Central Valley Regional Water Quality Control Board
18 March 2010 Board Meeting

Response to Comments for Musco Family Olive Company and the Studley Company
Wastewater Treatment and Land Disposal Facility
San Joaquin County

The following are Central Valley Regional Water Quality Control Board (Central Valley Water Board) Responses to comments submitted by interested parties regarding the tentative Waste Discharge Requirements for the Musco Family Olive Company wastewater treatment and land disposal facility. The Order was distributed for public comment on 14 January 2010. Comments were required to be submitted to the Central Valley Water Board by midnight on 16 February 2010. Comments were received from the following parties within the comment period:

1. The California League of Food Processors (CLFP);
2. Musco Family Olive Company; and
3. The California Sportfishing Protection Alliance (CSPA).

The comments were accepted into the record and are summarized below, followed by Central Valley Water Board staff's responses.

CALIFORNIA LEAGUE OF FOOD PROCESSORS (CLFP)

CLFP Comment: CLFP's letter expressed support for Musco and the WDRs. The following key points were expressed:

- The food processing industry is important to the economy of the Central Valley, and California is the leading U.S. producer of processed olives.
- Food processors employ over 220,000 workers in California, generating nearly $40 billion in sales revenue and $10 billion in annual labor income. Food processors are important customers of packaging suppliers, energy providers, truckers, and other companies.
- Many farmers depend on food processors and processing plants are the hub of economic activity in many rural communities in the Central Valley.
- Musco, like other CLFP members, is experiencing tightening regulatory requirements on its process wastewaters. Musco has been innovative and an industry leader in addressing its process wastewater issues. Musco has managed to reduce its salt loading by 32%, while substantially reducing the amount of water used in processing olives. This level of performance should be commended.
- Musco has also developed a NyPa grass into a viable, sustainable forage crop that can extract salts from wastewater, and the RENEWS system will treat its most concentrated wastewater. CLFP believes that these innovations will assist the industry in meeting requirements on wastewater application.

- Musco also provides over 225 full-time jobs and supports more than 200 grower families, and has been actively involved in statewide programs to develop solutions to salinity issues in the Central Valley, such as the CV-Salts Program.

Response: No response is required and no revisions to the WDRs were made to address these comments.

MUSCO FAMILY OLIVE COMPANY COMMENTS

Musco Comment 1: Revision of the flow limits (Discharge Specification B.1) is requested to allow average daily flows of up to 1.0 mgd for the harvest period months (September, October and November). This change would not affect the total annual flow of wastewater, nor would it impact the salt or hydraulic loadings to the LAAs.

Response: The requested revision is not supported by the approved water balance. Without commensurate reductions in the post-harvest monthly flow limits, the requested increase would allow overapplication of wastewater to the land application areas (LAAs) during the rainy season and/or overfilling of the reservoir during the design precipitation events. The flow limits in the proposed WDRs would allow numerous 1-MG days per month, which should allow Musco to accommodate reasonable variability in harvest rates. Therefore, the requested revision was not made.

Musco Comment 2: Revision of Land Application Area Specification D.4 is requested to allow the following:

a. Irrigation within 24 hours prior to rainfall which is predicted by the National Oceanic and Atmospheric Agency at a probability of 30 percent or less; and

b. Irrigation within 24 hours after a minor precipitation event (i.e., one that results in less than 0.1 inch of precipitation in Tracy).

Response: The requested revision was made (with some changes to clarify the requirements to ensure enforceability).

Musco Comment 3: Revision of the Antidegradation Analysis is requested to document and recognize Musco's efforts to assess the feasibility of reverse osmosis to reduce the salinity of wastewater discharges to the reservoir and LAAs

Response: A discussion of the reverse osmosis pilot test and the feasibility analysis included in the Report of Waste Discharge was added to the Antidegradation Analysis to address this comment. This is discussed further in the response to CSPA's comments.

Musco Comment 4: Revision of certain findings and Provisions G.1.b and G.1.c is requested because it is premature to require a Financial Assurance Report and funding of a Financial Assurance Account prior to approval of the Site Closure and Maintenance Report. As written, the WDRs require Musco to begin funding financial assurances for site closure in 2010 based on the highest cost alternative even though it is not Musco's preferred alternative. This would create extreme financial hardship and may make it impossible for Musco to obtain operational financing.

Response: Salt has been accumulating in the soil column in the LAAs for decades, and will continue to accumulate as long as Musco discharges elevated salinity wastewater onto the LAAs. The accumulated salt can threaten surface and groundwater quality if not properly dealt with at site closure. The alternatives for closure need further evaluation. However, at this time, staff has serious concerns over the ability of Musco to effectively move salts deeper into the soil column in a controlled manner consistently over the entire LAA. Therefore, staff is not sure that the Musco preferred alternative (which is the lower cost alternative) is a credible alternative. For the more expensive alternative involving removal of the uppermost soil layer from the LAAs, staff is concerned that more than six inches of soil may need to be removed (increasing the cost of closure) and that there was no consideration of closure costs for the reservoir. Thus, even the more expensive closure alternative may have an underestimated closure cost.

Staff recognizes that funding for closure is a significant economic issue for Musco. However, Musco agreed to establishing a closure funding mechanism for the LAAs and reservoir as part of the settlement of ACL Complaint No. R5-2004-0534 (ACL and Penalty Order No. R5-2007-0138, the Stipulation for Entry of Administrative Civil Liability and Penalty Order or Stipulated Order). The Stipulated Order is still in effect, and Musco would have been required to establish the financial assurance mechanism before now if staff had reviewed the closure plan earlier. Cease and Desist Order R5-2007-0139 also requires Musco to fund the financial assurance mechanism in accordance with Order R5-2007-0139.

Because site closure costs will be significant, staff recommends that a closure fund be established and funded as soon as feasible. Staff does not see why the financial issues for Musco will be less significant by delaying the start of closure funding by a year or two. However, staff has prepared alternative findings and provisions for the Board's consideration. See Attachment A to this Response to Comments for the alternative text.

Musco Comment 5: Provision G.1.d., which requires submittal of a Sludge Management Plan for the wastewater treatment/storage reservoir, includes requirements that are technically infeasible, unnecessary and undesirable:

a. It will not be possible to estimate sludge accumulated in the wastewater treatment/storage reservoir within a two-percent margin of error, but the proposed WDRs require sludge removal whenever the sludge volume exceeds two percent of the reservoir's capacity.

b. It is not possible to accurately estimate the rate of solids accumulation.

c. The Water balances provided in the Report of Waste Discharge were based on the assumption that the water depth would never drop below six feet, which is enough storage for sludge equivalent to seven percent of the reservoir's capacity.

d. The accumulated solids provide an additional seal to limit reservoir leakage and that sealing layer should not be disturbed.

Response: Provision G.1.d does not specify the required accuracy or precision of the sludge volume estimate, only that the Discharger propose a method of estimation that will comply with the intent of the Provision, which is to ensure that sludge is not allowed to accumulate to the point where the storage capacity is significantly reduced. If the sludge level is allowed to increase to the minimum operating depth of the aeration system (which is reflected by the six-foot minimum operating depth in the water balance), it will not be possible to operate the aerators without increasing the minimum operating depth, which would impact the reservoir's storage capacity. Staff agrees that a sludge layer can reduce reservoir leakage, but it should be possible to selectively remove excess sludge while leaving a certain minimum thickness of sludge relatively undisturbed.

Because a detailed sludge volume estimate was included in the 2007 *Storm Water and Tail Water Capacity Evaluation Report*, Provision G.1.d. was revised to increase the permissible sludge volume to 5 percent of the total reservoir volume and to remove the requirement to estimate the annual sludge generation rate. Instead, the Discharger will be required to complete a field evaluation of sludge volume at least every 5 years beginning in 2012 and remove sludge within 12 months of reaching the 5 percent limit.

Musco Comment 6: Revision of the Monitoring and Reporting Program is requested to change the soil moisture monitoring protocol to allow moisture testing at 12-inch intervals instead of the previous practice of obtaining moisture measurements at 4-inch increments from the ground surface to a depth of five feet. Revision is also requested to delete the four duplicate soil moisture monitoring locations.

Response: According to the *Final Report on Assimilative Capacity Study* (Kennedy/Jenks Consultants, January 2009), the soil moisture sensors used for the study obtained a soil moisture reading every 10 centimeters (approximately 4 inches) to a total depth of five feet. It is not appropriate to change the monitoring protocol because it would impact our ability to compare historic and future data.

The four "duplicate" soil moisture monitoring locations are not truly duplicates. According to the sampling location map provided in the assimilative capacity report, these sampling locations are at least 100 feet apart from their respective paired locations. In addition, comparison of the soil moisture time plots for the paired monitoring locations shows distinctly different moisture conditions at most, if not all, depths over the eight-month study period. Therefore, staff believes that it is appropriate to continue to monitor all of the soil moisture monitoring locations because the data will allow assessment of the spatial variability on both a small and larger (site-wide) scale. No revisions were made to address this comment.

Musco Comment 7: Revision of the Monitoring and Reporting Program is requested to consolidate the existing LAAs to four areas for the purposes of monitoring and reporting. The revised LAAs would be defined as follows:

- Area 1: Field 95 (1st, 2nd, and 3rd swales);
- Area 2: Field 55 (East and West);
- Area 3: South Ridge (East and West) and Checks; and
- Area 4: 18 North, Evaporation (South and West), Park West, Pasture, and Spur North.

Response: Musco has been monitoring and reporting land application to the individual LAAs for several years. The requested revision would allow averaging of critical monitoring data such as crop coverage, BOD loading, hydraulic Loading, and nitrogen loading over large areas. Such averaging is not appropriate because it would confound staff's ability to determine compliance with the discharge specifications. However, if Musco can demonstrate through future monitoring reports that the proposed change would provide equivalent assurance of compliance, the Executive Officer can issue a revised Monitoring and Reporting Program. At least two years of monthly comparison is recommended.

CALIFORNIA SPORTFISHING PROTECTION ALLIANCE COMMENTS

CSPA requested designated party status. Staff recommends that CSPA be treated as a designated party for this hearing. CSPA will have five minutes to make its presentation and conduct cross-examination, unless the Chair allows additional time at the hearing.

CSPA Comment 1: The discharge cannot be exempted from Title 27 because it is not in compliance with the Basin Plan, which includes water quality objectives for groundwater.

The comment mentions coliform several times, but this appears to be an erroneous reference. Coliform is not a constituent of concern in this discharge.

Comment 1a. Salinity constituents have been released from the wastewater treatment/storage reservoir and LAAs, and are present in groundwater at concentrations that exceed applicable water quality objectives.

Response: Staff has evaluated the hydrogeology of the site based on data currently available, some of which was obtained after the 2007 CDO was adopted. This reevaluation included salinity constituents. Several different types of groundwater exist below and adjacent to the facility. These groundwater types differ in quality from meteoric water (recharge primarily from precipitation) present in the swale upstream of the 84-million gallon reservoir with TDS concentrations between approximately 700 and 1,500 mg/L (MW-27 appears to be typical with a TDS slightly above 1,000 mg/L) to what appears to be connate water in 3 wells generally in the

southwestern portion of the site (MW-2, MW-2C, and MW-25) with TDS concentrations between 6,080 and 13,600 mg/L.

There have been legacy groundwater impacts from operation of the 84-million gallon reservoir that appear to be decreasing since seepage through the dam has been collected and redirected back to the reservoir and probable plugging of the reservoir by accumulation of fine-grained material and other solids on the bottom of the reservoir. TDS concentrations in groundwater from three of the four impacted wells (MW-3, MW-16, and MW-15) have returned to levels measured prior to operation of the 84-million gallon reservoir. TDS concentrations in groundwater from the other well (MW-5) are declining and less than 200 mg/lL above concentrations measured before the reservoir began operation.

Potential impacts from the LAAs are complicated by the complex hydrogeology and lack of data prior to initiation of land application. However, the concentration of salinity constituents is consistent with mixing of the different types of groundwater present beneath and upgradient of the site and it appears that many constituents are naturally occurring at concentrations that exceed water quality objectives. Nitrate concentrations measured in groundwater from shallow monitoring wells in the southern LAAs (the 95-acre LAA) do exceed the nitrate concentrations measured in shallow monitoring wells upgradient of the site. A technical argument was presented that these nitrates are due to a source other than the site. Additional information is needed to confirm that interpretation. Therefore, a supplemental nitrogen study is being required. Two additional provisions are being added to the WDRs that read:

> By **30 July 2010**, the Discharger shall submit a ***Workplan for Supplemental Evaluation of Nitrogen in Groundwater***. The workplan shall describe existing site conditions and the known distribution of nitrogen in groundwater and provide a detailed scope of work for assessing the nature and extent of nitrogen[1] in groundwater at the site and in background wells, and the potential for preferential waste constituent migration pathways within the LAAs and on-site tailwater drainages. The primary purpose of the study is to identify whether past operational practices have caused exceedance of water quality objectives; the mechanism(s) that caused the pollution; whether current treatment and control practices are adequate to prevent continued pollution, and whether a regional source(s) of nitrate is entering the Site from the southwest. The workplan shall describe all proposed investigative methods including, but not limited to, additional groundwater sampling locations (whether temporary or permanent), analytical testing, and data analysis.
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> **By 30 April 2011**, the Discharger shall submit *a Supplemental Evaluation of Nitrogen in Groundwater and BPTC Measures Report.* The report shall describe the investigation results and evaluate the following:
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> i. Whether past operational practices have caused exceedance of water quality objectives,

[1] Nitrogen includes total Kjeldahl nitrogen, ammonia nitrogen, and nitrate nitrogen.

ii. The mechanism(s) that caused the pollution,

iii. Whether current treatment and control practices are adequate to prevent continued pollution,

iv. Whether there is a regional source(s) of nitrate entering the Site from the southwest and responsible for nitrate concentrations detected in groundwater onsite.

If the study indicates that additional treatment/control practices are needed to stop or prevent any exceedance of water quality objectives, the report shall also includes a feasibility analysis of alternative treatment and control methods to ensure compliance with the Basin Plan; selection of the preferred treatment/control measures; and a schedule for full implementation of those measures. The schedule for full implementation shall not extend beyond **30 October 2012**.

Comment 1b. There is no containment of wastewater in the reservoir or the land application areas to prevent the release of minerals and salts under ambient environmental conditions.

Response: The commenter is correct that the wastewater treatment/storage reservoir and LAAs do not have engineered containment systems. Past operations of the 84-million gallon reservoir appear to have impacted groundwater in the central swale as discussed in the response to Comment 1a. In addition, as discussed in the response to Comment 1a. supplemental evaluation of the source of nitrogen detected in groundwater from shallow groundwater monitoring wells on site is warranted. However, ambient conditions at the site appear to provide a level of containment sufficient to prevent impacts to the beneficial uses of groundwater when combined with careful operations management, as described below.

As shown on the hydrogeologic cross sections in the RWD, the LAAs north and south of the reservoir and south of the Class II surface impoundments are underlain by a vadose (unsaturated) zone consisting of approximately 25 feet to over 100 feet of low permeability clay with interbedded layers or lenses of sand/gravel mixtures. The cross sections show that the LAAs southwest and north of the processing plant are underlain by a similarly deep vadose zone that exhibits slightly more permeable silt/sand mixtures. These site-specific ambient conditions provide a level of containment sufficient to prevent release of waste constituents to groundwater when land application is carefully controlled, as is the Discharger's current practice. This is supported by the soil monitoring data discussed in Finding Nos. 42 through 46. Those data indicate that, despite the Discharger's previous less-than-ideal operational practices, there is no evidence of significant salt or nitrogen migration deeper than three to four feet below the ground surface, even in LAAs that have been used since for 15 years or more. The same is true for the LAAs underlain by the more permeable soils, which have been in use for 8 to 10 years. The soil monitoring data indicate that migration of salts below four feet is limited in areal extent, if it exists at all. Therefore, soil monitoring data show that waste constituents have been, and can continue to be, contained within the shallow soil to prevent degradation of groundwater quality under ambient site conditions.

The wastewater treatment/storage reservoir is constructed within a natural drainage channel (the "central swale") which at one time drained several hundred acres. Drainage originating upstream of the reservoir was diverted around the reservoir as part of the reservoir construction project. As shown in the cross sections provided in the RWD, the drainage channel is characterized by a relatively thin deposit of coarser Quaternary alluvium over a significant depth of clay. Based on groundwater monitoring data provided in the RWD, shallow groundwater is currently present at depths of approximately 5 to 10 feet below the ground surface along the channel alignment both upstream and downstream of the reservoir. Because of the size of the original drainage area and the fact that the ephemeral stream is mapped by the United States Geological Survey as not extending to waters of the United States, it is likely that the presence of the shallow groundwater in the channel alluvium predates the dam (i.e., the channel was a historical, albeit small, source of shallow groundwater recharge).

According to a report prepared by a registered Geotechnical Engineer who performed testing and observation during dam foundation preparation and dam construction, "…[t]he dam was founded below the near-surface colluvial and weathered, older-alluvial soils in the very-stiff to dense, older-alluvial [clay] deposits. Due to sand and gravel deposits encountered, the foundation and cutoff trench were deepened up to a depth of about 23 feet." [2] This finding indicates that the dam was constructed in a manner that minimized the potential for impounded wastewater to travel through the coarser alluvium in the central swale past the dam.

Groundwater monitoring data indicate that bicarbonate, which has been present at relatively high concentrations in the waste since the Discharger started using carbon dioxide to neutralize the olive storage solution in about 1992, is present at elevated concentrations in shallow zone monitoring wells both upstream and downstream of the dam. However, bicarbonate concentrations in the shallow zone wells below the dam have been declining since 2008. During the same period, seepage into the dam's toe drain sump has declined from up to 3,500 gallons per day to no measurable flow. These facts indicate that the reservoir leakage is now minimal and that the dam provides an effective barrier to offsite migration of waste constituents from impounded wastewater. Increases in chloride levels concurrent with decreases in bicarbonate levels suggest that high salinity levels are due to natural conditions in connate water, and are not caused by discharges from the reservoir.

The WDRs have been modified to include a supplemental nitrogen study as described in the response to Comment 1a.

Comment 1c. Several groundwater monitoring wells exhibit mean TDS concentrations less than or equal to approximately 1,500 mg/l. Three of these wells have mean TDS concentrations of less than 800 mg/l. It is evident that groundwater with TDS at approximately 1,000 mg/l is present in the immediately adjacent vicinity of the Musco facility.

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[2] Summary of Testing and Observation, Process Water Storage Reservoir, Musco Olive Products, Kleinfelder, 29 March 2004.

Response: As discussed in the response to Comment 1a, there are several different types of groundwater beneath and upgradient of the site. These shallow groundwaters include what have been interpreted to be meteoric waters that have TDS concentrations in the range of approximately 700 to 1,500 mg/L. There are also connate waters present beneath the site that have TDS concentrations that range from approximately 6,000 to 13,000 mg/L. It is not appropriate to compare groundwater quality downgradient of site activities to the quality of groundwater from the wells containing ephemeral water any more than it is appropriate to compare to the quality of groundwater from the wells containing connate water. It appears that the naturally occurring groundwater beneath most of the site is a mixture of the different groundwater types. Similar geologic conditions have been observed at other sites along the eastern edge of the Coast Range Mountains.

Comment 1d. The FDS of the discharge to the wastewater treatment/storage reservoir exceeds background groundwater quality and the upper and short-term secondary MCLs. The fact that Musco has planted salt-loving grass on its application areas is evidence that the quality of the waste discharged renders it unfit for most agricultural applications and that the discharge, if allowed to continue, poses an obvious and serious threat to the beneficial use of agricultural supply.

Response: The narrative chemical constituents objective that protects the irrigated agriculture (AGR) use is applied on a site-specific basis. It appears that the natural quality of most groundwater beneath the site would not be appropriate for most agricultural activities. As discussed in responses to previous comments in this document, the complex hydrogeology of the site does allow comparison of upgradient versus downgradient groundwater quality. However, it does not appear that site operations pose a significant threat to agricultural water supplies downgradient of the facility.

Comment 1e. The waste contains pollutants such as salts that have been, and could be, released in concentrations exceeding applicable water quality objectives and that are reasonably expected to affect beneficial uses of the waters of the state under ambient environmental conditions. The discharge is, therefore, designated waste and must be regulated and managed in accordance with Title 27.

Response: Per section 13173(b) of the CWC, nonhazardous waste is designated waste if it "…consists of, or contains, pollutants that, under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives or that could reasonably be expected to affect beneficial uses of the waters of the state…" Staff agrees that the wastewater contains high concentrations of biodegradable organic matter and nondegradable salts. However, as described above, under ambient conditions at the LAAs, those constituents under current site operations are not reasonably expected to affect the beneficial uses of groundwater. As discussed above, groundwater data indicate that the reservoir has released one or more waste constituents to the shallow groundwater beneath the reservoir itself, and that there is a small plume of salt-impacted

groundwater downgradient of the dam that appears to be dissipating. However, the monitoring data also show that seepage from the toe drain has stopped and declining bicarbonate concentrations in shallow groundwater downgradient of the dam indicate that that the one-time source has been effectively blocked. Thus, the current discharge quality will not cause any degradation of groundwater. There is no applicable water quality objective or goal for bicarbonate on which to base a numeric groundwater limitation, because there is no scientific basis to establish the level of bicarbonate that is necessary to protect irrigated agriculture on a site-specific basis. Overall salinity limitations, expressed as FDS, address all types of salts, including bicarbonate.

When naturally occurring background conditions exceed the otherwise applicable water quality objective, this background serves as the applicable objective. (Basin Plan, pp. III-9.00, IV-17.00.) As described in the WDRs findings (see, e.g., Finding 70), naturally occurring background salinity TDS likely exceeds 2,000 µg/L. The Total Dissolved Solids (TDS) test measures the total solids that will pass through a specified type of filter paper, with the assumption that all those solids are "dissolved" in the water. Thus, TDS can include not only mineral salts (e.g., sodium, chloride, sulfates), but dissolved organic materials (e.g. sugars, starches), colloidal materials (solid materials of small enough size to pass through the filter paper, e.g. colloidal fats), and potentially other solids not generally considered to be "salt". A Fixed Dissolved Solids (FDS) test takes the solids collected on the filter paper and heats the solids under specified conditions to remove the organic matter from the sample, leaving only mineral salts. The heating processing can also "boil off" carbonates, hydrates, and other non-organic matter, so the test is not a perfect measure of mineral salts. The significance of the FDS test is that the organic portion of the TDS will generally be removed by physical and biologic action as the wastewater moves through the soil column, so the FDS is generally a better estimate of the potential impact of a wastewater on groundwater. Food processing wastes have high organic fractions, so a wastewater with a high TDS may not represent a salinity threat to the groundwater because the organic fraction of the wastewater will be removed by soil interactions. The ratios of FDS to TDS that are used to compare wastewater quality to groundwater quality were calculated from laboratory analysis of the wastewater when samples were analyzed for both constituents. Ratios for sodium and chloride were similarly calculated from wastewater data.

The applicability of Title 27 is discussed in more detail below

Comment 1f. Cease and Desist Order No. R5-2007-0139 for Musco states that process wastewater storage and application has resulted in degradation or pollution of the underlying groundwater, and that the data available at that time show that continuing the then-current discharge loading rate to land does not protect water quality.

Response: Finding No. 7 of Cease and Desist Order No. R5-2007-0139 states: "The complex hydrogeology and incomplete background groundwater quality data resulted in the Regional Water Board establishing interim effluent limitations for total dissolved solids (TDS), sodium, and chloride in WDRs Order No. R5-2002-0148. These effluent limits were set above the presumed

background groundwater concentrations, and the Order required the Discharger to (a) complete a Background Groundwater Quality Study, and (b) propose final background groundwater concentrations and final effluent limitations within two years. The Order stated that the final effluent limitations were expected to be more restrictive than the interim effluent limitations." Finding No. 31.b of the 2007 CDO states: "Process wastewater storage and application has resulted in increases in groundwater concentrations over time, causing degradation or pollution of the underlying groundwater. Although background groundwater concentrations have not yet been determined, the data clearly shows that the continuing current discharge loading rate to land does not protect water quality. Additional monitoring wells are needed to assess the extent of groundwater impacts."

As stated in the two findings presented in the paragraph above, additional data were required to evaluate background conditions. The evaluation of data collected since the CDO was adopted in combination with data available at the time the CDO was prepared has resulted in an updated analysis of impacts at the site. While it is clear that prior operation of the wastewater treatment/storage reservoir impacted groundwater quality, current operations appear to be protective of groundwater quality. It is not clear that operation of the LAAs has resulted in degradation or pollution of groundwater. Unfortunately, the complexity of the site hydrogeology does not allow comparison of upgradient groundwater quality to downgradient groundwater quality to determine impacts. As additional data are collected, the complexity of the site hydrogeology will require further evaluation of potential site impacts with modification of site activities should unacceptable degradation or pollution of groundwater occur.

Comment 1g. Degradation has already occurred. Continued degradation has the potential to unreasonably affect present and anticipated beneficial uses, and threatens to result in water quality that exceeds water quality objectives, at a minimum, by causing TDS or FDS in the groundwater to increase from approximately 1,000 mg/l TDS (upper level secondary MCL) to some value in excess of the 1,500 mg/l TDS short-term level secondary MCL.

Response: Please see responses to comments 1a, 1c, 1d, and 1f.

Comment 1h. The total nitrogen concentration of the wastewater is characterized as 47 mg/l. Nitrogen will generally convert to nitrate as it migrates to groundwater. The primary drinking water MCL for nitrate is 10 mg/l [as nitrogen]. Therefore, the discharge presents a reasonable potential to degrade groundwater and cause exceedance of the primary MCL for nitrate.

Response: The commenter correctly notes that the mean total nitrogen concentration of waste discharged to the LAAs is approximately 47 mg/L. The contention that the use of this wastewater to irrigate the LAAs will cause exceedance of the MCL in groundwater is unsupported. As noted in Finding No. 80.b, "…the potential for unreasonable degradation depends not only on the quality of the treated effluent, but the ability of the vadose zone below the wastewater treatment/storage reservoir and LAAs to provide an environment conducive to nitrification and denitrification to convert the effluent nitrogen to nitrate and the nitrate to nitrogen

gas before it reaches the water table. Available data indicate that nitrate concentrations detected in groundwater from onsite monitoring wells may be due to sources other than the site. As discussed in the response to Comment 1a, a supplemental nitrogen investigation is being required to further evaluate whether site activities have impacted nitrate concentrations in groundwater. The NyPa grass grown at the LAAs should remove most of the nitrogen in the applied wastewater if the Discharger continues the current level of wastewater treatment and maintains adequate crop coverage. Given the soil type and depth to groundwater at the LAAs, subsequent denitrification in the vadose zone is expected to prevent unreasonable groundwater degradation at the LAAs. This Order requires that the Discharger continue to treat the wastewater and maintain adequate crop cover at the LAAs." The thick fine-grained vadose zone beneath the LAAs provides ample opportunity for both the oxidizing and reducing environments necessary to convert nitrogen that is not taken up by the crop as the wastewater percolates through the root zone.

Comment 1i. The storage reservoir was apparently not designed to nitrify and/or denitrify. The removal of nitrogen from wastewater is common practice and can be considered best practicable treatment and control of the discharge.

Response: The commenter is correct that the wastewater treatment/storage reservoir is not designed specifically to nitrify or denitrify the waste. However, it is not correct to say that it is common practice to design wastewater treatment systems to do so. Such systems, while not common, are used to treat domestic wastewater that is discharged to surface waters under NPDES permits, but only where necessary to comply with effluent and receiving water limitations that protect the beneficial uses of surface water. It is not uncommon for domestic wastewater to be treated (nitrified/denitrified) to reduce effluent nitrate concentrations. Installation of a nitrification/denitrification system can either be a relatively simple modification of an existing treatment system, or it can require major modification or reconstruction of an existing treatment system. Installing a nitrification/denitrification system at Musco would require the Discharger to rebuild its entire system because the current system lacks mechanized treatment capacity necessary to support nitrification/denitrification. This would make installation of nitrification/denitrification significantly more expensive at this facility than at many wastewater treatment plants. Discharges that involve reuse of wastewater to irrigate crops (including domestic wastewater recycling projects) are typically not treated to remove nitrogen because the nitrogen present in the waste is an essential crop nutrient. When wastewater is applied at rates consistent with the nitrogen needs of the crop and with careful consideration of site-specific hydrogeologic conditions to ensure conversion of residual nitrogen within the vadose zone, there is no threat of exceedance of the nitrate water quality objective. For nitrogen, such operations do indeed provide best practicable treatment (within the vadose zone) and control (via crop uptake).

Comment 1j. The State Water Resources Control Board (State Board) issued a Water Quality Order for the Lodi White Slough Facility, WQO-2009-0005 (Lodi Order) dated 7 July 2009. The Lodi Order clarifies proper application of exemptions from the prescriptive

standards of Title 27. In accordance with the Lodi Order, the Discharger must provide evidence showing that the discharge meets applicable preconditions before the Regional Board find that the discharge is exempt from Title 27. Findings are not adequate if they merely assume that the Discharger will comply with WDRs requiring the Discharger to comply with the Basin Plan. Rather, the WDRs must find that the discharge currently complies with the Basin Plan. In this case, the discharge still exceeds water quality standards

Response: Staff agrees with the commenter's interpretation of the Lodi Order. Finding No. 88 has been revised to clarify that the discharge currently complies with the Basin Plan. The only possible exception is for nitrate nitrogen, but the proposed WDRs include a time schedule requiring the Discharger either to demonstrate that the current discharge does not cause an exceedence of nitrate objectives in groundwater or to upgrade the facility. However, it should be noted that compliance with any statute, regulation, or policy is always dependent on a Discharger's compliance with WDRs, which prescribe conditions of discharge that are specifically selected for that purpose. Therefore, the Title 27 exemption for future discharges correctly relies on the data (not an assumption) demonstrating that the proposed discharge will meet applicable objectives and comply with the Basin Plan..

The statement that the discharge exceeds water quality standards is confusing and potentially misleading. The waste discharged to the reservoir and LAAs contains certain constituents in concentrations that exceed some of the potentially applicable water quality goals, and possibly site-specific water quality objectives. However, objectives apply at the point of discharge to groundwater, not discharge to land. The discharge need not meet applicable objectives in the effluent discharged to land if pollutant removal will occur in the reservoir or soil column, or the groundwater has assimilative capacity and the discharge complies with the Antidegradation Policy. In addition, as discussed in detail in the WDRs' findings and the responses above, section 20090, subdivision (b) applies to land-discharges of designated waste as long as Title 22 does not require that the designated waste be managed as hazardous waste.

Comment 1k. Additionally, the proposed WDRs rely on the Discharger implementing a "new" technology [presumably the RENEWS system] to be installed and operational before an expansion in flows is allowed (see Finding No. 79). Therefore, the discharger does not meet the preconditions of current compliance with the Basin Plan, which is necessary to receive an exemption from Title 27.

Response: Staff disagrees. The WDRs do not rely on implementation of the RENEWS system (or any other technology) in granting an exemption from Title 27. In fact, Finding No. 85 expressly states that the Discharger has not committed to a time schedule to implement the full-scale RENEWS system. Although the pilot scale testing of the RENEWS system is promising, the feasibility of the RENEWS system will not be known until larger scale implementation is completed. The WDRs require the Discharger to begin operation of the full-scale system or demonstrate that it is infeasible. If installation of the RENEWS system is infeasible, it is not a best practicable treatment and control measure.

CSPA Comment 2: The proposed WDRs do not comply with the Antidegradation Policy (Resolution 68-16).

Comment 2a. The Antidegradation Policy discussion ignores the fact that groundwater at the site has been, and currently continues to be, degraded by the wastewater discharge. The wastewater discharge has and continues to degrade designated beneficial uses.

Response: Although Finding No. 79 specifically references findings in prior orders that unreasonable degradation has occurred, this Finding has been revised to more fully describe the nature and extent of the degradation that has occurred. The commenter is correct that the previous discharge has degraded groundwater quality, but the claim that there will be additional degradation in the future is unfounded. Staff acknowledge that Musco failed to comply with previous WDRs leading to enforcement orders that were adopted as a result of the serious and ongoing violations. However, the board must also consider the Discharger's recent compliance record, significant expenditures to improve discharge operations, and achievements in improving the character of the discharge and operations in an effort to comply and better protect water quality. The proposed WDRs regulate the current discharge quality, not historic operations. It is in consideration of all of the facts, including both the long history of noncompliance and more recent accomplishments that staff determined that the discharge currently complies with the Antidegradation Policy and, if it continues to be managed in accordance with Musco's current practices, will continue to comply with that policy. As described in revised Findings 65-66, the Discharger must provide additional information and possible upgrade the facility or modify operations in order to demonstrate compliance with nitrate objectives. However, WDRs may include time schedules for compliance (CWC section 13263, subdivision (c)). The proposed WDRs comply with the requirements of Resolution 68-16 that WDRs *will* protect high quality waters from degradation. Resolution 68-16 does not require this protection to be immediate.

Comment 2b. The proposed WDRs do not address the economic impact of allowing groundwater degradation. The determination that it is consistent with Resolution 68-16 is based on statements that some groundwater degradation is acceptable because economic prosperity of local communities is benefited, that significant degradation of groundwater quality beyond existing degradation is limited, that Musco has engaged measures to reduce water and chemical use and associated wastewater discharges, and that Musco has proposed to try an evaporation-based salinity removal system.

Response: Compliance with the Antidegradation Policy does not require that there be no demonstrated economic impact associated with the allowed level of degradation; it only requires that the Regional Water Boards consider all relevant factors in determining that the allowed degradation is in the best interest of the people of the State. . The proposed WDRs contain findings that support the overall finding of compliance with the Antidegradation Policy.

Comment 2c. The proposed WDRs state that the Discharger treats its process water supply and that all wastewater discharged to the LAAs receives treatment in the wastewater treatment/storage reservoir. The treatment provided in the reservoir is not described, but appears to consist only of the aerators referenced in the proposed Monitoring and Reporting Program. Clearly the discharger is aware of and employs water treatment technologies, but has simply chosen not to use them when it comes to protecting water quality and complying with water quality regulations. Musco is not employing best practicable treatment measures.

Response: Finding No. 22 describes the specific means of treatment provided upstream of and within the wastewater treatment/storage reservoir. As stated in Finding No. 24, the reservoir aeration system achieves approximately 81 percent BOD reduction while increasing the FDS concentration by approximately 50 percent due to evapoconcentration. The level of treatment provided is sufficient to reduce the threat of potential nuisance conditions and groundwater degradation due to biodegradable organic matter. Additional treatment to remove organic matter and nitrogen is provided in the soil of the LAAs, as described in Finding Nos. 74 and 80.b. Removal of BOD and nitrogen in the vadose zone is amply supported by numerous technical publications. Additionally, LAA soil monitoring data show significant reductions in nitrogen within the upper six feet of soil, with significant reduction occurring below the approximate 48-inche rooting depth of the NyPa crop. A new finding has been added after Finding No. 45 to discuss the soil nitrogen monitoring data.

Comment 2d. Musco's original proposal was to control its wastewater discharge via full containment of process wastewater, but a third Class II surface impoundment proposed as recently as 1996 was never constructed. Full containment, as originally proposed, would be an example of best practicable control.

Response: The commenter correctly notes that full containment is a control technology used at some facilities. However, it is not the only means of control available. The Discharger completed pilot-scale treatment studies and a feasibility study to evaluate other methods of treatment and control for salinity. This work was described in the RWD. The feasibility study is summarized below and included in a new finding (No. 84).

Between 2003 and 2005, the Discharger conducted a pilot study to evaluate the feasibility of using a two-stage reverse osmosis (RO) system to remove dissolved solids from the process wastewater. Wastewater was pre-treated with a membrane bioreactor (MBR) system and then routed to a two-stage RO unit. The MBR achieved very high BOD removal despite problems with fouling attributed to higher-than-expected organic strength in the raw wastewater. Despite the high level of BOD reduction, the MBR effluent caused frequent RO membrane fouling because it exhibited high chemical oxygen demand (COD). Some of the MBR effluent was transported off-site for further treatment using hydrogen peroxide, ultraviolet light and ozone, but this was not effective in reducing the frequency of RO membrane fouling. The study concluded that anaerobic treatment would likely be more effective as a means of pretreatment, but it would come at a higher capital cost than an MBR system.

Between 2007 and 2009, the Discharger performed a pilot study to evaluate the potential for using heat energy from olive pits, the harvested crop, and or other fuels to evaporate selected high-salinity wastewater to generate electricity. The Discharger constructed a demonstration-scale plant (called the "Renewable Energy/Wastewater System" or RENEWS), which is capable of treating up to 6,000 gallons of waste water per day. The demonstration-scale RENEWS unit successfully reduced the FDS of one of the Discharger's waste streams to below 100 mg/L. The concentrated brine from the RENEWS system could be discharged to the Class II surface impoundments or transported to a permitted offsite disposal facility. The low salinity condensate could be discharged to the effluent treatment/storage reservoir or otherwise recycled onsite.

The feasibility study included in the RWD also included an evaluation of using additional Class II surface impoundments to evaporate wastewater. The feasibility study provided incremental treatment and cost curves for various mass removal scenarios within each of the three alternatives. The following table summarizes the economic analysis of these alternatives at a consistent FDS removal level of 400 tons per year. This mass removal rate was selected from the incremental treatment and cost curves to compare the three alternatives because it is the expected removal achieved by RENEWS at 60,000 gpd (the size of the full-scale system that the Discharger plans to install this year). An FDS removal level of 400 tons per year is approximately equivalent to a 38 percent reduction of the FDS mass loading allowed by the proposed Order.

Feasibility Factor	**Reverse Osmosis**	**RENEWS**	**Class II Surface Impoundments**
Tons of FDS Removed per Year	400	400	400
Resultant FDS Concentration[1]	1,400	1,300	1,700
Volume Treated per Year	20 MG	22 MG	22 MG
Capital Cost	$3 million	$4 million	$30 million
Annual O&M Cost	$400,000	-$250,000[2]	Minimal[3]
30-Year Net Present Cost	$12 million	$0[2]	$30 million
Cost per Ton of FDS Removed	$1,000	-$200[2]	$2,000
Land Area Required	Minimal	Minimal	25 acres

[1] The resultant FDS concentration discharged to the reservoir and LAAs would not be constant due to differences in the volume treated and the volume of treated wastewater discharged to the reservoir.

[2] For this alternative the annual O&M cost is negative because of the energy savings that would be achieved by generating steam power on-site. Over a 30-year planning horizon, this energy cost savings is expected to pay for the treatment system.

[3] The economic analysis provided in the RWD assumed no O&M costs for this alternative. This is a conservative assumption, because O&M costs would increase the net present cost and cost per ton of FDS removed.

Based on this analysis, the RENEWS technology is the best practicable alternative to further reduce the mass of salt discharged to the reservoir and LAAs. Although the incremental treatment and cost curves are not linear, the cost ranking of alternatives indicated by the tabulated data remains the same over a wide range of FDS removal scenarios.

CSPA Comment No. 3: The proposed WDRs improperly use Fixed Dissolved Solids to regulate salinity as noted in Footnote 1 of Finding 23.

Comment 3a. There is no water quality standard or objective for FDS such as exists for TDS and EC. The existing MCLs expressed in terms of EC and/or TDS are applicable water quality standards and must be met, measuring FDS will not provide a means of determining whether the standards are being exceeded.

Response: Finding No. 23 explains the reason that FDS is used to characterize the salinity of the waste and regulate the salinity concentration of the waste discharged to the reservoir and LAAs, and we contend that it is appropriate to use FDS for this purpose. Staff agrees that FDS is not an appropriate analysis for direct measurement of the salinity of groundwater. The proposed Order does not use FDS to assess compliance in the groundwater. In addition, see Response to Comment 1. Therefore, no revisions were made to address this comment.

Comment 3b. There is no evidence that dissolved organic matter is not migrating to degrade groundwater quality.

Response: The conclusion that there is no evidence that dissolved organic matter is not migrating to degrade groundwater quality does not automatically lead to the conclusion that dissolved organic matter is moving to the groundwater. Perhaps the best indicator that organic matter is not migrating to groundwater is the paucity of detectable concentrations of BOD in groundwater. The only well that has had consistent detectable concentrations of BOD in groundwater samples is well MW-29. This is an offsite intermediate zone well in the central swale, south of the site. Groundwater from this well typically has BOD concentrations of 2.1 to 13.4 mg/L with one detection outside this range at 34.2 mg/L. The location of this well makes it highly unlikely that it is the only onsite monitoring well impacted by organic matter from the site.

Comment 3c. FDS levels are not comparable to previous results for TDS and/or EC.

Response: As stated above, the only use of FDS is to characterize the salinity of the wastewater itself. In addition, there is a large data set of monitoring data that allows a correlation of FDS to the TDS, sodium, and chloride concentrations of the wastewater so that readily shows the history of salinity regulation for this facility.

Comment 3d. The use of FDS appears to solely be a means of restarting the regulatory process, resulting in additional delay. Delay in regulatory actions results in additional profits for the industry but delays protecting groundwater quality.

Response: There is no attempt to "restart the regulatory process" or delay setting protective effluent or groundwater limitations for this site. In fact, there is an extensive record of wastewater, soil, storm water runoff, and groundwater monitoring data that forms the basis for the proposed WDRs.

CSPA Comment No. 4: The proposed WDRs do not determine background groundwater quality or establish protective effluent limitations despite adequate data to do so.

Comment 4a. According to the previous WDRs (Order No. R5-2002-0148), monitoring wells were not installed until 2002, approximately five to fifteen years after the discharge began. Therefore, there is no on-site monitoring well data that can be considered representative of pre-discharge conditions or conditions that are unaffected by the waste discharge. Additionally, Cease and Desist Order No. R5-2007-0139 states that the on-site monitoring wells were not sampled before land discharge was initiated and that off-site monitoring wells are necessary to determine background groundwater quality and to develop a Water Quality Protection Standard (WQPS).

Response: As discussed above, evaluation of currently available data show that comparison of groundwater quality of off-site wells with quality of groundwater from on-site wells is not appropriate due to the complex hydrogeology. The lack of data prior to operation of the facility significantly complicates the evaluation of impacts by site activities. However, the lack of pre-existing data does not justify the use of off-site wells to develop a WQPS that does not appear to be appropriate even under natural conditions.

Comment 4b. Therefore, the apparent assertion that multiple on-site monitoring wells are considered upgradient and unimpacted by Musco's discharge is puzzling.

Response: There are eight wells that have been designated as upgradient wells by the Discharger. Five of these wells are on-site (MW-1, MW-2, MW-2C, MW-14, and MW-23) and three of these wells are off-site (MW-25, MW-27, and MW-29). The five on-site wells in this list are on the "upgradient" edge of the facility, but still within or near site activities. However, as discussed above, these wells have geochemical signatures different from those used to identify site impacts. Again, because of the complex hydrogeology of the site, it is not appropriate to compare groundwater quality of upgradient wells to the quality of groundwater in downgradient wells because the wells may not be completed in the same geologic units and there appears to be significant lateral and vertical variation in groundwater quality.

Comment 4c. The proposed WDRs fail to mention the stock watering well located west of the 95-acre LAA, which was referenced in Revised Monitoring and Reporting Program No. R5-2002-0148. Therefore, any conclusions based on the assumption that on-site groundwater monitoring data are reflective of upgradient groundwater conditions are suspect, at best.

Response: The stock watering well is located upstream of upgradient monitoring well MW-27. The well has been sampled by Central Valley Water Board staff and the concentrations of general mineral constituents were similar to concentrations detected in groundwater samples from monitoring well MW-27. While the stock watering well has not previously been routinely sampled by Musco, the MRP has been modified to include collection and analysis of groundwater samples from the stock watering well consistent with other water supply wells. The presence of this well upgradient of the site does not alter conclusions regarding groundwater monitoring on the site.

Comment 4d. The proposed WDRs attempt to avoid the issue of background groundwater by relying on intra-well data analysis from monitoring wells that were all installed several years after the discharge began. This delay could have allowed the degradation to approach a steady state degradation which is not an appropriate baseline against which to compare subsequent data.

Response: Staff agrees that use of existing data that do not pre-date operations on site is not an ideal situation and that use of an intrawell analysis for wells impacted by site activities is not appropriate. However, as discussed in responses above, the complexity of the site hydrogeology and the natural lateral and vertical variation in groundwater quality does not allow a comparison of upgradient versus downgradient groundwater quality. The WDRs do not attempt to avoid this situation; rather they recognize that interwell (upgradient versus downgradient) comparisons of groundwater data are not appropriate for this site. Finding No. 69 of the tentative WDRs has been modified and requires evaluation of alternative methods to evaluate site impacts that could include an intrawell analysis. The finding now reads:

Because of the hydrogeologic complexity of the site and the natural lateral and vertical variability of groundwater quality, evaluation of site impacts at the downgradient edge of the site should not be based on upgradient groundwater quality. Alternative methods to evaluate site impacts will need to be presented in the Groundwater Limitations Compliance Assessment Plan required by Provision G.1.a of this order. Complexity of the Site hydrogeology suggests that intrawell analysis of data may be appropriate. However, if the supplemental evaluation of nitrogen in groundwater determines that application of effluent to land is causing or contributing to elevated nitrate concentrations in groundwater, intrawell analysis may not be appropriate for wells impacted by site activities.

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Comment 4e. The proposed WDRs include attachments identifying soil and storm water monitoring locations and should be revised to include an attachment identifying groundwater monitoring well locations.

Response: Attachments A and E depict groundwater monitoring locations.

RESPONSE TO COMMENTS - ATTACHMENT A

ALTERNATIVE FINDINGS AND PROVISIONS TO POSTPONE REQUIRING FINANCIAL ASSURANCE FOR FINAL SITE CLOSURE

MUSCO FAMILY OLIVE COMPANY AND THE STUDLEY COMPANY
WASTEWATER TREATMENT AND LAND DISPOSAL FACILITY
SAN JOAQUIN COUNTY

1. Replace the last paragraph of Finding No. 67 with the following:

   There is not sufficient information at this time to select the final closure alternative, and a more detailed conceptual design is needed to refine the scope of work and closure cost estimates before the amount of required financial assurance can be determined. **This Order requires that the Discharger address the concerns noted above, and provide a conceptual closure plan with a detailed cost estimate, and provide financial assurance for the closure option based on the detailed cost estimate contained in the approved conceptual closure plan.**

   ~~However, it~~ **It** is essential that the Discharger establish and begin contributing to a financial assurance account so that the Central Valley Water Board can be assured that adequate closure funds will be in place within ~~ten years of the date of this Order~~ **a reasonable time**. **However, the Discharger needs additional time to make financial arrangements to begin funding the financial assurances.** Therefore, this Order requires that the Discharger establish a financial assurance mechanism and begin making contributions ~~beginning in 2010~~ **within 18 months of adoption of this Order (by September 2011)**. ~~This Order also requires that the Discharger address the concerns noted above, and provide a conceptual closure plan with a detailed cost estimate, and provide financial assurance for the closure option based on the detailed cost estimate contained in the approved conceptual closure plan.~~

2. Replace Provision G.1.b with the following[3]:

   By **~~30 July 2010~~ 30 September 2011**, the Discharger shall submit a *Financial Assurance Report*. The report shall document and describe in detail the financial assurances in the form of an irrevocable fund or other mechanism(s) that the Discharger has created, with the Central Valley Water Board named as beneficiary, to ensure that funds are available to complete site closure in accordance with the Excavation and Offsite Disposal Alternative scope and cost estimate cited in Finding No. 67 of this Order. The Discharger shall create financial assurance instrument(s) such that the closure project is fully funded **by 30 December ~~2020~~ 2021**, allowing for reasonable inflation, in equal annual deposits. The Discharger may not use a Financial Means Test or similar method for providing financial assurances.

[3] The provisions would be re-ordered so that the compliance dates are in chronological order in accordance with the revised due dates.

If the Executive Officer subsequently approves a *Conceptual Site Closure Plan* and the cost and scope of the approved closure project differs from the Excavation and Offsite Disposal Alternative cited in Finding No. 67, the Discharger shall submit a revised *Financial Assurance Report* **within 120 days** of approval of the *Conceptual Site Closure Plan*.

3. Replace Provision G.1.c with the following:

   By **30 December ~~2010~~ 2011** and by 30 December each subsequent year, the Discharger shall submit a *Financial Assurance Account Annual Update Report* that demonstrates that the Discharger has increased the total amount of financial assurance in accordance with Provision G.1.b above.

4. Replace Provision G.1.e with the following:

   By **30 March 2011**, the Discharger shall submit a *Conceptual Site Closure Plan*. The plan shall address the issues identified in Finding No. 67 and provide the following for both the Root Zone Salt Displacement and Excavation and Offsite Disposal alternatives:

   v. A detailed description of the predesign work that will be required to support final design of the alternative;

   vi. A detailed conceptual design based on currently available information about site conditions (including conceptual drawings for grading, and any other site work required);

   vii. A description of anticipated permitting activities (e.g., CEQA, dam decommissioning);

   viii. A detailed post-closure monitoring plan designed to demonstrate the long-term effectiveness of closure;

   ix. A detailed cost estimate for capital and annual post-closure monitoring and maintenance costs that includes documentation of specific materials and work required, estimated units of each material/work item, estimated unit cost, and extended cost; and

   x. An engineering economic analysis that determines, based on the cost estimates and reasonable annual cost escalation, the amount of financial assurances that must be in place by **30 December ~~2020~~ 2021**.