th paragraph. The majority of large-diameter, deep, water wells in Sanpete Valley are completed in the valley fill aquifer. There are only a few completed in bedrock.
3. Page 19, 6th paragraph. This statement is not accurate. Heavy pumping has occurred in Sanpete Valley since the late 1940's with wide- spread draw downs in water levels and mutual well interference. In fact, there has been unplanned conjunctive use going on for many years throughout the valley, with surface-water supplies being supplemented with ground water pumped from alluvial fan aquifers at Manti Creek, Willow Creek, Ephraim Cottonwood Creek, Twin Creek, Cedar Creek, Oak and Canal Creeks (near Spring City), Pleasant Creek, Excell Canyon, and in the Fountain Green area. These alluvial fans are very suitable for aquifer storage and recovery operation. Indeed, they have been functioning in an unplanned and natural manner for many years.
4. Most large-diameter wells in Sanpete Valley have been in service for more than 50 years, and a program of well rehabilitation and/ or replacement should be implemented to restore the original specific capacity of these wells.
5. Page 17, Table 3-Transmountain Water Diversion Ditches. The following corrections and additions are suggested for this table.
   Black Canyon Ditch, location: Sections 10 & 14, T. 16 S., R. 5 E.
   Bob Wright Ditch, location: R. 7 E. should be changed to R. 6 E.
   Canal Canyon Ditch is the same as "Beck's" Ditch, and the location should be in Sec. 32, T. 16 S., R. 5 E.
   Cedar Creek Tunnel Ditch is the same as "Mountain Tunnel Ditch," and the location is in Sections 11, 1 & 2, T. 16 S. R. 5 E. It is 1.5 miles long.
   Coal Fork Ditch is the same as "Potter's Canyon Ditch", the location is Sec. 24, T. 15 S., R. 5 E., and is ½ mile in length.
   Ephraim Tunnel and "North Ephraim Ditch" are one and the same.

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I.B.20.047.20.(R)

Fairview Tunnel should be labeled "Fairview Lakes Tunnel and Ditch", and is 2 miles long.
Horseshoe Tunnel "and Ditch", location of ditch: Sections 1 & 2, T. 17 S., R. 4 E., length is 3 miles.
John August Ditch, location: Sec. 35, T. 17 S., R. 4 E., length is 1 mile.
Larson Tunnel "and Ditch", location: Sections 10, 11, & 12, T. 17 S., R. 4 E., length is 5 miles.
Low Pass Ditch and "South Ephraim Ditch", length is 7 miles.
Lucy Fork Ditch diverts water to Thistle Creek in the Spanish Fork River drainage.
Madsen Ditch is 2 miles long.
McEwan Flat Ditch conveys water to the Ferron Creek system and is about 5 Miles long. This is not a transmountain diversion to the Sanpete Valley.
Reeder Ditch is the same as "Beck's Ditch" or also known as "Canal Canyon Ditch," and is at the same location at Sec. 32, T. 16 S., R. 5 E. This location is incorrectly located in the same box as "Rufus B. Willberg Ditch."
Seeley-Proctor Ditch is the same as "Potter's Canyon Ditch," and is ½ mile long.
Smiths Reservoir Canal diverts water from the Thistle Creek drainage to the Lake Fork drainage, a tributary to Soldier Creek in the Spanish Fork River system.

Twin Creek Tunnel, location: Sec. 1, T. 16 S., R. 5 E.
Wasatch Ditch diverts water to the Larson Tunnel.

6. A subsurface transmountain diversion occurs in Section 15, T. 18 S. R. 4 E. Water is collected in a 2-1/2 mile long ditch and conveyed to Jet Fox Reservoir, and it then seeps through fractures, joints, and solution channels in the Flagstaff limestone formation, which forms the top of the Wasatch Plateau in this area. This ground water is then collected in several collection boxes on the west side of the plateau in Sections 18 and 19, T. 18 S., R. 4 E., and transmitted in pipelines to Manti for the Manti City drinking water supply. This water supply system has been in operation for about 80 years. As this water flows to Manti it passes through a hydroelectric generating station, which supplies power to Manti City.
7. Table 2: Proposed Conservation Projects in Sanpete County. Item 21, Rehab Conrad Reservoir. This reservoir is also known as "Patton Reservoir" and is located in Sec. 22, T. 18 S., R. 3 E.
7. The author has not had the opportunity to read previous reports prepared in 2000 And 2003 by the Central Utah Water Conservancy District, and wonders if consideration was given to the enlargement of the existing reservoirs and dams at Fairview Lakes, Beaver Dam Reservoir, and Lower Gooseberry Reservoir. This could be either individually or in various combinations to provide the required storage.

Concluding comment about hydrology.

Since the conversion of many irrigation systems from flood and furrow irrigation to sprinkler systems in the past 40 years in Sanpete County, there has been a gradual adjustment in the hydrologic budget and the environment in the impacted

areas. Many wetlands, marsh, and spring areas have dried up and ditch bank vegetation has died. The hydrologic budget must always be in balance, and changing one or more components must be balanced by a corresponding adjustment in the other components. This principle must always be considered in water resource development.

Thank you for the opportunity to comment on this draft.

Carl H. Carpenter, P. E., Retired Consultant.

June 18, 2008

Golder Associates

Section 7

TECHNICAL MEMORANDUM

Date: May 26, 2010

Project No.: 093-93384.300

To: Richard Lee

Company: Carbon Water Conservancy District

From: Don West

cc: Mike Brown

RE: REVIEW AND COMMENT ON THE SEISMIC HAZARD ASPECTS OF THE NARROWS DAM PROJECT SUPPLEMENTAL DRAFT ENVIRONMENTAL IMPACT STATEMENT

The following summary of observations and conclusions regarding the seismic hazards evaluations and proposed seismic design of the Narrows Dam(s) (i.e., proposed, mid-sized and small alternatives) is based on a review of the 2010 Supplemental Draft Environmental Impact Statement (SDEIS) for the Narrows Project, the 1998 Draft Environmental Impact Statement (DEIS) for the Narrows Project, as well as reports, maps and data available from the U.S. Geological Survey and the Utah Geological Survey regarding seismic hazards in Utah. In addition, guidelines from the Federal Emergency Management Agency (FEMA 2005), and the State of Utah (UAC 2010) regarding appropriate earthquake analyses for, and seismic design of dams were reviewed. The primary results, comments and conclusions of the review are listed below.

- There is no apparent updating of the information concerning seismic hazards and seismic design of the dam site from the 1998 DEIS to the 2010 SDEIS. The 2010 SDEIS appears to be verbatim from the 1998 DEIS. Much more technical information regarding the tectonics and seismic hazards of the Wasatch Plateau has become available since 1998 (e.g., U.S. Geological Survey 2006, Quaternary Fault and Fold Database for the United States), and such information and data have not been incorporated into the 2010 SDEIS. A dam is a critical structure and its seismic design, and seismic hazard evaluation, should be based on current, and the most up-to-date information on the active tectonics, potential seismogenic sources and seismic hazards in its region.

- The discussions of seismic hazards and seismic design in the 1998 DEIS and the 2010 SDEIS do not address or incorporate the seismic design requirements outlined in the State of Utah Administrative Code Rule R655-11, Requirements for the Design, Construction and Abandonment of Dams (UAC 2010) in Utah. The requirements of UAC (2010) outline the processes of seismic design and evaluation for dams, and list the types of investigations and analyses that should be completed in order to develop deterministic seismic design parameters.

- The discussions in the 1998 DEIS and the 2010 SDEIS of seismic hazards and seismic design also do not address or incorporate the seismic design requirements outlined in the Federal Guidelines for Dam Safety, Earthquake Analyses and Design of Dams, which

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was developed by FEMA (2005) and which was technically supported by other Federal agencies including the U.S. Bureau of Reclamation. FEMA (2005) outlines the processes of seismic design and evaluation for dams, and lists the types of investigations and analyses that should be completed in order to develop seismic design parameters. Based on the descriptions of seismic hazards in the 2010 SDEIS, the guidelines of FEMA (2005) were not followed.

- There are no stated criteria in either the 2010 SDEIS or the 1998 DEIS regarding what constitutes an active fault that must be considered in seismic design. FEMA (2005) and UAC (2010) in their guidelines for dam seismic design indicate that an active or capable fault is one that demonstrates "movement at or near the ground surface at least once within the past 35,000 years." FEMA (2005) further notes that "for high-hazard potential dams, movement of faults within the range of 35,000 to 100,000 years BP [before present] is considered recent enough to warrant 'active' or 'capable' classification." In addition, dePolo and Slemmons (1998) recommend that for faults in the extensional Basin and Range Province, a latest Pleistocene, 130,000-year activity criterion be used because of the long recurrence intervals of these faults. The Narrows Dam project, although in the Wasatch Plateau sub-province of the Colorado Plateau province, is within the extensional tectonic transition zone between the Basin and Range on the west and the Colorado Plateau on the east. Thus, if a 30,000-, 100,000-, or 130,000-year activity criterion is invoked for the Narrows Dam project, it implies that the Gooseberry Graben faults, which are late Quaternary (U.S. Geological Survey 2006; Black and Hecker 1999a) and within 1 km (0.6 mi) of the dam, may be potential seismogenic sources that should be studied, evaluated and considered in site seismic design. Doing so would result in the use of high design ground motions, and would also introduce the potential for surface fault rupture at the dam. Currently, neither the fault, nor the potential for surface rupture is considered in site seismic design as described in the 1998 DEIS and the 2010 SDEIS. Additionally, there do not appear to have been any fault-specific paleoseismic studies done on the Gooseberry Graben faults, or other nearby active and potentially active faults in order to dismiss them as potential seismogenic sources.

- Based on the 2010 SDEIS and the 1998 DEIS, detailed or comprehensive site-specific seismic hazard assessments and evaluations (as required by FEMA 2005 and UAC 2010) do not appear to have been carried out for the dam site. There is no clear description of what type of assessment (e.g., deterministic or probabilistic) is being used to develop the seismic design parameters, nor is there a description of what the regulatory requirements are for seismic design.

- The 2010 SDEIS and 1998 DEIS imply that there are no active faults near the site that could influence seismic hazards and thus seismic design, and they conclude that the "random" earthquake (a magnitude 5.5) controls the earthquake ground motions at the site. However, the U.S. Geological Survey (2006), in their Quaternary Fault and Fold Database of the United States indicates, for example, that there six (6) active and potentially active faults (i.e., ones that may have had at least one movement event in the past 35,000 years) within about 46 km (28 mi) of the dam site. Three of these faults are within 12 km (7 mi) of the dam site, and one is as close as about 1 km (0.6 mi) from the dam site. The 6 active and potentially active faults within 46 km (28 mi) include, from farthest to closest:

  - Wasatch fault zone, Nephi section (46 km [28 mi] away)
  - Wasatch fault zone, Levan section (45 km [28 mi] away)
  - Gunnison fault (32 km [20 mi] away)

- Joes Valley fault zone (12 km [7 mi] away)
- Pleasant Valley fault zone (12 km [7 mi] away)
- Gooseberry graben faults (< 1 km [< ½ mi] away)

- The seismic design by the Bureau of Reclamation for the nearby (~19 km [12 mi] away from the Narrows Dam site) Scofield Dam (U.S. Bureau of Reclamation 1995) considered the Pleasant Valley and Joes Valley fault zones as active faults capable of generating maximum credible earthquakes (MCE) of surface wave magnitude (M_S) 7.0 and 7.5 respectively. Neither of these earthquake sources is addressed in the 1998 DEIS or the 2010 SDEIS. The seismic design of the Scofield Dam (U.S. Bureau of Reclamation 1995) also considered the random or background earthquake to be a local magnitude (M_L) 6.5, while the 1998 DEIS and the 2010 SDEIS state that the random earthquake is magnitude 5.5. Because the site of the proposed Narrows Project is closer to the Joes Valley fault zone than the Scofield Dam, there is no apparent justification for a design MCE for the Narrows Project smaller than 7.5.

- Based on fault geologic and geometric characteristics taken from Black et al (2001a, 2001b, 2001c), Black et al (1999), and Black and Hecker (1999a, 1999b), the fault rupture-earthquake magnitude relationships of Wells and Coppersmith (1994), Anderson et al (1996), Hanks and Bakun (2002), and the seismic hazard and design studies for the Scofield Dam project (Carbon Water Committee 1998; U.S. Bureau of Reclamation, 1984, 1995; Skipper 1988), the 6 potential seismogenic sources within 46 km (28 mi) of the dam site (listed above) could produce large potential design earthquakes (e.g., magnitudes of 6.8 to 7.5). Using these earthquake magnitudes and the current New Generation Attenuation (NGA) earthquake attenuation relationships of Abrahamson and Silva (2008), Boore and Atkinson (2008), Campbell and Bozorgnia (2008), Chiou and Youngs (2008), and Idriss (2008), results in potentially high earthquake ground motions (e.g., mean PGA > 0.45 g) at the Narrows Dam site. The presence of a potentially active fault at the dam site (the Gooseberry graben faults), also indicates that there is a potential for surface fault rupture through the dam and facility foundations.

- The seismic design requirements of UAC (2010) state that the random or background earthquake to be considered should have a minimum magnitude of 6.5, and that the PGA developed for the background earthquake be taken from the U.S. Geological Survey seismic hazard mapping for Utah titled "Peak Accelerations (%g) with 5,000 Year Return Time, no fault-specific sources" (State of Utah 2010). This seismic hazard mapping indicates that the PGA from just a random or background earthquake could range from 0.30 to 0.40 g.

- Although the 2010 SDEIS and the 1998 DEIS state that the largest historical earthquake recorded in the Wasatch Plateau was magnitude 4.9, a search of the U.S. Geological Survey's earthquake database (U.S. Geological Survey 2010) reveals that the largest event in the Wasatch Plateau was an M_L 5.4 not 4.9. This earthquake occurred on January 30, 1989, about 97 km (60 mi) south of the dam site.

- The 1998 DEIS and the 2010 SDEIS do not address or discuss the potential for soil liquefaction induced by earthquake shaking, and they do not address the potential for earthquake-induced landslides to affect the reservoir, or other facilities of the proposed alternatives.

- Although the potential for reservoir-triggered seismicity (RTS) may be low, neither the 1998 DEIS nor the 2010 SDEIS address or discuss this potential seismic hazard in order to dismiss it.

- In Section 2 of the 2010 SDEIS, it is stated that the dam will be "designed to withstand effects induced by seismicity associated with mining of coal reserves east of the East Gooseberry Fault (approximately 1 mile away)." This appears to be in conflict with descriptions in Section 3 where the "random" earthquake is stated to be the controlling source for seismic design.

- Overall, the treatment of seismic hazards and seismic design appears to be inadequate given the critical nature of the structure/facility being proposed. The tectonic setting is not well described, appropriate identification, characterization and evaluation of significant potential seismogenic sources at the site (e.g., the Gooseberry graben faults) and in the vicinity of the site (e.g., Pleasant Valley, Joes Valley, Gunnison and Wasatch faults) is lacking, the identification and description of potential earthquake hazards is incomplete (e.g., the potential for liquefaction, surface fault rupture and earthquake-induced landslides into the reservoir are not addressed), and the development of the seismic design parameters is cursory, conflicting and inadequate resulting in a seismic design that is less than it should be. Even though the 1998 DEIS and 2010 SDEIS are environmental documents, that is, not design documents, they should nevertheless provide an adequate and complete treatment of seismic hazards and the proposed seismic design that assures that the EIS cost estimates are accurate, and that provides sufficient information to agency decision makers and the public to assure that they understand the seismic setting, potential hazards and risks, and the potential for related environmental impacts. Such information is lacking in these documents.

- If the seismic hazard assessment and seismic design were performed in accordance with current standard of professional practice, it is likely that the costs for alternatives involving dams at the Narrows site would increase significantly because of increased cost of site-specific hazard identification, characterization, evaluation and design, and the additional cost of permitting, and construction to accommodate a higher PGA, and required provisions to investigate for, and protect against surface fault rupture. Alternatives discarded in Section 2 of the 2010 SDEIS because of costs, or other declared difficulties, would thus become far more attractive.

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Golder Associates Inc. – Redmond

Education

M.S.-Level Graduate Studies, Geological Sciences, California State University, Hayward, California, 1976-1981

B.S, Geological Sciences, University of Washington, Seattle, Washington, 1972

Certifications

Licensed Geologist: California (1978), Oregon (1978), Washington (2002)

Licensed Engineering Geologist: California (1985), Oregon (1978), Washington (2002)

Professional Summary

Mr. West is a Senior Consultant and Engineering Geologist with 38 years of experience in the identification, characterization, and evaluation of geology for soil and rock geotechnical investigations, natural hazard evaluations and critical facility siting. This experience has been focused on dam (hydroelectric, water supply, tailings), transportation (pipelines, highways, transmission lines, tunnels), mining, energy, high-level nuclear waste repository, hazardous waste management, and municipal waste disposal projects in North America, Central America, South America, Africa, the Middle East, Asia, and the Southwest Pacific. His experience has included the planning of field and analytical investigation programs, implementation and management of the programs, and presentation of the results of the investigation programs to clients, and local, state, and federal regulatory agencies. Mr. West's technical specialties include the investigation and evaluation of seismic, volcanic, and slope stability hazards. His experience in seismic hazards evaluations has included regional and site-specific field and analytical paleoseismic studies to identify and characterize potential seismogenic and fault rupture sources, as well as the implementation of deterministic and probabilistic methodologies to develop earthquake strong ground motions for seismic design, seismic stability analyses, and seismic hazard mapping. He has studied volcanic hazards in western North America, South America, Far East Russia, and western Africa to develop hazard mitigation design criteria. Mr. West's experience in geomorphological analysis and geologic site characterization has allowed him to complete numerous regional and site-specific landslide and slope hazards investigations for projects in North America, South America and worldwide.

Employment History

Golder Associates Inc. – Redmond, Washington
Senior Consultant (2002 to Present)

AMEC Earth & Environmental, Inc. – Kirkland, Washington
Associate (2000 to 2002)

Golder Associates Inc. – Redmond, Washington
Associate (1994 to 2000)

Golder Associates Inc. – Alameda, California
Senior Geologist to Associate (1984 to 1994)

Woodward-Clyde Consultants, Inc. – San Francisco, California
Staff Geologist to Senior Project Manager (1973 to 1984)

United States Forest Service – Seattle, Washington
Geologist (1972 to 1973)

52. COTTONWOOD GOOSEBERRY IRRIGATION COMPANY, LYNN ANDERSON, PRESIDENT

Sat 5/29/2010 11:29 AM

May 26, 2010

Mr. Peter Crookston
PRO-774

302 East 1860 South

Provo, UT 84606

Dear Mr. Crookston:

52-1 As president of the Cottonwood Gooseberry Irrigation Company (CGIC), it is my pleasure to write this letter in support of the Narrows Dam and Reservoir Project. The CGIC service area is located in and around the city of Fairview. The CGIC currently operates Fairview Lake above the proposed reservoir, the Fairview Tunnel (referred to as the Narrows Tunnel in the SDEIS), and numerous other facilities at the mouth of Fairview Canyon. As described in the SDEIS, CGIC facilities will be impacted by the Narrows Dam and Reservoir Project; and although it will impact CGIC facilities, we are supportive of this project.

The construction of the Narrows Dam and Reservoir, and its associated facilities, will benefit the CGIC shareholders, as well as all of the people of northern Sanpete County. Due to very limited water storage capacity in northern Sanpete County, nearly all cost-effective water conservation measures have been implemented. Despite these extensive efforts, northern Sanpete County does not have adequate late-season water. In many years there is insufficient water in July, August, and September. The Narrows Dam and Reservoir Project will dramatically improve and stabilize the water supply in northern Sanpete County. A more stable water supply will provide a significant economic benefit to the county. It will allow higher value crops to be grown and increase the productivity of existing cultivated lands.

Multiple studies have confirmed that the Narrows Dam and Reservoir Project is the most environmentally feasible and cost effect way for Sanpete County to develop its water rights. The project contains extensive mitigation efforts to compensate for any environmental impacts. The CGIC's Fairview Lake has been identified in the SDEIS as a water source for wetland and fishery mitigation efforts above the proposed Narrows Reservoir. The CGIC is supportive of these mitigation efforts, and is willing to work with the Sanpete Water Conservancy District. However, some compensation for the use of CGIC facilities is expected.

The CGIC owns and operates the Fairview Tunnel. Since its construction in the 1960's, the CGIC has been diverting water from Fairview Lake through the tunnel. As mentioned in the SDEIS, the tunnel has severe stability problems. Failure at the tunnel outlet is already backing water up into the tunnel, which is accelerating the deterioration of the tunnel. Complete failure at the tunnel outlet appears imminent. Complete failure will occur in the near future. Failure of the tunnel would eliminate the ability of the CGIC to deliver water from Fairview Lake to its shareholders. To prevent the loss of the ability to convey water to our shareholders, CGIC is planning to conduct extensive maintenance of the tunnel starting in

the fall of 2010. The purpose of the maintenance will be to maintain the ability of the tunnel to convey water from Fairview Lake to CGIC shareholders. The CGIC will be arranging their own financing of the maintenance effort, and as such will only be doing the work necessary to maintain the ability of the tunnel to covey CGIC water rights. Recent inspections have shown that we cannot take the chance of waiting any longer.

The CGIC strongly supports the construction of the Narrows Dam and Reservoir. The Sanpete water rights have been reduced to obtain the highest priority water right in the Gooseberry Creek Drainage. We believe it is time that the many agreements that have been signed relating to the Sanpete Water Conservancy District's water rights be honored and this project built.

We appreciate the opportunity to comment on the Supplemental Draft EIS.

Sincerely,

Lynn Anderson

President

Cottonwood Gooseberry Irrigation Company

53. GUNNISON IRRIGATION COMPANY, ALLEN DYRENG, PRESIDENT

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Gunnison Irrigation Company

CENTERFIELD, UTAH 84622
April 22,2010

Bureau of Reclation
Peter Crookston PRO-774
302 E. 1860 South
Provo Utah 84606

To whom it may concern;

53-1 This letter is support of the Narrows Project for Sanpete County from our company.

This project is critical for the water needs of Sanpete County. This water belongs to Sanpete County and has been argued and passed over for the past 75 years, now is the time to make it happen. All of the communities in Sanpete impose water restrictions from about July on each year. Agriculture simply goes without. This water will make a difference as well as recreation.

Sanpete County has been a leader in the State in developing water conservation practices. A news report this week from the Department of Natural Resources stated that by 2050 Utah Reservoirs will have lost 25% of their storage capacities due to silt and sediment. This storage cannot be reclamed due to excessive costs. We simply need to build more storage reservoirs.

Sanpete County needs and deserves this Project.

Respectfully

Gunnison Irrigation Company
Box 220228
Centerfield, Utah.

President

Secretary

54. MAYFIELD IRRIGATION COMPANY, WILLIAM KAY CHRISTIANSEN, PRESIDENT

ORIGINAL

Crookston, Peter L

From: Shawn Kay Christiansen [shawnproperties@yahoo.com]
Sent: Thursday, May 27, 2010 2:10 PM
To: PRO NarrowsEIS
Subject: Narrows Project

To whom it may concern,

54-1 The courts have ruled!
Sanpete county has been promised the narrows project since 1943. The water right is Sanpete County's not Carbon County's.
We as a county have been deprived of this asset for far to long.

Make this Right!

William Kay Christiansen
"President" Mayfield Irrigation Company

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55. NORTH CARBON SALINITY IMPROVEMENT PROJECT, FRANK SACCOMANNO, PRESIDENT, SPRING GLEN CANAL COMPANY

COPY 774

TO THE BUREAU OF RECLAMATION CONCERNING THE GOOSEBERRY NARROWS PROJECT

FROM THE NORTH CARBON SALINITY IMPROVEMENT PROJECT

THE NORTH CARBON SALINITY IMPROVEMENT GROUP FORMED BY THREE CANAL COMPANIES AND ONE DITCH GROUP. THE THREE COMPANIES, THE SPRING GLEN CANAL COMPANY, THE STOWELL CANAL COMPANY, THE BRYNER HANSEN CANAL COMPANY, THE OBERTO DITCH GROUP. THE GROUP SUBMITTED A PROPOSAL TO THE USDI BUREAU OF RECLAMATION A SALINITY PROPOSAL FOR FUNDING TO PIPE THE MAIN LINES AND LATERALS. APPROVAL WAS GRANTED ALONG WITH THE HELP OF THE NRCS FOR ON FARM FUNDING AND DESIGN. THE PROJECT WAS DESIGNED AND BUILT BY HARWARD IRRIGATION COMPANY.

THE GROUPS COMPANIES AND FILINGS WERE COMPLETED PRIOR TO SCOFIELD RESERVOIR BEING BUILT.

THE GROUPS MAJOR WATER SUPPLY IS FROM DIRECT FLOW FILINGS. THE LISTING OF WATER RIGHT NUMBERS AND WATER CFS TOTALS FOLLOW. ALSO SEE ATTACHED LIST.

WATER USER- BRYNER HANSEN CANAL COMPANY. WR#S 91-646 91-1758 91-1759 911760 91-2503 91-2504. TOTAL CFS ALL CLASSES 3.4061

WATER USER-SPRING GLEN CANAL COMPANY. WR#S 91-717 91-753 91-752. TOTAL CFS ALL CLASSES 14.9231

WATER USER-STOWELL CANAL COMPANY. WR#S 91-718 91-759 91-758 91-757 91-756 91-755 91-754. TOTAL CFS ALL CLASSES 6.4158

WATER USER-OBERTO DITCH GROUP. WR#S 91-2151 91-641 91-5168 91-639 91-639 91-359 91-634 91-2408 91-633 91-633 91-636 91-642 91-643 91-644 91-645 92-2118 91-2148 91-2149 91-2152 91-2407. TOTAL CFS ALL CLASSES .9683

55-1 ALL DIRECT FLOW WATER RIGHTS MUST BE SATISFIED BEFORE WATER CAN BE STORED IN A RESERVOIR. DIRECT FLOW RIGHTS MUST PASS THRU A RESERVOIR AND CAN NOT BE STORED.

THE NARROWS PROJECT CANNOT HELP BUT REDUCE THESE DIRECT FLOW FILINGS.

FRANK SACCOMANNO 1522 KENILWORTH RD. SPRING GLEN UTAH 84526
Frank Saccomanno
PRESIDENT SPRING GLEN CANAL COMPANY AND CHAIRMAN OF THE NORTH CARBON GROUP

E-MAIL fs@emerytelcom.net

TELEPHONE 435-636-5652

USA Frank Saccomanno
1522 Kenilworth Rd.
Helper, UT 84526-2107

NORTH CARBON GROUP - PRICE RIVER
CHANGE APPLICATIONS FILED AND APPROVED
USER'S CLASSES/PRIORITIES & FLOW (CFS)

WATER USER	WR #	MORSE DECREE							KELLER DECREE		
		1st Class 1874	2nd Class 1876	3rd Class 1878	4th Class 1880	5th Class 1882	6th Class 1884	7th Class 1886	K-3 1906 A	K-5 1907 B	Total - CFS
Bryner - Hansen Ditch Company	91-646	1.058									1.058
	91-1758		0.117								0.117
	91-1759				0.117						0.117
	91-1760					0.117					0.117
	91-2503								1.32		1.32
	91-2504									0.6771	0.6771
	Total - cfs	**1.058**	**0.117**	**0**	**0.117**	**0.117**	**0**	**0**	**1.32**	**0.6771**	**3.4061**
Spring Glen Canal Company	91-717	5.6									5.6
	91-753								4.45		4.45
	91-752									4.8731	4.8814
	Total - cfs	**5.6**	**0**	**0**	**0**	**0**	**0**	**0**	**4.45**	**4.8731**	**14.9231**
Stowell Mutual Water & Canal Company	91-718	2.133									2.133
	91-759		0.117								0.117
	91-758			0.067							0.067
	91-757						0.1				0.1
	91-756							0.1			0.1
	91-755								2.41		2.41
	91-754									1.4888	1.4888
	Total - cfs	**2.133**	**0.117**	**0.067**	**0**	**0**	**0.1**	**0.1**	**2.41**	**1.4888**	**6.4158**
Tom Bruno	91-732	0.17									0.17
(Gay to No. Carbon Diversion)	91-1791								0.15		0.15
	91-1792									0.1167	0.1167
	Total - cfs	**0.17**	**0**	**0**	**0**	**0**	**0**	**0**	**0.15**	**0.1167**	**0.4367**
O'Berto Ditch User's											
Robert E. & F. Diane Olson	91-2151	0.0058									0.0058
William W. & Faye F. Branson	91-641	0.0417									0.0417
Robert A. & Mava F. Farrell	91-5168	0.043									0.043
Bruce B. & Sherry L. Christensen	91-639	0.0114									0.0114

WATER USER	WR #	MORSE DECREE							KELLER DECREE		
		1st Class 1874	2nd Class 1876	3rd Class 1878	4th Class 1880	5th Class 1882	6th Class 1884	7th Class 1886	K-3 1906 A	K-5 1907 B	Total - CFS
Steve Zamantakis	91-639	0.0397									0.0397
John Steve O'Berto	91-359	0.0046									0.0124
John Steve O'Berto	91-634	0.0281									0.0281
John O'Berto	91-2408	0.0407									0.0407
George & Eleanor Zamantakis	91-633*	0.012									0.012
Robert & Mava Farrell	91-636*	0.118									0.118
Joy & Mike Gipson	91-642*	0.0419									0.0419
Randy D. Leader	91-643*	0.0405									0.0405
Ed & Wilma Howa	91-644*	0.1161									0.1161
Larry D. Milano		0.0236									0.0236
Jerry & Geraldine Sherman		0.0238									0.0238
Dennis Lee & Ann Marie Milano		0.0238									0.0238
Clyde & Julie Ann Zorn		0.0243									0.0243
Robert Sherman, etal		0.0459									0.0459
Joseph N.& Clara B. Lovato		0.0145									0.0145
James Weston Decker, etal		0.0143									0.0143
Ronald T. & Bernadette L. Jones		0.0288									0.0288
William W. Branson, etal	91-645*	0.0423									0.0423
Kathleen M. & Linden W. Laws	91-2118*	0.0267									0.0267
New Life Ministries, Inc.	91-2148*	0.0737									0.0737
McCourt Holdings,LLC	91-2149*	0.0288									0.0288
Deson Properties, Inc		0.0386									0.0386
Robert E & F. Diane Olson	91-2152*	0.0045									0.0045
McCourt Holdings,LLC	91-2407*	0.0048									0.0045
Deson Properties, Inc		0.0064									0.0064
	Total - cfs	0.9683	0	0	0	0	0	0	0	0	0.9683
Cumulative Flow - CFS		9.9293	0.234	0.057	0.117	0.117	0.1	0.1	8.33	7.1557	26.15

*All require a change application and most title work.
5/12/2010

56. PRICE RIVER WATER IMPROVEMENT DISTRICT

ML

ORIGINAL

PRICE RIVER WATER
IMPROVEMENT DISTRICT
P.O. Box 903
265 South Fairgrounds Road
Price, Utah 84501
Telephone (435) 637-6350
FAX (435) 637-6374

PRO OFFICIAL FILE COPY
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Reply Date		
Date	Initials	Code
		100
		105
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	KS	700
6/16/10	BCH	770
6/24/10	PC	774cy

Action:
Classification: ENV-16.00
Project: Narrows
Control No: 10037466
I.D.: 1122816

May 24, 2010

Bureau of Reclamation
ATTN: Peter Crookston, PRO-774
302 East 1860 South
Provo, Utah 84606-7317

RE: Proposed Gooseberry/Narrows Project, SDEIS Review and Comments

Dear Mr. Crookston,

Recently, the Price River Water Improvement District, a Utah Special Service District, headquartered in Price, Utah (PRWID), received a copy of the Supplemental Draft
56-1 Environmental Impact Statement (SDEIS). We have determined that the effect of this project on the health of the citizens that use Scofield Reservoir and its tributaries as their source of drinking water has either been ignored or discounted so as to appear to be inconsequential. We, the Board of Trustees and staff of PRWID, wish to call your attention to what we have determined to be significant hazards to human health.

Scofield Reservoir is the primary source of drinking water to the citizens of Carbon County who live in the Price River Valley. This water supplements ground water sources previously developed by the municipalities of Helper and Price and is the sole source of water for Wellington City and the County in general. As such, any degradation in the quality of water in Scofield Reservoir negatively impacts the homes and businesses that depend on this water.

56-2 Two issues impacting water quality give us great concern, especially in the event of drought or reduction in flow to Scofield Reservoir. They are the levels of phosphorous that naturally occur in Scofield Reservoir and the formation of disinfection by-products in the drinking water distribution system. We believe that both of these conditions will increase if the flow of water entering Scofield Reservoir is diminished.

First, the phosphorous that is present will continue to be released into the reservoir. With lower levels of water, the dilution factor will decrease resulting in higher concentrations of phosphorous. This nutrient enrichment will then promote a significant increase in algal growth resulting in higher concentrations of dissolved organics within the Reservoir. As the life cycle of the algae occurs, greater amounts of algae will die-off, resulting in lowered levels of dissolved

CLEAN WATER

oxygen within the Reservoir. Lower levels of dissolved oxygen will promote the growth of Blue-Green algae which can directly affect the health of downstream users and will negatively impact the ability of fish to survive in the Reservoir. This will require additional water treatment efforts resulting in higher costs.

56-3 Second, the rise in dissolved organics and Total Organic Carbon (TOCs) from additional algal growth will have a direct correlation to the formation of disinfection by-products, i.e. Trihalomethanes (TTHMs), and Haloacetic Acids (HAA5s). PRWID has developed a history of testing for these components in its water treatment and distribution systems and has determined that when water levels are low, especially consistently low, and the temperature of the water increases, the formation of these components increases significantly. The Utah Division of Drinking Water and U.S. Environmental Protection Agency have determined that TTHMs and HAA5s are carcinogenic and must be prevented from forming because of their threat to human health. Additional treatment requirements to remove dissolved organics or TOCs from the raw water, or to remove TTHMs and HAA5s that form in the water distribution system can be cost prohibitive. The best way to prevent the formation of these compounds is to prevent the release of dissolved organics into the raw water supply.

PRWID expects that the proposed Gooseberry/Narrows Dam, if constructed will:

56-4 ➢ Negatively affect the quality of the water stored in and released from Scofield Reservoir.
56-5 ➢ Negatively affect the fishery coming into, and leaving Scofield Reservoir.
56-6 ➢ Negatively affect the ability of PRWID to effectively treat and distribute safe and healthy drinking water to its users.
➢ Negatively impact PRWID's ability to meet the drinking water needs of its users during drought cycles.
➢ Negatively impact the health of the District's culinary water users.
➢ Raise the treatment costs for drinking water to PRWID's users.

For these reasons and in addition to the questionable cost/benefit ratio associated with the proposed project, we directly oppose the proposed construction of the Gooseberry/Narrows Dam.

Thank you for your consideration of our comments.

Sincerely,

Richard Tatton, Chairman
Trustee - Price City

Keith Cox, Vice-Chairman
Trustee - the County-At-Large

Ben Blackburn, Board Member
Trustee - Wellington City

Gary Harwood, Board Member
Trustee - Helper City

Steve Rigby, Board Member
Trustee - the County-At-Large

Jeffrey R. Richens, District Manager
PRWID

Ken Snook Jr., Superintendent
Water Treatment Plant – PRWID

cc: Walt Baker, Director – Utah Division of Water Quality
Ken Bausfield, Director – Utah Division of Drinking Water
Utah Department of Environmental Quality Staff

57. PRICE RIVER WATER USERS ASSOCIATION, WILLIAM BUTCHER, PRESIDENT

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JUN 10 2010

ORIGINAL

Price River Water Users Association

375 South Carbon Ave #A10
Price, UT 84501

Reply Date		
Date	Initials	Code
		100
		107
		105
		700
6/22/10	BCH	770
6/23/10	PC	774 cy

Action:
Classification: ENV - 6.00
Project: NARROWS
Control No: 10041045
I.D.: 1122816

May 31, 2010

Mr. Peter Crookston
PRO-774
Bureau of Reclamation
302 East 1860 South
Provo, Utah 84606-7317
Sent via e-mail: narrowsSDEIS@usbr.gov

Dear Mr. Crookston,

I am writing to voice my opposition to the construction of the proposed Gooseberry Reservoir and to comment on the Supplemental Draft Environmental Impact Statement that has been prepared for it.

In addition to serving as president of the Price River Water Users Association, I am also operations manager for William Marsing Livestock, Inc., one of the largest, if not the largest, agricultural water users on the Price River system, and I know exactly how precious water is to this valley. Since the SDEIS was released, I've been doing some research on the proposed project. I've found many things to comment on.

I have found that the construction of the proposed dam revolves partially around the myth that the Price River system has a surplus of water, and that the Gooseberry Reservoir would only store the water that is spilled on a regular basis from Scofield Reservoir. I can assure you that this is not the case at all. Scofield Reservoir is subject to weather cycles, having a few high years in a row, and then it goes for a number of years where the storage is low, and sometimes not even meeting demand. The records are very clear on this point. I find it very concerning that on page S-10 the SDEIS states that *"From 1960 to 2002 the reservoir spilled 17 times. This indicates that, on average, the reservoir historically has spilled about every 2 to 3 years."* That statement is a complete misuse of statistical information. The math is technically correct that 42 years divided by 17 spills is a spill every 2 or 3 years, leading the reader to believe that Scofield Reservoir's natural state is full, or nearly always full, but the actual historical data paints a very different picture.

57-1

Records indicate that Scofield Reservoir usually spills for a number of years back to back, and then experiences a number of years with no spills. Over the period from 1960 to 2002 the reservoir has experienced 10 years in a row that no spill has occurred. Stating in the SDEIS that *"the reservoir historically has spilled about every 2 to 3 years"* is simply scientific malpractice. The information that the preparers used to arrive at the reservoir spilling 17 times also clearly shows that the reservoir does not spill *"about every 2 to 3 years."* Furthermore, the historical data shows that of the years that the reservoir did not spill, often times the maximum storage reached for the year did not allow for full water delivery. The preparers have ignored some of the historical data to skew the result of their analysis toward a specific viewpoint, one that supports the building of Gooseberry Reservoir. That said, I find it hard to believe any of the scientific information presented in the SDEIS.

57-2 Another disturbing fact that I've come across in my research is the fact that Sanpete Water Conservancy District is regularly and flagrantly in violation of the agreements that allow them to operate the transmountain diversion tunnel. The water control structures are in poor repair. The water measurement equipment is placed in the wrong locations. The waterworks that prevent water from flowing through the tunnel during the time when there is no right for the water to flow through it is in disrepair and not functioning. Work has been recently done that allows them to capture water from above the ditch that goes from Fairview Lake to the tunnel entrance that they should be allowing to pass into Gooseberry Creek. I fear that if the Gooseberry Reservoir is constructed, these kinds of violations of water rights will continue. I also fear that their track record of poor maintenance will continue to the detriment of all Carbon County water users.

57-3 My research has also shown me that, in the 1984 agreement, Sanpete agreed to a 10,000 acre foot storage limit on the Gooseberry Reservoir. This could only be increased as required if there were minimum streamflows in Gooseberry Creek below the dam. By increasing the capacity of the proposed reservoir to 14,500 acre feet (the maximum allowed in the 1984 agreement), it seems that there should be a demand for 4,500 acre feet to flow down Gooseberry Creek on a yearly basis. There is no plan to release that much water from the proposed reservoir down Gooseberry Creek, and therefore the maximum storage capacity of the reservoir must be lowered to the 10,000 acre foot limit, as required by the 1984 agreement, or the capacity increased above the 10,000 acre foot mark by only the amount of water that would be required to be released down Gooseberry Creek. This amount would only be a few hundred acre feet. The SDEIS needs to be re-written to reflect the legal storage limits.

Another thing that the SDEIS states that is worth mentioning is the fact that the project is touted for its recreational potential. There are several reservoirs in the area, each presenting a multitude of
57-4 recreational opportunities right now. The construction of the Gooseberry Reservoir will, according to officials from the Price River Water Improvement District, degrade the current quality of Scofield Reservoir, reducing or eliminating the recreational potential offered there. Numerous groups like the Utah Rivers Council oppose the Gooseberry Reservoir because they fear it will destroy a popular trout fishing stream. The small addition of recreational opportunity on the proposed Gooseberry Reservoir to an area already rich with recreational sites will not nearly offset the degradation of recreational opportunities that are now offered by Gooseberry Creek and Scofield Reservoir.

57-5 Furthermore, this proposed project is not about developing an unused source of water. This project, if built, would only serve to take water from Carbon County interests - water that has been put to beneficial use, and water that the water users have become accustomed to using.

In closing, I oppose the construction of this project. I thank you for taking the time to consider my comments.

Sincerely

William Butcher
President

58. ROCK DAM IRRIGATION COMPANY, DON HARDY, PRESIDENT

Thu 5/6/2010 7:59 PM

Don Hardy

220 S. 300 E.

Mt. Pleasant, Utah 84647

435-851-3305

dlhardy22@yahoo.com

To Whom this may concern,

58-1 I am a very concerned citizen of Sanpete County, where, I am President of the Rock Dam Irrigation Company. It concerns me to know that Sanpete County has to fight so hard for something that already belongs to us!! It's a shame to know that we may not receive what is rightfully ours! The federal government spends money on issues that seem frivolous when compared to people's need for water to earn a living. Not only am I the President of an Irrigation Company but I am a producer of many livestock, Turkeys, Cattle, and Sheep. I have a big need for this water, along with many other Ranchers/Farmers in the Sanpete County area. Therefore, I recommend that you seriously consider and do whats right for the people of Sanpete County and surrounding areas.

The Narrows will also have a favorable impact on education. New jobs in connection with building the Narrows will bring new income to families. Additional "ripple" economic activity, and particularly the increased ability of farmers to enhance the productivity of their land with the water the Narrows will provide, will likewise create additional income for local families. One of the important ways this will evidence itself will be in more people investing in education. The impact on Sanpete's public schools, Snow College and other educational institutions will be favorable. Sanpete County rightfully owns the water rights involved. The Utah Supreme Court and the US Department of Justice have both acknowledged Sanpete's water rights. So please give what rightfully belongs to Sanpete County...Water!!

Sincerely,

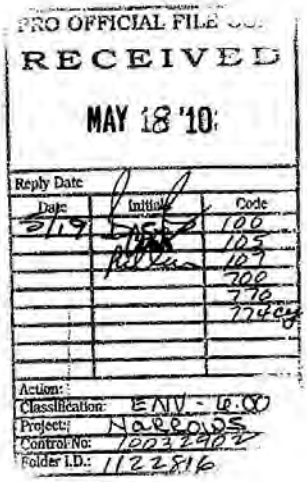
Don Hardy

President of Rock Dam Irrigation Company and Rancher

59. SANPETE WATER CONSERVANCY DISTRICT, DAVID L. PETERSON, MEMBER

AL

ORIGINAL



May 3, 2010

Bureau of Reclamation
Attn: Peter Crookston
PRO-774
302 East 1860 South
Provo, UT 84606

RE: Narrows Project

To Whom It May Concern:

59-1 The Narrows Project should have been completed years ago. Sanpete filed on this water and the filing were approved by the State Engineer and upheld by the courts. All the studies were approved showing that Sanpete could go ahead and build the dam and other parts of the project which will store 17000 acre feet of water and deliver all the water (except some prior rights) to Sanpete Water users every year.

When you add it all up there has been enough water gone east to Carbon County to supply their rights from now on. It would solve a lot of problem to just put in a tight dam and Sanpete could take it all for the next 100 years.

When we signed the 1984 agreement, we acted in good faith and thought things would get better. But, time has proven that Carbon County wants all the water and has no intention of cooperating. They could now prove other wise and support the completion of the project and helping both sides benefit with a completed project. It is time to correct past mistakes and complete this project.

The farming interest will soon be gone and all the water will be needed for homes and communities. All with higher priorities and will consume all the water available.

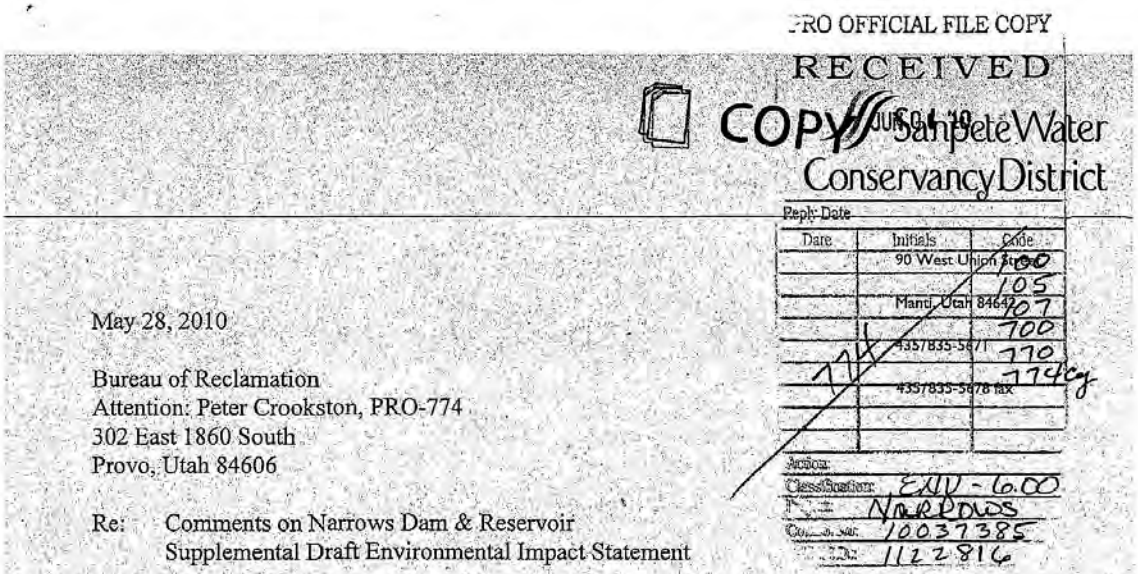
Please do the right thing. Finish this project as it was intended and previously approved.

Sincerely,

David L. Peterson

David L. Peterson
Sanpete Water Conservancy District member and former chairman
160 E. 200 N.
Mt. Pleasant, UT 84647
(435) 462-9494

60. SANPETE WATER CONSERVANCY DISTRICT, EDWIN B. SUNDERLAND, CHAIRMAN



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COPY
Sanpete Water Conservancy District

Reply Date

Date	Initials	Code
	90 West Union Street	100
	Manti, Utah 84642	105
	435/835-5671	700
	435/835-5678 fax	770
		774

Action:
Classification: ENV - 6.00
Project: NARROWS
Control No.: 10037385
Folder ID: 1122816

May 28, 2010

Bureau of Reclamation
Attention: Peter Crookston, PRO-774
302 East 1860 South
Provo, Utah 84606

Re: Comments on Narrows Dam & Reservoir
Supplemental Draft Environmental Impact Statement

60-1 The purpose of this letter is to comment on the recently-released Supplemental Draft Environmental Impact Statement which addresses the Narrows Dam & Reservoir in Sanpete County.

The Sanpete Water Conservancy District, representing the citizens of Sanpete County, strongly favors the creation of the Narrows Project.

As we have reviewed the recently-published Supplemental Draft, the follow points which encourage construction of the Narrows seem not to have been discussed in the document, or not discussed in sufficient detail. Please give careful consideration to the following:

1. Nowhere does the document address the matter of integrity as it pertains to promises of water storage that have been made to Sanpete County for nearly 80 years. Yes, we understand that an EIS is intended to focus on environmental matters. We believe that integrity falls completely within the broad scope of the word "environment." Environmentalism is advocacy for protecting the natural environment from destruction or pollution. Surely, dishonesty or lack of integrity are destructive, morally polluting forces, wherever they are found. Moral pollution is more reprehensible and more destructive to a society than biologic pollution. The failure to exercise integrity is the antithesis of all that is good and natural. The No-Action Alternative would propagate a huge, negative socio-economic impact to Sanpete County that is not addressed in the SDEIS. As Reclamation considers its Record of Decision, we ask that you give strong consideration to the promises that have been made to Sanpete, including (but not limited to):

   a. The original promises of the Gooseberry Project (as early as the 1930's) to provide water storage to Sanpete. Promises unkept.

   b. The promise to Sanpete that water storage would be provided after the enlargement/repair of Scofield in World War II. Promise unfulfilled.

c. Carbon County's promise (Compromise Agreement of 1984) to stop objecting to the Narrows, in exchange for a substantial reduction of water storage and other significant compromises made by Sanpete. Promise broken.

2. The Narrows will provide a very significant economic boost to Sanpete and surrounding counties. This is projected to come in the form of:

a. The creation of 185--241 full-time, meaningful jobs during the estimated 2-year construction phase of the project. These jobs would be filled largely by people from not just Sanpete County, but Carbon and other surrounding counties as well.

b. Another 180 indirect jobs through indirect and induced economic activities.

c. Every $1 million spent on construction (construction budget is approximately $34 million) will generate an additional $825,858 of economic output through indirect and induced activities.

d. After construction, the Narrows will create about $1 million per year of economic benefit. While this will impact primarily Sanpete County, the benefits will surely ripple outward to surrounding counties. This $1 million per year is anticipated to continue for 100 years, perhaps longer.

e. The recreational facilities that will be built as part of the Narrows (campgrounds, picnic areas, rest rooms, boat ramp, stocked fishing, etc.) will have a favorable economic impact. As people travel to reach the Narrows recreational facilities, the communities through which they travel will benefit from the kinds of economic activities that travelers typically produce (sale of fuel, restaurant food, groceries, etc.). These will be favorable to the businesses of Sanpete and other communities for decades or generations.

(The economic impacts mentioned in items 2a--2e above are based on estimates from President Obama's Council of Economic Advisors, from the Center for Strategic Economic Research, and from economic/engineering studies done directly in connection with the Narrows Project.)

3. Nowhere does the SDEIS mention that the Narrows will likely have a favorable effect on tax rates in Sanpete County. As additional jobs and increased economic activity are created, a portion of those revenues will naturally flow into tax coffers. That will tend to help hold down future taxes and provide for future needs of Sanpete County.

4. We believe the Narrows will have very marked, favorable impact on public and higher education in and beyond Sanpete County. This, in turn, will likely have a favorable impact on the environment. As the finances of local families are favorably impacted by the Narrows (as outlined in section 2 above), it is typical and consistent with the cultural habits of families throughout Utah (including Sanpete) to provide more and better education for themselves and their children. As more children and young adults are provided the advantages of greater educational opportunities, it will have an indisputable, favorable impact on our citizens, including a heightened awareness of and respect for environmental issues (a correlation can be drawn that links higher levels of education and income with greater environmental awareness and respect). These kinds of impacts typically ripple through multiple generations to come, in an ascending spiral that gains momentum as it passes from one generation to the next.

5. The SDEIS does not sufficiently emphasize the value of the recreational facilities that will be created as part of the Narrows Project. The fishing, boating, camping, and general outdoors activities that will be made available for residents of Sanpete, Carbon, Millard and other counties will elevate the land in question from an open, rather unremarkable meadow to an attractive lake that makes the land much more engaging and useful to those who value the outdoors. This, we believe, is an improvement to our environment, not a detriment.

6. The above-referenced (item 5) recreational facilities will have another direct, favorable environmental impact. People in Central Utah and beyond will have to drive shorter distances to access the more developed kinds of camping, fishing, etc. facilities that will be offered by the Narrows. Less driving equates to fewer automobile emissions and reduced fuel consumption.

7. The SDEIS mentions water conservation as an important element of Sanpete's future ability to have sufficient water. For many years Sanpete County has aggressively implemented water conservation infrastructure and techniques which have saved an average of 8,000 acre-feet of water per year so far. We will continue to conserve, and anticipate conserving even more water. Utah State University has recognized Sanpete as a leader in water conservation measures. But conservation alone will never--no matter how effectively done--alleviate our inability to capture water that flows past us, particularly in Northern Sanpete County.

8. The SDEIS mentions various wildlife species. Wildlife is important to us; we are outdoors people by nature. But storing water to enable Sanpete residents to farm and have residential water is vitally important.

9. The SDEIS does not mention the fact that the Utah State Legislature agrees that the Narrows should be built. The Utah House of Representatives passed a resolution (H.C.R. 8) in 2008, and the Utah State Senate passed a resolution (S.R. 2) in 2009, both with very wide margins, supporting construction of the Narrows.

10. As recently as April 29, 2010, (in the public comments meeting held in Price), Carbon County and others voiced the following objections to the Narrows. We offer the following answers, and welcome the opportunity to expand our answers as the NEPA process progresses:

Objection: Building the Narrows will cause a water shortage in Carbon.
Answer: *Carbon's water storage was doubled as part of the overall plan. Sanpete has yet to receive its promised water. It can't be Sanpete's responsibility to give Carbon water we own, or to help Carbon manage its water supply.
*Further, the 5,400 acre-feet of water that will be provided to Sanpete annually (as expressed in the 1984 Compromise Agreement) is based on engineering studies by the State of Utah which determined that 5,400 acre-feet is the amount of water that could be used by Sanpete without creating a negative impact on Carbon.

Objection: Building the Narrows will have a detrimental effect on Carbon's water quality.
Answer: *Thorough mitigation is planned to avoid negative impacts.
*Water quality issues already exist with Scofield. They are not Sanpete's responsibility to solve.
*Planned mitigation is such that the net impact of the Narrows on Carbon's water quality will be neutral.
*Our water quality mitigation was coordinated with and approved by Utah's Department of Environmental Quality.

Objection: PacifiCorp continues to express concern that if the Narrows it built, they may run short of water to run their Carbon power plant every three to four years.
Answer: *Sanpete farmers run out of water every year, not just every three to four years.
*Further, it is not Sanpete's responsibility to provide water to operate PacifiCorp's power plant. If PacfiCorp's water rights are inadequate, it is their responsibility to firm them up.

Objection: Environmental groups have expressed that the Narrows will somehow be bad for the environment.
Answer: *Expensive, and very comprehensive mitigation plans for the Narrows will offset any perceived or real environmental impact.
*Further, a very thorough, independent engineering study (CH2MHill, August 2008) determined that the Narrows (where proposed, as proposed) is the most environmentally-friendly means of storing Sanpete's water.

11. It is often assumed that residents of Carbon County universally and vehemently oppose the Narrows. Contrary to that assumption, there is reason to believe that a significant number of Carbon citizens feel that the Narrows should proceed. We refer to a survey conducted by the Price Sun Advocate newspaper, the week of May 4, 2010. In spite of the above-referenced (item 10 above) and other objections from Carbon County interests, the Sun Advocate's survey revealed that 17% of respondents feel the Narrows should proceed, and 10% don't care (May 11, 2010 Price Sun Advocate, page 4A). While we recognize that it is an informal survey, we feel it reveals a side of Carbon's citizenry that is seldom discussed in connection with the Narrows; i.e. some Carbon citizens favor the Narrows. Those in Carbon who wish to further delay the Narrows apparently don't represent the opinions of all Carbon citizens.

The Sanpete Water Conservancy District encourages Reclamation to:

-approve SWCD's application for an SRPA loan to construct the Narrows Project,
-approve SWCD's use of Reclamation-withdrawn lands for the Narrows Project,
-issue a favorable Record of Decision,
-grant a perpetual easement for the construction, operation and maintenance of the Narrows, and
-encourage USDA Forest Service to favorably proceed with the six items listed on page S-3 of the SDEIS.

Thank you for your considerations regarding this project that is so important to the well-being of Sanpete County.

Respectfully,

Edwin B. Sunderland

Edwin B. Sunderland
Chairman

61. SPRING CANYON IRRIGATION COMPANY, SCOTT DURRANT, PRESIDENT

AL

ORIGINAL

Crookston, Peter L

From: Cindy Durrant [cindy-durrant@hotmail.com]
Sent: Monday, May 31, 2010 4:06 PM
To: PRO NarrowsEIS
Subject: narrows project

To whom it may concern,

61-1 I am the President of the Spring Canyon Irrigation Co. of Fairview,UT. We are greatly concerned that the Narrows project will not pass, and this is very frustrating to us as a irrigation company. Every year we watch our neighbors as well as ourselves trying to raise our alfalfa and other crops and only getting one crop per summer,with no hope of a second or third crop. I wonder how many crops are the Carbon County farmers getting.

We don't understand why Carbon County farmers can get their fair share and Sanpete farmers can't. The articles that we read sounds like it should be very simple, was this not promised to us long ago?

We are all trying to raise families on this side of the mountain too,we NEED this project to happen. I think it would totally change Sanpete County for the good. We feel that the good Lord put this water on this earth to help us with our needs.

Thank you for your support.

Sincerely,
Scott Durrant
President:
Spring Canyon Irrigation Co.
R. R. 1 Box 243
Fairview, UT 84629

1

62. WALES IRRIGATION COMPANY, ROGER REES, PRESIDENT

AL

PRO OFFICIAL FILE COPY

ORIGINAL

Crookston, Peter L

From: Becky Rees [brees@cut.net]
Sent: Tuesday, May 25, 2010 9:51 PM
To: PRO NarrowsEIS
Subject: Narrows Project

Dear Mr. Crookston,

62-1 I am the President of the Wales Irrigation Company, I also serve on the Wales Silver Creek Irrigation Company board and the West Point Irrigation Company. We always run out of water later in the summer, having a steady supply of water thru the summer would be of a great help to our area. I have lived in sanpete all of my life and water has always been our biggest problem. A friend of mine served on the water conservancy board for many years. He worked really hard on getting the Narrows Project to come to pass. There have been many points of view expressed on the project but the bottom line is that it is our water and we need to have a way for it to be delivered to Sanpete County. If we could get the late water from the Narrows Project we could possibly grow a 3rd crop of alfalfa and we could utilize our pastures better because we would have water for our animals.

The people who years ago filed on that water knew how important it would be to our area. I feel that there would be many good benefits come from the Narrows Project. The dam would provide not only the water we need but would boost the local economy through recreation. Municipalities would also benefir from having the water for future growth.

It just seems that if this is our water, anu there seems to be no dispute about that, we should be able to get the water. It's just wrong that Carbon County has been able to use our water all these years and has forced us to spend thousands of dollars to fight for something that should have been done 60 years ago.

If this is our water, I just don't understand why the Narrows Project is being debated at all. It's time to do the right thing and for politicians to stop pandering to Carbon County in hopes to being re-elected. I think it's also a shame that for the price of a postage stamp, environmental groups can stop the work that decent, honest men have spent years working on.

I hope you will be fair in your decision because right is right and wrong is wrong. The right thing to do is to give Sanpete County a way to get the water that is ours.

Sincerely yours,
Roger Rees

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JUN 04 '10

Date	Initials	Code
		100
		105
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	KS	700
6/10/10	BCH	770
		774 cy

Action:
Classification: ENV-6.00
Narrows
Project: 10039701
ID: 1122816

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