JORDAN RIVER TMDL RESPONSES TO COMMENTS FROM PUBLIC ON DRAFT TMDL ISSUED JANUARY 3, 2012

Date: DRAFT MAY 29, 2012

This document responds to public comments received from January 3, 2012 through March 31, 2012 on the Jordan River TMDL Water Quality Study. Issue date: January 3, 2012.

Table 1 documents each comment and its associated response, including proposed changes to the draft TMDL. Table 2 lists the source of each comment, along with the commenter's name and affiliation.

Table 1. Public comment and associated response.

Commenter Type	Letter Number	Comment Number	Comment	Response to Comment	Resultant Change to Document or Analysis
WWTP	1	1	Total Organic Matter Load Allocation Pages: ii, 57-59 It is very unclear as to what "current data" was used to calculate the values shown in Tables 3.6 & 3.7. Especially the "future" values. Since the draft TMDL references Cirrus (2010c) as the source, I would like to have a copy of that work for reference. Is one available and if so, where? Simply put, I highly question the "future" value estimates for loads from SVWRF and JBWRF. I cautiously question the "current" values used in the report. I would like to see the backup data.	The data used in Tables 3.6 and 3.7 are contained within *Cirrus 2010c* and is available on the DWQ website at http://www.waterquality.utah.gov/TMDL/JORDAN/TechMemoCompendiumFinal.pdf This document was made available to the public on the website following TAC review and response to comments in summer of 2010. To understand the future value estimates we recommend reviewing the technical memos cited in the TMDL study.	No change to document
WWTP	1	2	Correlation of Phosphorous and Nitrogen with DO The draft report is noticeably mute on this topic. What has been the State's findings to date on this?	Correlation of Phosphorous and Nitrogen with DO (Cirrus 2010c) contains a discussion in regards to why P and N were not pursued further in the TMDL process. See Section 2.7.1 for analysis of impact of reducing P and N on DO, and Table 44 for evidence of lack of DO response to changes in N and P in the QUAL2Kw model. Based on these results, the TMDL process has focused on Total OM. Since that time, consensus has been reached by the TAC in regards to Total OM as the pollutant of concern. A parallel effort within DWQ is underway to review N and P effects on DO. For additional information on this effort please contact Nicholas Von Stackelberg at 801-536-4374.	No change to document

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Organization	2	1	Topic: Re-Aeration in the River Page Number/Section: 5.5, pp. 76-77 Bad idea! Aeration = increased productivity Increased productivity=increased organic matter Increased organic matter=increased downstream biological demand. Increased BOD=Increased Max (daytime)/Min (nighttime) swings in DO, CO2, pH, etc., etc. downstream Increased fluctuations downstream= DECREASED fish, etc. through catostrophic (sic) mortalities and INCREASED occurance (sic) of off-flavor compounds=Decreased Benefit!	Artificial aeration does increase DO but, as noted, may cause unintended consequences downstream. The concerns raised in this letter regarding unintended consequences and/or downstream impacts will be evaluated prior to serious consideration of this remediation strategy.	The following statement will replace the final sentence in the second paragraph of Section 5.5: "In stream artificial aeration may be a viable solution that will be researched and considered in the next phase of the TMDL following an evaluation of potential downstream effects through predictive modeling prior to implementing this remediation strategy."
Organization	3	1	(Would there be) any benefit to flushing the lower Jordan River from time to time to get rid of organic matter (well, I guess it would just move the problem to the GSL).	Flushing flows have been considered as a potential strategy to reduce OM deposits on the river bed and hence potentially reduce sediment oxygen demand. However, this strategy would have to be carefully evaluated to ensure there would be no downstream impacts to the Farmington Bay wetlands, the effects of flushing on flood control requirements, and other factors.	No change to document
Organization	3	2	(Would) combining the Utah Lake and Jordan River TMDLs be beneficial, and if so, would doing so even be feasible? Is there value in looking at the two related water bodies together?	TMDLs are established for specific water bodies based upon their unique chemical, physical and biological characteristics. In the context of watershed planning there are many benefits to considering the entire watershed, but this holistic perspective is constrained by the practicality of geographic extent, administrative boundaries, and specificity of available information.	No change to document
Citizen	4	1	The first paragraph of the Executive Summary states: "This water quality study for the Jordan River establishes the Total Maximum Daily Load (TMDL) for Organic Matter (OM) that includes only the fine particulate organic matter, or FPOM of 3,983 kg/day that will achieve the model endpoint for Dissolved Oxygen (DO)" of 5.5 mg/l. This does not seem logical because the calculations in the TMDL ignore the contribution from coarse particulate organic matter, or CPOM .	The draft TMDL report made available for public review does not include the language cited by the commenter. It has not been a part of any TMDL draft since 3/18/11. The public draft report reads "This water quality study for the Jordan River establishes the Total Maximum Daily Load (TMDL) for **Total Organic Matter** (OM) of 3,983 kg/day that will achieve the model endpoint for Dissolved Oxygen (DO)" (emphasis added). Given our current understanding on the source and fate of OM within the Jordan River watershed, it is appropriate to identify percent reductions in total OM. Alternative methods of calculating OM loads will be evaluated in future phases of the TMDL. In regards to CPOM data, DWQ has not received the CPOM measurements collected by Dr. Miller from the Jordan River.	No change to document

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Citizen	4	2	A grievous error in the Draft Report is the linking of the percent of concentrations needing appropriate reductions to a common value. The Draft TMDL calls for a 30% reduction in concentration for all the important parameters to achieve the required 5.5 mg/l DO in the lower Jordan River. The source of that value is arbitrary. It apparently came from a simplistic decision to have all reductions based on required percentages to be the same, i.e., 30% . That number is only one of many possible scenarios. Just to choose a single scenario is not appropriate and is a misapplication of science. I believe this to be arbitrary.	The equal reduction scenario is provided as further evaluation along with previous technical reports that discuss other allocation scenarios to be evaluated in future phases of the TMDL. One of these is a "least-cost" scenario that will look at the least expensive way to meet load reductions.	No change to document
Citizen	4	3	This TMDL is a phased study. The Executive Summary of the study recognizes that data and procedures need additional study, to wit: "The next phase in the TMDL process will be focused on gathering additional data to support a more accurate assessment of OM loading …" I totally agree with this statement. However to further indicate in the Phase I of the TMDL that load reductions are to be realized from point sources, non-point sources, and tributaries based upon a 30% reduction across the board is wrong and premature. That should be left for Phase II as indicated above.	Please see response to comment above.	No change to document
Citizen	4	4	Again, continuing to break this out the bulk allocation of 3,983 kg/day into point sources, non-point sources, tributaries, etc., is not justified, especially when the SOD topic needs much more evaluation. It is silly to put out a document with strong language about required reduction amounts when these values will undoubtedly be changed as the process continues. Why put those numbers into the TMDL document now when there is a 100% probability that they will need to be changed.	This TMDL document is the culmination of many years of intensive data collection and analysis, representing the most current state of our knowledge on sources, loads, and ecological processes that collectively result in beneficial use impairment. The uncertainty associated with our current level of understanding is the basis for justifying a phased approach to TMDL implementation. As with all such scientific studies, the current state of our knowledge will progressively improve through additional data collection, analysis and testing of assumptions and hypotheses.	No change to document
Citizen	4	5	The Draft TMDL should not carry any calculations past the river bulk allocation of 3,983 kg/day , as either FPOM or CPOM, until Phase 2 is completed.	It is important in this first phase of the Jordan River TMDL to provide the most comprehensive analysis possible, including preliminary estimates of source loads, to inform future data collection efforts and analyses that will improve and refine our initial load estimates.	No change to document
Citizen	4	6	The Draft TMDL document should contain a strong disclaimer that "detailed load allocation calculations" past the bulk allocation of 3,983 kg/day are preliminary and will most probably be changed as Phase II is completed. The following suggested wording should be prominently displayed in the (1) executive summary and (2) other appropriate locations in the text of the report. "Since additional data and procedures are needed, any loading calculations applied to point sources, non-point sources, and tributaries are preliminary and more than likely to be changed as the TMDL moves into the next phase. The numbers presented in the TMDL are an example of just one	The public draft TMDL report contains multiple references to revisiting and updating pollutant loads and load allocations during future phases of the TMDL process. Furthermore, DWQ has participated in discussions with EPA regarding the likelihood of updating these portions of the TMDL in a phased approach. DWQ has shared EPA's response to this issue with all members of the TAC in written and verbal format. It is not necessary to caveat the report with text suggested by the commenter. However, the following changes will be made to the Executive Summary of the report to insure there is no misunderstanding on this issue.	The following text (in bold) will be added to the Executive Summary to emphasize the ongoing effort to more accurately characterize and quantify OM load estimates. "Table 3.9 summarizes total

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			possible scenario, based upon a single reduction value of 30%. The "detailed load allocations" past the bulk allocation of 3,983 kg/day are preliminary and will most probably be changed as Phase II is completed. Therefore such numbers should not be quoted or referenced until all phases of the TMDL are completed and approved by the Utah Water Board ."		OM loads **(including FPOM and Other OM)** to the lower Jordan River **based on the methods outlined above**. Point sources (including stormwater) account for 53 percent of the OM load to the lower Jordan River, versus 47 percent for nonpoint sources. Sources upstream of 2100 South account for 55 percent of the OM load, versus 45 percent from downstream sources. **These load estimates represent the best information currently available and could change during future phases of the TMDL study as additional data is collected and analyzed."**
Government	5	1	Water Quality Targets: We concur that the QUAL2Kw modeling of DO in the Jordan demonstrates that organic matter rather than nutrient loading to the lower Jordan may be addressed to achieve DO standards in the Jordan segments 1, 2, and 3. The residence time of nutrients entering the Jordan likely is insufficient for conversion of nutrients into organic matter resulting in reduction in DO in the segments of interest. We recognize that while nutrient reductions are not the focus of attainment of DO standards in the Jordan River Segments 1, 2, and 3, nutrient loading into the Jordan is of significance for water quality in downstream receiving waterbodies including downstream wetlands and Farmington Bay. We support UDWQ in its efforts to evaluate the impact of nutrient loading to downstream waters of the Jordan. We would encourage UDWQ to undertake a timely and comprehensive analysis of nutrient loading throughout the Jordan River watershed. The document identifies the uncertainty in the analysis	DWQ appreciates EPA review and feedback on this complex and controversial water quality issue and looks forward to continuing this collaborative effort as we complete future phases of the study.	No change to document

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			including the limited dataset for VSS, lack of worst-case DO data, influence of sediment oxygen demand on the Jordan, and modeling uncertainties. For these reasons, a conservative dissolved oxygen endpoint was chosen for the TMDL development to ensure attainment of the daily minimum, 7-day average, and 30-day average dissolved oxygen standards. This is an appropriate approach for setting a margin of safety, which is a required element for a TMDL. In addition, the concentration of organic matter found to result in attainment of the DO endpoint under critical conditions was applied year-round as data were not available to determine if seasonal relaxation of this target concentration would result in attainment of DO water quality standards. Given the uncertainty, this is an approvable approach for load capacity establishment as a TMDL must be calculated to at least achieve water quality standards and may not be less conservative.		
Government	5	2	Waste Load Allocations (WLA): EPA typically requests that individual WLAs be provided in TMDL analyses. This ensures that WLAs can be implemented in a transparent manner. However, as this is a phased TMDL, we agree that there is significant uncertainty in the allocations and find that providing a bulk allocation at this time is reasonable for several reasons. First, it is not logical to implement individual WLAs that require expenditure of capital funds at this time as it is not clear how the WLAs may change in the near future as this project progresses into phase II. Second, individual WLAs would simply be best estimates as this time and hence provide no additional utility as compared to a bulk WLA. Third, we recognize the concerns of the regulated community in having individual WLAs applied given the uncertainties and potential implications for their effluent limits. We support use of science-based efforts to reduce uncertainties in this analysis prior to allocation of appropriate WLAs through the phased TMDL process.	DWQ appreciates EPA review and feedback on this complex and controversial water quality issue and looks forward to continuing this collaborative effort as we complete future phases of the study.	No change to document
Government	5	3	Restoration Strategy: Due to the uncertainties associated with target setting and allocating loads to sources, this TMDL was developed using a phased approach. The document provides a reasonable assurance demonstration by including a description of future phases of the process, a summary of milestones, a schedule to ensure progress, and a commitment by UDWQ to proceed with future phases to reduce uncertainties in the document and implement both point and nonpoint source controls in the future as needed to meet water quality standards. EPA will have the opportunity to review and approve future phases of the TMDL and track progress.	DWQ appreciates EPA review and feedback on this complex and controversial water quality issue and looks forward to continuing this collaborative effort as we complete future phases of the study.	No change to document

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Government	6	1	The decision to pursue a phased TMDL highlights the uncertainty of the current direction and provides time to redirect efforts for plausible and effective scientific solutions. We applaud the State's foresight in pursing (*sic*) this option.	DWQ agrees that actions that need to take place under Phase 2 including: 1) characterizing and quantifying natural OM sources; 2) conducting storm event sampling; and 3) recognizing past efforts including I&E and structural improvements. The DWQ appreciates the assistance provided by Salt Lake City in both reviewing the TMDL study as well as providing critical information on the watershed's hydrology and current storm water management efforts and challenges. As stated in the letter, there is additional work to be done to better characterize OM sources and their fate in the Jordan River. DWQ looks forward to continuing our partnership to address these and other questions in future phases of the TMDL. DWQ agrees that we need to work together directly to identify what storm water managers are already doing when we refine load estimates in the future phases of the TMDL. We also feel that it would be best to work in conjunction to determine how to properly credit what Phase I entities are already doing, such as the detention and retention ponds mentioned in the letter.	No change to document
Government	6	2	As this effort continues, the need to be open minded, to justify the currently identified impairment and to find the most practical, realistic options for water quality improvement is critical. Merely attempting to prove the initial assumptions is non-productive. Time related sampling, both diurnal and specifically during rain storms, will be important in identifying the sources of the impacts to the river.	See response to Comment 1 above.	No change to document
Government	6	3	The strict criteria utilized for programmatic storm water monitoring may exaggerate the impact of storms since the loading will vary dramatically between events and current data, by design, shows worst case scenarios.	Comment noted.	No change to document
Government	6	4	Specific testing for FPOM and CPOM contributions of all dischargers will need to be accomplished, to adequately utilize the time available during the next phase of the TMDL. The role of CPOM needs to be specifically identified, including its impacts, deposition patterns and contribution to the SOD.	Comment noted.	No change to document
Government	6	5	The highly controlled nature of the Jordan River flows, the slow movement of the river as a consequence, and the lack of flushing below the Surplus Canal diversion all need to be given additional consideration when analyzing the cause of any impairment. Naturally occurring components, impossible to control, their contribution to SOD, and the SOD impact to the river's condition, must be identified before costly restrictions are considered for dischargers that will have limited ability to alleviate the impairment.	Comment noted.	No change to document

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Government	6	6	As opportunities for some immediate improvements through non-point source controls are considered, community involvement needs to be highlighted…An analysis of the long term benefits already derived by the Phase 1 entities needs to be considered when comparing water improvements during the next few years.	Comment noted.	No change to document
Organization	7	1	I want to complement DWQ on a job well done. The background work appears to have been very thorough, and the presentation of results is well stated and readily understood. I have not had time to read the entire report, but those parts that I did read (several times) were quite helpful to me as an individual and as Chairman of the Jordan River Commission's Technical Advisory Committee. I particularly appreciated your segmentation of causes and effects as detailed in Table 4.1. This report will serve as a primary resource for the JRC TAC and for our consultants as we move forward on a major Jordan River BMP project. Also, we are planning to have the University of Utah's Civil and Environmental Engineering Department assist us in two projects: the first will include mostly "civil" engineering design for a pedestrian and biker tunnel beneath an arterial roadway, and the second will encompass prioritizing stormwater quality management across an entire tributary watershed – from foothills to the riparian zone. The TMDL report will be a major resource for the latter group. In conclusion I appreciate your acknowledgement that a Phased TMDL is in order. My own efforts to further Water Quality Management in the Jordan River and Corridor began 35 years ago with the Salt Lake Count 208 Project. Thirty-five years is not a short period of time, but the efforts of those who subsequently picked up the ball have made major strides in recovering and restoring the river and corridor to conditions that support a wide range of recreational uses. Although there is much left to do, your work is a significant building block in the construction of a treasured resource.	DWQ appreciates the comments provided and especially the complimentary work on behalf of the Jordan River Commission towards increasing public awareness and support for improving water quality of the Jordan River. We invite further communication and collaboration on prioritizing storm water quality management.	No change to document
WWTP	8	1	The greatest initial discrepancy is the use of the spawning season (May through July), 1-Day minimum standard of 4.5 mg/L as the starting point, upon which all TMDL goals and margins of safety are added and upon which all predictive modeling runs and load allocations are based; whereas the entire modeling effort was based on the August 29 synoptic sampling, which was performed during the non-spawning season when the 1-day minimum DO standard of 4.0 mg/L applies. It was agreed by all members of the TAC, that the August, 09 calibration run was the overall critical low flow/extreme condition. Under this agreement, all manipulations, adjustments, margins of safety,	As agreed by the TAC, this method of using August data for a July model run was done because we only had synoptic data for August and comparisons of August and July conditions suggested that August data would be reasonably similar to July. Water quality temperature, flows and irrigation uses are very similar in July and August, and since there is no significant difference, it was felt that August was a good surrogate for July. Ultimately, July—spawning season—is expected to be no better than August. The data was in fact collected on August 19, 2009, making this date 19 days outside of the window for the May to July 4.5 mg/L standard. Furthermore, model calibration and water quality endpoint are distinct issues. The	No change to document

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			etc., were expected to be and logically should be based on the non-spawning season standard of 4.0 mg/L . Because the spawning season standard is being used as the baseline, a spawning-season intensive synoptic sampling exercise should have been performed in order to obtain applicable calibration values for that season. Otherwise, as it is presented here, it is both scientifically inappropriate and misleading. For example, because of temperature differences and ensuing stream metabolism, sediment oxygen demand and even daily oxygen cycles are different, the entire approach of this TMDL report uses inaccurate assumptions. The simplest error of applying the warm season synoptic data to the cool season standard for model use has very large implications throughout this entire assessment and TMDL assumptions, preparation and conclusions. This is simply not appropriate.	TMDL is set to the most stringent criterion, and model calibration is set to the critical condition.	
WWTP	8	2	Further, the warm-season 4.0 standard has only been violated 5 times (4% of all samples) during the 14 years of data collection between 1995 and 2008 that was used for the 303(d) assessment (See Figure 1; DWQ's STORET data) . Additional issues with the misuse of the 30-day average standard are addressed below. In short, in every practical interpretation and application of the DO criteria, the lower Jordan River should not have been 303(d)-listed.	Figure 1.7 and Table 1.2 in the TMDL report show additional violations at Cudahy Lane and other stations for this same time period.	No change to document
WWTP	8	3	Nutrients are expressed in the plural "pollutants". Otherwise, this is an important point that was a critical finding of the study as confirmed by the use of QUAL2Kw. The second sentence is an inaccurate statement in that it fails to recognize that periphyton (attached algae) would be continuously exposed to water column nutrients in this reach of the river.	Reducing nutrients could, over the long term, result in reductions of periphyton and, consequently, reductions in respiration, reductions in DO produced by photosynthesis, and reductions in DO demand due to dying periphyton. However, this assumes that periphyton are not maximized now and would respond to a reduced nutrient concentration. Furthermore, this would be a long term effect and neither the existing data on periphyton nor the capabilities of QUAL2Kw (or probably most models) are satisfactorily accurate to allow these kinds of predictions. This analysis was designed to examine the dynamics in DO of nutrients entering the lower Jordan River over the time that they travel through the lower Jordan River.	No change to document
WWTP	8	4	Figure 1. Plot of all DO measurements performed at Center St. (Cudahy Lane) in Bountiful. The 4.0 standard applies to August through April. The 4.5 standard applies to May through July. This is the DWQ STORET data provided by Cirrus Environmental staff.	Analysis of DO data (1995-2005) in *Cirrus 2007* (Table 12) showed additional violations <4 mg/L at stations upstream of Cudahy Lane. Diurnal monitoring data also indicate there are periods when DO levels drop below 4.0 mg/L. Finally, Table 1.2 in the TMDL report shows 1995-2008 monitoring data at Cudahy Lane including 5 violations of the 4.5 mg/L standard and 2 violations of the 4.0 mg/L standard. Cirrus 2007 is available on the DWQ website at http://www.waterquality.utah.gov/watersheds/jordan/Work_Element_1_Evaluation_of_Existing_Information.pdf	No change to document
WWTP	8	5	The last paragraph of page S-2 …is only partially true and is highly misleading This idea of using only FPOM in load reduction calculations constitutes the second greatest mistake in the TMDL preparation.	As explained in Section 4.3.1, "The permissible load to the lower Jordan River was calculated from the target concentration of FPOM of 4.5 mg/L and historic flows at 2100 South.". As stated, this concentration was used with historic flows to determine a permissible load for FPOM. The same percent reduction needed to meet the permissible load for FPOM at 2100 South was applied to all sources of OM (including fine and coarse) to the lower Jordan River. Based on the current level of understanding, it is reasonable to assume that, over time, reductions of all forms of OM will be needed to meet the permissible load for Total OM. Without any scientific	Additional text has been added to page S-3 paragraph 5 stating that the same percent reduction was used during load reduction calculations for

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				justification to reduce these sources differently, the same percent reduction was used for all forms of OM. As stated in Chapter 4 and Chapter 5, more research and study will be completed on the fate and transport of OM in the next phase of the TMDL that should allow more specific recommendations to be made in regards to load reductions. Furthermore, it has been explained to the commenter on numerous occasions both verbally and in text that TMDL load reductions were applied to **all** OM, forms contributing to total OM and not just FPOM, in order to achieve the modeled DO results. The first sentence of the last paragraph (paragraph 7) on page S-2 clearly states that other forms of OM besides FPOM were considered. The draft TMDL report repeatedly emphasizes that TMDL load reduction calculations incorporate **all** OM and not just FPOM. A few instances where this information is found include Section 3.4.4, Section 3.5 (paragraph 8), Table 3.9, Section 4.1 (paragraph 3), and Section 4.3.2. Appendix G (referenced in Chapter 4) also includes additional detail on load reductions for Other OM (Table G.3) that were accounted for in Table 4.1 (Bulk OM load allocations and reductions). This comment appears to be taking the last of page S-2 out of context. Additional discussion in the Executive Summary clearly describes how loads and load reduction calculations of Other OM took place and did not rely solely on FPOM.	FPOM and Other OM pollutant sources. Explanatory text has been added to page S-2 paragraphs 6-7 and page S-3 paragraphs 2, 4, and 5 that describes the use of the FPOM concentration and how load reductions were calculated for all forms of OM (i.e. FPOM and Other OM).
WWTP	8	6	Concurrently, only a very tiny portion of the VSS is predicted to physically settle out in the QUAL2Kw calibration and model runs and in turn, this contributes less that 4% of the SOD – hence the requirement to prescribe additional massive amounts of SOD to calibrate the model.	It is true that only a very small part of the prescribed SOD could be generated in the 6 days of the QUAL2Kw model run. It is entirely reasonable that the rest of the prescribed SOD comes from: 1) SOD generated during the remainder of the year and 2) sources of Other OM not documented during the synoptic period such as OM entering surface waters during storm events, spring runoff, fall leaf drop, or rain-on-snow events.	No change to document
WWTP	8	7	Therefore, the entire exercise of OM load reduction based on FPOM reduction alone is inaccurate and misleading.	Section 4.1, Paragraph 3, page 63 states "This OM reduction includes all forms of OM – FPOM, CPOM, and any other OM." OM load reductions are clearly **not** based on FPOM reduction alone. As the sentence states, load reductions incorporate **all** forms of OM. This TMDL relies on available data which includes VSS, as there are no other direct measurements of OM that were available for this analysis. OM is found in many different sizes in the Jordan River, ranging from entire trees to the dissolved form and is constantly being broken down as it moves through the system. SOD is a significant factor in consuming water column DO but so is the BOD of suspended fine and dissolved forms of OM. As new data become available on these other forms of OM, their source and ultimate effect in the lower Jordan River will be incorporated into the next phase of the TMDL process.	No change to document
WWTP	8	8	The Jordan River is the only waterbody in the state with site-specific DO criteria.	Justifying water quality standards is outside the scope of this TMDL. DWQ suggests the commenter carry these recommendations for relaxing the Jordan's DO standard to the WQ Standards Group.	No change to document
WWTP	8	9	These physical alterations impose much greater stressors to the stream ecosystem than the occasional DO sag. In fact, growing evidence suggests that these DO sags are rare, short-lived and are most often associated with the occasional uncontrollable, high-flow event that delivers partially decomposed organic matter from culverts, backwaters and sedimentation basins, that	DO sags associated with storm water runoff events and their delivery of OM to the Jordan River have resulted in documented fish kills. These storm events and the quality of water discharged from storm water outfalls must be addressed through the continued and expanded use of best management practices and low impact development principles.	No change to document

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			add temporary oxygen-consuming compounds to the lower Jordan.		
WWTP	8	10	This statement is inaccurate. The assumption of using FPOM in the modeling effort to characterize improvements to DO through FPOM reductions is clearly not defined.	See response to Letter 8, comment 5.	No change to document
WWTP	8	11	While certain statements in Chapter 4 acknowledge the presence of CPOM, this component is ignored in all load reduction calculations.	Paragraph 3, page 63 states that "This OM reduction includes all forms of OM – FPOM, CPOM, and any other OM (emphasis added)." Section 3.4.4 describes in detail how OM contributing to SOD (in addition to FPOM) was calculated. Section 3.5 provides a summary discussion of FPOM and Other OM results. The eighth paragraph of page 61 states "Table 3.9 shows total estimated current OM loading and the combined values for FPOM and **other OM** sources contributing to SOD in the lower Jordan River. … Total OM is defined in this report…and is assumed to include all OM particle sizes."	No change to document
WWTP	8	12	This is unacceptable misuse of the data and the model and ignores more objective scientific process.	Reducing FPOM will improve DO conditions in the Jordan River. Reductions to other forms of OM, specifically CPOM is included in Total OM reductions and is expected to be necessary to address SOD. Other forms of OM are the focus of future phases of the TMDL due to the absence of quantifiable data on this portion of total OM loading.	No change to document
WWTP	8	13	The above quotation was formally given to DWQ on February 14, 2011 to remind DWQ of this "off ramp".	This guidance pertains to "naturally-occurring" conditions. These natural conditions are not present in the lower Jordan River and are not applicable to the assessment process.	No change to document
WWTP	8	14	These records display the extremely managed nature of the river below the diversion at 2100 S. Total flows regularly reach 2000 cfs and in the high runoff year of 2011 flows exceeded 3000 cfs in the Surplus Canal. Yet flows were carefully adjusted so that the river channel never exceeded 200 cfs except for the late fall and winter of 2011.	Flows at 1700 South do not represent the entire lower Jordan. Four major tributaries enter the lower Jordan below 1700 S (upper segment 3 and at the segment 2-3 boundary). Examining flows at 500 S might provide a clearer indication of flow variability, although this is still above City Creek discharge (N. temple). Figure 30 (pg. 86) and Table 37 (pg 85) in the WE1 report show flow statistics of the 500 N gage and indicate moderate levels of variability. Inflow to the lower Jordan is controlled for a reason: to provide additional capacity for tributary inflow and avoid flooding. Seasonal tributary inflow to the lower Jordan adds variability and mimics a natural hydrograph somewhat (albeit more OM loads as well). It is apparent that true flushing flows at the scale of 2100 S flows do not occur in the lower Jordan. However, flow variations resulting from tributary inflow below 1700 S disturb, resuspend, and transport settled OM downstream to some degree. The full impact of tributary inflow on these processes will be investigated during future phases of the TMDL.	No change to document
WWTP	8	15	UDWQ needs to recognize these conditions and the fact that water management practices for flood control and water delivery requirements will forever preclude natural stream flow and natural sediment flushing from the lower river system. Although these events have been known to cause fish kills, they are the result of accumulations of natural organic sources that have decomposed and become largely anaerobic in small temporary depositional areas in culverts, small debris basins, etc. throughout the watershed, but which are mobilized during storm events that occur primarily during summer. For these reasons, and as described in EPA's DO criteria document, DWQ should	While DWQ recognizes the challenges inherent with improving DO conditions in the lower Jordan River due to limiting factors listed in the letter (hydrologic modifications, storm water pollutant loads etc.) there are many opportunities for improving water quality yet to be implemented or fully realized. This entire discussion is part of the reason a phased TMDL was proposed.	No change to document

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			petition to have the Jordan River removed from the 303(d) list. Further, cleaning out these culverts, underground pipelines and debris basins is virtually impossible and any effort would have to include flushing/sluicing or dredging, activities that would only serve to cause additional low-DO events through mobilizing these anaerobic sediments.		
WWTP	8	16	Although these guidelines appear in the 305(b) portion of the IR, there is no scientific or logical rational for this inappropriate and now antiquated guidance.	An evaluation of assessment methods is outside the scope of this TMDL study and instead should be brought before the WQ Standards Work Group that meets on a regular basis to address these types of issues and recommendations. The use of the 30-day average DO standard is consistent with EPA guidance that the TMDL must be protective of the most stringent criterion.	No change to document
WWTP	8	17	…as it is currently presented, the display of monthly data and the labeling of Figure 1.7 and Table 1.2 (page 19 and 20 of the TMDL report), is highly misleading. Stating that the figure reports "Means and Chronic Violations " of dissolved oxygen is just simply not the case – according to EPA guidance.	The public document was searched thoroughly and there is no mention of Table 1.2 or Figure 1.7 where "Means and Chronic Violations" are referenced as indicated by the comment. The captions and discussion for Figure 1.7 and Table 1.2 refer to violations of the 30-day and site-specific instantaneous minimum standards that are assigned to the lower Jordan River. Furthermore Table 1.2 contains the average time when samples were collected for any given station. The text describing results in Table 1.2 indicates the actual daily minimum DO is likely lower than actual measurements collected from grab samples. Application and display of measurements in the manner shown in Figure 1.7 and Table 1.2 is appropriate and follows current State protocol used to initially assess impaired water bodies. Furthermore, this same method has been previously used in many Utah TMDLs that were reviewed and approved by EPA.	No change to document
WWTP	8	18	As it is presented in the TMDL report, the display of dissolved oxygen data and "percent violations" for the Jordan River violates EPA guidelines and labeling of these data as "violations" is simply not true and is unacceptable – even according to EPA guidelines.	See comment above regarding DWQ assessment protocol and 30-day avg. standard.	No change to document
WWTP	8	19	Moreover, with the data that is now available, applying the 10% rule to the instantaneous DO standard of 4 mg/L – and even applying the 10% rule to all of diel measurements that have been collected since 2006, the assessment would have to conclude that the river is fully supporting.	Table 1.2 in the TMDL report clearly shows that, according to DWQ protocol, the lower Jordan River should be listed.	No change to document
WWTP	8	20	As such, we believe DWQ will reach this same conclusion, for both the assessment results and the more serious question whether there is even a DO impairment in the Jordan River at all.	The lower Jordan River is assessed every two years as required by the CWA and the results are reported in the State's Integrated Report.	No change to document
WWTP	8	21	Similarly, Table 1.2 also violates the DWQ's own guidelines (first, second and third bullets; pages 16 and 17), for the assessment of the instantaneous DO measurements (last two columns).	Table 1.2 assesses 3 periods of data including 1995-2008, 2004-05, and 2008. Data collected in each period is assessed for violations of the 5.5, 4.5, and 4.0 mg/L standard. The assessment of acute standards only looks at measurements collected during the applicable time period for each standard (e.g. May-July or Aug-Apr). In regards to the 2 intensive monitor periods (2004-05 and 2008), a total of 6 stations and 5 stations had more than 10 samples collected from each station during 2004-05 and 2008, respectively. Each of these stations meet DWQ protocol for listing using the 5.5 standard. Based on the more stringent 4.5 and 4.0 standards, 5 of 6 stations in 2004-05 and 4 of 5 stations in 2008 meet standards for listing (i.e. more than 10 samples and 2	No change to document

Commenter Type	Letter Number	Comment Number	Comment	Response to Comment	Resultant Change to Document or Analysis
				or more violations). A closer look at when samples were collected indicates more instantaneous samples were collected during summer months (critical conditions) than during times of the year.	
WWTP	8	22	First, DWQ had to rely on 14 years of data (1995 to 2008 – noticeably ignoring 2009, and 2010 data) in order to achieve something close to 10 samples per site.	The TMDL was written to address the most recent data at the time of writing. A phased TMDL approach was justified in part to assure that adequate data was gathered. The DWQ strives to incorporate all relevant information in its assessment and TMDL development efforts. Data and information used in these analyses are evaluated in light of the unique characteristics of each monitoring location. The guidelines cited do not preclude DWQ from using data such as continuous DO measurements in evaluating water quality conditions, but rather serve to inform and guide these efforts considering the totality of information and data gathered.	No change to document
WWTP	8	23	"All violations of the standard occur in June, July, and August at the lower Jordan River stations. However, these statistics likely understate the frequency of violations because 67 percent of DO measurements taken at the State Canal , Cudahy Lane, and 2100 South were made after mid-day when algal photosynthesis increases DO. Had DO been measured prior to when photosynthesis begins, concentrations of DO would have been lower and the number of violations higher."	The State Canal should not be referenced in the draft TMDL report as it is not an official part of the three lower Jordan River segments (1-3) that are listed as impaired for low DO..	State Canal has been removed from Section 2.2.2 and the discussion of DO violations and time of day when samples were collected.
WWTP	8	24	Therefore, the data were actually collected on the "ascending leg" of the diel DO cycle – before the solar peek (*sic*), indicating that such measurements were made closer to the daily minimum rather that (*sic*) closer to the afternoon peak in photosynthesis and concomitant peak in DO. Hence, the frequency of such "violations" were actually overstated.	Assuming that DO measurements made on the ascending limb of a diurnal cycle are automatically closer to minimum DO than maximum DO is incorrect as the shape and magnitude of a diurnal DO curve changes throughout the year. The point of the statement is to indicate that instantaneous sampling can measure conditions that are far from minimum values. It is safe to say that (1) time of day can have a significant influence on whether a grab sample will violate chronic or acute standards, and (2) DO levels measured after mid-day as a part of routine monitoring do not represent minimum diurnal DO.	No change to document
WWTP	8	25	Therefore the data actually "overstate" the frequency of violations – particularly as compared to how the data would look if the proper method of determining diel means were to be used. That section of the TMDL report should be rewritten to reflect the true accuracy and limitations of the utility of that instantaneous measurement data.	This sentence in the report was supposed to refer to 2004-08 data. We have reviewed the data used to complete the assessment. The sentence in question will be changed to more accurately reflect the intent of the paragraph. This number is slightly different from what the commenter's table shows for 2 reasons: (1) the original spreadsheet (and the data used here) sent to the commenter contained 314 DO records, his table only includes 309 records, (2) the State Canal data has been removed from the assessment as it is not part of the lower Jordan.	Section 2.2.2, first paragraph changed to read "However, these statistics likely understate the frequency of violations because 52 percent of DO measurements taken during 1995-2008 at Cudahy Lane and 2100 South were made after 12:00 noon when algal photosynthesis is making significant contributions to DO."

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WWTP	8	26	Adding this small source of error to the total error adds additional unnecessary conservatism and is therefore inappropriate and should be removed from the table.	At this point in the phased TMDL process, DWQ feels it appropriate to account for all known sources of uncertainty (error) where they can be quantified.	No change to document
WWTP	8	27	Because DWQ has chosen to include the entire reach of the Jordan River below 2100 S., as well as upstream sites in the analysis, all endpoints of the Monte Carlo analysis should be used; i.e. the average difference between the mean and minimum DO of just the three sites evaluated (Burnham Dam, Center Street, and 1700 S.) is 0.6 mg/L. This more accurately reflects the selected data that was used and reflects the entire distance of the impaired reach. However, even estimates of SOD and bottom algae coverage from reaches several miles upstream from 2100 S were used in the Monte Carlo analysis. These have little applicability to the low-flow, depositional conditions that dominate downstream from 2100 S. But if they are used in the analysis then the average of estimates should be used. Otherwise, the selection of just the Burnham Dam output is arbitrary and capricious and introduces additional uncertainty by not utilizing the entire data set. Hence, the average of 0.6 mg/L (or lower), would be a more appropriate uncertainty value. However, and as described below, this uncertainty factor should be rounded down to 0.5 mg/L so that the goal is 5.0 mg/L rather than 5.5 mg/L. Moreover, however, as described above, because all synoptic sampling for model calibration and the calibration values themselves were performed for August (when the DO criterion is 4.0 and not 4.5), the final endpoint should be the O.5 mg/L MOS added to 4.0 rather than added to the 4.5 reproductive season standard. Therefore the target endpoint should be 4.5 as for the non reproductive season and not 5.5. Further, since the reproductive season criterion is 4.5 a MOS of 0.5 would raise the target endpoint to 5.0. The target value of 4.5 (non-reproductive season plus MOS of 0.5), is both based on better science and on the actual applicable criterion during the time for which the model was calibrated. Applying the synoptic data, model calibration and subsequent model runs to the reproductive season is simply not appropriate. This data and its results should be changed as suggested.	The uncertainty analysis was completed on a QUAL2Kw model of the entire Jordan River to determine sensitivity and uncertainty of any model inputs to DO levels in the lower Jordan River. It is reasonable to consider the influence that upstream conditions could have on lower Jordan DO levels, given the significance of flow contributions and loading contributions from 2100 S. The value of 0.6 (Table 2.5) is based on results shown in Appendix E - Figure E.7 for Burnham Dam. It represents the difference between the mean and the lower 10 percentile value (or the lower half of the 90 percent confidence interval) of the frequency distribution of minimum DO at this site. As such, it works to ensure that, through load reductions of OM, the lower end of the 90 percent confidence interval for min. DO would be above the 4.5 mg/L standard. Furthermore it provides statistical support to a claim of reasonable assurance (90 percent confidence) that load reductions would result in samples complying with DO standards in the lower Jordan River. Burnham Dam was selected due to previous model runs that indicated this location has the lowest DO levels in the lower Jordan.	No change to document
WWTP	8	28	Even though, if few instances of measurements are available, how can it be verified that these are indeed the “recent years worst for DO?”	The statement is qualified by a reference to the 2004 and 2008 years. It does not state what period “recent years” covers but the assessment of 1995-2008 generally show that 2004 and 2008 were among the worst for DO. Table 1.2 supports this.	No change to document
WWTP	8	29	USGS flow data indicate that the flow regime did not change during the “recent worst years” because flows downstream from 2100 S. are so closely regulated (see above). Flows are typically maintained in the 100 to 175 cfs range and only dropped below this range to accommodate expected high-flow events as a result of forecasted summer thunderstorms.	Low DO levels in the lower Jordan are not directly correlated to low flow. See Appendix D, Tables D.3 and D.4 where violations of chronic and acute DO standards are assessed by flow percentile at Cudahy Lane and 1700 S. Low flow/managed flow is not a cause of low DO. Inability to remove decaying OM deposits could be, but not low flow, low reaeration, etc.	No change to document

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WWTP	8	30	DWQ had purchased data recording sondes as early as 2005, and hence could have and should have used these instruments to accommodate the true letter of the rule, and not just rely on a convenient caveat in the 305(b) assessment document to claim a DO impairment.	The TMDL report includes an assessment of diurnal data collected by these probes in Chapter 2.	No change to document
WWTP	8	31	Table 2.5 statement: Few measurements of FPOM – only four events and three seasons none during spring runoff.	This statement is not in Table 2.5 in the public draft report. The statement is included in an earlier version dated 12/8/10. Many of the comments from this commenter related to Table 2.5 appear to be based on this earlier version and not on the public draft report.	No change to document
WWTP	8	32	Moreover, CPOM samples were collected during spring and summer of 2010 (and 2011) in the six major tributaries, upstream and downstream from known sedimentation basins and at the mouths of the tributaries.	DWQ has requested this CPOM data from the commenter on numerous occasions in order to incorporate it into the draft TMDL. It has not been provided at this time.	No change to document
WWTP	8	33	Cirrus has chosen an extremely conservative value of 2 standard deviations (~95% confidence intervals), the uncertainty ascribed here represents an unnecessary redundancy and unnecessarily compounding of the uncertainty and relatively low variability of multiple and seasonal values of SOD.	Cirrus Ecological Solutions is the contractor assisting DWQ in producing the Jordan River TMDL. All decisions regarding confidence intervals and other factors in the analysis were made by DWQ in consultation with its contractor. The Monte Carlo analysis generated a distribution of model DO output that was used to define a 90 percent confidence interval (CI) and not 95 percent. This interval contained 90 percent of all DO concentrations (min or mean) that were produced during a 2,000 iteration model run. The lower half of the 90 percent CI for the Burnham Dam station (0.6 mg/L) was added to the MOS (not 2 standard deviations). As expressed in Appendix E (Section E.5, second paragraph, pg E-6),this approach was taken to "…ensure that even though model inputs and outputs are uncertain, the 90 percent confidence interval value for dissolved oxygen in the lower Jordan River is still above the water quality standard."	No change to document
WWTP	8	34	Table 2.5 statement: 67% of DO measurements have been measured in the afternoon, perhaps missing the lowest DO measurements before dawn.	We have reviewed the data used to complete the assessment supporting this statement. The text in this bullet statement will be updated accordingly. Also see the response to Letter 8 Comment 24.	Second bullet in Table 2.5 changed to read "52 percent of DO measurements in the lower Jordan River between 1995-2008 (44 percent 2004-2008) were made after noon, perhaps missing lowest DO conditions near dawn and additional DO violations."
WWTP	8	35	Table 2.5 statement: Dynamics of CPOM are unknown – How fast CPOM moves along the bottom, rate of conversion to FPOM or DOM is unknown.	This statement is not in Table 2.5. See response to Letter 8, Comment 31.	No change to document

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WWTP	8	36	Further, these same observations indicate that the conversion from CPOM to FPOM to DOM largely occurs after final settlement below 2100 S.	Conversion/breakdown of OM occurs throughout the watershed, in tributaries, and the main stem lower Jordan River, upstream and downstream of 2100 S. Deposition of this OM load predominates below 2100 S.	No change to document
WWTP	8	37	There simply exists a continuum of size fractions, dependent upon residence time and refractoriness of each particle in the sediments. Thus, it has already been incorporated into the many SOD measurements that have been performed and which have been noticeably consistent within individual sites and similar substrates. Nevertheless, for further confirmation, this database will be supplemented with additional SOD measurements in 2011 and 2012. The relatively narrow range of existing SOD results at specific sites, even among seasons, has led to the understanding that decomposition of organic matter is very much a time-integrated phenomenon; there is no reason to expect any large aberration from this range. Therefore, although the specific CPOM transport rate is unknown, it is inconsequential to the longterm integration of deposition/decomposition/oxygen consumption which is continuous, substantially elevated and relatively constant.	This is a valid point and will be addressed in next phase of the TMDL.	No change to document
WWTP	8	38	Therefore, concern over the transport, conversion and decomposition rates is exaggerated and this factor should be removed from Table 2.5.	DWQ's concern with the transport, conversion and decomposition rates of OM is relevant for identifying feasible and cost effective strategies for controlling anthropogenic OM loading.	No change to document
WWTP	8	39	Few data exist on SOD temporally and spatially. This is actually not true. There are more than 90 separate SOD measurements including several upstream and downstream sites, and during all seasons. This uncertainty is therefore overstated and should be removed from Table 2.5.	This statement does not exist in Table 2.5 of the public draft Jordan River TMDL.	No change to document
WWTP	8	40	This was during and following the highest flow/runoff rates (Late May/early June) since the mid 1980s. This included sample collection during most of the ascending limb of the hydrograph as well as the descending limb. Our data shows that huge amounts of CPOM were being transported, yet, within a few days following the spring high flows, movement of CPOM returns to near-undetectable values. Notwithstanding these high flows and CPOM delivery to the lower Jordan, SOD measurements immediately following the high flows were noticeably consistent with previous measurements and remained within a narrow range.	DWQ has requested but not received this CPOM data in order to evaluate these statements.	No change to document
WWTP	8	41	Table 2.5 statement: Few actual measurements of reaeration that do exist do not correspond well with values expected from established reaeration equations.	The fact remains that reaeration is still not well understood throughout the lower Jordan River. This factor was a minor contributor in a minor quantity of the MOS and is still a legitimate consideration.	

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WWTP	8	42	Table 2.5 statement: The Qual2Kw model is a static model and does not show how OM contributes to SOD throughout the year.	This statement is not in Table 2.5. See response to Letter 8, Comment 31.	
WWTP	8	43	Nevertheless, the TMDL report is projecting the fallacy that removal of 38% of VSS will resolve the DO issue. This is simply not true.	The TMDL report states that removal of Total OM is needed to meet the DO endpoint, not just VSS. See Section 4.1, pg 63 3rd paragraph.	
WWTP	8	44	Taking this information into account, the following narrative (shown by the "track changes" tool), is suggested replacement of the narrative starting on page 38. These changes reflect the limitations proposed in the current report and provide necessary caveats that still retain the evidence that OM is the cause of DO sags. From the discussions in Section 2.3 and the detailed review of linkage processes in Appendix D, it was clear that SOD places a major demand on DO. The QUAL2Kw model accounts for generates some SOD into the lower Jordan River resulting from settling detritus/FPOM during the season and time period (6 days) for which the model is calibrated run but it does not account for SOD organic matter that enters the lower Jordan River in the preceding weeks and months nor does it provide for the addition of organic matter that enters and settles in the lower Jordan River as CPOM. However, the model does provide for prescribing SOD in order to calibrate the model to more-accurately reflect measured conditions. In this case, model calibration required the prescription of 6 to 20 times the predicted SOD output based on FPOM/VSS settling alone (approximately 20x in the lower reaches). Water quality inputs to the model included VSS values ranging from 6 to 8 mg/L in the Lower reaches and among several dozen VSS measurements during the last 2.5 years, values have rarely strayed from that range. Further, although some of the VSS undoubtedly settles to the sediment surface in the lower reaches of the river (QUAL2Kw predicts a SOD value of ~0.02 g/m2 based on VSS measurements and the settling coefficient of 0.1/day), these recent VSS measurements have indicated that there is no measurable loss or settling of VSS from the water column in these lower reaches. This suggests that the contribution of OM to the lower Jordan River must include a significant, but unmeasured OM fraction that settles to the bottom and contributes to the SOD. Some very preliminary CPOM measurements by Peterson and Miller (2011, personal communication) suggest that the tributaries carry large quantities (at least several hundred thousand kg) of CPOM to the Jordan River. This is in the range of values that would be necessary to account for the high SOD measurements (Goel 2010) and similarly high SOD prescriptions. However, considerably more research and methods development will be	Several of the points provided by the commenter in the narrative are either already included in the public draft TMDL or misrepresent conclusions drawn from our analysis. Specifically, the commenter places unwarranted emphasis on the part of VSS/FPOM in determining resultant DO concentrations and not enough on the necessity of reducing SOD by a proportional amount to achieve the DO endpoint. DWQ appreciates the concern of the commenter regarding third-party interpretations of Tables 2.8 and 2.9. However it is not necessary to caveat the study's findings in order to demonstrate DWQ's commitment to moving forward towards a more complete understanding of water quality impairments in the Jordan River through subsequent phases of the TMDL.	Changes have been made to text describing Table 2.8 and captions for Tables 2.8 and 2.9. These edits were made to more clearly describe methods used to obtain results shown in Tables 2.8 and 2.9 as well as their application to TMDL calculations. .

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			required during Phase II in order to provide sound measurements and subsequent estimations of CPOM loading. In light of these developments the following tables are included only to illustrate that organic matter load reductions will result in reductions of SOD and consequent improvement of water column dissolved oxygen. For example, based on the QUAL2Kw model a total annual load reduction of 549, 887 kg OM will provide for a minimum DO at Burnham Dam of 4.5 mg/L (Table 2.6). Absent of accurate CPOM loading data at this time, the examples depicted in Tables 2.8 and 2.9 are relevant with the following caveats: 1) they are based on the assumption that VSS is the only source of OM to the lower Jordan River; and 2) they are based on the assumption that all of the VSS is settling to the bottom and immediately contributes to the SOD. Thereby, a prescribed percentage reduction in the SOD in the model that equals the percent reduction that is prescribed for the VSS is included for each of the scenarios listed. for the entire Jordan River so each scenario also included an equal reduction in this prescribed SOD in QUAL2Kw. Because of the inherent difficulties in measuring and modeling CPOM loads and decomposition, QUAL2Kw represents OM only as a combination of VSS (fine particulate organic matter)detritus (dead OM) and phytoplankton, represented by chlorophyll-a. The headwater conditions, inputs, and calibration values also come from measurements of VSS. For the model, detritus was calculated as the mass of VSS remaining after subtracting living phytoplankton, estimated based on the stoichiometric ratio of 1:100 for the concentration of chlorophyll-a to phytoplankton (from QUAL2Kw). For the initial run (Table 2.8) no changes were made to water quality of the outflow from Utah Lake. Table 2.8 shows that if the VSS were the only source of OM to the lower Jordan River and it all settled to the bottom and immediately contributed to the SOD the expected DO response for the compliance points at Cudahy Lane and Burnham Dam to reductions in FPOM and equal reductions in prescribed SOD in the lower Jordan River, a target concentration of 4.5 mg/L in FPOM in the lower Jordan River is sufficient to restore DO to the recommended endpoint of 5.5 mg/L. This suggests that reducing OM delivered to the lower Jordan River will restore the DO to water quality standards. However, one additional issue that remains to be investigated is the effect of legacy OM that has been buried during recent years. Suggested wording for the table headings for Table 2.8 and Table 2.9 are as follows: Table 2.8. An example of the DO response to a reduction in OM delivered to the lower Jordan. In this example OM is represented as only the FPOM and all of the prescribed reduction is assumed to provide for a concomitant reduction in SOD in a linear		

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			fashion. This table also assumes that there is NO reduction to headwater detritus and chlorophyll-a from Utah Lake. Table 2.9. An example of the DO response to a reduction in OM delivered to the lower Jordan River.OM is represented as only the FPOM and all of the prescribed reduction is assumed to provide a concomitant reduction in SOD in a linear fashion. This table also assumes an EQUAL reduction to headwater detritus and chlorophyll-a from Utah Lake.1		
WWTP	8	45	Achievable: although the report claims that future phases of the TMDL will define the relative importance of FPOM vs. CPOM, the existing computations are not related to the known existing settling coefficient and measured and modeled values of FPOM .	The discussion of methods and computations used to calculate FPOM loads is included in Chapter 3 and notes that loads were based on measured and (where appropriate) modeled values of FPOM. Settling coefficients for FPOM were based on discussion with the TAC and recommendations from Dr. Steve Chapra.	No change to document
WWTP	8	46	In short, given the evidence that minimizes the importance of FPOM, it was inappropriate and misleading to proceed with FPOM load reduction calculations and associated narrative – as if it were true. All discussion about load reduction in the report should be limited to OM, with additional narrative that future phases will report intensive and detailed measurements of CPOM, in addition to FPOM in order to characterize the importance of these portions in future load allocations.	Minimum TMDL standards require that parameter(s) contributing to impairment should be characterized, including sources, loads and discussion of how those loads were calculated. Based on existing data and a defensible modeling approach, a Total OM TMDL has been defined, including loads for FPOM and CPOM and reductions of Total OM. Minimum standards also require a discussion of how reductions are made and reasonable assurance that WQ endpoints will be reached.	No change to document
WWTP	8	47	With these extremely conservative margins of safety, the additional 1 mg/L recommended in the TMDL report represents an additional and even more excessively conservative extrinsic margin of safety. It is extrinsic because the Monte Carlo analysis is a significant step removed from that applied to toxicological or environmental response indicators used to develop the standard. Given EPA's enormous intrinsic MOS, the extrinsic MOS used in the TMDL is of much less importance and logically should be reduced to a 0.5 mg/L additional MOS.	This will be considered in Phase II of the Jordan River TMDL.	No change to document
WWTP	8	48	As explained above, this should be the guiding principle in understanding and addressing the direct causes of the low DO in the lower Jordan River: carefully controlled low flows, resulting in very low velocity and without any chance of flushing flows, along with warm temperatures and hundreds of thousands of kilograms of "natural" CPOM that are delivered each year to the lower Jordan River will never prevent the Lower Jordan River from experiencing occasional, temporary excursions below the 1-day minimum criterion.	This will be considered in Phase II.	No change to document
WWTP	8	49	1. DWQ has added unnecessary and redundant layers that compound the estimated margin of safety in their effort to create an overly protective and scientifically indefensible target of 5.5 mg/L at Burnham Dam.	DWQ has provided an appropriate margin of safety based upon the level of uncertainty within the QUAL2Kw model. Information will be gathered in future phases of the TMDL regarding the sources and fate of OM loads to the lower Jordan River that can ultimately affect future MOS numbers.	No change to document

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WWTP	8	50	2. During this process, DWQ has not fully recognized or understood important environmental data that elucidates the nature of organic matter and the continuum that explains the decomposition states leading to consistent high levels of oxygen consumption by the sediments.	DWQ recognizes the limits of what we know about the nature of OM as supported by quantifiable data. More importantly we recognize what we don't know or aren't confident in with regards to the veracity of what the evidence suggests. Therefore, we will follow a defined phased approach to better understand OM processes prior to making judgments based on scientific evidence.	No change to document
WWTP	8	51	3. DWQ staff should have recognized many years ago, at the very early stages of the Jordan River assessment, that the lower Jordan River suffers from perennial low flows, due to carefully managed diversions, high summer temperatures, and excessive oxygen deficits from natural organic addition and decomposition. These three characteristics, as described in EPA's Dissolved Oxygen Criteria document, quality for exemption to EPA's criteria; Thus negating the need for 303(d) listing and TMDL preparation.	DWQ recognizes the limitations imposed on the Jordan River by flow alterations and habitat modifications. These factors can and are being addressed through discussions regarding flow management and completion of habitat improvement projects in partnership with cooperating agencies and organizations. The commenter should recognize the distinction between "natural" and anthropogenic sources of pollutant loads. Since the predominant source of OM loading into the lower Jordan River appears to originate from storm water outfalls (pending verifications through an OM budget study) and the majority of the lower watershed is developed, OM loads impacting DO cannot be considered "natural" and hence do not qualify for an exemption from Utah's water quality standards.	No change to document
WWTP	8	52	4. The use of this off ramp is well justified and should be implemented to avoid a controversial and unnecessary TMDL. Alternatively, at least a site-specific use attainability analysis, or preparation of a "Tiered Aquatic Life Uses" document for the lower Jordan River should be performed in developing meaningful beneficial uses that are appropriate to the habitat, flow and dissolved oxygen limitations unique to this reach.	DWQ has developed site specific criteria where warranted and has discussed the need for developing tiered aquatic life uses in specific cases where existing designations are not representative of existing or potential uses. However in the case of the lower Jordan River, DWQ supports the current designation as appropriate and attainable.	No change to document

Table 2. Comments received from TAC members.

Letter Number	Responder Type	Response Type	Name	Organization(s)
1	WWTP	Email 2/22/2012	Taigon Worthen	South Valley Water Reclamation Facility
2	Organization	Printed Comment from Public Open House 2/21/2012	Dan Potts	Salt Lake County Fish and Game Association
3	Organization	Email 3/19/2012	Reed Price	Utah Lake Commission
4	Citizen	Letter 9/21/2011	William Moellmer	
5	Government	Letter 3/29/2012	Sandra Spence	US EPA Region 8

Letter Number	Responder Type	Response Type	Name	Organization(s)
6	Government	Letter 3/30/2012	Florence Reynolds	Salt Lake City Public Utilities
7	Organization	Email 3/30/2012	David W. Eckhoff, PhD, PE	The Jordan River Commission
8	WWTP	Letter 3/30/2012	Theron Miller	Jordan River/Farmington Bay Water Quality Council