SAN FRANCISCO
PLANNING DEPARTMENT

Addendum to Environmental Impact Report

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Addendum Date:	July 22, 2013
Case No.:	**2005.0161E**
Project Title:	Calaveras Dam Replacement Project
EIR:	2005.0161E, certified January 27, 2011
Project Sponsor:	San Francisco Public Utilities Commission
Lead Agency:	San Francisco Planning Department
Staff Contact:	Chris Kern – (415) 575-9037 chris.kern@sfgov.org

REMARKS

Background

The San Francisco Planning Commission certified a final environmental impact report (EIR) for the subject project, file number 2005.0161E, on January 27, 2011. The project analyzed in the EIR is the replacement of the Calaveras Dam to improve the seismic safety of the dam and to modify both existing facilities and future operations of the reservoir to enhance fish and wildlife habitat. The EIR also analyzed a project variant that included additional habitat enhancements for fish, refinements to various facility and construction components of the project, and related operational modifications. Following certification of the EIR, the San Francisco Public Utilities Commission (SFPUC) on January 27, 2011 and the San Francisco Board of Supervisors, on March 16, 2011, approved the project variant as the final adopted project.[1] The SFPUC has awarded contract(s) for the adopted project and construction began in August 2011. The San Francisco Planning Department subsequently issued an addendum to the EIR, dated December 13, 2012, to incorporate modifications to the project to address geotechnical hazards related to a previously unknown landslide feature in the left dam abutment for the new dam.

Calaveras Dam and Reservoir are part of the regional water system owned and operated by the City and County of San Francisco, through the SFPUC. Calaveras Dam is located on Calaveras Creek in the Diablo Mountain Range in Alameda County, California, approximately 12 miles south of the City of Pleasanton and 7.5 miles east of the City of Fremont. Calaveras Dam forms Calaveras Reservoir, which is situated on the border between Alameda and Santa Clara Counties.

The SFPUC initiated studies in 1998 to evaluate the structural stability and performance of the dam during projected large earthquakes. The studies indicated that the dam does not meet current safety standards for large earthquakes. Beginning in the winter of 2001, the SFPUC lowered water levels in the reservoir in response to safety concerns about the

[1] The final approved project – described in the EIR as the Calaveras Dam Replacement Project (CDRP) Variant – is referenced in this addendum as the "adopted project."

seismic stability of the dam. A mandate from the California Department of Water Resources, Division of Safety of Dams (DSOD) directed the SFPUC to undertake necessary seismic improvements to the dam and lower the reservoir water level to a maximum of 705 feet[2] until these improvements are completed. The elevation of the lowered water level corresponds to about 38,100 acre-feet (AF) of storage, which is approximately 60 percent less than the pre-DSOD restricted total water storage volume.[3]

With the DSOD-restricted maximum elevation of 705 feet (approximately 38,100 AF) and a previous California Department of Fish and Wildlife (CDFW) established minimum lake level elevation of 690 feet (approximately 25,700 AF), usable storage[4] at present is limited to 12,400 AF (4 billion gallons), a reduction of more than 75 percent from the 96,850 AF pre-DSOD restricted storage capacity. At this reduced volume, Calaveras Reservoir's current usable storage capacity cannot meet the SFPUC's delivery reliability objective for the Sunol Region reservoirs of up to 60 consecutive days of supply. Overall system operational flexibility and reliability have also been reduced. Replacing Calaveras Dam would allow the reservoir storage to be restored to its pre-DSOD restricted capacity of 96,850 AF, and previous level of delivery reliability. Following approximately six years of engineering studies, the SFPUC determined that the best solution to address the seismic issue was construction of a new dam to replace the existing Calaveras Dam. Construction of the replacement dam is underway immediately downstream at the foot of the existing dam, and will respond to DSOD requirements to improve seismic safety. Following construction, SFPUC will be able to fill the reservoir to a normal maximum of 756 feet and its former volume of about 96,850 AF. This will restore the previously existing yield and reliability of the SFPUC local system and provide water supply during droughts.

PROPOSED PROJECT MODIFICATIONS

As further detailed below, the project modifications proposed by the SFPUC and addressed in this addendum are to place approximately 390,000 cubic yards (CY) of fill containing naturally occurring asbestos (NOA) and associated metals at Disposal Sites F and I below elevation 756 feet within the future inundation zone of the reservoir, and to relocate the hard rock previously planned to protect the toe of the fill at Disposal Site 3 to the face of the fill at Disposal Site I.

[2] All elevations of the reservoir for this report are identified in feet above the NGVD 1929 Datum.

[3] Total storage is the total volume of water that is stored behind the dam. The pre-DSOD restriction total storage of Calaveras Reservoir was 96,850 acre-feet. Thus, the total storage of the reservoir has been reduced by almost 60 percent.

[4] Useable storage is the volume of water between the water surface and the deadpool or other lower limit such as the CDFW minimum lake level elevation. The pre-DSOD restriction useable storage of Calaveras Reservoir was 96,850 AF minus the volume that CDFW requires to be maintained (approximately 30,000 AF). Thus, the normal useable storage was approximately 68,850 AF. After the DSOD restriction, the useable storage was reduced to 12,400 AF, a reduction of approximately 75 percent.

Excavation during construction has revealed that some of the rock from Borrow Area B, the stilling basin cut, and other excavation locations that was expected to provide suitable rockfill for the upstream shell of the dam is too highly fractured and pulverized to produce the free draining characteristics required for this zone of the dam and cannot be used for dam construction as originally planned. Two of the rock unit types of the excavated material, greenstone and blueschist, contain NOA and metals. As a result, this approximately 390,000 CY of NOA and metal containing materials that cannot be used for construction of the new dam must be disposed.

The SFPUC has evaluated the available disposal sites and determined that the only feasible option is to dispose of this material at Disposal Sites F and I. As shown in Appendix A of this addendum, placement of this material at the other disposal sites is infeasible because of lack of capacity, timing of availability, or physical constraints that preclude the required capping of NOA-containing materials.

Placement of this material at Disposal Sites F and I would result in approximately 390,000 CY of NOA and metal containing fill materials below the 756-foot future inundation area of the restored reservoir. The SFPUC would place the NOA-containing materials in areas of the disposal sites that are dry during construction and would cap the NOA-containing materials below a 10-foot thick layer of Temblor Sandstone. Placing the materials at these disposal sites would be a modification from the adopted project, which specified that with the exception of rockfill from the upstream side of the existing dam and the toes of the disposal sites, excavated materials that may potentially contain NOA would only be placed in the disposal sites at or above Elevation 760 feet, a minimum of 4 feet above the future inundation area of the restored reservoir.

Disposal Sites F and I are sufficiently sized to accommodate this material such that there would be no change in their location or area. The additional rockfill that would be needed for dam construction to replace the unsuitable material would come from the previously allocated 530,000 CY of reserve material at Borrow Area B, as identified in the EIR. Thus, there the proposed project modifications would not require the expansion of an existing or creation of a new borrow area beyond those described in the EIR for the adopted project. As a result, the proposed modification would not change the project work area or the total volume of materials to be excavated, handled and disposed. Therefore, the proposed modifications would not result in changes to the construction methods or activities, equipment, number of workers, or the duration of construction.

Additionally, the SFPUC proposes to relocate the hard rock previously planned to protect the toe of the fill at Disposal Site 3, as described in the EIR, to the face of the fill at Disposal Site I due to the modified configuration of the disposal areas as described in the previous addendum to the EIR issued on December 13, 2012 (see below). The same hard rock material would be used.

PREVIOUS PROJECT MODIFICATIONS

On December 13, 2012, the San Francisco Planning Department, in its capacity as the CEQA lead agency, issued an addendum to the EIR documenting that project modifications proposed by the SFPUC to abate geotechnical hazards related to a previously unknown landslide feature in the left dam abutment for the new dam would not result in any new significant impacts beyond those identified in the EIR or substantially increase the severity of a significant impact, and that no new mitigation measures would be required.[5] The project modifications described in the December 12, 2012 addendum increased the total volume of materials required to be excavated, handled and disposed for the project associated with construction of the left dam abutment and spillway to 9.57 million cubic yards; increased the project footprint by 29.1 acres due to use of five new disposal sites (Disposal Sites A/D, F, G, H, and I); and increased the duration of construction from 4 to 7 years.

In addition, the SFPUC has proposed various minor refinements during the course of project construction. The San Francisco Planning Department reviewed each of these project modifications, concurred that they were minor, and determined that the project as modified would not deviate from the adopted project such that it would result in any new significant impacts beyond those identified in the EIR or substantially increase the severity of a significant impact, and that no new mitigation measures would be required. **Table 1** summarizes the minor project modification (MPMs) that the Planning Department has reviewed for the project. The full text of the recent MPM 24 is included in Appendix B of this addendum.

Table 1: Minor Project Modifications

MPM Number	Approval Date	Description
1	05/17/11	In accordance with air quality mitigation provided in EIR, install 12 air monitoring stations in the project vicinity
2	06/02/11	Relocate two air quality monitoring stations addressed previously in MPM 1
3 *	07/11/11	Delay implementation of California Tiger Salamander mitigation to the 2011-2012 rainy season
4 *	10/19/11	Expand the limits of construction for Disposal Site 3 temporary bypass pipe and rock dike
5	10/26/11	Extend construction hours to 24 hours during 3 month site preparation at Disposal Site 3
6	N/A	Note: MPM was initiated but due to design changes, was not implemented
7 *	12/7/11	Increase the construction limits to provide additional work area at the right abutment and to provide improvements to the existing boat ramp access road

[5] Addendum to Environmental Impact Report, Calaveras Dam Replacement Project, Case No, 2005.0161E, San Francisco Planning Department, December 13, 2012.

8	12/6/11	Install two survey monuments outside the construction limits
9	2/21/12	Place construction staff trailer in existing parking area and excavate an approximately 960-foot long trench (12 inches deep by 8 inches wide) to provide power from an existing power pole
10 *	2/8/12	Widen road to maintain two-way traffic while providing additional area for a wheel-wash area, required for health and safety (asbestos dust mitigation)
11 *	2/8/12	Expand the haul route to Disposal Site 7 for approximately 1 mile resulting in additional habitat impacts subject to compensatory mitigation provided in the EIR
12 *	2/8/12	Expand the construction work area at Borrow Area B resulting in additional habitat impacts subject to compensatory mitigation provided in the EIR
13	3/28/12	Use two Tier 2 diesel engine Dozers (D11) that do not have the California Air Resources Board (CARB) Level 3 Diesel Emission Control Strategies
14 *	4/4/12	Modify Staging Area 6 to provide access to construction personal vehicles without having to traverse areas within the project that may contain naturally occurring asbestos
15 *	5/15/12	Modify construction method to replace use of a barge with land based approach at ADIT#2 and use of a platform extending from the shoreline at ADIT#1 due to low water levels
16 *	5/22/12	Expand Disposal Site 3 to correct a grading/ponding issue and reduce construction footprint by equivalent amount at Staging Area 3 resulting in no net change in habitat impact
17	6/17/12	Realign a portion of the west haul route to address a perceived safety issue
18 *	6/25/12	Modify the slope of the left dam abutment excavation to 2:1 (included in description of proposed project modifications addressed in this addendum)
19 *	7/11/12	Develop new Disposal Site 10 with a capacity of approximately 2 million cubic yards for the additional excavation required at the left bank of the new dam (included in description of proposed project modifications addressed in this addendum)
20 *	7/16/12	Increase capacity of Disposal Site 2 located behind the new dam and below the inundation level from 900,000 to 1.3 million cubic yards (included in description of project modifications addressed in this addendum)
21	7/30/12	Install 2 temporary geologic slope monitoring stations located outside of the approved work area, each occupying about 16 square feet of surface area and extending about 30 inches above grade and 3 feet below grade
22	11/5/12	Improve existing boat ramp
23 *	11/5/12	Restore berm at existing cattle pond that serves as relocation area for California tiger salamander as requested by CDFG with USFWS concurrence
24	3/26/13	Use a Tier 2 diesel engine 5130 excavator that does not have the California Air Resources Board (CARB) Level 3 Diesel Emission Control Strategies

*Planning Department approval was subject to concurrent approval from the applicable state and federal agencies, including DSOD, CDFW, RWQCB, USFWS, and/or USACE

APPROVALS REQUIRED

The California Department of Fish and Wildlife, Regional Water Quality Control Board, and U.S. Army Corps of Engineers have approved the proposed project modifications described in this addendum. No other approvals are required for the proposed project modifications.

ANALYSIS OF ENVIRONMENTAL EFFECTS

Section 31.19(c)(1) of the San Francisco Administrative Code states that a modified project must be reevaluated and that, "If, on the basis of such reevaluation, the Environmental Review Officer determines, based on the requirements of CEQA, that no additional environmental review is necessary, this determination and the reasons therefore shall be noted in writing in the case record, and no further evaluation shall be required by this Chapter."

California Environmental Quality Act (CEQA) Guidelines Section 15164 provides for the use of an addendum to document the basis for a lead agency's decision not to require a subsequent EIR for a project that is already adequately covered in a previously certified EIR. The lead agency's decision to use an addendum must be supported by substantial evidence that the conditions that would trigger the preparation of a Subsequent EIR, as provided in CEQA Guidelines Section 15162, are not present.

Based upon the review and analysis of the modified project described in this addendum, the modified project does not entail any substantial changes that would require major revisions to the EIR, nor would new significant environmental effects or a substantial increase in the severity of previously identified significant effects occur. Since certification, other than as explained and discussed in this addendum and the December 13, 2012 addendum, no changes have occurred in the project or in the circumstances under which the adopted project would be undertaken, and no new information has emerged that would materially change any of the analyses or conclusions of the EIR. Therefore, no additional environmental review is necessary beyond this addendum.

ENVIRONMENTAL EFFECTS OF THE MODIFIED PROJECT

This section presents results of the analysis of the modified project, which is based on the same significance criteria and the same setting information presented in the EIR. This section also demonstrates why the impact analysis of the modified project does not require major revisions to the EIR.

The proposed modification to place the hard rock along the face of the fill at Disposal Site I for erosion protection instead of at Disposal Site 3 due to the reconfiguration of these sites in the previous addendum would not constitute a substantial change from the adopted project because the same rock would be used at the same location relative to the future water inundation zone (i.e., at the edge of the water line). The conclusions reached in the EIR for

the adopted project would therefore remain the same for the modified project for impacts related to this project component and as such, this modification is not further discussed in this addendum.

This addendum focusses on whether potential impacts resulting from the proposed disposal of NOA-containing fill materials within the future inundation zone of the reservoir would alter the conclusions reached in the EIR for impacts associated with the disposal of NOA-containing fill materials. Impacts related to the disposal of NOA-containing fill materials are addressed in the EIR under the following resource topics: Fisheries and Aquatic Habitat; Water Quality; and Hazards and Hazardous Materials. This addendum therefore evaluates potential effects related to changes in the disposal of NOA-containing materials under the proposed project modifications under each of these resource topics.

Similar to the adopted project and for the same reasons, the modified project would not cause impacts related to Wind and Shadow, or Population and Housing, and these topics are not discussed further in this addendum. Additionally, the conclusions reached in the EIR for the adopted project would remain the same for the modified project for impacts related to Plans and Policies and the resource topic areas of: Land Use, Agricultural Resources, and Recreation; Vegetation and Wildlife; Hydrology; Geology, Soils, and Seismicity; Cultural Resources; Visual Resources; Transportation and Circulation; Air Quality; Noise and Vibration; Mineral and Energy Resources; and Utilities, Service Systems, and Public Services because there are no impacts associated with the disposal of NOA-containing fill under these topics. Moreover, the proposed project modifications would not change the location of work where impacts would occur; the overall construction approach including total volume of material to be excavated, handled, and disposed or the construction workforce, the construction schedule, or operation of the completed project. As such, these topics are not discussed further in this addendum.

As shown below, in all cases, the modified project would result in determinations of the same impacts in comparison to the adopted project. The modified project would not result in any new significant effects beyond those identified in the EIR or substantially increase the severity of a significant impact, and no new mitigation measures would be required.

FISHERIES AND AQUATIC HABITAT

The fisheries and aquatic habitat setting for the modified project is the same as the study area described in the EIR for the adopted project. As described below, the proposed modifications to the project would not result in any new significant effects on fish or aquatic habitat beyond those identified for the adopted project or a substantial increase in the severity of a significant impact, and no new mitigation measures would be required.

Impact 4.5.4: Temporary effects on fisheries resources related to increases in sediments and turbidity and release of and exposure to contaminants

The EIR determined that construction of the adopted project could temporarily degrade water quality and reduce or adversely affect fish habitat and populations in localized areas

due to construction-related sediment discharges and increased turbidity or other contamination, including resident rainbow trout and other native and non-native species in the reservoir. As described in the EIR and the December 13, 2012 addendum, the project includes excavation, handling, and disposal of a total of 4 million cubic yards of NOA-containing material. Under the proposed project modifications, 390,000 CY of this material would be placed at Disposal Sites F and I rather than used for dam construction as previously proposed. Material to be excavated from the reserve at Borrow Area B would be used to replace this material in the dam construction. Therefore, temporary construction-related effects of the modified project on fisheries resources would remain the same as the adopted project because the proposed modifications would not change the overall amount of material to be excavated and handled from which construction-related runoff of sediments, turbidity, and other contaminants to surface waters could be generated and degrade fish habitat. As with the adopted project, Mitigation Measure 5.7.1 (Stormwater Pollution Prevention Plan) would also be implemented to minimize sediment and contaminants in stormwater runoff to receiving waters during handling and placement of the NOA-containing fill at Disposal Sites F and I to a less than significant level.

Under the proposed project modifications, the SFPUC would place approximately 390,000 CY of fill material containing NOA and associated metals below the future inundation level of the restored reservoir. As further discussed under Water Quality Impact 4.7.4 below, this proposed modification would not expose fish or other sensitive aquatic species to NOA or metals due to release of these contaminants to surface waters because the disposal sites would be capped with 10 feet of Temblor Sandstone rock. Thus, the modified project would not result in any new significant effects on fisheries beyond those identified in the EIR for the adopted project or substantially increase the severity of a significant impact, and no new mitigation measures would be required.

WATER QUALITY

Existing water quality conditions for the modified project are the same as described in the EIR for the adopted project. As discussed below, implementation of the modified project would not result in any new significant effects on water quality beyond those identified in the EIR or an increase in the severity of a significant impact, and no new mitigation measures would be required.

Impact 4.7.2: Impact on water bodies as a result of a hazardous materials release, naturally occurring asbestos or metals release, or solid waste discharge during construction

The EIR determined that the adopted project could result in detrimental impacts on water quality due to releases of hazardous materials or discharges of other contaminants during construction, such as from leaking construction equipment, or erosion of soils containing NOA and metals that could be carried to waterways in stormwater runoff. Impacts of the modified project on water quality would remain the same as the adopted project because, as noted above, the proposed modifications would not change the overall

amount of material to be excavated and handled from which contaminated construction-related runoff could be generated and degrade water quality or the type and amount of equipment that could leak hazardous materials and degrade water quality. As with the adopted project, Mitigation Measure 5.7.1 (Stormwater Pollution Prevention Plan) would also be implemented to minimize sediment and contaminants in stormwater runoff to receiving waters during handling and placement of the NOA-containing fill at Disposal Sites F and I to a less than significant level. Thus, the modified project would not result in any new significant effects on water quality related to the excavation and handling of NOA-containing fill beyond those identified in the EIR for the adopted project or substantially increase the severity of a significant impact, and no new mitigation measures would be required.

Impact 4.7.4: Impact on reservoir water quality during and following inundation due to contact with borrow materials containing NOA, metals, or contaminants

The EIR determined that the adopted project could have a significant impact on reservoir water quality due to contact with borrow materials containing NOA, metals, or other contaminants once inundated. As descried in the EIR for the adopted project, excavated fill containing NOA and metals would be placed in the disposal sites at or above elevation 760 feet (4 feet above the proposed normal maximum reservoir surface elevation of 756 feet) to prevent contact with the reservoir surface water. The adopted project further specified that all NOA-containing material at the disposal sites would be capped by 4 feet of Temblor Sandstone. By disposing 390,000 CY of fill containing NOA and metals at Disposal Sites F and I below elevation 756 feet within the future reservoir water inundation zone, the modified project could affect reservoir water quality through the release of NOA and metals following inundation.

As described above, the NOA-containing fill would be placed in areas of Disposal Sites F and I that are dry such that there would be no exposure of NOA or metals to reservoir water during construction. NOA-containing fill placed at Disposal Sites F and I would be capped with a 10-foot thick layer of Temblor Sandstone, which would prevent the release of asbestos fibers and metals to the reservoir after inundation. Temblor Sandstone material contains a large percentage of fine silt and clay particles that, when compacted, has a very low porosity and low permeability that would essentially trap asbestos and metals in this layer (see Appendix A). As described in the EIR, this method of encapsulation to prevent direct exposure to the reservoir water would prevent the discharge of NOA and associated metals to the reservoir. Moreover, as described in the EIR for the adopted project, any NOA or metals present in the reservoir water would be removed at the Sunol Valley Water Treatment Plant to drinking water standards.

For these reasons, the modified project would not result in any new significant effects on reservoir water quality due to the disposal of NOA-containing fill below the future inundation level of the reservoir beyond those identified in the EIR for the adopted project or substantially increase the severity of a significant impact, and no new mitigation measures would be required.

Impact 4.7.7: Changes in groundwater quality related to construction and operations

The EIR determined that operations of the adopted project would not substantially affect groundwater quality, but that construction-related runoff and associated sediment and contaminants to surface waters could degrade groundwater quality if these constituents infiltrated into the groundwater. Temporary effects of the modified project on groundwater quality would remain the same as the adopted project because the proposed modifications would not change the overall amount or type of material to be excavated and handled from which construction-related runoff of sediments, contaminants, NOA, and metals to surface waters could be generated and degrade groundwater quality. As with the adopted project, the potential for a significant impact under the modified project would also be reduced to a less-than-significant level with implementation of Mitigation Measure 5.7.1 (Storm Water Pollution Prevention Plan), which contains best management practices (BMPs) to reduce effects on groundwater quality during construction. Therefore, the modified project would not result in any new significant effects on groundwater quality beyond those identified in the EIR or a substantial increase in the severity of a significant impact, and no new mitigation measures would be required.

HAZARDS AND HAZARDOUS MATERIALS

Existing hazards and hazardous materials conditions for the modified project are the same as described in the EIR for the adopted project. As discussed below, implementation of the modified project would not result in any new significant effects related to hazards and hazardous materials beyond those identified for the adopted project or an increase in the severity of a significant impact, and no new mitigation measures would be required.

Impact 4.9.2: Release of airborne NOA and naturally occurring metals from excavation, hauling, blasting, tunneling, placement, and on-site disposal of Franciscan Complex or serpentinite mélange

The EIR determined that construction activities in areas containing NOA and metals could create a significant hazard to the public, construction personnel and SFPUC employees. The potential release of airborne NOA and naturally occurring metals during construction of the modified project would remain the same as the adopted project because the proposed modifications would not change the amount of NOA-containing material to be excavated, handled, and disposed. These hazards are addressed in the EIR under Mitigation Measures 5.9.2a (Asbestos Dust Mitigation Plan and Comprehensive Air Monitoring Program), 5.9.2b (Construction Worker Protection), and 5.9.2c (Watershed Keeper's Residence), which require enhanced monitoring and protective measures in addition to compliance with all applicable Bay Area Air Quality Management District and Cal-OSHA regulatory requirements. These mitigation measures and regulatory requirements would reduce any potential hazards related to the excavation, handling, and disposal of this additional NOA-containing material under the modified project to a less-than-significant level.

Because the modified project would be subject to the same mitigation measures and regulatory requirements as the adopted project, implementation would not result in any new

significant effects related to the release of airborne NOA or naturally occurring metals beyond those identified in the EIR or a substantial increase in the severity of a significant impact, and no new mitigation measures would be required.

OTHER ENVIRONMENTAL TOPICS

As discussed above, the modified project would not result in any new or substantially more severe impacts. As such, the modified project also would not result in a cumulatively considerable contribution to cumulative environmental effects with other past, present, and reasonably foreseeable projects, beyond what was already identified for the adopted project.

CONCLUSION

Based on the foregoing, it is concluded that the analyses conducted and the conclusions reached in the Final EIR certified on January 27, 2011 remain valid. The proposed modifications to the project will not cause new significant impacts not identified in the EIR, and no new mitigation measures will be necessary to reduce significant impacts. Other than as described in this addendum, no project changes have occurred, and no changes have occurred with respect to circumstances surrounding the proposed project that will cause significant environmental impacts to which the project will contribute considerably, and no new information has become available that shows that the project will cause significant environmental impacts. Therefore, no supplemental environmental review is required beyond this addendum.

Date of Determination:

July 22, 2013

I do hereby certify that the above determination has been made pursuant to State and Local requirements.

Sarah B. Jones
Acting Environmental Review Officer

cc: SFPUC

Bulletin Board / Master Decision File

Distribution List

APPENDIX A

FILL DISPOSAL FEASIBILITY ANALYSIS

San Francisco Water Power Sewer
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MEMORANDUM

DATE: June 21, 2013

TO: Kerry O'Neill, SFPUC BEM, ECCM

FROM: Bradley Erskine, NOA Compliance Manager

RE: **Memorandum on the Placement of NOA-Containing Materials within Calaveras Reservoir below the 756 foot elevation at Calaveras Dam Replacement Project (CDRP)**

The purpose of this Technical Memorandum is to demonstrate that placement of NOA-containing materials within Disposal Sites F and I at Calaveras Reservoir below the 756' restored reservoir level will meet water quality objectives contained in the Water Quality Control Plan (Basin Plan) for the San Francisco Bay and is the preferred disposal alternative as long as the material is capped sufficiently to prevent erosion from contact to the reservoir surface.

Several rock units in Borrow Area B and within the stilling basin cut are desired for rockfill placement in the upstream shell of the dam. Two of these units, called greenstone and blueschist, are NOA-bearing units. It was anticipated that these materials would be suitable for use in the dam. However, it turns out that much of these rocks in the stilling basin cut are highly fractured and pulverized. The resulting is a material that, while meeting the specified gradation, it is not producing a rockfill shell that has the free draining characteristics that are intended for this zone. Because the material does not meet this requirement, it cannot be placed in the upstream shell of the dam foundation as designed. Therefore, an additional and unanticipated quantity of greenstone, blue schist, and other potentially NOA-containing materials associated with the Franciscan Mélange formation will require disposal at an alternate disposal location.

HETCH HETCHY
WATER SYSTEM
IMPROVEMENT
PROGRAM

Background Information

In the *Request to Amend the Waste Discharge Requirements and Water Quality Certification for the Calaveras Dam Replacement Project, Order No. R2-2011-0013* dated November 12, 2012, the SFPUC stated:

> *"Materials potentially containing NOA would not be placed in Disposal Site F or I."*

This statement was included to ensure compliance with the Final Environmental Impact Report (FEIR) that states (Volume I, Project Description, page3-45):

> *"**With the exception of rockfill from the upstream side of the existing dam and the toes of the disposal sites**, excavated materials that may potentially contain NOA would be placed in the disposal sites at or above Elevation 760 feet (4 feet above the proposed normal maximum reservoir surface elevation of 756 feet) to **prevent NOA from coming into contact with the reservoir surface water**… At those disposal sites where excavated material containing NOA has been placed, 4 feet of Temblor Sandstone would be used to cover the NOA-containing material." **[Emphasis Added]***

The FEIR also states (Volume 2, Water Quality-Impacts, page 4.7-49):

> *"The Basin Plan establishes a municipal supply water quality objective of 7 million fibers per liter of water for asbestos, as well as establishing municipal supply water quality objectives for numerous metals and other water quality parameters (RWQCB 2006, Table 3-5)."*[1]

The FEIR also states (Volume 2, page 4.7-50):

> *"As a result of construction activities, NOA and metals could be deposited by air or water in Calaveras Reservoir and subsequently transported to the SVWTP via Calaveras pipeline where treatment would remove them or reduce them to required Drinking Water Act standards, and therefore the potential impact would be less than significant."*

The above references imply that the concern is whether NOA bearing materials, "*With the exception of rockfill from the upstream side of the existing dam and the toes of the disposal sites*", could be in direct contact with the surface water in the reservoir. If NOA bearing materials came in contact with surface waters, there is the potential that asbestos and metals might be discharged to the reservoir by wave erosion at the water/landfill interface when the water level is less than 756 feet in elevation.

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[1] RWQCB 2006 – San Francisco Bay Regional Water Quality Control Board (RWQCB). 2006. *Water Quality Control Plan (Basin Plan) for the San Francisco Bay.* Latest version effective as of December 22, 2006. San Francisco Bay Regional Water Quality Control Board website: http://www.waterboards.ca.gov/sanfranciscobay/basinplan.htm. Accessed February 14, 2007.

[2] *Bales, R.C., Newkirk, D.D., and Hayward, S.B.,: Chrysotile Asbestos in California Surface Waters: From Upstream Rivers Through Water Treatment. J. American Water Works Association, v. 76, no. 5. May 1984.*

Naturally Occurring Asbestos in the Calaveras Reservoir

NOA is a ubiquitous component of lakes and reservoirs in northern California. For example, a study of asbestos in California surface waters indicates that concentrations range from 100 million fibers per liter (MFL) to 1,000,000 MFL in waters from the western slope of the Sierra Nevada foothills[2]. The asbestos is derived primarily by surface water runoff that transports asbestos derived from weathered serpentinitic rocks.

Asbestos is also present in the Calaveras Reservoir. Two samples collected from reservoir water indicate that the total asbestos concentration is 200 MFL. The primary source of asbestos is probably transport from Franciscan Complex mélange soil, most notably down Arroyo Hondo on the east side of the reservoir. Therefore, asbestos concentration in Calaveras Reservoir is relatively low compared to other waters located in or downstream of serpentinitic rocks.

Potential Impacts to Water Quality

Discharge of asbestos is of concern because of the health risk due to ingestion. Because long fibers could penetrate the stomach mucous layer, the EPA Maximum Contaminant Level (MCL) for asbestos in drinking water established at 7 MFL is based on fibers greater than 10 microns. The concentration of long asbestos fibers (>10 microns) measured in the two Calaveras water samples indicate that levels are below 2.2 MFL, well below the drinking water standard. Although the Calaveras reservoir could accept large quantities of long fibers and not exceed the asbestos MCL, it is of interest to public safety that the addition of long asbestos fibers to the Calaveras Reservoir be prevented. If not engineered properly, disposal of NOA material below the 756 elevation mark could potentially increase the long fiber content during periods of erosion. While trying to minimize the quantities of the long asbestos fiber, these materials, if any being deposited in the Calaveras Reservoir, will subsequently be removed or reduced *to* the required Drinking Water Act standards at the Sunol Valley Water Treatment Plant (FEIR Volume 2, page 4.7-50).

Analysis of Disposal Sites

SFPUC has reviewed feasibility for disposal of this material in the project disposal sites (see Attachment A) and below is a summary:

> **Disposal Site 2** – This disposal site is not a feasible alternative for disposal of this material. The disposal site is not available until 2015 due to the construction sequence of the new dam, as the disposal site overlies the toe of the new dam's upstream shell.
>
> **Disposal Site 3** – This disposal site is not a feasible alternative for disposal of this material. Disposal Site 3 is at capacity; therefore it is not available for additional materials.

Disposal Site 5 – This disposal site is not a feasible alternative for disposal of this material. Disposal Site 5 is not available until 2015. The dam embankment must be fully excavated and cleared prior to receiving the clay core material. The clay core material will be excavated from Borrow Area E which will leave a hole that eventually becomes Disposal Site 5.

Disposal Site 7 – This disposal site is not a feasible alternative for disposal of this material. Disposal Site 7 is not available for disposal of these materials as the haul road cannot be built to the site until Disposal Site F is completed in 2015. The haul road to Disposal Site 7 will be built on top of Disposal Site F.

Disposal Site A/D – This disposal site is not a feasible alternative for disposal of this material. Disposal Site A/D are at capacity; therefore they are not available for additional materials.

Disposal Site G – This disposal site is not a feasible alternative for disposal of this material. Disposal Site G is not available for disposal of these materials as the haul road cannot be built to the site until Disposal Site F is completed in 2015. The haul road to Disposal Site G will be built on top of Disposal Site F. Additionally, filling of DS-G will commence after filling of DS-7 is completed.

Disposal Site H – This disposal site is not a feasible alternative for disposal of this material. Disposal Site H is not available for disposal of NOA materials. The limits of the thickness of materials placed in Disposal Site H preclude the construction of a three foot cap of non-NOA materials as required for upland disposal of NOA.

Prevention of Asbestos Migration into the Reservoir

The migration from NOA containing materials disposed at Disposal Site F and I below the 760' water line will be mitigated by capping the material with Temblor formation sands or other NOA-free materials. The proposed design of Disposal Site F and I specifies an outer 10 foot cap of Temblor formation sand (see Attachment B-Disposal Site F and I) to prevent release of fibers. This outer shell would filter long asbestos fibers and prevent them from migrating to the reservoir. In this particular location and other disposal sites, the Temblor cap will be protected from erosion by a shell of blueschist rip rap mined from Borrow Area B onsite. The use of NOA-bearing blueschist is permitted to be used for this purpose (see Regional Water Quality Control permit application, page 2-11, October 2009).

Transport of long fibers in groundwater through the pore spaces of the Temblor sand is unlikely for several reasons:

1. The Temblor material contains a large percentage of fine silt and clay size particles that will be compacted. The resulting cap will have low porosity and low permeability.
2. The pore space is a complex matrix where long thin fibers would be trapped, creating an impediment to groundwater flow. Fine clays that are present in the Temblor would have the same effect.

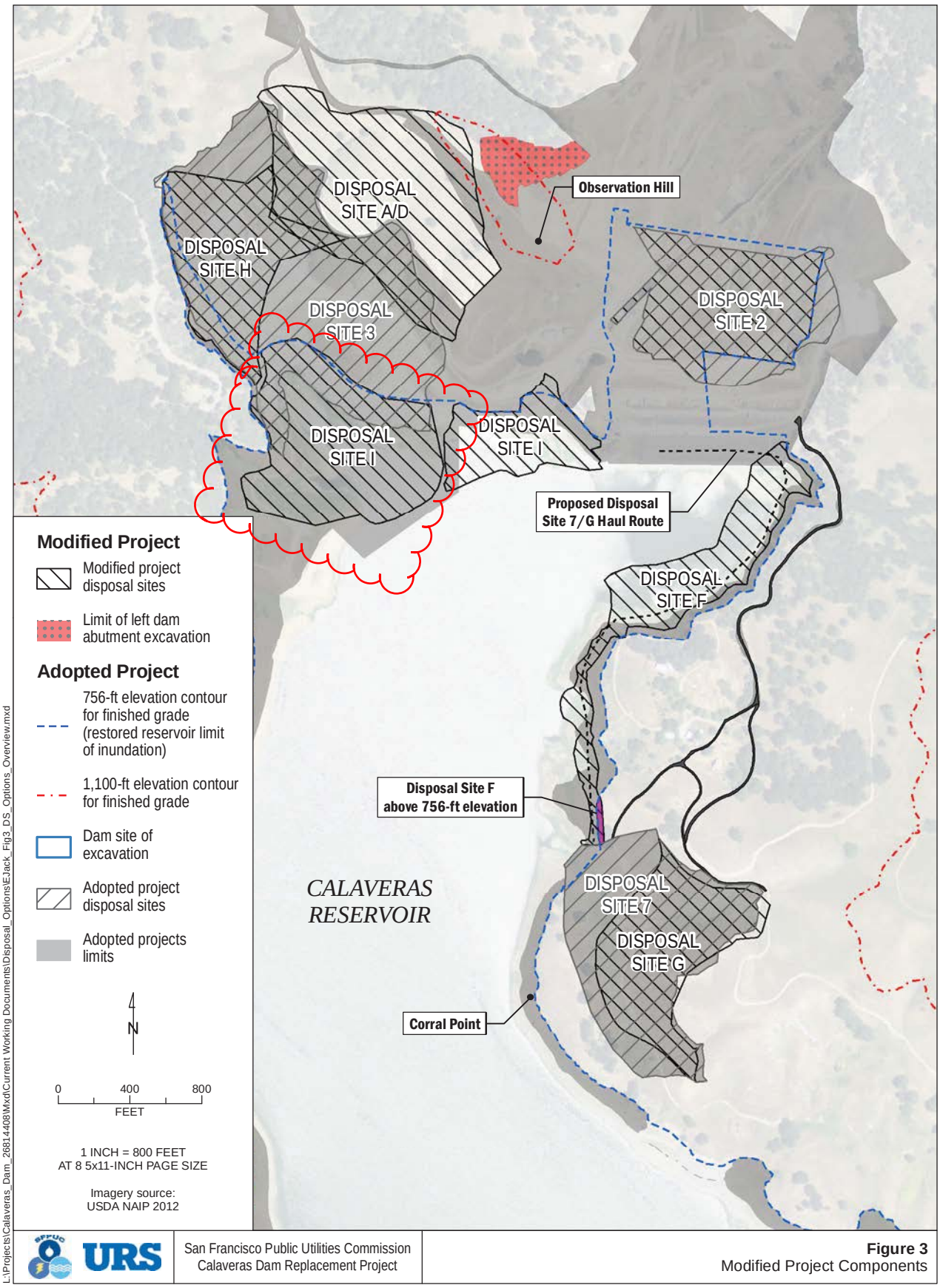
3. Because the reservoir surface is artificially elevated well above the natural groundwater table, the groundwater gradient at the disposal sites is away from the reservoir. This is confirmed by data from 12 piezometers in the north part of the dam area showing the gradient to be northerly and away from the reservoir.

Data from the Calaveras site supports this analysis. The concentration of total fibers in the groundwater collected in 2009 is >10,000 MFL as compared to 200 MFL for the reservoir. Because loading of particulate material, including asbestos, is derived primarily from surface water runoff down creeks and streams, it can be concluded that the impact to water quality by asbestos transported by groundwater is not significant or absent.

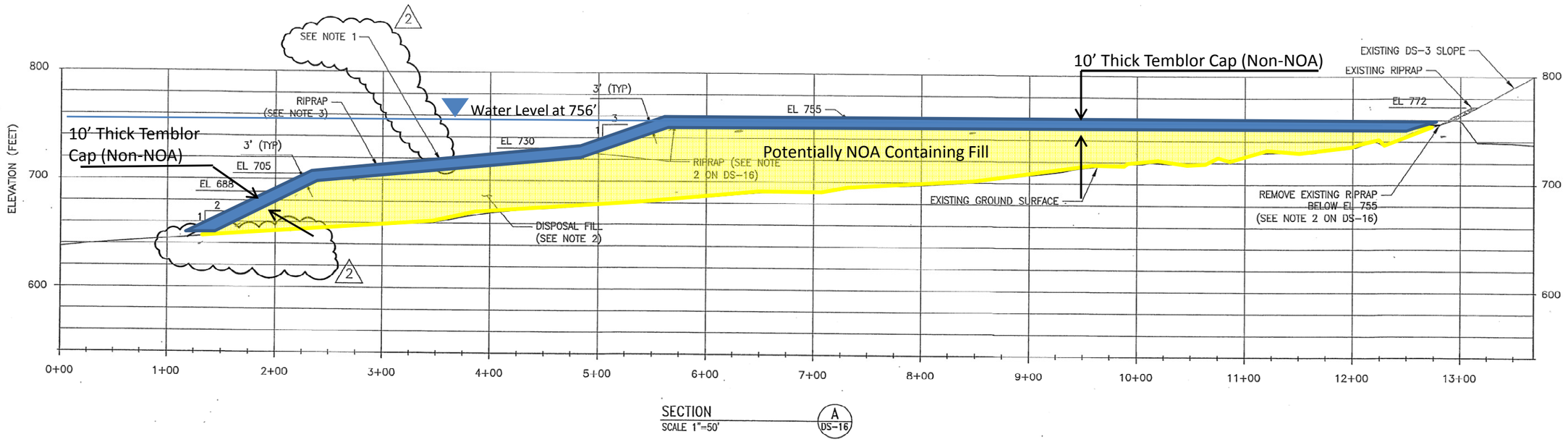
Conclusions

Asbestos fibers are discharged to the reservoir through erosion and runoff during storms. In upland disposal areas, discharge by runoff or release into the air are prevented as designed by constructing a three foot cap of Temblor sandstone fill. A similar cap below the 756' elevation will be of equal or greater protective value. The proposed minimum 10 foot cap will protect the NOA backfill from erosion.

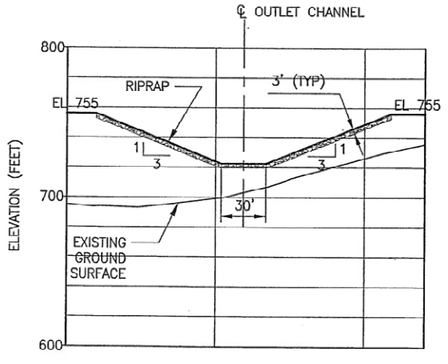
Attachment A



Attachment B



SECTION A DS-16
SCALE 1"=50'



SECTION B DS-16
SCALE 1"=50'

50' 0 50' 100'
SCALE 1"=50'

NOTES:

1. FINAL GRADE SHOWN IS MAXIMUM EXTENT OF DISPOSAL SITE. FINAL GRADE SHALL BE DETERMINED BY CITY REPRESENTATIVE. (2)
2. DISPOSAL FILL TO BE BULL-DOZED FROM SHORELINE INTO RESERVOIR. ABOVE RESERVOIR WATER LEVEL, FILL SHALL BE PLACED IN 2-FT THICK LIFTS AND DOZER TRACK-WALKED FOR COMPACTION IN ACCORDANCE WITH SECTION 02210.
3. RIPRAP BELOW EL. 730 SHALL BE PLUS 9" TEMBLOR SANDSTONE ROCK.

ELEVATION DATUM NGVD29

REGISTERED PROFESSIONAL ENGINEER MICHAEL PAUL FORREST No. 27855 CIVIL STATE OF CALIFORNIA 2/8/13

URS
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612
PHONE: (510) 893-3600

XXXXXX	DRAWN F. BAYANI
XXX	DESIGNED F. BAYANI
XXX XXXX	CHECKED M. FORREST

CIVIL	ELECT.	MECH.	PIPING	GEOTECH.

NO.	DATE	DESCRIPTION	BY	APPR'D
2	02/08/13	PCO NO. 020		
1	12/11/12	PCO NO. 020	JWR	MPF

REVISIONS

CONTRACT NO. WD-2551

CITY AND COUNTY OF SAN FRANCISCO
PUBLIC UTILITIES COMMISSION
INFRASTRUCTURE DIVISION
ENGINEERING MANAGEMENT BUREAU

CALAVERAS DAM REPLACEMENT PROJECT

DISPOSAL SITE I
SECTIONS

CHECKED / APPROVED	DRAWN	SCALE AS SHOWN
SECTION MANAGER	DESIGNED	DATE
APPROVED	APPROVED	
MANAGER, ENGINEERING MANAGEMENT BUREAU	MANAGER, WATER SUPPLY AND TREATMENT DIVISION	

SHEET	PLAN NO.	DRAWING NO.	REVISION NO.
— OF	DS-17	E-22030.11	2

ARCH.	CIVIL	ELECT.	MECH	PIPING	STRUC.	OTHERS

Feb 07, 2013 - 3:21pm
d:\0349 - D&R\Sheets\DS-17 R1.dwg

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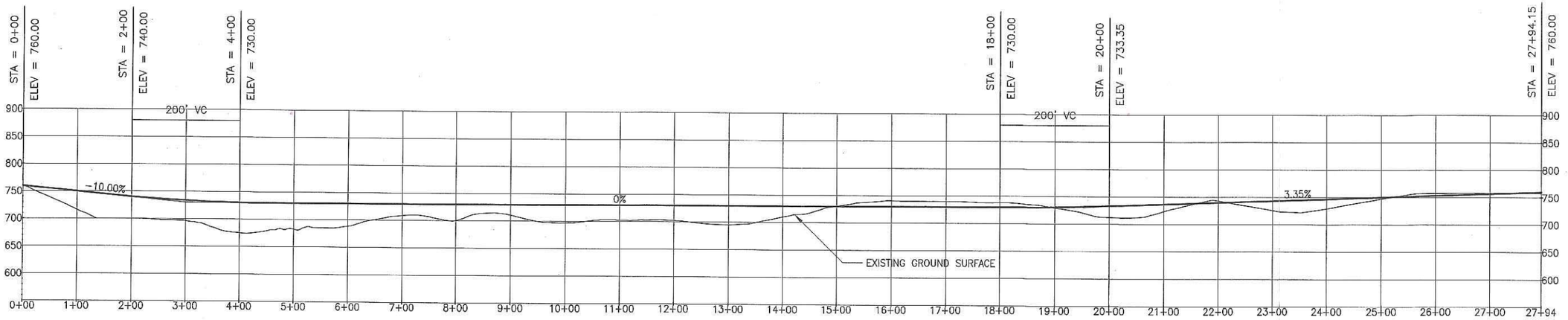
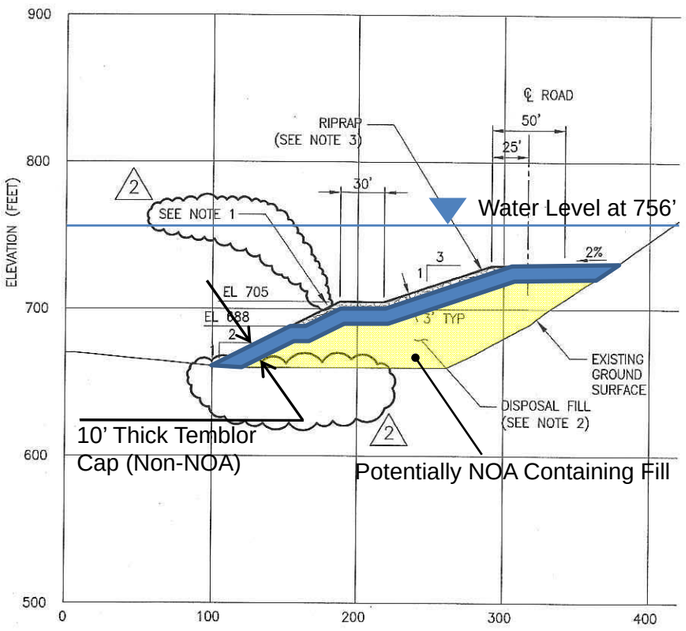
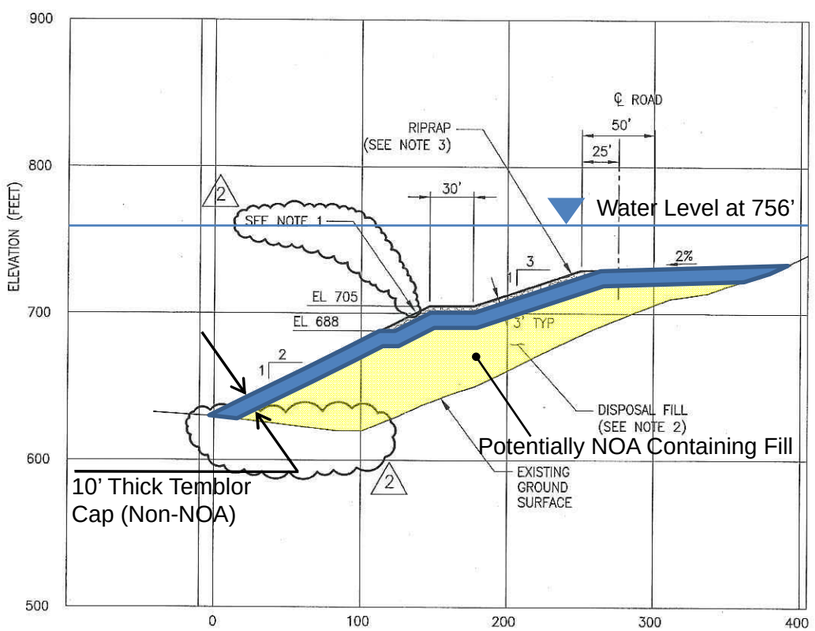
GREEN 0.25MM
CYAN 0.40MM
BLUE 0.50MM
MAGENTA 0.20MM
WHITE 0.35MM
GRAY 0.15MM
9 0.15MM
10 1.00MM
11 0.70MM
12 0.60MM
100 0.70MM
210 0.60MM FILE:



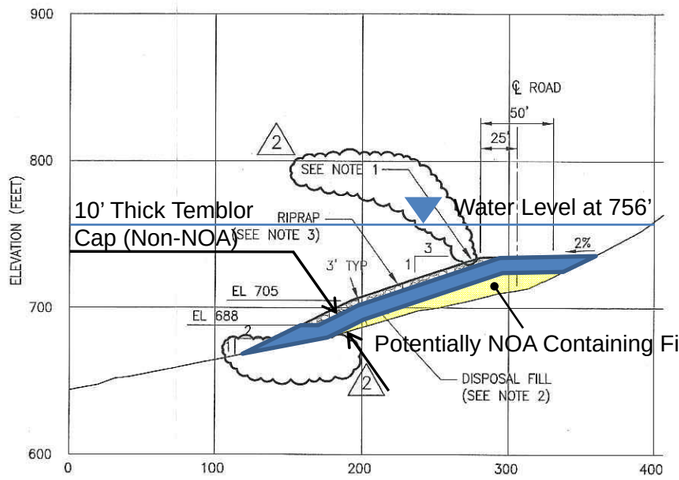
ROAD PROFILE
SCALE 1"=100'
1
DS-14



SECTION
SCALE 1"=50'
A
DS-14



SECTION
SCALE 1"=50'
B
DS-14



SECTION
SCALE 1"=50'
C
DS-14

NOTES:

1. FINAL GRADE AS SHOWN IS MAXIMUM EXTENT OF DISPOSAL SITE. FINAL GRADE SHALL BE DETERMINED BY CITY REPRESENTATIVE.
2. DISPOSAL FILL TO BE BULL-DOZED FROM SHORELINE INTO RESERVOIR. ABOVE RESERVOIR WATER LEVEL, FILL SHALL BE PLACED IN 2-FT THICK LIFTS AND DOZER TRACK-WALKED FOR COMPACTION IN ACCORDANCE WITH SECTION 02210.
3. RIPRAP SHALL BE PLUS 9" TEMBLOR SANDSTONE ROCK.

50' 0 50' 100'
SCALE 1"=50'

100' 0 100' 200'
SCALE 1"=100'

ELEVATION DATUM
NGVD29

REGISTERED PROFESSIONAL ENGINEER
MICHAEL PAUL FARRELL
No. 27855
CIVIL
STATE OF CALIFORNIA
2/8/13

URS
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612
PHONE: (510) 893-3600

XXXXXX	DRAWN	F. BAYANI
XXX	DESIGNED	S. TOUGH
XXX XXXX	CHECKED	

CIVIL | ELECT. | MECH. | PIPING | GEOTECH.

NO.	DATE	DESCRIPTION	BY	APPR'D
2	02/08/13	PCO NO. 020 CO No. 44	JWR	MPF
1	12/14/12	PCO NO. 020		

REVISIONS

CONTRACT NO. WD-2551

CITY AND COUNTY OF SAN FRANCISCO
PUBLIC UTILITIES COMMISSION
INFRASTRUCTURE DIVISION
ENGINEERING MANAGEMENT BUREAU

CALAVERAS DAM REPLACEMENT PROJECT

DISPOSAL SITE F
ROAD PROFILE & SECTIONS

CHECKED / APPROVED		DRAWN	SCALE AS SHOWN
SECTION MANAGER		DESIGNED	DATE
APPROVED		APPROVED	
MANAGER, ENGINEERING MANAGEMENT BUREAU		MANAGER, WATER SUPPLY AND TREATMENT DIVISION	

SHEET	PLAN NO.	DRAWING NO.	REVISION NO.
– OF	DS-15	E-22030.9	2

ARCH. | CIVIL | ELECT. | MECH | PIPING | STRUC. | OTHERS

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0.20MM
0.25MM
0.40MM
BLUE 0.50MM
MAGENTA 0.20MM
WHITE 0.35MM
GRAY 0.15MM
9 0.15MM
10 1.00MM
11 0.70MM
12 0.60MM
100 0.70MM
210 0.60MM FILE:

Feb 07, 2013 - 3:02pm
D:\2418 - C&G\Sheets\DS-15 R1.dwg

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES
0 4

APPENDIX B

CDRP MINOR PROJECT MODIFICATION NO. 24

MINOR PROJECT MODIFICATION

SAN FRANCISCO PUBLIC UTILITIES COMMISSION
WATER SYSTEM IMPROVEMENT PROGRAM

Minor Project Modification Number:	**024**		**Date: 3/26/13**
Project Title:	**Calaveras Dam Replacement Project**		
MEA Case No./Project No.	**2005.0161E/CUW37401**		
MPM Prepared By:	**Cullen Wilkerson, ECM**		
MPM Triggered By:	☒ RFD	☐ PCO	☐Other:
Landowner:	**SFPUC**		
Vegetative Cover/Land Use:	N/A	**Net Acreage Affected:** N/A	
Modification to:	☒ Mitigation Measure: 5.13.3a Diesel Particulate Matter Reduction	☒ Other: Project Design	
	☐ Permit:		

Detailed Description of Minor Project Modification:

The contractor requests to use one Tier 2 diesel engine Excavator (5130) on the Calaveras Dam Replacement Project (CDRP). Mitigation Measure 5.13.3a in the project Final Environmental Impact Report (FEIR) states,

"The SFPUC shall ensure that construction-contract specifications include a requirement that all off-road diesel construction equipment is equipped with U.S. Environmental Protection Agency Tier 2 diesel engines as defined in U.S. Code of Federal Regulations, Title 40, Part 89 and are equipped with California Air Resources Board Level 3 Diesel Emission Control Strategies as defined in Title 13, California Code of Regulations, §§2700 through 2710 and meet the California Air Resources Board's most recent certification standards for off-road heavy duty diesel engines. The construction-contract specifications will require the contractor to submit a comprehensive inventory of all off-road construction equipment that will be used during any portion of the construction project. The inventory shall include each piece of equipment's license plate number, horsepower rating, engine production year, confirmation that the equipment contains a Level 3 abatement device verified by the California Air Resources Board, and projected hours of use or fuel throughput for each piece of equipment. The contractor shall update the inventory and submit it monthly to the SFPUC throughout the duration of the project."

This MPM proposes to allow the use of one 5130 Excavator (Tier 2 diesel engine off road piece of equipment) that cannot be retrofitted by the manufacturer to meet "California Air Resources Board (CARB) Level 3 Diesel Emission Control Strategies" specified in the CDRP FEIR, with currently available retrofit equipment.

The contractor has also supplied a Letter from Petersen/Caterpillar stating "Caterpillar has no level 3 after treatment device that is currently approved by California Air Resources Board (CARB)".

The contractor has provided supporting documentation that shows how the project is meeting its diesel particulate

matter reduction goals despite the use of the 5130 Excavator. The contractor has submitted the following supporting documents:

- Cover Letter
- CDRP Monthly vehicle maintenance inventory
- Sacramento Metropolitan Air Quality Mitigation Calculator output for the 5130 EXCAVATOR and fleet calculation
- Letter Statement From Caterpillar

ENVIRONMENTAL IMPACTS

No environmental impacts beyond those previously analyzed in the FEIR.

Attachments:

- Contractor Letter with Supporting documentation

Biological ☐ Yes ☒ No	**Cultural** ☐ Yes ☒ No	**Photos** ☐ Yes ☐ No	**Other** ☒ Yes ☐ No

Resources:

N/A

Biological ☒ No Resources Present ☐ Resources Present ☐ NA

Previous Biological Survey Report Reference:

N/A

Cultural ☒ No Resources Present ☐ Resources Present ☐ Within Project APE ☐ NA (paved/graveled area and no ground disturbance)

Cultural Survey Report Reference:

N/A

Conditions of Approval or Reasons for Denial

SFPUC Required Signatures for Environmental Approval:

ECCM: Kerry O'Neill Date: 3/26/13

☒ Approved ☐ Approved with Conditions (see conditions above) ☐ Denied

SFPUC agrees that Contractor will abide by the mitigation measures detailed in the CEQA document and project permit requirements and have appropriate Specialty Environmental Monitors present where required.

Charge Code:

EP Required Signatures for Approval:

Signee: Steven H. Smith Date: 3/26/13

☒ Approved ☐ Approved with Conditions (see conditions above) ☐ Denied

CEQA SECTION	APPLICABLE	(Y) Define Potential Impact or (N) Briefly Explain Why CEQA Section isn't Applicable
Geology, Soils and Seismicity	☐ Y	There would be no new significant geology, soil or seismicity impacts beyond those analyzed in the FEIR.
	☒ N	
Hazardous Materials and Waste	☐ Y	There would be no new significant geology, soil or seismicity impacts beyond those analyzed in the FEIR.
	☒ N	
Hydrology	☐ Y	There would be no new significant geology, soil or seismicity impacts beyond those analyzed in the FEIR.
	☒ N	
Cultural Resources	☐ Y	There would be no new significant geology, soil or seismicity impacts beyond those analyzed in the FEIR.
	☒ N	
Traffic and Circulation	☐ Y	There would be no new significant geology, soil or seismicity impacts beyond those analyzed in the FEIR.
	☒ N	
Air Quality	☐ Y	The 5130 EXCAVATOR emissions would not result in exhaust emissions that would be beyond what was analyzed in the CDRP FEIR. The diesel emissions reduction goals will be met despite the use of the 5130 EXCAVATOR with Tier 2 diesel engines. There would be no new air quality impacts. See attached documentation.
	☒ N	
Noise and Vibration	☐ Y	There would be no new significant geology, soil or seismicity impacts beyond those analyzed in the FEIR.
	☒ N	
Visual Resources	☐ Y	There would be no new significant geology, soil or seismicity impacts beyond those analyzed in the FEIR.
	☒ N	
Vegetation and Wildlife	☐ Y	There would be no new significant geology, soil or seismicity impacts beyond those analyzed in the FEIR.
	☒ N	

DRAGADOS USA, INC. / FLATIRON WEST, INC. / SUKUT CONSTRUCTION, INC. JOINT VENTURE
12750 Calaveras Rd Fremont, CA 94539 PHONE: 925-493-4514 EMAIL: CALAVERASDAM@DRAGADOS-USA.COM

March 20, 2013

Transmittal: DFSJV Equipment Emissions

This transmittal is regarding DFSJV's emissions from equipment being used for the Calaveras Dam Replacement Project. DFSJV proposes to operate a 5130 Excavator on the Project. Although DFSJV's overall fleet is below the State targets and achieves emissions standards determined for the project in the Air Pollution Control Plan (APCP), the 5130 (Tier 2) can't be fitted with California Air Resources Board Level 3 Diesel Emission Control Strategy by the manufacturer (Caterpillar). Even though certain manufacturers exist for a "verified" retrofit device, there appears to be no proven solution for all off road applications. In addition, any such device has neither been proven nor tested by the Caterpillar dealer or Caterpillar Inc. to be a safe, viable, and warrantable solution for the 5130 Excavator. Any such aftermarket retrofit devices installed on these machines may increase the risk of safety hazards such as but not limited to; Operator visibility, machine performance issues, vibration fatigue failure, engine failure, operator safety, machine fire hazards, or Installer and DPF manufacturer warranty issues, should they arise. We have included with this transmittal, a letter from the manufacturer stating these concerns.

DFSJV verified that our fleet (including the 5130 Excavator) would meet the requirements of the APCP and the State requirements for emissions reduction by utilizing the Sacramento Metropolitan Air Quality Mitigation Calculator (SMAQMC). All inputs to the calculator and outputs have been included with this transmittal.

The APCP states the DFSJV will achieve approximate reductions below the State wide average in the range of values bellow:

- Reduction NOx: 40%-60%
- Reduction PM10: 50%-70%
- Reduction PM2.5: 50%-70%

DFSJV's fleet emissions (g/bhp-hr) are 62% for NOx, 60% for PM10, and 60% for PM2.5 below the State wide average for construction equipment (see table below). Based on DFSJV's calculations, DFSJV's fleet is in compliance with the State requirements and within and exceeding the targets of DFJV's Air

12750 Calaveras Rd Fremont, CA 94539 PHONE: 925-493-4514 EMAIL: CALAVERASDAM@DRAGADOS-USA.COM

Pollution Control Plan. Operating the 5130 Excavator without Tier 3 equipment would not significantly increase DFSJV's emissions.

Targets AND Calculated Reductions in Emissions			
	NOx	**PM 10**	**PM 2.5**
State Targets from SMAQD Mitigation Calculator	>20%	>46%	>46%
DFSJV's Targets from the Air Pollution Control Plan	40%-60%	50%-70%	50%-70%
DFSJV's Fleet Emissions (Calculated with 5130)	**62%**	**60%**	**60%**

Documentation Included:

- Summary of DFSJV Emissions (Calculated Results, SMAQMC)
- Current Total Equipment Usage for CDRP Work (February Off-Road Inventory)
- DFSJV Emissions Analysis with 5130 Excavator (Calculations, SMAQMC)
- Letters from CAT Regarding Updating Equipment with Tier 3 Diesel Emissions Control

Machines

Non-Current Machine Line

» Agricultural Tractors
» Articulated Trucks
» Asphalt Pavers
» Backhoe Loaders
» Combines
» Compact Track and Multi Terrain Loaders
» Compactors
» Feller Bunchers
» Forest Machines
» Forwarders
» Harvesters
» Hydraulic Excavators
› 345D L
› 345B L Series II
› 345C L
› 365C L
› 345D L
› 365B L
› 385C L
› 365B L Series II
› 336D L
› 365C L
› 375
› 375 L
› 385B
› 385B L
› 385C L
› 336D L
› 375 L ME
› 5110B
› 5110B/5110B L
› 5130B ME
› 5230
› 5230B
› 5230 ME
› 320B
› 320B L
› 320C L Utility
› 320D L
› 320D LRR
› 321B LCR

5130B ME MASS EXCAVATOR

--- Select a Model ---

Overview & Specifications

OVERVIEW & SPECIFICATIONS

Units: **US** | **Metric**

Engine	
Engine Model	3508B EUI
Net Power	800 hp
Gross Power	860 hp
Bore	6.7 in
Displacement	2105 in3
Stroke	7.5 in
Hydraulic System - Implement/Travel	
Main Implement - Circuit	Closed Center
Main Implement - Pump	Piston
Max Flow at 1915 rpm (1x)	99 gal/min
Relief Valve Setting - Travel	5000 psi
Relief Valve Setting - Implement - Std.	4500 psi
Hydraulic System - Swing	
Swing System - Circuit	Open Center
Swing System - Pump	Piston
Relief Valve Setting - Accelerating	5000 psi
Relief Valve Setting - Decelerating	3620 psi
Max Pump Flow at 1915 rpm	117 gal/min
Hydraulic System - Pilot	
Pilot System - Circuit	Open Center
Pilot System - Pump	Gear
Relief Valve Setting - Controls	580 psi
Relief Valve Setting - Track Tension	1000 psi
Max Pump Flow at 1915 rpm	14.5 gal/min
Operating Specifications	
Maximum Reach at Ground Level	48.9 ft
Maximum Dump Height	29.8 ft
Bucket Capacity - Heavy Duty Rock	13.7 yd3
Operating Weight - Std.	399000 lb
Maximum Digging Depth	27.6 ft
Drive System	
Maximum Drawbar Pull	196000 lb
Maximum Travel Speed - High	2.1 mph
Swing Mechanism	
Swing Torque	433240 lb ft
Undercarriage	
Track Width - Rock	26 in
Track Width - General Purpose	32 in
Track Width - Soft Underfoot	39 in
Carrier Idlers	2
Shoes Per Side - Std.	48
Rollers Per Side - Std.	8

› 321C LCR
› 322B L
› 322C L
› 325B
› 325B L
› 325C L
› 325C LCR
› 325D L
› 330B
› 330B L
› 330B L UHD
› 330C L
› 330D L
› 301.5
› 301.6
› 301.6C
› 301.8
› 301.8C

› 302.5
› 302.5C
› 303C CR
› 304 CR
› 303 CR
› 303.5
› 303.5C CR
› 304C CR
› 304.5
› 305 CR
› 305C CR
› 307C
› 307C SB
› 308C CR
› 307B
› 307B SB
› 311B
› 311D LRR
› 312B
› 312B L
› 312C L
› 312D/312D L
› 313B CR
› 314C LCR
› 314D CR/314D LCR
› 315B
› 315B L
› 315D L
› 318B L
› 318B LN

Ground Pressure - Soft Underfoot	21 psi

Service Refill Capacities

Fuel Tank	987 gal
Cooling System	79 gal
Engine Oil	33 gal
Hydraulic Tank	324 gal
Final Drive (each)	8.2 gal
Hydraulic System (incl. tank)	476 gal
Swing Drive	3.7 gal

Standards

Brakes - Swing	Wet, multiple disc

Dimensions

Overall Width	21.7 ft
Upper Structure Width	19.3 ft
Ground Clearance	37.8 in
Track Length - Std.	23.8 ft
Height to Top of Cab	21.4 ft
Height to Top of Counterweight	14.4 ft
Tail Swing Radius	17.22 ft

3/20/2013

To:
Dave Wickam
Equipment Manager
Calaveras Dam Replacement Project
925-493-4585

RE: CARB level 3 DECS for the Cat model 5130 mining excavator.

Reason: No verified DECS available.

At this time, Peterson does not have available for sale such a device nor a solution applicable to the listed machine that will accept a retrofit Diesel Particulate Filter device, or (DECS).

In our efforts to search for an aftermarket device, we have concluded that even though certain manufacturers exist for this "verified" retrofit device (DPF), there appears to be no proven solution for all off road applications. In addition, any such device, if currently made available to us has neither been proven nor tested by this dealer or Caterpillar Inc. to be a safe, viable, and warrantable solution for the listed off road equipment.

We have recently researched the compatibility of certain applications for DPF's and it is apparent that some machines physically will not accept the DPF due to severe visibility, application and safety concerns.

In addition, any such aftermarket retrofit devices installed on these machines may increase the risk of safety hazards such as but not limited to; Operator visibility, machine performance issues, vibration fatigue failure, engine failure, operator safety, machine fire hazards, or Installer and DPF manufacturer warranty issues, should they arise. It is further understood that any such device offered for installation for retrofitting Caterpillar engines in these off road machines is solely at the discretion of the end user.

Sincerely,

Grant Stickney,
Product Support and Emissions Sales
Peterson Tractor
510-618-2966 Office
gastickney@petersoncat.com

Peterson Tractor Co.
955 Marina Boulevard
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DRAGADOS USA, INC. / FLATIRON WEST, INC. / SUKUT CONSTRUCTION, INC. JOINT VENTURE

MONTHLY OFFROAD EQUIPMENT INVENTORY

	DATE OF REPORT:		3/4/2013	PROJECTED 02/01/2013 THROUGH: 02/28/13					
	EQUIPMENT #	CARB ID#	HORSE POWER	ENGINE YR	ENGINE TIER / ABATEMENT DEVICE	PROJECTED HOURS OF USAGE	GPH	FUEL CONSUMED	NOTES
1	1601	NN3I55	300	2006	TEIR 3	155	15	1162	(SEI) 16G BLADE
2	1602	KY7H67	300	2006	TIER 3	150	15	812	(SEI) 16G BLADE
3	34505	DK3S48	400	2007	TIER 3	146	12	1,420	(SEI) 345 EXCAVATOR
4	9604	WW3P43	286	2006	TIER 3	37	12	297	(SEI) 966 LOADER
5	99001	NP8A37	687	2007	TIER 3	6	18	403	(SEI) 990 LOADER
6	9033	HV5D73	410	2006	TIER 3	169	16	2,182	(SEI) D9 DOZER
7	9035	JV8E53	464	2006	TIER 3	109	16	1,455	(SEI) D9 DOZER
8	1023	AB6J53	580	2006	TIER 3	136	22	2,735	(SEI) D10 DOZER
9	1024	KC3R76	580	2006	TIER 3	118	22	2,636	(SEI) D10 DOZER
10	1029	IG3K55	580	2006	TIER 3	54	22	903	(SEI) D10 DOZER
11	1037	TP6Y37	575	2007	Tier3	75	22	1,602	(SEI) D10 DOZER
11	1042	SR3H45	580	2006	TIER 3	114	22	1,973	(SEI) D10 DOZER
12	1043	RP4T79	580	2006	TIER 3	181	22	3,792	(SEI) D10 DOZER
13	1102	AR9X97	875	2009	TIER 2	199	35	4,876	(SEI) D11 Dozer
14	1103	HV7Y57	875	2009	TIER 2	239	35	5,005	(SEI) D11 Dozer
15	5121	EE7L38	600	2006	TIER 3	36	12	336	(SEI) 651 SCRAPER
16	5123	MG8L96	600	2006	TIER 3	141	12	1,908	(SEI) 651 SCRAPER
17	5125	YX5Y39	600	2006	TIER 3	135	12	2,041	(SEI) 651 SCRAPER
18	5126	DR7W98	600	2007	TIER 3	142	12	1,947	(SEI) 651 SCRAPER
19	5127	PF6J56	600	2006	TIER 3	135	12	2,245	(SEI) 651 SCRAPER
20	5128	XC3E66	600	2006	TIER 3	128	12	1,656	(SEI) 651 SCRAPER
21	5129	GY9N97	600	2006	TIER 3	140	12	1,958	(SEI) 651 SCRAPER
21	5130	DC5N98	540	2006	TIER 3	79	12	1,143	(SEI) 651 SCRAPER
22	5153	HW4K66	540	2005	TIER 3	2	12	6	(SEI) 651 SCRAPER
23	5155	NK3K33	540	2006	TIER 3	135	12	1,716	(SEI) 651 SCRAPER
24	5156	XN4R53	540	2006	TIER 3	18	12	40	(SEI) 651 SCRAPER
25	5157	VM4M56	540	2006	TIER 3	30	12	792	(SEI) 651 SCRAPER
26	5160	KH5P86	540	2006	TIER 3	39	12	467	(SEI) 651 SCRAPER
27	5163	ND5A87	600	2006	TIER 3	89	12	1,134	(SEI) 651 SCRAPER
28	5170	JJ6Y54	600	2006	TIER 3	48	12	595	(SEI) 651 SCRAPER
29	5173	VM3A53	600	2006	TIER 3	74	12	889	(SEI) 651 SCRAPER

30	5174	RM3G94	540	2006	TIER 3	121	12	1,530	(SEI) 651 SCRAPER
31	5175	WY4U67	540	2006	TIER 3	17	12	5	(SEI) 651 SCRAPER
31	5177	TF8B86	540	2006	TIER 3	37	12	441	(SEI) 651 SCRAPER
32	5181	YA3V68	540	2004	TIER 4	23	12	400	(SEI) 651 SCRAPER
33	82502	BV5P86	354	2006	TIER 3	9	10	52	(SEI) 825 COMPACTOR
34	3406	NC3Y56	498	2006	TIER 3	0	15	5	(SEI) 834B RUBBER TIRE DOZER
35	1328003	CS7M39	202	2008	TIER 3	107	10	559	(FWI) 328DLGR EXCAVATOR
36	1302010	VF5X67	124	2011	TIER 3	43	10	132	(FWI) 450E BACKHOE
37	9530009	NW4B87	100	2008	TIER 3	65	8	142	(FWI) D4KXL DOZER
38	1509002	KV5R46	225	2009	TIER 3	118	11	257	(FWI) LINK BELT 8090
39	4810044	FC9R97	125	2006	TIER 3	40	3	50	(FWI) GRADALL FORKLIFT
40	349E	EH9H45	425	2011	TIER 4	162	12	1,845	(CRESCO) 349 EXCAVATOR
41	385C	FF8G58	513	2006	TIER 3	175	19	3,885	(DFS JV) CAT 385 C EXCAVATOR
42	09CBC003R	NY5L83	125	2010	TIER 3	115	4	108	(CRESCO) CAT 1055
43	BIG230	RX5W34	130	2012	TIER 4I	140	6	208	BIGGE TEREX RTC230 CRANE
44	CRE1255	XR4F38	159	2012	TIER 4I	125	5	85	(CRESCO) 1255TL Reachlift
49	CRED10T	XF4A77	580	2010	TIER3	195	26	3,425	(CRESCO) CAT D10T DOZER
46	74-01	GY3S36	156	2009	TIER 3	3	10	36	(DFS JV) CS74 COMPACTOR
47	74-02	TJ5A85	156	2009	TIER 3	0	0	-	(DFS JV) CS74 COMPACTOR
48									
49	CONDON JOHNSON	NY5L83	125	2010	TIER 3	20	4	85	(CRESCO) CAT 1055 (CJA)
50	3043	WY6J55	220	2005	TIER 3	120	8	830	ATLAS COPCO DRILL (CJA)
51									
52	DR-48	JR7H46	155	2011	TIER 3	60	6	320	DRILL TECH ECM-475
53	DR-41-160	LN9T85	114	2004	TIER 3	90	8	693	DRILL TECH HYUNDAI EXCAVATOR
54									
55	United Rentals	FF5V68	125	2010	TIER 3	0	4	-	CASE 580N (NCB)
56	D-20	NM6G38	220	2007	TIER 3	20	8	142	IR ROC D7 RRC (NCB)
57	D-22	SL7H97	225	2006	TIER 3	20	7	156	IR ECM 590 RC (NCB)
58									
59									
60									
								65,517	FUEL USAGE

SMAQMD Construction Mitigation Calculator Outputs

Version 6.0.5 updated by TIAX LLC for SMAQMD, 4 May 2010

CDRP, Dave Wickam, 925.493.4585

Comparison of your project fleet's emissions with the statewide average for construction equipment

Your fleet's emission factors based on what you have entered so far >>
Statewide average emission factors as determined by this calculator >>

#N/A or #Value! indicates that you must return to the input page and correct engine data.
Be sure to press the Record Data button after each entry.

Fleet average emissions reductions for this project relative to California state average (g/bhp-hr)**

Compare your fleet-wide g/bhp-hr average with the statewide g/bhp-hr average for construction equipment

Fleet NOx:	1.91	Fleet ROG:	0.18	Fleet PM10:	0.079	Fleet PM2.5	0.074
ARB Average NOx:	5.04	ARB Average ROG:	0.66	ARB Average PM10:	0.20	ARB Average PM2.5:	0.18
NOx Reduced:	3.13	ROG Reduced:	0.48	PM10 Reduced:	0.12	PM2.5 Reduced:	0.11
Reduction NOx:	**62%**	**Reduction ROG:**	**73%**	**Reduction PM10:**	**60%**	**Reduction PM2.5:**	**60%**
NOx Passes, >20%		**ROG Passes, >20%**		**PM10 Passes, >45%**		**PM2.5 Passes, >45%**	

Compare your fleet-wide average daily emissions with statewide average fleet of same size (lbs/day)

Fleet NOx:	406.62	Fleet ROG:	38.29	Fleet PM10:	16.90	Fleet PM2.5:	15.88
ARB Average NOx:	488.92	ARB Average ROG:	63.65	ARB Average PM10:	19.45	ARB Average PM2.5:	17.95

Your overall project emissions (lbs):

Total NOx:	609931	Total ROG:	57434	Total Lbs PM10:	25345	Total PM2.5:	23827

**Only emissions rates from construction equipment considered in statewide average. All state average calculations use emission factors provided in ARB MO99-32.5 (diesel engines >25hp) and MO98-23 (gasoline engines >25hp).

ULSD use is assumed in state average.

3/21/2013 12:10

Input Characteristics								Emission factor lookups and							
Equipment Type	Qty. equip	Equip ment	Current Year	Equipm ent	Hours Operat	Total EngineHou	Fuel	Load Factor	Zero Hour Emission	Deterioration Factor NOx	Effective Emission	Effective Daily	Zero Hour Emission	Deterioration Factor ROG	Effective Emission
	71			445.06	148433						**1.91**	**406.62**			**0.18**
Excavators	1	2001	2013	800	2700	6300	ULSD	0.57	6.25	0.000104	3.73	11.85	0.32	0.00	0.22
Excavators	1	1996	2013	800	2700	6300	ULSD	0.57	6.25	0.000104	3.73	22.21	0.32	0.00	0.22
Crawler Tractors	1	2010	2012	575	300	63.5	ULSD	0.64	2.45	0.000032	1.49	0.71	0.1	0.00	0.07
Crawler Tractors	1	2007	2012	575	2000	5172	ULSD	0.64	2.45	0.000032	1.59	5.03	0.1	0.00	0.15
Bore/Drill Rigs	4	2007	2012	220	2000	4055	ULSD	0.75	2.45	0.000032	1.83	8.89	0.1	0.00	0.15
Bore/Drill Rigs	4	2006	2012	225	2000	4866	ULSD	0.75	4.38	0.000063	3.33	16.53	0.12	0.00	0.18
Cranes	2	2011	2012	93	50	297	ULSD	0.43	2.89	0.000038	1.18	0.03	0.1	0.00	0.05
Cranes	2	2012	2012	130	300	14	ULSD	0.43	2.27	0.000029	0.93	0.20	0.09	0.00	0.04
Crawler Tractors	2	2009	2012	875	1000	9	ULSD	0.64	4.29	0.000058	2.60	12.55	0.12	0.00	0.08
Crawler Tractors	1	2006	2012	580	1000	890	ULSD	0.64	2.45	0.000032	1.50	2.40	0.1	0.00	0.08
Crawler Tractors	1	2005	2012	464	2000	10693	ULSD	0.64	4	0.000053	2.77	7.09	0.1	0.00	0.24
Graders	1	2006	2012	300	2000	3900	ULSD	0.61	2.45	0.000032	1.49	2.46	0.1	0.00	0.12
Rollers	2	2009	2012	160	2000	1500	ULSD	0.56	2.45	0.000032	1.33	2.34	0.1	0.00	0.08
Scrapers	10	2006	2012	600	4000	7500	ULSD	0.72	2.45	0.000032	1.84	121.37	0.1	0.00	0.21
Off-Highway Trucks	2	2007	2012	725	4000	8500	ULSD	0.57	2.45	0.000032	1.47	23.49	0.1	0.00	0.18
Crawler Tractors	2	2009	2012	600	4000	10500	ULSD	0.64	2.45	0.000032	1.69	22.34	0.1	0.00	0.23
Crawler Tractors	1	2009	2012	875	4000	11442	ULSD	0.64	4.29	0.000058	3.01	28.99	0.12	0.00	0.25
Crawler Tractors	1	2009	2012	875	2000	1524	ULSD	0.64	4.29	0.000058	2.66	12.81	0.12	0.00	0.10
Excavators	1	2004	2012	114	720	9772	ULSD	0.57	5.64	0.000103	3.59	0.81	0.46	0.00	0.45
Rubber Tired Loaders	1	2008	2012	125	720	2871	ULSD	0.54	2.45	0.000032	1.30	0.32	0.1	0.00	0.09
Bore/Drill Rigs	1	2009	2012	717	720	1622	ULSD	0.75	2.45	0.000032	1.78	2.53	0.1	0.00	0.11
Cranes	1	2000	2012	215	12	13772	ULSD	0.43	6.25	0.000145	3.26	0.02	0.32	0.00	0.21
Other Construction Equip	1	2011	2012	80	540	0	ULSD	0.62	2.89	0.000038	1.70	0.20	0.1	0.00	0.06
Other Construction Equip	1	2008	2012	315	720	2070	ULSD	0.62	2.45	0.000032	1.48	0.92	0.1	0.00	0.09
Other Construction Equip	1	2002	2012	110	56	6210	ULSD	0.62	6.9	0.000160	4.64	0.08	0.99	0.00	0.79
Graders	1	2005	2012	250	2000	2541	ULSD	0.61	4.38	0.000063	2.63	3.62	0.12	0.00	0.11
Scrapers	5	2007	2012	600	2000	4256	ULSD	0.72	2.45	0.000032	1.76	29.18	0.1	0.00	0.15
Crawler Tractors	1	2006	2012	410	2000	4256	ULSD	0.64	2.45	0.000032	1.57	3.54	0.1	0.00	0.13
Crawler Tractors	1	2008	2012	200	2000	3970	ULSD	0.64	2.45	0.000032	1.56	1.72	0.1	0.00	0.13
Rubber Tired Loaders	1	2007	2012	687	2000	14131	ULSD	0.54	2.45	0.000032	1.45	5.49	0.1	0.00	0.22
Scrapers	2	2007	2012	600	4000	10500	ULSD	0.72	2.45	0.000032	1.90	25.13	0.1	0.00	0.26
Off-Highway Trucks	2	2006	2012	469	2000	3650	ULSD	0.57	2.45	0.000032	1.39	7.17	0.1	0.00	0.11
Off-Highway Trucks	4	2008	2012	725	2000	2500	ULSD	0.57	2.45	0.000032	1.37	21.85	0.1	0.00	0.09
Crawler Tractors	2	2008	2012	203	2000	1981	ULSD	0.64	2.45	0.000032	1.52	3.41	0.1	0.00	0.10
Rubber Tired Loaders	1	2007	2012	180	1000	960	ULSD	0.54	2.45	0.000032	1.27	0.63	0.1	0.00	0.07
Rough Terrain Forklifts	1	2006	2012	122	1000	1023	ULSD	0.6	4.44	0.000065	2.56	0.86	0.16	0.00	0.11
Crawler Tractors	1	2006	2012	410	1000	8701.9	ULSD	0.64	2.45	0.000032	1.65	1.87	0.1	0.00	0.20
Skid Steer Loaders	1	2007	2012	150	1245	1000	ULSD	0.55	2.45	0.000032	1.29	0.67	0.1	0.00	0.07
Crawler Tractors	1	2008	2012	100	1000	1000	ULSD	0.64	2.89	0.000038	1.78	0.49	0.1	0.00	0.08
Crawler Tractors	1	2006	2012	580	2000	6351.4	ULSD	0.64	2.45	0.000032	1.61	5.14	0.1	0.00	0.17
Excavators	1	2007	2012	400	1000	2287	ULSD	0.57	2.45	0.000032	1.36	1.50	0.1	0.00	0.09

		Input C	effective daily emissions before DECS									Impact	
Equipment Type	Qty. equip	Equip ment	Effective Daily	Zero Hour Emission	Deterioration Factor	Effective Emission	Effective Daily	Zero Hour Emission	Deterioration Factor PM10	Effective Emission	Effective Daily	**Retrofitted Equipment**	Any Change in	Difference in NOx
	71		**38.29**			**0.07**	**15.88**			**0.08**	**16.90**			
Excavators	1	2001	0.71	0.138	0.00	0.09	0.27	0.15	0.00	0.091	0.29		No	0.00
Excavators	1	1996	1.33	0.138	0.00	0.09	0.51	0.15	0.00	0.091	0.54		No	0.00
Crawler Tractors	1	2010	0.03	0.1012	0.00	0.05	0.02	0.11	0.00	0.057	0.03		No	0.00
Crawler Tractors	1	2007	0.47	0.1012	0.00	0.07	0.21	0.11	0.00	0.071	0.23		No	0.00
Bore/Drill Rigs	4	2007	0.73	0.1012	0.00	0.07	0.36	0.11	0.00	0.080	0.39		No	0.00
Bore/Drill Rigs	4	2006	0.88	0.1012	0.00	0.08	0.39	0.11	0.00	0.083	0.41		No	0.00
Cranes	2	2011	0.00	0.184	0.00	0.07	0.00	0.2	0.00	0.074	0.00		No	0.00
Cranes	2	2012	0.01	0.0092	0.00	0.00	0.00	0.01	0.00	0.004	0.00		No	0.00
Crawler Tractors	2	2009	0.37	0.1012	0.00	0.05	0.25	0.11	0.00	0.056	0.27		No	0.00
Crawler Tractors	1	2006	0.13	0.1012	0.00	0.05	0.09	0.11	0.00	0.059	0.09		No	0.00
Crawler Tractors	1	2005	0.60	0.1012	0.00	0.08	0.21	0.11	0.00	0.087	0.22		No	0.00
Graders	1	2006	0.20	0.1012	0.00	0.06	0.10	0.11	0.00	0.064	0.11		No	0.00
Rollers	2	2009	0.14	0.1288	0.00	0.06	0.11	0.14	0.00	0.069	0.12		No	0.00
Scrapers	10	2006	13.69	0.1012	0.00	0.08	5.44	0.11	0.00	0.087	5.78		No	0.00
Off-Highway Trucks	2	2007	2.85	0.1012	0.00	0.07	1.08	0.11	0.00	0.072	1.15		No	0.00
Crawler Tractors	2	2009	3.07	0.1012	0.00	0.08	1.08	0.11	0.00	0.086	1.14		No	0.00
Crawler Tractors	1	2009	2.41	0.1012	0.00	0.09	0.83	0.11	0.00	0.090	0.87		No	0.00
Crawler Tractors	1	2009	0.48	0.1012	0.00	0.06	0.27	0.11	0.00	0.061	0.29		No	0.00
Excavators	1	2004	0.10	0.3588	0.00	0.29	0.07	0.39	0.00	0.305	0.07		No	0.00
Rubber Tired Loaders	1	2008	0.02	0.1288	0.00	0.07	0.02	0.14	0.00	0.073	0.02		No	0.00
Bore/Drill Rigs	1	2009	0.15	0.1012	0.00	0.07	0.09	0.11	0.00	0.071	0.10		No	0.00
Cranes	1	2000	0.00	0.138	0.00	0.08	0.00	0.15	0.00	0.084	0.00		No	0.00
Other Construction Equip	1	2011	0.01	0.184	0.00	0.10	0.01	0.2	0.00	0.106	0.01		No	0.00
Other Construction Equip	1	2008	0.06	0.1012	0.00	0.06	0.03	0.11	0.00	0.060	0.04		No	0.00
Other Construction Equip	1	2002	0.01	0.6348	0.00	0.47	0.01	0.69	0.00	0.497	0.01		No	0.00
Graders	1	2005	0.15	0.1012	0.00	0.06	0.08	0.11	0.00	0.061	0.08		No	0.00
Scrapers	5	2007	2.46	0.1012	0.00	0.07	1.19	0.11	0.00	0.077	1.27		No	0.00
Crawler Tractors	1	2006	0.30	0.1012	0.00	0.06	0.14	0.11	0.00	0.068	0.15		No	0.00
Crawler Tractors	1	2008	0.14	0.1012	0.00	0.06	0.07	0.11	0.00	0.068	0.07		No	0.00
Rubber Tired Loaders	1	2007	0.82	0.1012	0.00	0.07	0.27	0.11	0.00	0.076	0.29		No	0.00
Scrapers	2	2007	3.45	0.1012	0.00	0.09	1.22	0.11	0.00	0.097	1.28		No	0.00
Off-Highway Trucks	2	2006	0.56	0.1012	0.00	0.06	0.29	0.11	0.00	0.059	0.31		No	0.00
Off-Highway Trucks	4	2008	1.48	0.1012	0.00	0.05	0.84	0.11	0.00	0.056	0.90		No	0.00
Crawler Tractors	2	2008	0.21	0.1012	0.00	0.06	0.13	0.11	0.00	0.062	0.14		No	0.00
Rubber Tired Loaders	1	2007	0.03	0.1012	0.00	0.05	0.02	0.11	0.00	0.050	0.02		No	0.00
Rough Terrain Forklifts	1	2006	0.04	0.1472	0.00	0.08	0.03	0.16	0.00	0.083	0.03		No	0.00
Crawler Tractors	1	2006	0.23	0.1012	0.00	0.08	0.09	0.11	0.00	0.081	0.09		No	0.00
Skid Steer Loaders	1	2007	0.04	0.1288	0.00	0.06	0.03	0.14	0.00	0.066	0.03		No	0.00
Crawler Tractors	1	2008	0.02	0.184	0.00	0.10	0.03	0.2	0.00	0.107	0.03		No	0.00
Crawler Tractors	1	2006	0.53	0.1012	0.00	0.07	0.22	0.11	0.00	0.074	0.24		No	0.00
Excavators	1	2007	0.10	0.1012	0.00	0.05	0.06	0.11	0.00	0.056	0.06		No	0.00

Input Cs due to equipment retrofits (originally changes to equipment but now just existing retrofitted equipment)												
Equipment Type	Qty. equip 71	Equip ment	Difference in ROG	Difference in PM2.5	Difference in PM10	Retrofitted Equipment	Retrofitted Equipment	Retrofitted Estimated Hours	Total Engine Hours Operated	Number of pieces of equipment with	Retrofit?	Zero Hour Emission
Excavators	1	2001	0.00	0.00	0.00	2001	800	2700	6300	1	No	6.25
Excavators	1	1996	0.00	0.00	0.00	2001	800	2700	6300	1	No	6.25
Crawler Tractors	1	2010	0.00	0.00	0.00	2010	575	300	63.5	1	No	2.45
Crawler Tractors	1	2007	0.00	0.00	0.00	2007	575	2000	5172	1	No	2.45
Bore/Drill Rigs	4	2007	0.00	0.00	0.00	2007	220	2000	4055	4	No	2.45
Bore/Drill Rigs	4	2006	0.00	0.00	0.00	2006	225	2000	4866	4	No	4.38
Cranes	2	2011	0.00	0.00	0.00	2011	93	50	297	2	No	2.89
Cranes	2	2012	0.00	0.00	0.00	2012	130	300	14	2	No	2.27
Crawler Tractors	2	2009	0.00	0.00	0.00	2009	875	1000	9	2	No	4.29
Crawler Tractors	1	2006	0.00	0.00	0.00	2006	580	1000	890	1	No	2.45
Crawler Tractors	1	2005	0.00	0.00	0.00	2005	464	2000	10693	1	No	4.00
Graders	1	2006	0.00	0.00	0.00	2006	300	2000	3900	1	No	2.45
Rollers	2	2009	0.00	0.00	0.00	2009	160	2000	1500	2	No	2.45
Scrapers	10	2006	0.00	0.00	0.00	2006	600	4000	7500	10	No	2.45
Off-Highway Trucks	2	2007	0.00	0.00	0.00	2007	725	4000	8500	2	No	2.45
Crawler Tractors	2	2009	0.00	0.00	0.00	2009	600	4000	10500	2	No	2.45
Crawler Tractors	1	2009	0.00	0.00	0.00	2009	875	4000	11442	1	No	4.29
Crawler Tractors	1	2009	0.00	0.00	0.00	2009	875	2000	1524	1	No	4.29
Excavators	1	2004	0.00	0.00	0.00	2004	114	720	9772	1	No	5.64
Rubber Tired Loaders	1	2008	0.00	0.00	0.00	2008	125	720	2871	1	No	2.45
Bore/Drill Rigs	1	2009	0.00	0.00	0.00	2009	717	720	1622	1	No	2.45
Cranes	1	2000	0.00	0.00	0.00	2000	215	12	13772	1	No	6.25
Other Construction Equip	1	2011	0.00	0.00	0.00	2011	80	540	0	1	No	2.89
Other Construction Equip	1	2008	0.00	0.00	0.00	2008	315	720	2070	1	No	2.45
Other Construction Equip	1	2002	0.00	0.00	0.00	2002	110	56	6210	1	No	6.90
Graders	1	2005	0.00	0.00	0.00	2005	250	2000	2541	1	No	4.38
Scrapers	5	2007	0.00	0.00	0.00	2007	600	2000	4256	5	No	2.45
Crawler Tractors	1	2006	0.00	0.00	0.00	2006	410	2000	4256	1	No	2.45
Crawler Tractors	1	2008	0.00	0.00	0.00	2008	200	2000	3970	1	No	2.45
Rubber Tired Loaders	1	2007	0.00	0.00	0.00	2007	687	2000	14131	1	No	2.45
Scrapers	2	2007	0.00	0.00	0.00	2007	600	4000	10500	2	No	2.45
Off-Highway Trucks	2	2006	0.00	0.00	0.00	2006	469	2000	3650	2	No	2.45
Off-Highway Trucks	4	2008	0.00	0.00	0.00	2008	725	2000	2500	4	No	2.45
Crawler Tractors	2	2008	0.00	0.00	0.00	2008	203	2000	1981	2	No	2.45
Rubber Tired Loaders	1	2007	0.00	0.00	0.00	2007	180	1000	960	1	No	2.45
Rough Terrain Forklifts	1	2006	0.00	0.00	0.00	2006	122	1000	1023	1	No	4.44
Crawler Tractors	1	2006	0.00	0.00	0.00	2006	410	1000	8701.9	1	No	2.45
Skid Steer Loaders	1	2007	0.00	0.00	0.00	2007	150	1245	1000	1	No	2.45
Crawler Tractors	1	2008	0.00	0.00	0.00	2008	100	1000	1000	1	No	2.89
Crawler Tractors	1	2006	0.00	0.00	0.00	2006	580	2000	6351.4	1	No	2.45
Excavators	1	2007	0.00	0.00	0.00	2007	400	1000	2287	1	No	2.45

	Input C		Emission factor lookups and effective daily emissions with DECS												
Equipment Type	Qty. equip	Equip ment	Deterioratio n Factor	Effective Emission	Effective Daily	Zero Hour Emission	Deterioratio n Factor	Effective Emission	Effective Daily	Zero Hour Emission	Deterioratio n Factor	Effective Emission	Effective Daily	Zero Hour Emission
	71			**1.91**	**406.62**			**0.18**	**38.29**			**0.07**	**15.88**	
Excavators	1	2001	0.00	3.73	11.85	0.32	0.00	0.22	0.71	0.14	0.00	0.09	0.27	0.15
Excavators	1	1996	0.00	3.73	22.21	0.32	0.00	0.22	1.33	0.14	0.00	0.09	0.51	0.15
Crawler Tractors	1	2010	0.00	1.49	0.71	0.10	0.00	0.07	0.03	0.10	0.00	0.05	0.02	0.11
Crawler Tractors	1	2007	0.00	1.59	5.03	0.10	0.00	0.15	0.47	0.10	0.00	0.07	0.21	0.11
Bore/Drill Rigs	4	2007	0.00	1.83	8.89	0.10	0.00	0.15	0.73	0.10	0.00	0.07	0.36	0.11
Bore/Drill Rigs	4	2006	0.00	3.33	16.53	0.12	0.00	0.18	0.88	0.10	0.00	0.08	0.39	0.11
Cranes	2	2011	0.00	1.18	0.03	0.10	0.00	0.05	0.00	0.18	0.00	0.07	0.00	0.20
Cranes	2	2012	0.00	0.93	0.20	0.09	0.00	0.04	0.01	0.01	0.00	0.00	0.00	0.01
Crawler Tractors	2	2009	0.00	2.60	12.55	0.12	0.00	0.08	0.37	0.10	0.00	0.05	0.25	0.11
Crawler Tractors	1	2006	0.00	1.50	2.40	0.10	0.00	0.08	0.13	0.10	0.00	0.05	0.09	0.11
Crawler Tractors	1	2005	0.00	2.77	7.09	0.10	0.00	0.24	0.60	0.10	0.00	0.08	0.21	0.11
Graders	1	2006	0.00	1.49	2.46	0.10	0.00	0.12	0.20	0.10	0.00	0.06	0.10	0.11
Rollers	2	2009	0.00	1.33	2.34	0.10	0.00	0.08	0.14	0.13	0.00	0.06	0.11	0.14
Scrapers	10	2006	0.00	1.84	121.37	0.10	0.00	0.21	13.69	0.10	0.00	0.08	5.44	0.11
Off-Highway Trucks	2	2007	0.00	1.47	23.49	0.10	0.00	0.18	2.85	0.10	0.00	0.07	1.08	0.11
Crawler Tractors	2	2009	0.00	1.69	22.34	0.10	0.00	0.23	3.07	0.10	0.00	0.08	1.08	0.11
Crawler Tractors	1	2009	0.00	3.01	28.99	0.12	0.00	0.25	2.41	0.10	0.00	0.09	0.83	0.11
Crawler Tractors	1	2009	0.00	2.66	12.81	0.12	0.00	0.10	0.48	0.10	0.00	0.06	0.27	0.11
Excavators	1	2004	0.00	3.59	0.81	0.46	0.00	0.45	0.10	0.36	0.00	0.29	0.07	0.39
Rubber Tired Loaders	1	2008	0.00	1.30	0.32	0.10	0.00	0.09	0.02	0.13	0.00	0.07	0.02	0.14
Bore/Drill Rigs	1	2009	0.00	1.78	2.53	0.10	0.00	0.11	0.15	0.10	0.00	0.07	0.09	0.11
Cranes	1	2000	0.00	3.26	0.02	0.32	0.00	0.21	0.00	0.14	0.00	0.08	0.00	0.15
Other Construction Equip	1	2011	0.00	1.70	0.20	0.10	0.00	0.06	0.01	0.18	0.00	0.10	0.01	0.20
Other Construction Equip	1	2008	0.00	1.48	0.92	0.10	0.00	0.09	0.06	0.10	0.00	0.06	0.03	0.11
Other Construction Equip	1	2002	0.00	4.64	0.08	0.99	0.00	0.79	0.01	0.63	0.00	0.47	0.01	0.69
Graders	1	2005	0.00	2.63	3.62	0.12	0.00	0.11	0.15	0.10	0.00	0.06	0.08	0.11
Scrapers	5	2007	0.00	1.76	29.18	0.10	0.00	0.15	2.46	0.10	0.00	0.07	1.19	0.11
Crawler Tractors	1	2006	0.00	1.57	3.54	0.10	0.00	0.13	0.30	0.10	0.00	0.06	0.14	0.11
Crawler Tractors	1	2008	0.00	1.56	1.72	0.10	0.00	0.13	0.14	0.10	0.00	0.06	0.07	0.11
Rubber Tired Loaders	1	2007	0.00	1.45	5.49	0.10	0.00	0.22	0.82	0.10	0.00	0.07	0.27	0.11
Scrapers	2	2007	0.00	1.90	25.13	0.10	0.00	0.26	3.45	0.10	0.00	0.09	1.22	0.11
Off-Highway Trucks	2	2006	0.00	1.39	7.17	0.10	0.00	0.11	0.56	0.10	0.00	0.06	0.29	0.11
Off-Highway Trucks	4	2008	0.00	1.37	21.85	0.10	0.00	0.09	1.48	0.10	0.00	0.05	0.84	0.11
Crawler Tractors	2	2008	0.00	1.52	3.41	0.10	0.00	0.10	0.21	0.10	0.00	0.06	0.13	0.11
Rubber Tired Loaders	1	2007	0.00	1.27	0.63	0.10	0.00	0.07	0.03	0.10	0.00	0.05	0.02	0.11
Rough Terrain Forklifts	1	2006	0.00	2.56	0.86	0.16	0.00	0.11	0.04	0.15	0.00	0.08	0.03	0.16
Crawler Tractors	1	2006	0.00	1.65	1.87	0.10	0.00	0.20	0.23	0.10	0.00	0.08	0.09	0.11
Skid Steer Loaders	1	2007	0.00	1.29	0.67	0.10	0.00	0.07	0.04	0.13	0.00	0.06	0.03	0.14
Crawler Tractors	1	2008	0.00	1.78	0.49	0.10	0.00	0.08	0.02	0.18	0.00	0.10	0.03	0.20
Crawler Tractors	1	2006	0.00	1.61	5.14	0.10	0.00	0.17	0.53	0.10	0.00	0.07	0.22	0.11
Excavators	1	2007	0.00	1.36	1.50	0.10	0.00	0.09	0.10	0.10	0.00	0.05	0.06	0.11

		Input C												
Equipment Type	Qty. equip	Equip ment	Deteriorati on Factor	Effective Emission	Effective Daily	average hours/year	ARB NOx (g/bhp-hr)	ARB ROG (g/bhp-hr)	ARB PM2.5	ARB PM10	ARB equipment	ARB equipment	ARB equipment	ARB equipment
	71			**0.08**	**16.90**		**1.85**	**0.16**	**0.07**	**0.07**	**3.88**	**0.71**	**0.22**	**0.24**
Excavators	1	2001	0.00	0.0913	0.29	1396	3.73	0.22	0.09	0.09	2.47	0.32	0.08	0.09
Excavators	1	1996	0.00	0.0913	0.54	1396	3.73	0.22	0.09	0.09	2.47	0.32	0.08	0.09
Crawler Tractors	1	2010	0.00	0.0565	0.03	1013	1.49	0.07	0.05	0.06	4.54	1.19	0.34	0.36
Crawler Tractors	1	2007	0.00	0.0710	0.23	1013	1.59	0.15	0.07	0.07	4.54	1.19	0.34	0.36
Bore/Drill Rigs	4	2007	0.00	0.0796	0.39	811	1.83	0.15	0.07	0.08	3.11	0.37	0.11	0.12
Bore/Drill Rigs	4	2006	0.00	0.0829	0.41	811	3.33	0.18	0.08	0.08	3.11	0.37	0.11	0.12
Cranes	2	2011	0.00	0.0742	0.00	1252	1.18	0.05	0.07	0.07	2.77	0.63	0.20	0.21
Cranes	2	2012	0.00	0.0037	0.00	1252	0.93	0.04	0.00	0.00	2.77	0.63	0.20	0.21
Crawler Tractors	2	2009	0.00	0.0563	0.27	1013	2.60	0.08	0.05	0.06	4.54	1.19	0.34	0.36
Crawler Tractors	1	2006	0.00	0.0588	0.09	1013	1.50	0.08	0.05	0.06	4.54	1.19	0.34	0.36
Crawler Tractors	1	2005	0.00	0.0867	0.22	1013	2.77	0.24	0.08	0.09	4.54	1.19	0.34	0.36
Graders	1	2006	0.00	0.0642	0.11	929	1.49	0.12	0.06	0.06	3.97	0.95	0.29	0.31
Rollers	2	2009	0.00	0.0694	0.12	695	1.33	0.08	0.06	0.07	2.32	0.27	0.08	0.09
Scrapers	10	2006	0.00	0.0873	5.78	1092	1.84	0.21	0.08	0.09	4.93	0.77	0.30	0.33
Off-Highway Trucks	2	2007	0.00	0.0717	1.15	1958	1.47	0.18	0.07	0.07	2.91	0.43	0.10	0.11
Crawler Tractors	2	2009	0.00	0.0862	1.14	1013	1.69	0.23	0.08	0.09	4.54	1.19	0.34	0.36
Crawler Tractors	1	2009	0.00	0.0902	0.87	1013	3.01	0.25	0.09	0.09	4.54	1.19	0.34	0.36
Crawler Tractors	1	2009	0.00	0.0608	0.29	1013	2.66	0.10	0.06	0.06	4.54	1.19	0.34	0.36
Excavators	1	2004	0.00	0.3048	0.07	1396	3.59	0.45	0.29	0.30	2.47	0.32	0.08	0.09
Rubber Tired Loaders	1	2008	0.00	0.0729	0.02	957	1.30	0.09	0.07	0.07	2.34	0.31	0.08	0.08
Bore/Drill Rigs	1	2009	0.00	0.0714	0.10	811	1.78	0.11	0.07	0.07	3.11	0.37	0.11	0.12
Cranes	1	2000	0.00	0.0845	0.00	1252	3.26	0.21	0.08	0.08	2.77	0.63	0.20	0.21
Other Construction Equip	1	2011	0.00	0.1056	0.01	690	1.70	0.06	0.10	0.11	2.57	0.30	0.09	0.10
Other Construction Equip	1	2008	0.00	0.0603	0.04	690	1.48	0.09	0.06	0.06	2.57	0.30	0.09	0.10
Other Construction Equip	1	2002	0.00	0.4969	0.01	690	4.64	0.79	0.47	0.50	2.57	0.30	0.09	0.10
Graders	1	2005	0.00	0.0609	0.08	929	2.63	0.11	0.06	0.06	3.97	0.95	0.29	0.31
Scrapers	5	2007	0.00	0.0770	1.27	1092	1.76	0.15	0.07	0.08	4.93	0.77	0.30	0.33
Crawler Tractors	1	2006	0.00	0.0684	0.15	1013	1.57	0.13	0.06	0.07	4.54	1.19	0.34	0.36
Crawler Tractors	1	2008	0.00	0.0677	0.07	1013	1.56	0.13	0.06	0.07	4.54	1.19	0.34	0.36
Rubber Tired Loaders	1	2007	0.00	0.0763	0.29	957	1.45	0.22	0.07	0.08	2.34	0.31	0.08	0.08
Scrapers	2	2007	0.00	0.0969	1.28	1092	1.90	0.26	0.09	0.10	4.93	0.77	0.30	0.33
Off-Highway Trucks	2	2006	0.00	0.0594	0.31	1958	1.39	0.11	0.06	0.06	2.91	0.43	0.10	0.11
Off-Highway Trucks	4	2008	0.00	0.0565	0.90	1958	1.37	0.09	0.05	0.06	2.91	0.43	0.10	0.11
Crawler Tractors	2	2008	0.00	0.0620	0.14	1013	1.52	0.10	0.06	0.06	4.54	1.19	0.34	0.36
Rubber Tired Loaders	1	2007	0.00	0.0498	0.02	957	1.27	0.07	0.05	0.05	2.34	0.31	0.08	0.08
Rough Terrain Forklifts	1	2006	0.00	0.0826	0.03	1123	2.56	0.11	0.08	0.08	3.57	0.71	0.24	0.25
Crawler Tractors	1	2006	0.00	0.0810	0.09	1013	1.65	0.20	0.08	0.08	4.54	1.19	0.34	0.36
Skid Steer Loaders	1	2007	0.00	0.0660	0.03	834	1.29	0.07	0.06	0.07	2.63	0.33	0.13	0.14
Crawler Tractors	1	2008	0.00	0.1068	0.03	1013	1.78	0.08	0.10	0.11	4.54	1.19	0.34	0.36
Crawler Tractors	1	2006	0.00	0.0744	0.24	1013	1.61	0.17	0.07	0.07	4.54	1.19	0.34	0.36
Excavators	1	2007	0.00	0.0559	0.06	1396	1.36	0.09	0.05	0.06	2.47	0.32	0.08	0.09

		Input C												
Equipment Type	Qty. equip	Equip ment	ARB equipment	ARB equipment	ARB equipment	ARB equipment	ARB equipment	ARB equipment	ARB equipment	ARB equipment	ARB NOx (g/hr)	ARB ROG (g/hr)	ARB PM2.5	ARB PM10 (g/hr)
	71		902	103	26	29	847	95	26	28	1784	335	106	114
Excavators	1	2001	422	52	14.1	15.3	422	52	14.1	15.3	1976	260	67	73
Excavators	1	1996	422	52	14.1	15.3	422	52	14.1	15.3	1976	260	67	73
Crawler Tractors	1	2010	623	81	24.9	26.9	623	81	24.9	26.9	2609	686	195	208
Crawler Tractors	1	2007	623	81	24.9	26.9	623	81	24.9	26.9	2609	686	195	208
Bore/Drill Rigs	4	2007	809	53	21.4	23.1	809	53	21.4	23.1	684	81	24	26
Bore/Drill Rigs	4	2006	809	53	21.4	23.1	809	53	21.4	23.1	699	83	25	27
Cranes	2	2011	926	103	26.6	28.7	926	103	26.6	28.7	257	58	18	19
Cranes	2	2012	926	103	26.6	28.7	926	103	26.6	28.7	360	82	25	27
Crawler Tractors	2	2009	623	81	24.9	26.9	623	81	24.9	26.9	3971	1043	297	316
Crawler Tractors	1	2006	623	81	24.9	26.9	623	81	24.9	26.9	2632	692	197	210
Crawler Tractors	1	2005	623	81	24.9	26.9	623	81	24.9	26.9	2106	553	158	168
Graders	1	2006	588	68	19.9	21.5	588	68	19.9	21.5	1190	284	86	92
Rollers	2	2009	293	36	14.4	15.6	293	36	14.4	15.6	371	44	13	14
Scrapers	10	2006	1257	146	35.4	38.4	1257	146	35.4	38.4	2957	461	181	195
Off-Highway Trucks	2	2007	1270	148	30.0	32.3	1270	148	30.0	32.3	2106	309	76	82
Crawler Tractors	2	2009	623	81	24.9	26.9	623	81	24.9	26.9	2723	715	204	217
Crawler Tractors	1	2009	623	81	24.9	26.9	623	81	24.9	26.9	3971	1043	297	316
Crawler Tractors	1	2009	623	81	24.9	26.9	623	81	24.9	26.9	3971	1043	297	316
Excavators	1	2004	451	55	15.9	17.2	451	55	15.9	17.2	282	37	9	10
Rubber Tired Loaders	1	2008	468	54	17.3	18.7	468	54	17.3	18.7	292	38	10	11
Bore/Drill Rigs	1	2009	809	53	21.4	23.1	809	53	21.4	23.1	2228	263	78	85
Cranes	1	2000	926	103	26.6	28.7	926	103	26.6	28.7	595	135	42	45
Other Construction Equip	1	2011	392	34	11.6	12.5	392	34	11.6	12.5	205	24	7	8
Other Construction Equip	1	2008	392	34	11.6	12.5	392	34	11.6	12.5	809	96	28	31
Other Construction Equip	1	2002	392	34	11.6	12.5	392	34	11.6	12.5	283	33	10	11
Graders	1	2005	588	68	19.9	21.5	588	68	19.9	21.5	992	237	71	76
Scrapers	5	2007	1257	146	35.4	38.4	1257	146	35.4	38.4	2957	461	181	195
Crawler Tractors	1	2006	623	81	24.9	26.9	623	81	24.9	26.9	1861	489	139	148
Crawler Tractors	1	2008	623	81	24.9	26.9	623	81	24.9	26.9	908	238	68	72
Rubber Tired Loaders	1	2007	468	54	17.3	18.7	468	54	17.3	18.7	1607	211	53	58
Scrapers	2	2007	1257	146	35.4	38.4	1257	146	35.4	38.4	2957	461	181	195
Off-Highway Trucks	2	2006	1270	148	30.0	32.3	1270	148	30.0	32.3	1363	200	49	53
Off-Highway Trucks	4	2008	1270	148	30.0	32.3	1270	148	30.0	32.3	2106	309	76	82
Crawler Tractors	2	2008	623	81	24.9	26.9	623	81	24.9	26.9	921	242	69	73
Rubber Tired Loaders	1	2007	468	54	17.3	18.7	468	54	17.3	18.7	421	55	14	15
Rough Terrain Forklifts	1	2006	290	40	17.1	18.5	290	40	17.1	18.5	435	87	29	31
Crawler Tractors	1	2006	623	81	24.9	26.9	623	81	24.9	26.9	1861	489	139	148
Skid Steer Loaders	1	2007	122	17	7.4	8.0	122	17	7.4	8.0	394	49	19	20
Crawler Tractors	1	2008	623	81	24.9	26.9	623	81	24.9	26.9	454	119	34	36
Crawler Tractors	1	2006	623	81	24.9	26.9	623	81	24.9	26.9	2632	692	197	210
Excavators	1	2007	451	55	15.9	17.2	451	55	15.9	17.2	988	130	33	36