

RECLAMATION

Managing Water in the West

Supplement to the Final Environmental Assessment Finding of No Significant Impact

**Stony Gorge Dam
Safety of Dams Modification
Orland Project
Glenn County, California**



**U.S. Department of the Interior
Bureau of Reclamation
Mid-Pacific Region**

February 17, 2006

INTRODUCTION

The purpose of this supplement to the Environmental Assessment (EA) entitled *Stony Gorge Dam Safety of Dams Modification*, dated January 21, 2005, is to add minor construction and operational information not included in the previously approved action.

The changes are:

1. Adaptation of minor modifications of the aggregate specifications to accommodate local suppliers and supplies of cement and aggregate.
2. Addition of a requirement to not exceed a 70°F temperature threshold for concrete mixes and for the mass concrete placement in the 6-foot thick diaphragm wall of the dam. The temperature requirement will be met by using a liquid nitrogen cooling system during the warm months (6 months) of the year. The batch plant and the liquid nitrogen system may be located in one of several possible areas to produce concrete with the cooling system. The liquid nitrogen system may be located near the dam or a contractor may elect to use an on-site batch plant for producing the concrete.
3. Provision of an option for the contractor to request a reservoir drawdown in each year of construction should it be necessary for project completion.

The criteria for coverage under the EA and the alternatives including the preferred alternative remain unchanged under this Supplemental Environmental Assessment (SEA).

PURPOSE AND NEED

The purpose and need for the proposed action are identical to those stated in the EA.

- The purpose of the proposed action is to reduce the probability of Stony Gorge Dam failure and risk to the public in conformance with Bureau of Reclamation guidelines.
- The need for corrective action was identified in an October 2001 Risk Analysis Report and a July 1, 2002, Decision Memorandum. This Decision Memorandum found Stony Gorge Dam has inadequate lateral support of the concrete buttresses to withstand a large seismic event and, therefore, poses an unacceptable risk to downstream residents.

PROPOSED ACTION AND ALTERNATIVES

Proposed Action

The proposed action of the SEA is to add supplemental operational and construction information to the project description in the final EA, which calls for structural modifications at Stony Gorge Dam (installing a diaphragm wall and struts and capitals between the buttresses) to address

inadequate lateral support of the concrete buttresses during a large seismic event. Details of the proposed action are in a subsequent section of this SEA.

The additions to the proposed action are:

1. Description of the sources of cement and aggregate and the minor modification of aggregate specifications to include local supplies.

Two possible methods are available to supply concrete to the job site. One method is to use an existing ready mix plant to produce and deliver the concrete to the site. Cooling of this concrete could be done at either the ready mix plant or on site. The other method for supplying concrete is for the contractor to set up an on-site batch plant.

Concrete is produced by mixing cement with fine aggregate (sand), coarse aggregate (gravel or crushed stone), and water. Cement is the binding agent that holds sand and other aggregates together in a hard, stone-like mass. All these components will be hauled to the construction site, to a nearby batch plant, or to a local ready mix plant where they will be mixed in a kiln or silo. Cement and aggregate can be purchased through local suppliers, most likely near the town of Willows, California. During investigation of trial concrete mixes with local suppliers, it was discovered that local suppliers did not have the size #467 (1½") aggregate as required by the specifications. However, 1½" to 2½" drain rock may be taken and mixed with ¾" aggregate to make the proper gradation needed for the #467.

As an alternative to using a local ready mix plant, the contractor may elect to produce concrete at an on-site batch plant. Temporary batch plant facilities typically consist of silos containing fly ash, lime, and cement; sand and gravel material storage areas; mixing equipment; above-ground storage tanks containing concrete additives and water; and designated areas for sand and gravel truck unloading, concrete truck loading, and concrete truck washout. One possible location for a batch plant is an old abandoned saw mill located across the road from the dam. Approximately 2 acres would be needed to construct the batch plant and related structures. The batch plant may be powered by either on-site electricity, if available, or by diesel-powered generators.

An on-site plant would necessitate portable toilets for the workers. The number of portable toilets would be dependent upon crew size. One toilet per no more than 20 workers is required and one additional toilet is required for each additional 40 workers. It is estimated that no more than one toilet will be required for the crew operating the batch plant and the liquid nitrogen cooling system.

2. The requirement to not exceed a 70°F temperature threshold for the concrete mixing and mass concrete placement in the 6-foot thick diaphragm wall of the dam.

Heat is a by-product of the reaction which occurs when cement in the concrete mix reacts with water to form a strong bond. High curing temperatures can have a detrimental effect on the strength of the concrete because the expansion of concrete during the curing process is greater

with an increasing temperature. Expansion due to high curing temperatures is especially a problem on large concrete placements during warm weather, where the inside portion of the concrete can be 15°-20°F warmer than the exterior portion, which causes the concrete to have less tensile strength or even crack. Because of this problem, concrete is typically cooled prior to placing for those projects with thick mass concrete placements. Concrete can be cooled by various methods such as adding ice to the concrete mix or mechanical chilling; however, these methods would likely not be able to produce enough cooling during the hottest times of the year. The use of liquid nitrogen (LN2) is an ideal choice that allows convenient cooling, low capital, and maintains the proper water/concrete ratio. The temperature requirement, therefore, would be met by using an LN2 cooling system during the warm months (6 months) of the year.

The cooling system can be located at local concrete suppliers where the concrete can be chilled after mixing. The cooling system can also be used on site. Direct injection produces the quickest and most dramatic result. It was discovered that local cement and aggregate suppliers in the Willows area do not have room for a cooling system on their sites; therefore, sites for cooling systems, or a batch plant with a cooling system, need to be found. LN2 will be hauled to the batch plant/cooling system area. One potential site for both a batch plant and a cooling system is the abandoned sawmill across the road from Stony Gorge Dam.

3. Seasonal drawdown of the reservoir at contractor's option.

It is expected that the seasonal drawdowns could occur for up to 3 years (anticipated duration of the contract). If the contractor requests a drawdown, the reservoir can be drawn down from June 15 through September 30, 2006, and the same period the following years. The contractor must submit a request to the Government at least 60 days in advance of the start of the drawdown period date each year, if a drawdown is desired. If a reservoir drawdown is requested, the reservoir will be drawn down to elevation 836.5 feet (838 feet) by the start of the drawdown period, and the gates will be left at elevation 841 feet (842.5 feet). This will allow storage of a June 15 through September 30 25-year, 7-day seasonal flood. The gates will be left at elevation 841 feet (842.5 feet) until November 10 when the gates will be lowered to elevation 831 feet (832.5 feet) for winter operations. Typically, the reservoir is drawn down from 841 feet to

831 feet between July 5 and October 1, and by October 1 the reservoir is at the 831-foot elevation. Reclamation will accommodate the desired water levels for any needed drawdown by using the exchange agreement with the Orland Unit Water Users' Association (OUWUA), which allows for a water exchange between the three reservoirs: East Park Reservoir, Stony Gorge Reservoir, and Black Butte Lake.

Preferred Alternative

The preferred alternative to address the modification of Stony Gorge Dam includes the installation of a diaphragm wall and struts and capitals between buttresses to provide lateral support during seismic loading. The diaphragm wall would be located adjacent to the buttress walkway and would extend to elevation 810.0 feet (original datum). The walls would be located

in the bays between buttresses 17 and 52, including the bays under the spillway, to increase the stability of the structure. The structural analyses used for the final design have incorporated recommendations made by an independent Consultant Review Board. The preferred alternative provides a technically acceptable solution to reduce the risk of dam failure during seismic events, ensures continued structural integrity of the dam under normal operating conditions, and maintains full project benefits at current levels.

No Action Alternative

No structural modifications or operational changes would be made to prevent failure of the dam. As this alternative would not meet the project purpose of implementing a corrective action to develop a sound structure, it was not considered a feasible alternative.

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Physical Resources

The use of a batch plant and cooling system and the option of a reservoir drawdown would not adversely affect unique geological or hydrological features such as wetlands, wild or scenic rivers, refuges, flood plains, rivers placed on the nationwide river inventory, or prime or unique farmlands because construction or operational changes approved under this EA would be restricted to those which use existing facilities and essentially existing operations.

No measurable differences in impacts to the natural environment such as the upland and riparian areas would result from the adoption of alternatives to the proposed action, but adverse effects to public safety could result under the alternatives, particularly the No Action Alternative.

Batch plant: No major impacts are associated with the proposed construction options involving on-site batch plant locations because no physical resources would be permanently damaged. Should a batch plant be required near the construction site, chosen locations would include previously disturbed areas. The location of a batch plant near the construction site would only cause minor changes to the project description in the final EA.

Turbid and high alkaline wastewater, dust emissions, and noise are the key potential impacts associated with concrete batch plants. To avoid any impacts from an on-site batch plant there would be proper control and use of equipment. Materials and waste products from temporary batch plant facilities would be controlled to reduce the discharge of potential pollutants to the storm drain system or watercourses, reduce air emissions, and mitigate noise impacts.

Dust and Sediment

Emission control equipment would be used to collect and suppress dust and sediment caused by the cement, sand, and aggregates as well as by movement of vehicles on dirt roads. Air pollution from concrete batching would be controlled by ensuring that maximum pollution levels are not exceeded. An approved fabric filter incorporating a fabric-cleaning device should be installed in each cement storage silo, along with high-level audible and visual alarms. The use of fly ash (pozzolan) in the cement, which has a lower sulfur and lower carbon content than ash, can reduce overall energy use while increasing concrete strength and reducing the water ratio required.

Air quality should not be impacted if electricity is used to power the batch plant rotary cement kiln and other equipment. However, if diesel generators are used to power the batch plant, then care will be taken to meet emission standards, follow the Airborne Toxic Control Measures for diesel-fueled portable engines that are 50 horsepower and larger, and keep the particulate matter (PM) below PM 10. PM 10 describes liquid and solid air particles less than 10 microns in diameter, which are a major component of air pollution that threatens public health and the environment. By having the batch plant close to the construction site, the number of truck trips are expected to be reduced by 25 percent, thereby reducing air quality concerns, since a larger amount of aggregate and cement can be hauled at one time to the construction site. However, traffic to and from the batch plant would contribute to the local traffic on the county road adjacent to the dam. Overall, traffic would be reduced by having a batch plant on site. The remoteness of this location from major sources of air pollutants should facilitate compliance with air quality standards.

Noise

Diesel generators can also contribute to the overall noise levels. By locating the batch plant away from residential areas, noise should not be a significant issue. Vehicular traffic would contribute to the overall noise level; however, this will be temporary in nature.

Water and Solid Waste Pollution

Potential pollutants in batch plant wastewater and storm water include cement, sand, aggregates, chemical admixtures, lime, fuels, and lubricants. The General Permit specifications for storm water discharge from the State, as well as other Federal, State and local laws and regulations, would be followed for the batch plant/cooling system operation. The batch plant would be properly located away from watercourses, drainage courses, and drain inlets. It would be located at least 300 feet from any recreational area, school, residence, or other structure not associated with the construction project. Continuous interior berms around batch plant equipment would be constructed to ensure proper containment and cleanup of releases. Rollover or flip-top curbs will be placed at ingress and egress points. The site would be designed and constructed such that clean storm water is diverted away from contaminated areas and directed to the storm water discharge system. Direct runoff from the plant would be directed into a sump and pipe to a lined

washout area or dewatering tank. Concrete washout facilities would be constructed and removed in accordance with concrete waste management. Above-ground fuel and chemical additive storage areas must be sealed with an impervious material to contain spills and/or leaks.

The main solid waste generated by batching plants is waste concrete. Waste concrete can be directed to a suitable washout pit where it becomes gravel and sand, which can subsequently be collected and reused, and sludge.

An on-site plant would necessitate portable toilets for the workers. The number of portable toilets would be dependent upon crew size. One toilet per no more than 20 workers is required and one additional toilet is required for each additional 40 workers. It is estimated that no more than 4 workers are expected to run the batch plant, therefore, only one toilet would be provided. This would involve one to two trips per week for maintenance of the toilet.

Cooling system: Some condensate in the air would be caused by the extremely low temperatures involved with LN₂, but that is not a concern. The visible water condensate, which looks like steam, would rapidly dissipate in the hot dry air of the local summers and not cause visibility problems. Likewise, any nitrogen vented into the atmosphere would not be an environmental concern because gaseous nitrogen is inert. Nitrogen gas does not contain any Class I or Class II ozone-depleting chemicals and is not listed as a marine pollutant by DOT 49 CFR. Hence, no adverse ecological effects are expected. However, oxygen concentrations must be monitored in the release area, since nitrogen gas could form an occupational hazard through displacement of oxygen. All cryogenic liquids produce large volumes of gas when they vaporize. One volume of liquid nitrogen will expand to produce 696.5 equivalent volumes of gas.

Reservoir drawdown: No impacts to physical resources are associated with the proposed reservoir drawdown. A reservoir drawdown would closely resemble typical drawdown operations, and no physical resources would be damaged.

Biological Resources

Batch Plant: No negative impacts to upland plants or wildlife are anticipated because no new lands would be disturbed as a result of the proposed changes, and the project description would remain relatively the same.

Similarly, no negative effects are expected to aquatic and riparian species or their habitats as a result of the batch plant as it will not be located near a water body.

Cooling System: No affects on the biota are expected because the LN₂ would be used in an industrial area, and the effects of lowered temperatures or nitrogen releases would be confined to the work site.

Reservoir drawdown: In 1971, Reclamation, the U.S. Army Corps of Engineers, the California Department of Fish and Game, and the OUWUA entered into a memorandum of understanding (MOU) entitled *General Operating Objectives, Stony Creek Reservoirs*. The MOU provides for stable water levels during a 4- to 5-week period when water temperatures reach 60°F (late spring) in Stony Gorge Reservoir (odd years) and Black Butte Lake (even years) for the production of crappie spawning habitat. The guidelines state that when water surface temperatures reach 60°F in the spring, all agencies will endeavor to limit reservoir elevation fluctuations to within plus or minus 2 feet for 4 to 5 weeks. In order to accomplish this, Reclamation conducts a water exchange with the OUWUA to maintain the 2-foot criteria in Black Butte Lake. Under normal operating conditions, Stony Gorge Reservoir elevation in most years remains within the 2-foot criteria and requires minimal manipulation to get through the spawning period. The possible seasonal reservoir drawdown during construction should not affect the MOU as the drawdown would not occur until mid-June, and the crappie spawn is usually over by mid-May. If the drawdown should overlap with the crappie spawning period (in odd years), which is not expected, the MOU may need to be revisited by all the agencies involved to discuss options to meet, adjust, or waive the guidelines for that particular year. In this case, the first year of consideration would be 2007.

With regard to the Stony Gorge Reservoir fishery in general, the seasonal reservoir drawdown is not expected to create an impact because the maximum drawdown level of 836.5 feet is still above the winter drawdown level of 831 feet. No listed fish species occur either in the reservoir or in Stony Creek which runs into and out of the reservoir.

Thus, no difference in effects on threatened or endangered species are expected between the proposed action and the additional construction activities discussed.

Land Use and Recreation

Batch plant and cooling system: The batch plant and cooling system will not cause any lasting impact as the effects of both would be confined to the previously disturbed or cleared area selected for setting up the plant. All structures and equipment would be removed upon completion of the work.

Reservoir drawdown: As mentioned in the final EA, the dam modifications may require short-term changes to the reservoir operations during construction work near the spillway. The dam modifications may also affect the operation of the hydroelectric plant. Timing of power generation may require adjustments to not conflict with the staging and construction. Communication with the OUWUA will be continuous and ongoing throughout the project. Adjacent residential and recreational land uses would not result in long-term adverse impacts.

Under the proposed action and alternatives, the present use of the adjacent lands would be maintained. Although a reservoir drawdown may be perceived as an impact to recreation by visitors who prefer a full reservoir with which to enjoy their activity and moor their boats close to their shoreline campsite, the drawdown will be within the range that normally occurs. While

the distance between the campsite and the moored boat increases with a lower reservoir level, the existing boat ramp at Skipper's Point boat launch is usable above a water level of 818.25 feet, where the boat ramp ends. The maximum drawdown level of 836.5 feet would still be well above the usable water level; therefore, the impact to boaters and campers would not be great. In contrast, visitors who fish often prefer a compacted water body to ease the search for a good catch and may prefer the lower reservoir levels.

Cultural Resources

No negative impacts to cultural resources are anticipated with the proposed changes because activities approved under this SEA would be restricted to those which use existing facilities and essentially existing operations.

No new facilities or construction would occur. No properties listed or eligible to be listed in the National Register of Historical Places would be affected. No Federal, State, local, or Tribal law, or requirements imposed for protection of the environment, would be violated.

Indian Trust Assets

The changes would not affect Indian Trust Assets.

Other Socio-Economic Resources

Health concerns: The use of LN2 presents the possibility of freeze burns as LN2 is a dangerous material. Dangers include:

- Liquid nitrogen can spatter (possibly in eyes) while being poured.
- Flying chunks of frozen objects could cause eye injury.
- Contact with liquid nitrogen can cause tissue damage.
- Gaseous nitrogen by displacing oxygen could be a hazard in a confined space.

Specific safety precautions should include:

- Wearing goggles or safety glasses and face shield and protective clothing whenever pouring or dumping nitrogen and when personnel are inside the safety perimeter and operating the LN2. LN2 can spatter into the eyes, and potentially blinding pieces of frozen objects can fly around when dropped.
- Using low temperature gloves and/or tongs to handle any object going into or out of nitrogen and to carry the nitrogen in a dewar.
- One oxygen monitor per crew inside the safety perimeter would be present.

- The Air Products Nitrogen Material Safety Sheet first aid instructions would be followed for cryogenic freeze burns if needed.

The changes would not affect the public health or safety if the proper precautions are taken with regard to the use of LN₂. The changes would not affect the quality of human environment or involve unresolved conflicts concerning alternative uses of available resources under any of the alternatives because they essentially maintain present conditions. Given the criteria for approval of a proposal under this EA, the proposed action would not increase the amount of water available or the amount of irrigated land within the Sacramento Valley. It would merely facilitate efficient use of the resources already in use. Minor shifts in the location of water use would occur, but they can be accommodated within the complex of three reservoirs in the Stony Creek Watershed and would be too small to noticeably affect regional economics. The benefits would primarily be felt by individual users, not by whole communities.

No action could adversely affect individual water users because they may not be able to meet water deficiencies which may be met under the proposed action.

The changes would be consistent with the Department of the Interior environmental justice guidelines and would not preferentially favor or discriminate against any socio-economic groups under the preferred alternative.

Project Operations

Reclamation has determined that there would be no identifiable impacts to the Central Valley Project or Orland Project operations as a result of the project other than some minor timing of water releases to accommodate the desired water levels. Therefore, no impacts associated with Stony Gorge Dam modification are anticipated as a result of the proposed action under the preferred alternative.

CONSULTATION AND COORDINATION

No consultation under the Endangered Species Act with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service was required for this SEA because Reclamation determined the additional construction and operational changes would not affect any listed species.

Reclamation circulated the draft EA for this proposed action to all appropriate agencies and other parties who had previously expressed interest in the project. No public comments were received. Since the SEA describes minor additional construction actions, no further circulation will be pursued.

Finding of No Significant Impact

**Stony Gorge Dam
Safety of Dams Modification
Orland Project
Glenn County, California**

FONSI No. NC-06-02

BACKGROUND

The proposed action is to add minor construction and operational information not included in the previously approved action for the modification of Stony Gorge Dam, without further National Environmental Policy Act review.

The additional minor construction and operational information includes:

1. The discussion of cement and aggregate sources and the minor modification of aggregate specifications to include local suppliers and supplies.
2. The requirement to not exceed a 70°F temperature threshold for concrete mixes and for the mass concrete placement in the 6-foot thick diaphragm wall of the dam. The temperature requirement will be accomplished by using a liquid nitrogen cooling system during the warm months (6 months) of the year. A batch plant may be located in one of several possible areas to produce concrete with the cooling system.
3. An option for the contractor to request a reservoir drawdown in each year of construction should it be necessary for project completion.

The criteria for coverage under the Environmental Assessment (EA) remain unchanged, and the alternatives, including the preferred alternative, remain unchanged apart from these minor additions under this Supplemental Environmental Assessment (SEA).

The proposed additions to actions addressed in the attached SEA describe additional construction and operation activities, which had previously been approved under an EA entitled *Stony Gorge Dam Safety of Dams Modification*, dated January 21, 2005. The proposed additions will differ from those described in the EA only in the details of the activities needed to safely modify Stony Gorge Dam. The described activities are authorized by the Bureau of Reclamation's Dam Safety Program.

FINDINGS

This Finding of No Significant Impact is based on the following:

1. Water resources: Modification of Stony Gorge Dam will not change the current water management program. There will be no effect on surface water supplies or quality. The potential drawdowns of the reservoir can be accommodated within the summer operations of the three reservoirs in the Stony Creek Drainage.
2. Land use: Modification of Stony Gorge Dam will have no effect on land uses. The potential installation of a concrete batch plant near the site and the use of liquid nitrogen will not cause environmental damage, and the occupation risks associated with liquid nitrogen are well known, as this is an established technology.
3. Biological resources: There will be no significant effect on or changes to land or water use or on biological resources.
4. Threatened and endangered species: No species listed as threatened or endangered and no critical habitats occur within the proposed action area. Therefore, the proposed action will not adversely affect listed species or critical habitat.
5. Cultural resources: The criteria for State Historic Preservation Office approval of described changes will prevent adverse effects on cultural resources and unique geologic features.
6. Recreation resources: The proposed action will not cause significant or permanent changes to the season of use, historical recreation uses, or visitor use numbers associated with the reservoir.
7. Demographics and environmental justice: The proposed action will not cause changes in population and the various indicators of social well-being. The proposed action will support current local lifestyles and, therefore, will not cause changes to employment of minority and low income populations.
8. Indian Trust Assets: There will be no effect to Indian Trust Assets because existing rights will not be affected, no physical changes to existing facilities are proposed, and no new facilities are proposed.
9. Economic resources: Modification of Stony Gorge Dam will not cause any economic impacts, except for some short-term benefits during the construction period.

Information about the EA prepared for the proposed action or this FONSI may be obtained from Basia Trout, Bureau of Reclamation, at telephone number 530-528-0512.