RECLAMATION

Managing Water in the West

San Luis Drainage Feature Re-evaluation

Final Environmental Impact Statement

VOLUME III. COMMENTS AND RESPONSES

May 2006

U.S. Department of the Interior
Bureau of Reclamation

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APPENDIX P

Comments and Responses on the Draft EIS

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Appendix P: Comments and Responses

APPENDIX P1

Introduction to Comments and Responses

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P1.1 INTRODUCTION

Appendix P presents comments received on the *San Luis Drainage Feature Re-evaluation Draft Environmental Impact Statement* (EIS) and responses to those comments from the Bureau of Reclamation (Reclamation). Any text changes resulting from the comments are summarized in the responses and have been incorporated into the text of the Final EIS.

P1.2 COMMENT PERIOD

A Notice of Availability of the Draft EIS was published in the Federal Register (70[105]: 32370–32371) on June 2, 2005. The comment period officially began on June 2, 2005, and was scheduled to end on August 1, 2005. In response to public feedback, the end of the comment period was extended to September 1, 2005.

The Draft EIS was mailed directly to individuals and agencies that provided comments during the public scoping period. Federal, State, and local representatives for the area also received copies of the Draft EIS. Paper or CD versions of the Draft EIS were provided to any individuals who requested a copy. Paper copies were also available for public inspection at the following locations during the review period:

- U.S. Bureau of Reclamation, Denver Office Library, Building 67, Room 167, Denver Federal Center, 6th and Kipling, Denver, CO 80225
- U.S. Bureau of Reclamation, Office of Public Affairs, 2800 Cottage Way, Sacramento, CA 95825–1898
- Natural Resources Library, U.S. Department of the Interior, 1849 C Street NW., Main Interior Building, Washington, DC 20240–0001
- Alameda County Public Library, 2450 Stevenson Blvd., Fremont, CA
- Cayucos Library, 248 South Ocean, Cayucos, CA
- Concord Library, 299 Salvio Street, Concord, CA
- Contra Costa County Public Library, 1750 Oak Park Blvd., Pleasant Hill, CA
- Fresno County Public Library, 2420 Mariposa Street, Fresno, CA
- Kern County Public Library, 701 Truxton Avenue, Bakersfield, CA
- Kings County Public Library, 401 North Douty Street, Hanford, CA
- Merced County Public Library, South 7th Street, Los Banos, CA
- Sacramento Central Library, 828 I Street, Sacramento, CA
- San Joaquin Public Library, 605 North El Dorado Street, Stockton, CA
- San Luis Obispo County Public Library, 995 Palm Street, San Luis Obispo, CA
- Stanislaus County Public Library, 1500 I Street, Modesto, CA
- UCB Water Resources Center Archives, 410 O’Brien Hall, Berkeley, CA

In addition, the Draft EIS was available in electronic format at http://www.usbr.gov/mp/.

Four public hearings were held for comment on the Draft EIS. A hearing announcement was mailed to each stakeholder and interested person on the project's distribution list in late June 2005. In addition, the public hearings were advertised as follows:

- *Sacramento Bee*, July 7
- *Modesto Bee*, July 8
- *Stockton Record*, July 8
- *Lemoore Advance*, July 10
- *Fresno Bee*, July 11
- *San Luis Obispo Tribune*, July 11
- *Sun Bulletin*, July 13

The public hearings were held at the following locations:

- Monday, July 11, 2005, 1:30–3:30 p.m., Federal Building, Cafeteria Conference Room C-1001, 2800 Cottage Way, Sacramento, CA 95825
- Tuesday, July 12, 2005, 6–8 p.m., Heald College Conference Center, Rooms 1 and 2, 5130 Commercial Circle, Concord, CA 94520
- Wednesday, July 13, 2005, 6–8 p.m., Piccadilly Inn Shaw, Crown Room, 2305 West Shaw, Fresno, CA 93711
- Thursday, July 14, 2005, 6–8 p.m., Cayucos Veterans Hall, 10 Cayucos Drive, Cayucos, CA 93430

Comments received by mail and e-mail during the comment period and transcribed at the public hearings are presented and addressed in this Final EIS, as described below.

P1.3 RESPONSES TO COMMENTS

During the comment period, Federal, State, and local agencies and representatives as well as private organizations and businesses and members of the public submitted both written and spoken comments. Each public hearing comment, letter, e-mail, petition, or note that was received was reviewed and substantive comments were identified. Responses to each comment are organized and presented in the following subparts of this Appendix P:

- Appendix P2, Master Responses to Comments
- Appendix P3, Federal Agency Comments and Responses
- Appendix P4, State Agency Comments and Responses
- Appendix P5, Local Agency Comments and Responses
- Appendix P6, Private Organizations and Businesses Comments and Responses
- Appendix P7, Individual Comments and Responses

- Appendix P8, Public Hearing Comments and Responses

Reference materials cited in this appendix are listed in Section 23.

Each subpart of Appendix P includes a complete Table of Contents followed by an Alphabetical Table of Commenters. Within each subpart, comments are presented in the order received. Each comment submittal is followed by Reclamation's responses. To locate a Master Response, use the Table of Contents for Appendix P2 to find the page number on which the response begins.

APPENDIX P2

Master Responses to Comments

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P2.1 INTRODUCTION AND BACKGROUND

This section provides an overview of the most prevalent topics and issues that emerged from the body of comments received on the Draft EIS. These issues (Comment Summaries) were identified by a number of commenters and are summarized and shown in italics below by resource area and topic. Following each issue summary is a response prepared by Reclamation.

Many issues are interrelated and cannot be considered in isolation. Therefore, the divisions among the comments and responses that follow are for organizational purposes only and do not reflect the importance of any single issue in relation to all of the others.

P2.2 MASTER RESPONSES

P2.2.1 Agricultural Production and Economics (AG)

AG-1 Effects of Ocean Disposal on Local Agriculture

Comment Summary: *Drainwater discharged by the Ocean Disposal Alternative will result in tighter restrictions on agricultural discharges from Central Coast farmers due to diminished water quality.*

The Ocean Disposal Alternative outfall would be approximately 1.4 miles from the shore – a very different environment from the tributaries, creeks, rivers, and nearshore environment to which agricultural drainage discharges – and the mixing zones are not expected to overlap (see Master Responses SW-8 and SW-13). In addition, the effluent discharged under the Ocean Disposal Alternative would consist of subsurface agricultural drainage, which is different from surface runoff. Subsurface drainage is less likely than surface runoff to contain pesticides and other chemicals that are used in agriculture. Therefore, discharge under the Ocean Disposal Alternative would not be expected to result in tighter restrictions on agricultural discharges.

P2.2.2 Air Resources (AIR)

AIR-1 Analysis of Effects to Air Resources

Comment Summary: *The Draft EIS includes insufficient analysis of impacts to air resources. Section 11 should include air quality impact data for construction and operation of the project and state whether a general conformity determination is required.*

Reclamation has conducted the analysis of impacts to air resources to the extent possible based on currently available information. This analysis was conducted at a level sufficient to identify impacts for the purposes of selecting the preferred alternative in accordance with NEPA policy. Development of a complete consistency determination would require detailed estimates of emissions. At this time, it is not feasible to develop these estimates for either the construction phase or the operational phase of the project since work is continuing on the Feasibility Study. To conduct a detailed construction emission analysis at this time would require speculation on construction schedule details and a premature assumption regarding crop mixes and land use for retired lands over the 50-year planning period. These details will be generated for the selected alternative during completion of the design work and project implementation, if determined to be appropriate and necessary. Reclamation will complete any required Federal consistency analysis and obtain appropriate air permits following the completion of the ROD.

P2.2.3 Alternatives (ALT)

ALT-A1 No Preferred Alternative Identified

Comment Summary: *The Draft EIS failed to identify a preferred alternative, which makes it difficult to evaluate consistency and compliance with other environmental laws and to comment on the EIS. NEPA requires an EIS to identify a preferred alternative.*

The Draft EIS did not identify a preferred alternative because Reclamation had not determined a preferred alternative at the time the Draft EIS was published. Reclamation has, as required by NEPA regulations, identified a preferred alternative in the Final EIS. NEPA regulations at 40 CFR 1502.14(e) require the EIS description of alternatives to “identify the agency’s preferred alternative if one or more exists, in the draft statement, and identify such alternative in the final statement.” The Council on Environmental Quality (CEQ) elaborated on this requirement in their response to the 40 most frequently asked questions regarding CEQ’s NEPA regulations, published on March 23, 1981. CEQ stated that Section 1502.14(e) means that if the agency has a preferred alternative at the Draft EIS stage, that alternative must be labeled or identified as such in the Draft EIS. If the responsible Federal agency has no preferred alternative at the Draft EIS stage, a preferred alternative need not be identified. By the time the Final EIS is filed, Section 1502.14(e) presumes the existence of a preferred alternative and requires its identification in the Final EIS “unless another law prohibits the expression of such a preference.”

Neither the Draft nor Final EIS need to identify an environmentally preferable alternative. NEPA regulations at 40 CFR 1505.2(b) require that, in cases where an EIS has been prepared, the Record of Decision (ROD) must identify all alternatives that were considered, “specifying the alternative or alternatives which were considered to be environmentally preferable.” The environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA Section 101. Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative that best protects, preserves, and enhances historic, cultural, and natural resources.

ALT-L1 Land Retirement Implementation

Comment Summary: *The EIS should include long-term management planning for retired lands and complete analysis of the effects of land retirement on regional economics, environmental justice, and other resources.*

Some commenters stated that long-term management planning is needed for retired lands, including mitigation for socioeconomic impacts and restoration of habitat. The land retirement alternatives include costs for management of retired lands, assuming these lands will be used for grazing, dryland farming, and fallowing (with weed control). Habitat restoration and recreation use were not included in the action alternatives and any such action would be a future, separate project subject to a separate environmental review. As described in Sections 17 and 18 of the

Draft EIS, socioeconomic impacts were not found to be significant, and no mitigation is necessary.

ALT-L2 Retirement of All Drainage-Impaired Lands

Comment Summary: *The EIS should present an alternative that retires all drainage-impaired lands.*

The In-Valley/Drainage-Impaired Area Land Retirement Alternative would retire 308,000 acres, including all of the drainage-impaired lands in Westlands – approximately 298,000 acres. The Northerly Area (non-Westlands) is excluded from land retirement except for 10,000 acres in Broadview Water District. The July 2004 Plan Formulation Report states: “Retirement of Northerly San Luis Unit lands other than Broadview was not included in this screening, because the initial screening showed land retirement to be more costly than drainage service. Since the Northerly Unit lands already have drainage system components in place (drains, collector system, recirculation systems, etc.), it was assumed that including these lands would be even less cost effective. Also, retirement of other Northerly Unit lands was eliminated from further analysis because uncontrolled drainage flows would continue to occur. These unmanaged flows include uncontrolled seepage into deep open drains, tailwater (from continued non-Unit farms) that is not able to be recycled, and runon from storm events. In the absence of drainage service, these uncontrolled flows would continue downstream and could reach the adjacent wildlife refuges on the San Joaquin River, resulting in adverse effects to water quality and wildlife. With no single entity responsible for managing these uncontrolled flows, the practical result would be ongoing environmental degradation for an indefinite period of time.”

The screening of land retirement options, including retirement of all drainage-impaired lands in the Unit, is described in detail in Draft EIS Section 2.11.4.1. Also see Appendix K for a discussion of the land retirement analysis.

ALT-L3 Future Uses of Retired Lands

Comment Summary: *Land retirement should include planning elements that incorporate restoration of retired lands to native habitat and inclusion in overall habitat goals for the Central Valley.*

The proposed Federal action is to provide drainage service. The land retirement component of this action can be accomplished by acquiring non-irrigation covenants from landowners. The land may remain in private ownership and still achieve the project purposes of land retirement. It is logical that landowners would wish to continue to generate income from their land, or at least to minimize their costs. The most appropriate ways this could be accomplished without irrigation water are grazing, dryland farming, or fallowing with weed control. Native habitat restoration, while not precluded by the drainage service alternatives, is not a project purpose and would require a separate project authorization and funding source.

ALT-M1 Funding of Action Alternatives

Comment Summary: *The EIS should evaluate the Federal government’s ability to guarantee funds for drainage service and operation of biotreatment plants and other facilities over the 50-*

year project life. Reclamation's need to obtain this authorization from Congress and potential legal actions could delay drainage service implementation.

All of the action alternatives exceed the authorized spending limit in the San Luis Act and would require additional authorization and appropriations from Congress. Federal costs are reimbursable by project beneficiaries in accordance with existing Reclamation law. Financial analysis, including the ability to pay, is part of the feasibility report that would be submitted to Congress prior to authorization.

ALT-N1 Assumptions for Existing Conditions and No Action Alternative

Comment Summary: *The No Action Alternative has been described incorrectly and inaccurately. The Draft EIS ignores the positive effects of drainage reduction and management that have occurred since 2001 as well as existing plans and programs for local drainage management needed to meet future regulatory requirements. Because of these local actions, the effects analyzed for surface water resources are theoretical and overly conservative. The Draft EIS should incorporate more reasonable No Action assumptions or at least indicate that, because of the constrained assumptions, the conclusions about impacts do not apply in other contexts, such as contract renewal, to depict conditions that will exist if Federal drainage service is not provided.*

The Affected Environment and subsequent No Action assumptions were developed based on a review of actions that were funded and under way at the time the alternatives were formulated (2001). Setting a specific year as the basis for the affected environment (existing conditions) is necessary in a multiyear planning project to allow the analysis to proceed. Since 2001, several projects have been proposed and are in various stages of planning, particularly the expansion of the Northerly Reuse Area and groundwater pumping projects in the area served by the San Joaquin River Exchange Contractors Water Authority. From a NEPA prospective, such projects, if implemented, would serve to lessen the severity of environmental effects under No Action. As such, comparisons of action alternatives with No Action could overstate impacts. The purpose of the EIS is to compare the environmental effects of project alternatives. While this comparison may be conservative relative to recent changes in drainage management, it still provides an accurate comparison among project alternatives. It also provides full disclosure of potential impacts. The Final EIS will include a statement under the No Action assumptions that such assumptions were made for this evaluation and should not be used for other evaluations.

ALT-P1 Ocean Disposal Alternative Pipeline Right-of-Way

Comment Summary: *The EIS should provide more detail about losses to landowners within the pipeline easement, the requirements for access to the pipeline, and the use of existing pipeline rights-of-way including arrangements that would be made with public agencies.*

The Ocean Disposal Alternative design attempted to use as many existing rights-of-way for the conveyance pipeline as practical and to avoid impacts to existing land uses. Because this EIS was prepared at an appraisal level of design (described in Master Response GEN-1), no owners of rights-of-way used were contacted at this design stage. If the Ocean Disposal Alternative advances and the project establishes a right-of-way, then any subsequent use of that right-of-way must satisfy applicable regulations and be approved by the owner.

If the Ocean Disposal Alternative pipeline were constructed, access to the pipeline right-of-way would be needed to correct any unforeseen problems and maintain proper pipe loadings. At this design level, it is hard to predict what would be allowed in the right-of-way. Trees would probably not be allowed to grow in the right-of-way, but other crops may. Any crops grown in the right-of-way could be damaged if pipeline access were needed.

ALT-P2 Ocean Disposal Alternative Pipeline Burial

Comment Summary: *Describe the aboveground structures that would be visible along pipeline routes and whether pipeline stream crossings would be buried or suspended aboveground.*

The Ocean Disposal Alternative design calls for burying the entire conveyance pipeline going to the ocean, except at the end under the ocean. The pipeline itself would not be visible. Pumping plants and other appurtenances, usually several miles apart, would be visible. The pipeline would pass under rivers and other watercourses and either above or below existing pipelines (to be determined during final design).

ALT-P3 Ocean Disposal Alternative Pipeline Hydraulic Design

Comment Summary: *The description of the physical size and capacity of the Ocean Disposal Alternative pipeline is ambiguous. The pipeline appears to be oversized to allow others to dispose of additional drainage in the future and/or to carry a greater volume than that projected for drainage service. Who else might use the pipeline, and will the amount of drainage needed for the San Luis Unit increase over time?*

The SLDFR project designers economically sized the pipe used for the Ocean Disposal Alternative for specific discharge rates. The designers used only discharges from the reuse areas. The EIS suggests that another party, such as an existing coastal municipality or farm, could also use the outfall, if all regulations were met to do so. Reclamation is not aware of any such request at this time.

The conveyance systems have been designed to carry the same rate of flow throughout their entire length. Because of economic sizing, the pipe diameter varies as the pressure (head) in the pipeline varies. Complete description of the many pipe diameters and head classes is unnecessary for this level of design (see Master Response GEN-1). The design calls for pumps where heads need to increase and pressure-reducing valves where heads need to decrease. Drainage needs were evaluated in the Plan Formulation Report and Plan Formulation Report Addendum, and the Ocean Disposal Alternative pipeline has been designed to convey the amount of drainage needed to meet the purpose and need of the project.

ALT-S1 Source Control

Comment Summary: *The EIS should place more emphasis on source control and less on drainage.*

During development of the project alternatives, a detailed analysis of feasible and cost-effective source control actions was conducted to identify the flows that would need drainage service. The Plan Formulation Report (Section 3.2) discusses the drainwater reduction optimization that was conducted to determine the volumes of drainwater that need treatment and disposal. Source control measures are the responsibility of farmers and districts; therefore, source control is a local action, not a Federal action. The local entities may choose to implement drainwater reduction measures other than those identified in the EIS, or they may more extensively implement the measures identified in the EIS if they feel that the measures are more cost effective, better serve the purpose of reducing drainage production, and reduce the overall cost of drainage service. If farmers and districts choose to invest in additional source control activities that result in less drainage, the size of the treatment and disposal facilities could be reduced. This would make the analysis of effects in the EIS conservative (i.e., the EIS would overstate the environmental impacts of these Federal facilities). Also see Section 2.2.1.3 of the Draft EIS for a description of on-farm, in-district drainwater reduction activities that have been assumed to occur under the No Action Alternative.

ALT-T1 Reverse Osmosis, Selenium Treatment

Comment Summary: *The EIS should include more detailed information about the contaminant profile and disposal options for Se and RO treatment wastes (i.e., contaminant profile of the drainage effluent and expected concentrations of Se in biomass sludge), as well as potential impacts to water and air quality. The Se biotreatment and RO treatment technologies described in the EIS have only been pilot tested and have not been demonstrated on the scale proposed by the project. Whether water treatment facilities can be designed to function efficiently is unclear. In addition, Reclamation should consider new treatment technologies.*

Reclamation considers that all components of drainage service alternatives have been adequately demonstrated and are technically reliable and effective to the level described in the EIS. With regard to treatment of drainage, site-specific pilot tests are adequate to collect information for planning studies for commercially available, demonstrated technologies. Biotreatment and RO treatment technologies have a demonstrated commercial track record for Se removal and desalination, respectively, at many locations in the United States. For example, ABMet™ technology has been in use since 2004 at the 150 gpm Cochenour biotreatment plant located at Red Lake, Ontario, Canada. In addition, the technology is used at the Wharf Mine near Lead, South Dakota. Use of RO for desalination is currently a part of the strategy to supply supplemental water for California. The City of Santa Barbara operates a desalination plant for supplemental water supply during droughts. Further, the City of Tampa, Florida, constructed a large desalination facility to help meet its population's water demands. Other water suppliers in California and other states are evaluating the use of RO for water supply needs.

The duration of and data received from the pilot studies were adequate for the appraisal-level evaluation of alternatives in the EIS. Additional pilot tests are being conducted for more detailed feasibility design and cost estimates. Recent pilot data collected through December 2005 is appended to the Final EIS and includes an evaluation of biotreatment sludge and disposal requirements. A nationally recognized water treatment expert will conduct an independent peer review of Reclamation's RO and biotreatment pilot studies, data analyses, and design assumptions. The results of the peer review will be available in 2006.

Recovery and reuse of product water from RO are included in the In-Valley Alternatives. The potential for salt recovery from the evaporation process is addressed in Appendix J of the Draft EIS. Salt recovery and beneficial reuse is considered to be a potentially viable component of drainage service and will be evaluated in more detail in future design and implementation phases. Future designs and research will also evaluate the potential for Se recovery from the biotreatment sludge and beneficial reuse.

P2.2.4 Biological Resources (BIO)

BIO-1 Appendix M

Comment Summary: *Appendix M, the February 2005 Draft Fish and Wildlife Coordination Act Report prepared by the Service, contains several factual errors, inappropriate assumptions, and discrepancies with the EIS.*

Appendix M of the Draft EIS, the Draft Fish and Wildlife Coordination Act Report for the San Luis Drainage Project, was prepared by the Service in support of the proposed project. It is not within Reclamation's authority or the scope of this EIS to respond to comments on a report prepared by another agency. Comments on Appendix M of the Draft EIS were forwarded to the Service for consideration. A revised report is included as Appendix M1 of the Final EIS.

BIO-2 Endangered Species Act Consultation

Comment Summary: *The Draft EIS provides inadequate detail about the status of ESA consultation.*

Reclamation initiated formal consultation under Section 7 of the ESA with the Service on November 7, 2005. On March 16, 2006, the Service issued its Biological Opinion on the In-Valley Alternatives, completing the formal consultation. The Biological Opinion is included as Appendix M2 of the Final EIS. In addition, Reclamation initiated informal consultation with NOAA Fisheries on March 27, 2006. NOAA Fisheries responded in a letter dated April 21, 2006, which is included in the Final EIS as Appendix M3. Results of the consultation have been incorporated into the appropriate sections of the Final EIS.

BIO-3 Evaporation Basin Effects to Wintering Birds

Comment Summary: *A discussion of potential effects to wintering birds at evaporation basins (such as salt toxicosis and salt encrustation) should be added to the EIS.*

In the Draft EIS, a discussion of winter bird use of evaporation basins was included in Appendix G, Section G3.2.4, and a brief mention of these potential effects was also made in Section 7.4.2.4. Table 7-7 includes this as a significant effect: "Losses of waterbirds that occur due to salt toxicosis and salt encrustation despite available hazing and dispersal measures would be a significant unavoidable effect." In the Final EIS, a reference to Section G3.2.4 has been added to Section 7.4.2.4.

P2.2.5 Cumulative Impacts (CUM)

CUM-1 Analysis of Cumulative Impacts

Comment Summary: *Cumulative effects of changes in water quantity, quality, and circulation due to each alternative need to be analyzed. The EIS should also consider past, present, and* *reasonably foreseeable actions that could affect the San Joaquin Valley drainage solution. For example, although on-farm, in-district actions may not be part of the Federal action, they are an integral to a complete drainage service alternative. Therefore, the Final EIS should evaluate the indirect cumulative impact and benefits of these actions.*

Although the on-farm, in-district activities are not Federally funded, Reclamation has assumed that certain management activities would occur under the No Action Alternative (see Section 2.2.1.3). These activities were not included as components of the action alternatives, but they represent the assumptions that Reclamation has made regarding the conditions of the area to be served and the reasonable actions that districts could implement once drainage service is provided. Therefore, on-farm, in-district activities are considered in the cumulative effects analysis of each alternative for each resource area (see the subsections entitled “Cumulative Effects” in Sections 5 through 18).

Section 5 has also been updated with additional CALSIM II modeling information regarding impacts to the water quality and quantity in the San Joaquin River due to changes in the Grassland Bypass Project discharges. As a part of the development of CALSIM II, assumptions regarding probable future projects were included to reflect changes in water system demand, system operation rules, and infrastructure improvements expected to occur by 2030. Also see Master Response SW-16.

P2.2.6 Regional Economics (EC)

EC-1 Energy Costs in the Economic Analysis

Comment Summary: *Increased energy costs and the resulting water treatment and conveyance system cost increases have not been considered in the economic analyses of the alternatives.*

Economic analyses of the alternatives were performed in accordance with the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G). P&G Section 1.4.10 states that the prices of goods and services used for evaluation should reflect the real exchange values expected to prevail over the period of analysis. For the SLDFR, the period of analysis is 50 years. For this purpose, relative prices during, or immediately preceding, the period of planning generally represent the real price relationships expected over the period of analysis, unless specific considerations indicate that prices are expected to change. Some comments indicated a concern that energy prices may increase and proposed including an escalation factor for energy costs. However, prices for other key resources such as water or crops may also increase (or decrease) in a manner difficult to predict. Rather than conducting an unsupportable speculative analysis on how prices might vary for different commodities through the 50-year period of analysis, Reclamation used prices that reflected real market conditions at the time the EIS was drafted.

EC-2 Economic Impact Region

Comment Summary: *The EIS should evaluate the economic effects of the project on individual counties and communities rather than combining the nine counties in the project area.*

Sections 17 and 18 of the Draft EIS used a nine-county study region to evaluate regional economic, social, and environmental justice effects of the proposed project because components of each of the three general disposal alternatives (In-Valley, Delta, and Ocean) are located in different geographic areas. It is not possible to compare the impacts of different alternatives if the impact analysis uses a different type of geographic region for each alternative.

In addition, using single counties (or even smaller geographic areas such as communities) as economic impact regions usually results in underestimating the potential impacts of an action, especially when the counties are primarily rural with small populations and few major industries or businesses. The underestimation arises because economic impacts on a geographic region depend upon the prevailing business patterns and relationships that occur within that defined region. The economic impacts of many economic and financial transactions that occur as the result of a particular economic activity in a defined region actually occur outside of the defined region. For example, construction materials for a project may actually be manufactured outside of the region and shipped into the region. Such business transactions that occur outside of a defined region are known as “leakages.” The full impact of these leakages is not identified (or quantified) as an economic impact to the region where the original activity or project is located. Therefore, the smaller the geographic region and, perhaps even more importantly, the less comprehensive the region’s economic or business structure is, the more likely it is that economic impacts of an activity will not be identified.

Analyzing the economic impacts in a number of different regions and then adding them together will not provide the total impact, because that would fail to account for all of the interregional business relationships. The best way to determine economic impacts of an action is to define a region that is large enough to capture all of the business relationships without having it so large that the impacts of the activity are lost in the total economic activity of the region. Defining the economic impact region as the same group of counties for all alternatives allows for a more meaningful comparison of the economic impacts among the various alternatives.

Identifying an economic impact region as a group of counties is also necessary to complete the economic analyses, since much of the required economic data are only available on a county-level basis.

EC-3 Repayment of Project Costs

Comment Summary: *Describe how Reclamation will ensure that the drainage program and the cost of the alternatives are fully reimbursed, how project costs will be repaid, and whether project beneficiaries would bear the cost of drainage and water subsidies. The EIS should fully account for the costs and benefits of the alternatives.*

The primary purpose of the NEPA analysis is to disclose environmental impacts and benefits from a proposed action. Detailed cost and benefit analysis are presented in feasibility studies under the planning process as they are not environmental issues. As such, repayment analyses will be conducted as a part of the Feasibility Study. Project costs, including mitigation costs, will be allocated and repaid according to project authorizing legislation and Reclamation policy.

P2.2.7 General Issues (GEN)

GEN-1 Level of Design of the Draft EIS

Comment Summary: *The EIS should identify the pipeline construction routes, including areas of disturbance; the engineering details of the pipeline design such as leak detection and prevention measures, pipeline pressures, sizing, and materials; effects to the environment due to pipeline construction and potential leaks; more detailed construction and implementation costs; marine and terrestrial substrate and environment (ocean currents, air quality, soils, etc.) of the pipeline route; location and types of proposed facilities for all alternatives; and construction techniques and mitigation for construction-related impacts.*

Reclamation uses three levels of design to conduct the planning, feasibility assessment, final design, and construction of projects. The purpose of this progression of design levels is to use resources efficiently while meeting the project requirements.

The first level of design is the appraisal design. The Draft EIS was prepared at the appraisal level of design, which is sufficient to define the nature and magnitude of the potential impacts as required by NEPA. Reclamation uses this level to compare costs of two or more alternatives that differ substantially. Appraisal-level cost estimates for construction (including right-of-way and land acquisition), annual operation and maintenance (including energy), and replacement costs were included for all alternatives analyzed in the Draft EIS.

At the appraisal level, project designers use readily available data and generally do not collect new data to compare the alternatives. Approximate distances may be used. For example, readers of the EIS should consider the pipeline routes as bands, possibly several miles wide. The precision and accuracy of appraisal-level designs can vary greatly from one project to another.

The middle level of design is the feasibility design. This type of design is much more accurate than an appraisal-level design. Reclamation uses feasibility designs to determine if a project is economically feasible and constructible and to obtain funding from Congress. It is possible for an alternative to advance from the appraisal level and be found infeasible during the feasibility-level design. The feasibility-level design usually requires the collection of design data, including geological data. Pipeline routes and tunnel alignments are firmly established by the end of the feasibility design. In the event that the feasibility design results in significant modifications of the project facilities or alignments not addressed in the EIS, an environmental re-evaluation would be conducted and followed by additional environmental review, if necessary.

The highest level of design is the final design. The product of the final level of design is a set of specifications for construction. The final design requires extensive design data collection and design time. Project designers must thoroughly understand and account for all design problems.

On the SLDFR appraisal design, Reclamation provided more detail than a typical appraisal-level design but did not conduct a feasibility-level design for the purpose of comparison of project alternatives. The use of additional detail was possible because of Reclamation’s experience with the local geology and new, readily available tools. While the routes were defined precisely, they should still be considered bands. At this level of detail, it is possible that an appraisal pipeline route goes through major structures and houses. These impacts would be avoided by adjusting the exact pipeline route during the feasibility design.

Project designers visited the pipeline routes, allowing them to see the slopes and the general lay of the land. Reclamation has experience in designing pipelines across active faults, down steep slopes, and across slide areas. While designers try to avoid such areas, it is possible to design for them, which does not necessarily mean that designers will find such routes feasible in future designs, if the Ocean Disposal Alternative progresses. Additional design details that are standard in engineering practice such as anchoring systems, leak detection, joint details, and site-specific mitigation are not specifically included in the appraisal-level design. However, costs for these features are included because the costs are based on unit costs for recently completed projects, which would have incorporated these features if necessary. The schedule for feasibility and final design for each alternative is shown in Section 2. Public input on design features was received through the public project scoping meetings, comments received on the Draft EIS, and individual meetings held with concerned parties.

GEN-2 Use of Excess Water Under Land Retirement Alternatives

Comment Summary: *The EIS should identify how water freed up by retirement of lands within Westlands and elsewhere would be allocated. Excess water should revert to the CVP for other beneficial uses. Reallocation of San Luis Unit water is a significant project impact compared to No Action and should be explicitly evaluated. Reclamation did not consider reclaiming water from retired lands and adjusting water contracts accordingly.*

CVP water contractually goes to support beneficial uses within the contract service area, in this case, the San Luis Unit. If land retirement reduces water demand such that the full contract amounts cannot be put to beneficial use within the contract service area (for example, under the In-Valley/Drainage-Impaired Area Land Retirement Alternative), water in excess of demand would be used to meet other CVP obligations according to existing CVP needs and priorities. Water allocation issues and contract modifications are not part of the proposed Federal action for this project; therefore, they are not appropriate for analysis in this EIS.

GEN-3 Impact Analysis for Pipeline Failure

Comment Summary: *The EIS should identify risks to the water supply, water quality, and soils in the event of a pipeline failure. A contingency plan for such an event should be included.*

NEPA requires Reclamation to address “reasonably foreseeable” impacts, even if their probability of occurrence is low, “provided that the analysis of the impacts is supported by credible scientific evidence, is not based upon pure conjecture, and is within the rule of reason” (40 CFR 1502.22). Given the rarity of breaks in properly designed pipelines and the use of accepted design standards for pipelines crossing the Coast Ranges of California, Reclamation believes a discussion of a catastrophic break in the pipeline is not reasonably foreseeable, would be based upon pure conjecture, and would be outside of the rule of reason.

GEN-4 Public Comment Deadline Extended

Comment Summary: *The public comment period should be extended to allow for a more complete review of the Draft EIS.*

In response to public comments, Reclamation extended the public comment period from July 31, 2005, to September 1, 2005.

GEN-5 Incorporation of New Technologies

Comment Summary: *Reclamation should consider using technologies other than those evaluated in the Draft EIS.*

Reclamation continues to investigate technical innovations that can potentially reduce costs and impacts of drainage service. These innovations will be incorporated into drainage service components when they are adequately documented and demonstrated. New technical information can be forwarded to Reclamation's Project Manager for evaluation. Evaluation and implementation of innovative treatment technologies are described in Section 2.4.2 and Appendix J of the EIS.

GEN-6 Water Contract Renewals

Comment Summary: *The Draft EIS should have included the NEPA evaluation of the renewal of long-term water supply contracts for the San Luis Unit and the Delta-Mendota Canal Unit in its evaluation of drainage alternatives. A new Draft EIS should be prepared that evaluates all contract renewals in the context of water assignments, toxic drainage prevention and disposal, economic viability and costs, and environmental assurances and risks. No water contracts should be renewed until allotments are adjusted to reflect the decreased amount of land to be irrigated, and those allotments should be factored into the SLDFR drainage needs evaluations.*

The proposed Federal action addressed in this EIS is the provision of drainage service to lands authorized under the San Luis Act, as discussed in Master Response P&N-1. Water contract renewals are water supply issues that are outside of the scope of this proposed project.

P2.2.8 Geology and Seismicity (GEO)

GEO-1 Seismic Hazards in the Project Vicinity

Comment Summary: *The EIS should provide greater detail about seismic hazards in the project vicinity, especially along the Ocean Disposal Alternative pipeline route.*

The entire project area is seismically active, with some alternatives more susceptible to the effects of earthquakes and faulting than others. Detailed descriptions of historical earthquakes and significant faults in the region are included in Appendix H. Generally, in seismic hazard assessment past activity is considered the key to future activity; in other words, a fault that has been active recently poses a greater likelihood of being active in the future and a fault with no recent past activity is less likely to be active. Thus, faults with Holocene activity (movement in the past 11,000 years) are considered a higher hazard than faults that have not been active in the Holocene. The Alquist-Priolo Act defines an active fault as a fault with Holocene activity. Faults with late Quaternary but not Holocene activity are potentially active but pose a lower hazard, all else being equal, because they rupture rarely. Faults with no Quaternary activity are probably not active and are generally not considered in seismic hazard analysis. Appendix H of the Final EIS includes more detailed information regarding seismic hazards along the Ocean Disposal Alternative pipeline route. Based on the analysis presented in Appendix H and Section 9 of the Final EIS, impacts from seismic hazards were found to be not significant after application of standard engineering design practices to avoid such hazards.

GEO-2 Surface Disruption Potential in the Project Vicinity

Comment Summary: *The EIS should provide greater detail about topographic hazards in the project vicinity, especially along the Ocean Disposal Alternative pipeline route.*

Numerous factors can disrupt the earth’s surface: mass wasting (gravity-driven slope failure such as landslides, rockfall, and debris flows), liquefaction, settlement, and surface fault rupture. Surface fault rupture occurs when a tectonic fault ruptures the surface of the earth. Not every fault rupture in the subsurface breaks though to the surface. In general, most earthquakes smaller than about M 6.5 have little or no surface rupture. Many, though not all, earthquakes with larger magnitudes are accompanied by surface rupture. For example, the 1994 M 6.7 Northridge earthquake occurred on a “blind” fault and ruptured only in the subsurface, deforming but not breaking the surface. The 2003 M 6.5 San Simeon earthquake did not have surface fault rupture.

Surface fault rupture, however, refers only to rupture of the fault plane at the surface, not to all seismically induced surface disruption. Strong ground shaking caused by purely subsurface rupture can trigger mass wasting, liquefaction, and settlement. All of these phenomena occurred in response to the San Simeon earthquake shaking, although no surface faulting occurred. However, they can also result from different triggering mechanisms, such as high precipitation, slope oversteepening, anthropogenic forcing, etc. Managing the hazard from these secondary effects is different from managing the hazard from surface fault rupture. Each requires its own mitigation practices. Some of the available mitigation options for each alternative are discussed in Section 9.2. If the Ocean Disposal Alternative were advanced for further consideration, final mitigation measures would be selected and incorporated in the final design.

GEO-3 Geologic and Seismic Mitigation

Comment Summary: *The EIS should provide greater detail about mitigation in the event of a pipeline failure due to geologic or seismic events.*

Several geologic phenomena pose a potential hazard to the pipelines proposed for the Delta Disposal and Ocean Disposal Alternatives: seismic ground shaking, surface fault rupture, earth movement such as mass wasting (landslide and rockfall) and liquefaction, and erosion. Section 9 and Appendix H discuss the phenomena and their potential effects on the pipelines. In many cases the phenomena pose a serious hazard if unmitigated, but with proper mitigation, the effect becomes negligible. The hazards, the need for mitigation for each alternative, and possible (updated) options for mitigation are discussed in Section 9. However, the specific mitigation procedures most appropriate for each case and each location would be determined in a later design phase. Operation of the pipeline would include development of a spill monitoring and response plan. This plan would address procedures for spill monitoring (e.g., pressure monitoring locations, flow comparison techniques) and for responding to pressure drops should such events occur. These types of mitigation procedures have been effectively implemented on pipelines throughout the United States.

P2.2.9 Groundwater Resources (GW)

GW-1 Evaporation Basin Effects to Migratory Waterfowl and Other Species

Comment Summary: *The evaporation basins proposed for the In-Valley Alternatives could have significant effects on migratory waterfowl and other species. These effects would be considered "takes" under the Migratory Bird Treaty Act.*

As discussed in Sections 7 and 8 and Appendix G, the EIS recognizes that significant effects are likely to occur due to evaporation basins operated under all of the In-Valley Alternatives. The Migratory Bird Treaty Act and associated Service protocols for evaporation basins are described in Section 20 and Appendix L, Section L2.2. As described in Section 20, impacts will be addressed through mitigation, monitoring, and adaptive management.

GW-2 Reuse Area Effects to Biological Resources

Comment Summary: *The EIS should summarize current information, research, challenges and potential impacts of reuse areas to species that may be present.*

A description of available data on Se concentrations in existing reuse areas has been added to Sections 8.1.5 and 8.2.4.1, including data on forage crops collected at Panoche Drainage District reuse areas and data on waterbirds nesting at Panoche Drainage District and Red Rock Ranch reuse areas. Elevated Se levels in shorebirds that have been documented at existing reuse areas are believed to have been due to ponded water events. As discussed in Section 8.2.2.5, measures will be taken to prevent the occurrence of ponded water at reuse areas.

The action alternatives include reuse facilities with drainage for irrigation of salt-tolerant crops. The possibility that reuse areas may attract wildlife does exist. Reclamation is evaluating management concepts that would address such concerns. Management would make reuse areas unattractive for use and/or interrupt the food chain movement of constituents such as Se. An obvious consideration is the avoidance of standing water or ponding of water. Reclamation staff is evaluating designs to prevent ponding. Another concept may lie in the types of vegetation used at reuse sites. Tall, robust grasses may provide habitat for rodents, but the structure of that habitat would reduce the availability of rodents to predators such as Swainson's hawk.

P2.2.10 Mitigation (MIT)

MIT-1 Adaptive Management and Monitoring

Comment Summary: *The EIS should include additional detail on plans for various types of monitoring and adaptive management for all alternatives, given the level of uncertainty present in certain components of the effects assessments.*

Since publication of the Draft EIS, Reclamation has worked with the Service, CDFG, and Regional Board to further develop plans for monitoring and adaptive management during all phases of the project. In Section 20 of the Final EIS, an equivalent level of analysis is used for all alternatives. Section 20 also includes a discussion of contingency measures that could be implemented if monitoring results indicate that effects are more severe than initially anticipated, and cost estimates for mitigation, monitoring, and contingencies are included in Appendix O.

Appendix J includes more detailed mitigation planning information for the In-Valley Alternatives.

As suggested in the comments, the monitoring will be set up to identify potential effects in certain areas that have not been previously monitored in a systematic way and where limited data exist, such as salt toxicosis, salt encrustation, adult diving duck mortality, and effects to wildlife in reuse areas. Once a specific alternative is selected in the Record of Decision, Reclamation will continue to work with the Service, CDFG, Regional Board, and others as necessary to develop a more detailed Monitoring and Adaptive Management Plan.

MIT-2 Mitigation Planning

Comment Summary: *The Draft EIS provides inadequate detail about the feasibility, planning, and costs of mitigation. Specific issues mentioned include mitigation and associated costs for coastal/marine impacts during construction and operation of the Ocean Disposal Alternative; mitigation for construction of evaporation basins; status of Service protocols; and potential for netting surface of evaporation basins to prevent utilization by birds.*

The following sections of the Final EIS have been updated or added to provide additional detail on mitigation planning:

- Section 20.1 includes a description of the phased adaptive management process.
- Section 20.3 has been added to describe monitoring for all alternatives.
- Appendix J includes a new schedule showing the phased mitigation planning approach for the In-Valley Alternatives, potential mitigation locations and criteria, mitigation cost estimates (initial and contingency), and the phased adaptive management approach specific to evaporation basins.
- Appendix O, Mitigation Cost Estimates, has been added.

The status of the Service protocols is discussed in Appendix M1 of the Final EIS.

Netting and other types of pond covers were evaluated as a means of limiting bird exposure to impounded water in the evaporation basins; however, it was determined that biotreatment to remove Se is more effective and less costly than measures aimed at reducing exposure.

P2.2.11 Purpose and Need (P&N)

P&N-1 Authorization of the SLU

Comment Summary: *To continue delivering publicly subsidized CVP water to drainage-impaired lands and provide drainage service for those lands is contrary to the State Board definition of reasonable use, other Federal and State laws and regulations (e.g., California Water Code, State Constitution) for reasonable and beneficial water use, and public interest in the evaluation and planning of State water resources.*

Water is delivered to the San Luis Unit in accordance with State and Federal law. The purpose of the project, as described in Section 1.1, is to provide agricultural drainage service to the Unit and the general area as authorized under Public Law 86-488.

P2.2.12 Regulatory Environment (REG)

REG-1 Permitting and Regulatory Compliance for the Ocean Disposal Alternative

Comment Summary: *The Draft EIS did not adequately address the feasibility, time, and cost of mitigation and monitoring for the Ocean Disposal Alternative to meet the permit requirements, standards, and regulations imposed by the Coastal Zone Management Act, Coastal Zone Act Reauthorization Amendments of 1990, Coastal Commission, California Ocean Plan, Monterey Bay National Marine Sanctuary, toxicity standards, the San Luis Obispo General Plan, and other regulatory requirements. Some comments stated that the Ocean Disposal Alternative would take much longer to permit than the other alternatives.*

Section 4 and Appendix L describe the regulatory environment and compliance requirements that apply to all of the action alternatives. Reclamation will follow all necessary Federal regulations during the planning, permitting, design and construction stages of the project, including the Coastal Zone Management Act, as appropriate. Reclamation will also make every reasonable effort to be consistent with State and local environmental regulations and plans. Any monitoring required by permits will be determined at the time that the permit is obtained. The time to obtain necessary permits for all action alternatives was assumed to be equal for the purpose of determining the start date for drainage service. This assumption is thought to be reasonable, given the lack of information to the contrary.

The Draft EIS did not specifically include the San Luis Obispo General Plan and certain other local plans and programs in the discussion of regulatory compliance. State and local land use regulations do not apply to Federal actions. However, in accordance with 40 CFR 1502.16(c) and 1506.2(d), Reclamation will make every reasonable effort to be consistent with State, regional, and local environmental and land use plans and policies.

The point-source discharge would be subject to Clean Water Act (CWA) National Pollutant Discharge Elimination (NPDES) permitting and Ocean Plan Requirements, as described in Appendix L. Conformity of the Ocean Disposal Alternative to specific water quality requirements is discussed in Section 5 of the EIS and in Master Response SW-13.

The Monterey Bay National Marine Sanctuary currently does not include the proposed Point Estero outfall location. Therefore, MBNMS requirements will not be considered at this time. See Master Response SW-7 in regard to permit authority of the MBNMS.

REG-2 CEQA Compliance for the EIS

Comment Summary: *The EIS lacks discussion of CEQA documentation requirements and should address the need for CEQA compliance and local permits.*

The proposed project is a Federal action, and no CEQA lead agency was identified during the course of public scoping for the project or preparation of the EIS. Any required CEQA compliance will be conducted for discretionary actions by State or local government agencies, as necessary. This EIS can be used as a source of information for those CEQA documents, if they become necessary. Reclamation will coordinate project planning and design with State, regional, and local agencies to make the project consistent with appropriate environmental and land use plans and policies, to the extent practicable.

REG-3 Permitting and Regulatory Compliance for Delta Disposal Alternatives

Comment Summary: *The projected level of Se loading under the Delta Disposal Alternatives may not be compatible with new Se criteria for the Bay-Delta and the State, and the use of a mixing zone for a bioaccumulative contaminant to meet water quality standards may not be feasible. Therefore, permitting for the Delta Disposal Alternatives could be difficult. The Final EIS should identify the potential regulatory and policy limitations of the proposed Se discharge levels and how these changes may affect the Delta Disposal Alternatives. The Final EIS should also explain how the proposed discharge affects water quality goals adopted by State and Federal agencies in the CALFED process.*

The Draft EIS considered all currently promulgated Se standards and recent scientific information in its analysis of water quality and bioaccumulation effects of drainwater disposal to the Delta at Chipps Island or at Carquinez Strait. Reclamation acknowledges that permitting the Delta Disposal Alternatives will be a significant undertaking. However, no clear guidance from the State Board was provided indicating these alternatives were not permittable. It is true that the Regional Board is developing a Se-based TMDL. Reclamation recognizes that mass loading is a future issue and has based the effects analysis in the EIS on changes to Se in potential food-chain items. The TMDL has not yet been adopted, and the EIS analysis cannot be based on potential future requirements.

The Bay-Delta diffuser described in the Draft EIS was designed and modeled to meet the California Toxics Rule Se concentration criteria of 5 micrograms per liter (µg/L) within a reasonable zone of initial dilution (see Section 5.2.2.1). See Master Response SW-16. Consistency with State and Federal water quality goals developed as a part of the CALFED process was assessed through comparison of the changes in Bay-Delta water quality predicted for the Delta Disposal Alternatives for constituents of concern identified by CALFED (total dissolved solids [TDS], bromide, and total organic carbon [TOC]). These results are presented in Section 5.2.9 and Section 5.2.10. Additionally, Section 4 presents an overview of regulatory compliance requirements for each of the alternatives.

P2.2.13 Selenium Bioaccumulation (SE)

SE-1 Bioaccumulation of Se and Other Constituents Under the Ocean Disposal Alternative

Comment Summary: *The Draft EIS contains inadequate analysis of bioaccumulation effects – primarily from Se – that could result from the Ocean Disposal Alternative and does not account for related impacts to the ecosystem, recreation, and human health. Discharge from the Ocean Disposal Alternative could have bioaccumulation-related effects to marine plankton, plants, shellfish, fish, birds, dolphins, porpoises, harbor seals, and whales.*

Some comments regarding the analysis of bioaccumulation effects specifically mention Se; other comments mention no specific constituent, but it is assumed that the comments are related to Se (except for one comment regarding bioaccumulation effects of MBTA). This Master Response addresses both Se and other potential bioaccumulative constituents that may be present in Ocean Disposal Alternative effluent.

Selenium

As discussed in Section 5 of the EIS and Master Response SW-13, the 6-month median marine aquatic life criterion of 15 ppb of Se reported in the California Ocean Plan was used as the standard for evaluating the Ocean Disposal Alternative diffuser design and resultant plume. However, this criterion is based on aquatic toxicity, not bioaccumulation to upper-trophic-level receptors, and it is recognized that bioaccumulation-related effects can occur at Se concentrations below the 15 µg/L criterion. Therefore, to respond to this concern, an additional analysis was conducted to evaluate the size of the mixing zone that would be required before a concentration of 2 µg/L Se is achieved. The value of 2 µg/L Se was selected because this is the lowest promulgated water quality criterion for Se in California and was put in place to protect the waterfowl (based on food-chain effects) in Grasslands Water District, San Luis National Wildlife Refuge, and Los Banos State Wildlife Area.

Although a fair amount of Se research has been conducted in estuarine environments such as the San Francisco Bay-Delta, limited data exist on the concentrations, speciation, and bioavailability of Se in open ocean waters offshore of California (or in other parts of the world). Cutter and Bruland (1984) measured vertical profiles of Se species in the North and South Pacific Oceans to depths of 3,250 meters. At the VERTEX II site (18N, 108W, off the coast of Mexico) total dissolved Se concentrations ranged from 0.075 µg/L (15-meter depth) to 0.19 µg/L (3,000-meter depth). The water was about 3,500 meters deep with a surface mixed layer of about 30 meters. Dissolved organic selenide averaged 0.6 µg/L within the 30-meter mixed layer and increased to a maximum of about 0.79 µg/L between 45 and 60 meters deep. This depth also coincided with maximums for primary productivity, total pigments, and bioluminescence. Below 100 meters, dissolved organic selenide ranged from less than 0.0079 to 0.037 µg/L. Surface selenate values averaged 0.011 µg/L, and selenate increased rapidly from 30 to 125 meters to 0.092 µg/L.

Cutter and Bruland (1984) also measured surface water Se speciation on a horizontal transect beginning off the coast south of Monterey and north of Morro Bay. The station closest to the shore was about 250 km southwest of Monterey, and at this location the dissolved organic selenide concentration in the surface mixed layer was 0.030 µg/L, while the dissolved selenate concentration was almost the same (0.029 µg/L).

Several other studies measured Se concentrations and speciation in ocean environments. However, like the Cutter and Bruland (1984) study, these studies have been conducted in deep ocean waters or fjord systems very different than the near-shore shallow coastal shelf environment at the Ocean Disposal Alternative outfall location off the coast of Point Estero. For example, Nakaguchi et al. (2004) measured vertical profiles of dissolved Se species in the Celebes Sea, the Sulu Sea, and the South China Sea, and found considerable variation among locations and sometimes among sampling events, but in general organic selenide made up less than half of the total Se concentration. Nakaguchi et al. (2004) compared their results to an earlier study in the Indian Ocean by Hattori et al. (2001, cited in Nakaguchi et al. 2004), which found that organic selenide was the dominant species at that location. Wrench and Measures (1982) measured Se speciation at a fjord ecosystem (Bedford Basin, Nova Scotia, Canada) at a depth of 5 meters on a weekly basis in the winter/spring, and found that biological activity can modify the redox balance and the speciation of Se. In general, most studies found data to indicate that the Se speciation regime is correlated with nutrient profiles and biological activity.

As indicated by the above studies, variation appears to be considerable in Se speciation regimes in the ocean environment, and it is not possible to predict the forms of Se that would occur when Se is released to the ocean under the Ocean Disposal Alternative. Data on Se bioaccumulation and toxicity in the open ocean environment are also insufficient to predict bioaccumulation or toxic effects in this environment. Therefore, the analysis presented here uses available data from inland and estuarine environments, using conservative values due to the inherent uncertainty. Skorupa and Ohlendorf (1991) identified a threshold of 3 ppm Se in avian eggs as elevated compared to background conditions, and used existing water and tissue data to develop a regression equation that identified 2.3 ppb total recoverable Se as the corresponding threshold in water. The regression equation was developed using primarily evaporation basin data, not marine data. Skorupa and Ohlendorf (1991) also identified an embryotoxicity threshold of 2 to 13 ppb total recoverable Se, based on a dietary threshold of 5 ppm Se in dietary items and empirically derived bioaccumulation curves for dietary items from Tulare Basin evaporation ponds. While few data are available on Se bioaccumulation rates and adverse effects in the open ocean environment, available data on Se toxicity to birds indicate that marine (salt-tolerant) species tend to be less sensitive to Se than freshwater species (Hamilton 2004).

Based on data presented in Section 5.2.2, EPA's VP program was used to evaluate the ability of the two diffuser designs specified in the EIS (designed to meet a Se criterion of 15 ppb at the edge of the ZID) to meet a Se target of 2 ppb within a reasonable ZID. Key diffuser design parameters are listed in Final EIS Table 5.2-6.

Under *maximum* ocean current conditions, the resulting Se plume would reach a concentration of 2 ppb at heights of less than 5 meters above the diffuser for both designs, in both summer and winter temperature conditions. At this elevation, under summer and winter conditions, the plumes would be less than 7 meters wide for both designs, and would be 52 and 28 meters long for the 10-cm and 15-cm port alternatives, respectively.

Under summer temperatures with zero current velocity conditions, the diffuser with 10-cm ports yields a Se concentration of 5.1 ppb at a trapping depth of 32 meters while the diffuser with 15-cm ports yields a Se concentration of 6.9 ppb at a trapping depth of 25 meters. The plume dimensions (lengths and widths) for these two cases would be 56.7 by 7.9 meters and 31.2 by 9.9 meters, respectively.

Under stagnant (worst-case) ocean current conditions, the resulting Se plume did not reach the 2 ppb target before reaching either a trapping depth (i.e., a level at which upward plume motion is halted due to density gradients) or the water surface. Because EPA's VP program is not able to model the lateral spread of the plume that would occur after the trapping depth or water surface is reached, an additional diffuser design was produced as an example of the kind of diffuser that would be able to meet the 2 ppb target before the water surface is reached, and could be modeled using EPA's VP program. Table P-1 shows the design parameters for this additional diffuser design (the "2 ppb design"). Under stagnant (worst-case) ocean current conditions (summer and winter), the Se plume resulting from this design would reach a concentration of 2 ppb at a height of approximately 13 meters above the diffuser. At this elevation the plume would be less than 6 meters wide and would be approximately 284 meters long (again, for both summer and winter). Note that this is not the only diffuser configuration that would achieve the 2 ppb target within a reasonable ZID and is only a preliminary example. The 2 ppb diffuser design would need to be refined if the Ocean Disposal Alternative and the 2 ppb Se target were selected for the preferred alternative in the future.

Table P-1
2 ppb Diffuser Design Parameters, Point Estero Diffuser

Diffuser Design Parameter	Parameter Value
Diffuser port valve type	Tideflex®
Port diameter	6.1 cm
Diffuser design depth	61 meters
Port elevation above ocean floor	0.61 meter
Port angle	Vertical (0^o)
Number of ports	77
Port spacing	3.7meters on center
Diffuser length	278 meters
Diffuser discharge velocity	3.67 meters/second (12 feet/second)

Source: Flow Science VP analysis, 2005.

Under worst-case conditions, the size of the plume with Se concentrations greater than 2 ppb would be approximately 13 meters in height. At this elevation the plume would be less than 6 meters wide, and would be approximately 284 meters long. For EIS purposes, the exact configuration and location of the diffuser have not been determined – it could either be T-shaped, with a pipe extending out to the diffuser, where the length of the diffuser is oriented roughly parallel to the shoreline (and along the depth contour), or the diffuser could be continued in the direction of the pipe, with the length extended out perpendicular to the shoreline and into deeper water. For this evaluation it is assumed that the area of the plume could include habitat within a distance of about 300 meters in any direction from the approximate outfall location described in Master Response SW-8. This area would include habitat at a depth of approximately 50 to 65 meters.

Organisms expected to inhabit the area surrounding the diffuser are described in Master Response SW-8. Because the diffuser ports would be elevated above the ocean floor and the effluent would be expected to rise due to lower salinity, the plume is not expected to directly impact the benthic environment on the ocean floor, although organisms that colonize the diffuser itself might be expected to accumulate Se at elevated levels. The plume would cover an area of approximately 1,700 square meters (less than half an acre). Pelagic organisms are very unlikely to be constricted to an area this small for any significant period of time (longer than a portion of a day).

An exception might occur if conditions existed in the diffuser vicinity that attract organisms. Such conditions might include increases in temperature and/or elevated nutrient concentrations that result in increased productivity. Fish species have been shown to be attracted to thermal discharges in some cases. The attraction may be advantageous for several reasons, including temperatures that closely approximate seasonally preferred temperatures, that fish may maintain energetically optimal temperatures near the warm water discharge, and discharges may attract and concentrate prey species

Most of the information found on the potential for fish to be attracted to thermal plumes are for inland waterbodies rather than the open ocean environment. Literature discussed in environmental documentation for Portlands Energy Centre, a power plant located on Lake Ontario, suggests numerous cases where fish have been found to be attracted to warm water discharges where temperatures do not approach the upper tolerance ranges (generally around 30°C) (Portlands Energy Centre 2003). For example, Spigarelli and Thommes (1976, 1979) found that rainbow trout appeared to be attracted to warm water discharges in Lake Michigan and that sport fishing success for various trout species as well as coho and chinook salmon had increased in the thermal discharge plume of a nuclear power plant. Shuter et al. (1985) also found that the numbers of smallmouth bass increased near thermal plumes. Others studies, however, have found a lack of correlation between temperature plumes and fish. For example, studies by Minns et al. (1978) showed no correlation between fish distribution and thermal plumes from different power plant thermal discharges. The fish in these cases appeared to be more influenced by currents and turbulence than by the thermal plume. Studies of thermal discharges from the west coast such as from power plants including Diablo Canyon, San Onofre Nuclear Generating Station, or Morro Bay Power Plant have generally focused on impacts of the thermal plume itself and measurement of any resulting decline in plant and animal populations in the plume rather than on the attractive properties of the warm water.

In cases where temperatures approach the upper tolerable levels, fish tend to avoid the thermal plume. Gray (1990) reported that juvenile chinook salmon avoided thermal plumes in laboratory tests when the difference in temperature exceeded 9 to 11°C above ambient temperatures, but thermal discharge in the Hanford reach of the Columbia river did not block the upstream migration of tagged adult chinook salmon and rainbow trout even at temperature differences of 17°C.

Many of the studies cited in the Portlands Energy Centre document that discuss the attractive properties of thermal plumes appear to have been conducted on discharges to canals or semi-enclosed bays rather than open ocean conditions. In these cases, the discharge canal represents a fixed location where temperatures remain elevated.

Given the lack of data on thermal attraction in the open ocean environment, it may be conservatively assumed that some fish species may be attracted to the warmer waters. However, given that the thermal plume from the Ocean Disposal Alternative discharge would be relatively small (less than half an acre) in relation to the surrounding open-water areas, it would be unlikely that large numbers of fish would be able to congregate in any large number and forage within the plume for a sustained length of time. Any food sources for fish would also need to stay within the plume for a length of time to experience increased Se accumulation.

No significant effects to marine organisms or human health are expected to occur as a result of increased Se bioaccumulation due to the Ocean Disposal Alternative.

As discussed in Master Response SW-13, the following constituents are expected to exceed WQOs within the ZID:

- Cadmium
- Chromium
- Copper
- Lead
- Nickel

- Silver
- Ammonia

Ammonia is a nutrient and not a bioaccumulative constituent. Available evidence indicates that no significant biomagnification of chromium takes place in aquatic food webs (http://www.epa.gov/docs/R5Super/ecology/html/references.htm#atsdr93d). The remaining constituents listed above bioaccumulate to some degree, as discussed below.

Frazier (1979) reviewed data on bioaccumulation of cadmium in marine organisms and concluded that cadmium is accumulated to the greatest extent in mollusks such as oysters, scallops, and mussels, and to a lesser extent by crustaceans and fish. Eisler (1986) conservatively estimated that adverse effects on fish or wildlife are either pronounced or probable when cadmium concentrations exceed 4.5 ppb in saltwater or 100 ppb in the diet. Cadmium residues in the vertebrate kidney or liver that exceed 10 ppm fresh weight or 2 ppm whole body fresh weight should be viewed as evidence of probable cadmium contamination; residues of 200 ppm fresh weight kidney, or more than 5 ppm whole animal fresh weight, are probably life-threatening to the organism. Mammals and birds are comparatively resistant to the biocidal properties of cadmium.

Copper has been shown to bioconcentrate in many different organs in fish and mollusks. Low potential exists for bioconcentration in fish, but high potential exists for mollusks. There is a moderate potential for bioaccumulation in plants and no biomagnification potential. Toxic effects in birds include reduced growth rates, lowered egg production, and developmental abnormalities. While mammals are not as sensitive to copper toxicity as aquatic organisms, toxicity affects a range of mammals and includes a wide range of effects such as liver cirrhosis, necrosis in kidneys and the brain, gastrointestinal distress, lesions, low blood pressure, and fetal mortality (http://www.epa.gov/docs/R5Super/ecology/html/toxprofiles.htm#cr).

High accumulations of lead from ambient seawater by marine plants is well documented; concentration factors vary from 13,000 to 82,000 for algae from Raritan Bay, New Jersey (Seeliger and Edwards 1977), and from 1,200 to 26,000 for algae from Sorfjorden, Norway (USGS 2006). Although lead is concentrated by biota from water, there is no convincing evidence that it is transferred through food chains (Branica and Konrad 1980; Settle and Patterson 1980). Lead concentrations tended to decrease markedly with increasing trophic level in both detritus-based and grazing aquatic food chains (Wong et al. 1978). In the marine food chain of seawater (<0.08 µg /L), to a brown alga (*Egregia laevigata*), to the red abalone (*Haliotis rufescens*), lead concentrations in the alga and abalone were both <0.04 mg/kg fresh weight after 6 months, indicating negligible biomagnification (Stewart and Schulz-Baldes 1976). When seawater contained 1,000 µg /L, young abalones that fed on *Egregia* for 6 months contained up to 21 mg /kg fresh weight, but neither growth nor activity was affected; lead selectively accumulated in the digestive gland (38 mg/kg) and was lowest in muscle (<l mg/kg) – the part normally consumed by humans (Stewart and Schulz-Baldes 1976). In the freshwater food chain of an alga (*Selenastrum capricornutum*), to a daphnid (*Daphnia magna*), to the guppy (*Poecilia reticulata*), lead accumulation progressively decreased from the alga to the guppy (USGS 2006).

Nickel is an essential element necessary for growth of microorganisms, plants, and many vertebrates. Chemical and physical forms strongly affect nickel bioavailability and toxicity. Nickel concentrations in species are dependent upon differential tissue uptake and retention, trophic position (i.e., place in the food chain), sex, age, and reproductive state. Nickel concentrations increase with age of many marine mammals due to prolonged exposure and subsequent accumulation. Placental transfer does not occur, and bioaccumulation varies widely among organisms. Nickel concentrations are often elevated in bone, reproductive organs, and kidneys of wildlife (Eisler 1998).

Nickel-related toxicity is exhibited through direct mortality or reductions in species abundance. Biomagnification does not readily occur, as many organisms are able to regulate nickel levels by reduced uptake and increased excretion (Eisler 1998).

Limited data are available on bioaccumulation of silver in the marine environment. Juvenile Pacific oysters (*Crassostrea gigas*) exposed for 2 weeks to solutions containing 20 µg g/L had high silver accumulations in tissues and a reduced capacity to store glycogen; however, after 30 days of depuration, glycogen storage capacity was restored and 80 percent of the soluble silver and 27 percent of the insoluble forms were eliminated, suggesting recovery to a normal physiological state (USGS 2006). Yoo et al. (2004) exposed three benthic invertebrates, the clam *Macoma balthica*, the polychaete *Neanthes arenaceodentata,* and the amphipod *Leptocheirus plumulosus*, to silver-contaminated sediments to evaluate the relative importance of various uptake routes (sediments, porewater or overlying water, and supplementary food) for silver bioaccumulation. Ingestion of contaminated sediments and food were the principle routes of silver bioaccumulation by the benthic invertebrates during chronic exposure, but the relative importance of each uptake route differed among species.

Although evidence indicates that copper, lead, nickel, and silver are likely to bioaccumulate to some degree in the marine environment, the area where elevated concentrations of these constituents would occur is very small (i.e., WQOs would be met at or within the boundaries of the ZID described in Master Response SW-13). For reasons similar to those discussed above for Se, any bioaccumulation effects are expected to be very localized, and no significant effects are expected to occur due to increased bioaccumulation of these constituents under the Ocean Disposal Alternative.

Effects of bioaccumulation on special-status species are addressed in Master Response SW-12. Bioaccumulation-related concerns regarding fish consumption, human health, tourism, and recreation are addressed in Master Response SW-10.

SE-2 Bioavailability of Selenium After Treatment

Comment Summary: *The bioavailability of Se after biological treatment may increase.*

As discussed in Appendix G (Section G5.2), limited existing evidence indicates that biological reduction systems result in a higher proportion of organic selenide (the most bioavailable form) than raw drainwater. To better quantify the changes in bioavailability that might occur after treatment and subsequent transport through a series of evaporation basins, Reclamation conducted a pilot study to measure the speciation and bioaccumulation of Se in the effluent of a treatment system and in a series of three evaporation cells. The results of the study are presented in Appendix B. In general, results of the study indicated that, at an Se water concentration of 10 µg/L, Se bioaccumulation from biotreated drainwater would be about twice as high as Se bioaccumulation predicted based on historical data from existing evaporation ponds in the San Joaquin Valley. However, Reclamation is planning to add an oxidation process to the biotreatment that would serve to reduce the bioavailability of biotreated drainwater.

P2.2.14 Social Issues and Environment Justice (SI)

SI-1 Retraining Programs

Comment Summary: *Sections 17.2.5 and 18.2.10 state that retraining and similar programs to assist the unemployed in the local area may help avoid significant cumulative unemployment effects. What are these programs, how are they funded, how secure is the funding, who do the programs target, how successful are they, and how many people can be retrained with the funds available?*

Land retirement has been ongoing in the project vicinity for several years, and retraining and other programs to assist the unemployed have been known to exist in the local area. As Reclamation noted, continuation of these programs could help the unemployed to receive assistance in finding other employment. Implementation of a land retirement alternative is not expected to have significant adverse employment impacts, thus mitigation is not proposed. Significant impacts would only occur if a certain number of other actions do indeed occur. Therefore, it would be speculative to attempt to discuss details of any potential retraining programs in the future. Also see Master Response ALT-L1.

P2.2.15 Surface Water Resources (SW)

SW-1 Delta Disposal Alternatives Impact Analysis

Comment Summary: *The analysis of the Delta Disposal Alternatives included inadequate information on impacts to drinking water supplies, Bay/Delta water quality, and biological resources. In evaluating impacts on drinking water intakes, human health must have the highest consideration. Reclamation has understated the environmental consequences of these alternatives, and the analysis should be revised to more accurately represent the adverse impacts to biological resources and other beneficial uses. Because implementation will be phased, both intermediate and long-term effects should be analyzed.*

The EIS team conducted extensive hydrodynamic water quality modeling to evaluate the impacts to drinking water supply, Bay/Delta water quality, and biological resources. The modeling methods and results are presented in Section 5.2.9.5 and indicate that changes would not be significant. The evidentiary basis of the comment that impacts are underestimated is unclear. Reclamation has provided additional information in the Final EIS on impacts to water quality, biological resources, and Se bioaccumulation (see Sections 5, 7, and 8). However, these analyses support the conclusions presented in the Draft EIS. See Master Response SW-2.

The comment that impacts to human health must have the highest consideration is noted. Sections 5.1.5.2 and 5.2.9.5 discuss Delta drinking water resources, and Section 5.2.9.5 concludes that disposing drainwater to Chipps Island would result in small increases in TDS, bromine, TOC, and Se at the CCWD Mallard Slough intakes. However, as noted in the EIS, the water quality would decrease, which reverses a trend of improving water quality in the Delta and may result in higher operating costs for CCWD under certain conditions. This observation is likely to affect the selection of a preferred alternative.

SW-2 Uncertainties Regarding Delta Disposal Alternatives

Comment Summary: *The Draft EIS underestimates impacts to the Bay-Delta, an important ecosystem that is already being affected by Se and other pollutants. The Draft EIS includes relatively little long-term scientifically based studies demonstrating that discharging drainwater to the Bay-Delta will carry no immediate or long-term biological effects. The effects analysis would benefit from use of Luoma and Presser's 2000 Bay-Delta Selenium Model.*

A number of factors unrelated to the SLDFR affect fisheries and waterfowl populations in the Bay-Delta, and considerable uncertainty exists regarding the effects of various factors. The objective of the EIS is to evaluate potential impacts of the alternatives considered, and this evaluation is presented in Sections 7 and 8. The study referenced in the comment (Luoma and Presser 2000) is discussed in Sections 8.1.4, 8.2.9, and 8.2.10. It should be noted that this study was conducted using different assumptions for the discharge and has not been updated based on more recent predictions and Se treatment plans.

SW-3 Water Quality Objective Compliance for Delta Disposal Alternatives

Comment Summary: *The Draft EIS should provide more complete estimates of water quality discharged to the Bay-Delta and comparisons with the appropriate WQOs.*

Table C2-7a has been added to Appendix C and is also included below to provide additional existing water quality data on subsurface drainage from the drainage area. These data were collected for the Grassland Bypass Project EIS/EIR (Reclamation 2001c). Samples were collected from the Grassland Bypass Project discharge from the San Luis Drain into Mud Slough (Station B) and would represent the quality of water that would be discharged into the Northerly Reuse Area. The fate of the organic compounds is difficult to judge following discharge into the reuse area because many compounds tend to absorb to soil due to their hydrophobic nature. As such, the concentrations would represent a maximum predicted concentration in the discharge from the reuse areas to the Bay-Delta. Note that these data supplement those presented in Draft EIS Appendix C, Tables C2-7 and C2-8. Similar data do not exist for the Westlands drainage-impaired lands because the lands are not currently drained and no collection point is available to collect a sample. Sampling of shallow groundwater could have been performed for organic compounds similar to the sampling described in Appendix E-2. However, due to the lack of detectable concentrations of organic compounds found when samples were collected from Station B (shown in Table C2-7a), it was thought that such samples were not likely to yield useful data for the EIS.

Table C2-7a
Drainwater Quality for Other Constituents – 1997 San Luis Drain Site B Sampling

	Sample 1	Sample 2		Sample 1	Sample 2
Selenium	69.9	69.7	**Organochlorine Pesticides (µg/L) cont.**		
Molybdenum	49	49	Endosulfan I	<0.050	<0.050
Standard Minerals (mg/L)			Endosulfan II	<0.10	<0.10
Alkalinity as CaC03	200	200	Endosulfan sulfate	<0.10	<0.10
Bicarbonate as CaC03	200	200	Endrin	<0.10	<0.10
Cardonate as CaC03	<1.0	<1.0	Endrin aldehyde	<0.10	<0.10
Hydroxide as CaC03	<1.0	<1.0	Heptachlor	<0.050	<0.050
Calcium	340	330	Heptachlor epoxide	<0.050	<0.050
Chloride	660	680	Kepone	<0.10	<0.10
Hardness as CaC03	1,300	1,300	Methoxychlor	<0.50	<0.50
Boron	8.6	8.4	Mirex	<0.10	<0.10
Potassium	6.0	5.7	Toxaphene	<1.0	<1.0
Methylene Blue Active Substances	<0.50	<0.50	**Polychlorinated Biphenyls (µg/L)**		
Magnesium	110	110	Aroclor 1016	<0.50	<0.50
Sodium	830	870	Aroclor 1221	<0.50	<0.50
Nitrate (as N)	14	13	Aroclor 1232	<0.50	<0.50
pH	8.2	7.0	Aroclor 1242	<0.50	<0.50
Specific Conductance (umho/cm)	4,800	4,800	Aroclor 1248	<0.50	<0.50
Sulfate	1700	1600	Aroclor 1254	<0.50	<0.50
Ammonia	<0.10	0.10	Aroclor 1260	<0.50	<0.50
Ortho-phosphate	<0.050	<0.050	**Organophosphorus Pesticides (µg/L)**		
Total Dissolved Solids	3,900	3,900	Dichlorvos	<1.0	<1.0
Trace Elements (µg/L)			Demeton	<1.0	<1.0
Arsenic	8.0	8.4	Ethoprop	<1.0	<1.0
Chromium	3.6	3.7	Naled	<2.0	<2.0
Copper	17	19	Phorate	<1.0	<1.0
Mercury	<0.20	<0.20	Diazinon	<1.0	<1.0
Nickel	11	10	Disulfoton	<1.0	<1.0
Lead	<2.0	<2.0	Ronnel	<1.0	<1.0
Zinc	10	13	Methyl parathion	<1.0	<1.0
Hexavalent Chromium	<10	<10	Chlorpyrifos	<1.0	<1.0
N-Methylcarbamates (µg/L)			Trichloronate	<1.0	<1.0
Aldicarb	<0.10	<0.10	Merphos	<1.0	<1.0
Aldicarb sulfone	<0.10	<0.10	Prothiophos	<1.0	<1.0
Baygon	<0.10	<0.10	Bolstar	<1.0	<1.0
Carbaryl	<0.10	<0.10	Mevinphos	<1.0	<1.0
Carbofuran	<0.10	<0.10	Fenthion	<1.0	<1.0
3-Hydroxycarbofuran	<1.0	<1.0	Malathion	<1.0	<1.0
Methiocarb	<0.10	<0.10	Stirophos	<1.0	<1.0
Dioxacarb (Elocron)	<0.10	<0.10	Fensulfothion	<1.0	<1.0
Promecarb (Carbamult)	<0.10	<0.10	Coumaphos	<2.0	<2.0
Methomyl	9.7	15	Gution	<1.0	<1.0
Organochlorine Pesticides (µg/L)			**Chlorinated Acid Herbicides (µg/L)**		
Aldrin	<0.050	<0.050	2,4,5-T	<0.50	<0.50
alpha BHC	<0.050	<0.050	2, 4-D	<1.0	<1.0
beta BHC	<0.050	<0.050	2, 4-DB	<2.0	<2.0
delta-BHC	<0.050	<0.050	Dalapon	<2.0	<2.0
Lindane	<0.050	<0.050	Dicamba	<1.0	<1.0
Chlordane	<0.50	<0.50	Dichloroprop	<2.0	<2.0
4, 4'-DDD	<0.10	<0.10	Dinoseb	<1.0	<1.0
4,4'-DDE	<0.10	<0.10	MCPA	<250	<250
4, 4'-DDT	<0.10	<0.10	MCPP	<250	<250
Dieldrin	<0.10	<0.10	Silvex (2, 4, 5-TP)	<0.20	<0.20

Source: Reclamation 2001c

As shown in Tables C2-7, C2-7a, and C2-8 in Appendix C, some data exist to estimate typical effluent concentrations for all constituents specifically listed in the comments. These estimated concentrations are compared to discharge standards (if available) in Section 5, Table 5.1-12, of the Draft EIS.

Estimated concentrations of the following constituents exceed one or more of the WQOs:

- Cadmium – flow-weighted average of 2 µg/L exceeds the 4-day average of 1.1 µg/L.
- Chromium – flow-weighted average of 52 µg/L exceeds the 4-day average of 11 µg/L
- Copper – flow-weighted average of 19 µg/L exceeds the 4-day average of 3.1 µg/L.
- Lead – flow-weighted average of 8 µg/L exceeds 4-day average of 3.2 µg/L.
- Mercury – flow weighted average of 0.4 ug/L exceeds the 30-day average concentration of 0.025 ug/L.
- Nickel – flow-weighted average of 35 µg/L exceeds the 4-day average of 7.1 µg/L.
- Se – flow-weighted average of 10 ug/L exceeds the 4-day average of 5 ug/L.

It should be noted that concentrations for all of these constituents are based on data that were not collected using "clean hands" techniques and therefore may be subject to unknown sample contamination common to ultra-trace-level metals analysis. In addition, discharges to Chipps Island or Carquinez Strait would be biotreated, and no treatment for metals has been incorporated into the water quality estimates with the exception of Se. Previous biotreatment projects have shown to be effective for arsenic and mercury, which have some similar chemical properties to Se.

Water quality objectives for most metals are based on the dissolved fraction of the metal. Translators to convert the dissolved fraction to a total fraction are developed based on site-specific receiving water chemistry. Such translators would be developed as part of the NPDES permit application process. After application of likely translators and allowable dilution credits, only copper, Se, and mercury would still exceed likely permit limits.

Copper criteria are the subject of a pending regulatory action to develop site-specific water quality criteria based on the lower bioavailability of copper in San Francisco Bay. Scientific information indicates that copper is complexed by organic molecules; this complexation renders copper less bioavailable to aquatic life. Base on these observations and the limited size of the required mixing zone, copper would not be considered to have a significant effect.

Mercury is likely to be removed by the biotreatment process and would not likely be present at concentrations that may cause an adverse effect in San Francisco Bay. However, due to a lack of currently available performance data to demonstrate the effectiveness of mercury removal by the biotreatment process, adverse effects due to mercury accumulation in fish tissue of the Bay-Delta are assumed to be significant. The EIS has been revised to reflect this assumption. Se concentrations and bioaccumulation are discussed in detail in Sections 5 and 8 of the EIS.

SW-4 Diffusion Zone of Ocean Disposal Alternative Effluent

Comment Summary: *The Draft EIS fails to address how far the effluent discharged at the Ocean Disposal Alternative outfall will spread or the potential impacts that the effluent could have outside of the direct area of the watershed.*

Once discharged to the ocean, the agricultural drainwater will diffuse, or spread, into the surrounding ocean environment. However, the point of the diffuser design analysis was to demonstrate that the concentration of effluent, and concentrations of particular constituents of concern in the effluent, will be diluted to levels below appropriate water quality standards very quickly after discharge, and thus surrounding ocean areas will experience relatively low levels of effluent. For example, even under the infrequently occurring condition[1] when ocean currents are zero above the diffuser, Se concentrations would reach the applicable water quality criterion of 15 milligrams per liter (mg/L) at between 6 and 12 meters above the diffuser. With maximum expected currents, diffusion to the water quality criterion would be achieved at only 2 meters above the diffuser (see Section 5.2.8.3 of the Draft EIS). Thus, the water quality criterion for Se would be met very quickly after discharge.

At locations farther from the diffuser—such as in the areas outside of the "watershed" referred to in the comment—dilution would rapidly reduce constituent concentrations even further, to levels that cannot be detected above background. For example, the boundary of the zone of initial dilution (ZID; defined as the point at which the diffuser plume either stops behaving as a jet or reaches the water surface) under worst-case conditions (zero ocean current) is 36 meters (118 feet) above the discharge point. At this point, the Se concentration in the plume is approximately 7 µg/L, well below the 15 µg/L criterion specified in the California Ocean Plan. Clearly, the ZID only accounts for a tiny fraction of the surrounding ocean water available to dilute discharged drain-water, and ambient turbulence and currents within the ocean will mix the discharge with additional ocean water very rapidly. If the surrounding ocean water and currents were accounted for in the analysis, effluent concentrations would be quickly reduced to levels that are below our ability to detect.

SW-5 Far-Field Effects of the Ocean Disposal Alternative

Comment Summary: *The Draft EIS fails to adequately address far-field effects in receiving waters for the Ocean Disposal Alternative or the potential for contaminants from the drainwater to enter Marine Protected Areas located within 10 miles of the proposed outfall.*

Far-field impacts of the Ocean Disposal Alternative were not explicitly analyzed, as noted in the comment. However, as discussed in Master Response SW-4, diffuser modeling indicates that effluent and constituent concentrations would quickly be diluted to minimal levels such that the discharge's contribution to concentrations outside of the immediate mixing zone would be negligible. Significant additional mixing will occur between the discharge zone and locations such as Marine Protected Areas that are 11 miles away from the discharge zone, so that the contribution of the discharge to constituent concentrations at such a distance from the diffuser will not be discernible from background levels. Furthermore, if the Ocean Disposal Alternative is advanced for further consideration, an explicit analysis of far-field impacts would be conducted.

[1] That is, <1 percent of the time, and for durations of around one hour (though in some cases up to three hours). Source: Acoustic Doppler current profiler (ADCP) data at the NOAA Point San Luis station for the years 1997-2002, including approximately 82,500 data points.

SW-6 Lack of Treatment for Ocean Disposal Alternative Effluent

Comment Summary: *The Ocean Disposal Alternative should include Se treatment before the effluent water is discharged. The alternative costs should be revised after treatment is added, and new comparisons should be made.*

Section 5.2.8.3 describes changes in ocean receiving waters due to the discharge with a diffuser. Modeling results for the Ocean Disposal Alternative suggest that treatment of effluent water is not needed to comply with the water quality requirements of the Ocean Plan. See Master Responses SW-4 and SW-13 for a detailed discussion of water quality changes under the Ocean Disposal Alternative. If this alternative were advanced for further consideration, the final decision regarding the need for treatment would be made by the State Board and Regional Board as part of the NPDES permit requirement. If treatment were required as a condition of permitting, Reclamation's cost analysis indicates that Se treatment to <10 µg/L would increase the project cost by approximately $138 million.

SW-7 Potential Addition of Point Estero to Monterey Bay National Marine Sanctuary

Comment Summary: *The Ocean Disposal Alternative outfall may be located in an area that is proposed for inclusion in the Monterey Bay National Marine Sanctuary (MBNMS) when the sanctuary boundaries expand. The MBNMS has permit authority under Title 15 of the CFR over discharges of "any material or other matter that subsequently enters the Sanctuary and injures a Sanctuary resource or quality" outside of Sanctuary boundaries. The EIS should examine the permit authority of the MBNMS and provide a policy consistency analysis for all permits required.*

The EIS cannot evaluate proposals that have not been made, such as the expansion of the MBNMS to include Point Estero. Reclamation was unable to find any official announcement of the MBNMS expanding its southern boundary.

The Ocean Disposal Alternative outfall would be 11 miles south of the MBNMS boundary. Table 5.2-5 lists data for the dominant ocean current direction for Point Estero. The data do not suggest that the effluent would be carried north into the MBNMS. In addition, as stated in Master Response SW-13, water quality impairment of the MBNMS is unlikely given its distance from the outfall and the rapid dilution of effluent that occurs immediately after discharge. A review of the permitting authority of the MBNMS was erroneously omitted from Appendix L of the Draft EIS and is included below.

The National Marine Sanctuaries Act (NMSA) authorizes the Secretary of Commerce to designate and manage areas of the marine environment with special national significance due to their conservation, recreational, ecological, historical, scientific, cultural, archeological, educational, or esthetic qualities as national marine sanctuaries. Day-to-day management of national marine sanctuaries has been delegated by the Secretary of Commerce to the National Marine Sanctuary Program. The primary objective of the NMSA is to protect marine resources such as coral reefs, sunken historical vessels, or unique habitats.

The MBNMS is one of 13 national marine sanctuaries administered by the National Oceanic and Atmospheric Administration. The MBNMS consists of an area of coastal and ocean waters from Marin County to the City of Cambria. The Code of Federal Regulations (CFR) describes sanctuary-prohibited activities in Title 15, Part 922, including "[d]ischarging or depositing, from beyond the boundary of the Sanctuary, any material or other matter that subsequently enters the Sanctuary and injures a Sanctuary resource or quality …" (15 CFR 922.132(E)(ii)).

All other permits and regulatory requirements that would apply to the proposed project are summarized in Section 4 and described in Appendix L.

SW-8 Discharge Environment for the Ocean Disposal Alternative Outfall

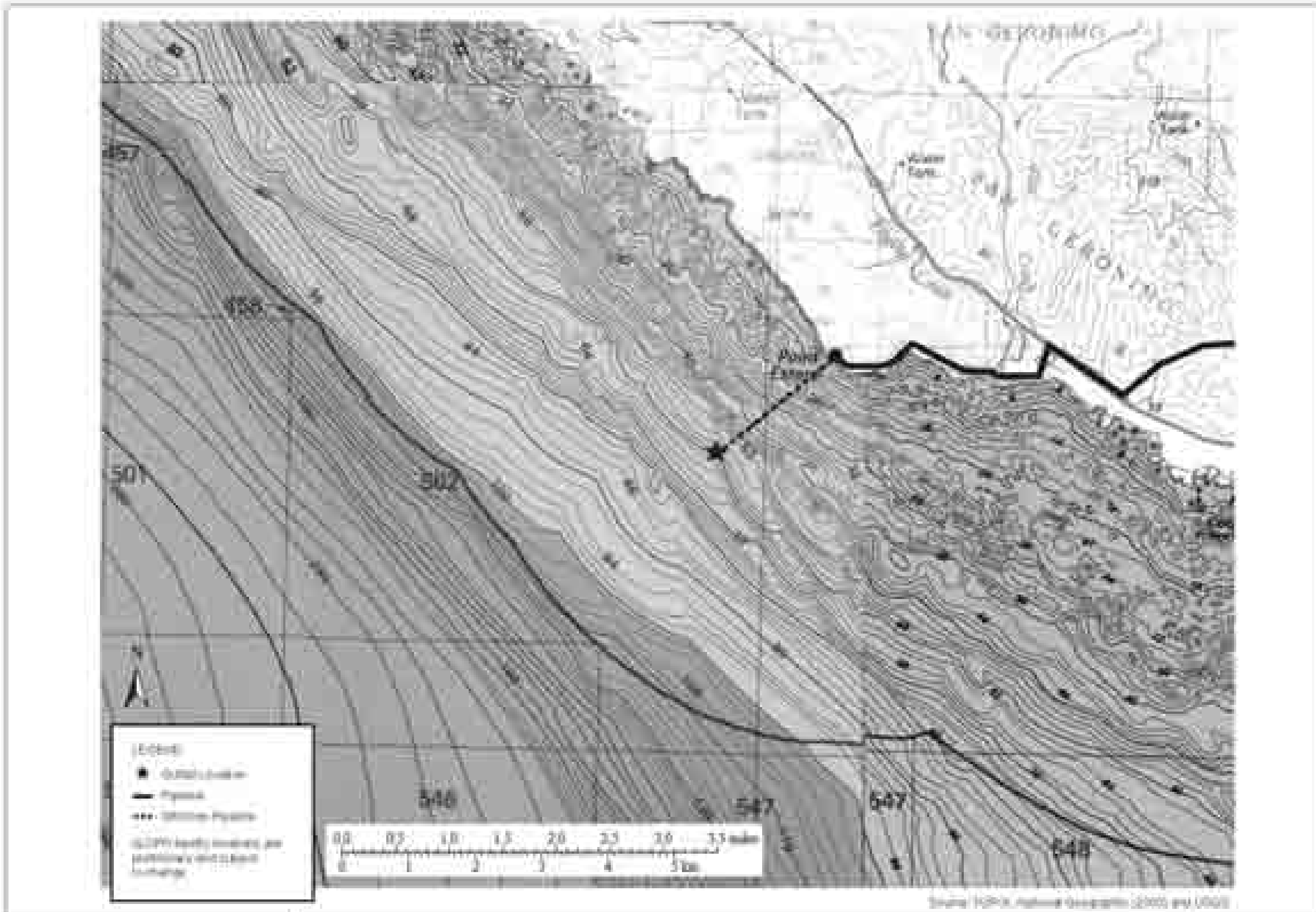
Comment Summary: *Many comments expressed concerns regarding effects to various species in the vicinity of the outfall that would be constructed under the Ocean Disposal Alternative. This Master Response provides a description of the environment surrounding the outfall and the biological resources in the vicinity. Impacts to marine resources are described in the EIS and in other Master Responses.*

As described in Section 2.8.1 and shown in Figure P-1, the ocean diffuser would be approximately 1.4 miles offshore at a depth of about 200 feet, approximately 11 miles south of the southern boundary of Monterey Bay National Marine Sanctuary.

The substrate surrounding the area where the diffuser would be located is likely to consist of silty mud with fine-grained sand that is typically found at this depth. The epifauna in this region typically includes cerianthaid anemones, the seastars *Luidia foliolata* and *Rathbunaster californicus*, and the seapens *Stylatula elongate*, *Ptilosarcus gurneyi*, and *Pennatula* sp. (California State Lands Commission 2005). The diffuser would create a hard substrate that would likely be colonized by epifauna typically found at the same depth and substrate type along much of the California coast. These communities commonly include cup corals, e.g., *Paracyathus* and *Balanophyllia*, hydroids, encrusting sponges, ascidians, gorgonians, anemones, e.g., *Metridium* and *Urticina*, and ophiuroids (MEC 2002).

Submerged aquatic vegetation found in the general area includes red and brown macroalgae such as giant kelp (*Macrocystis pyrifera*), *Sargassum* spp., *Taonia* spp., *Gigartina* spp., and *Corallina* spp. (USACE 2002). Giant kelp is found at depths up to 40 meters, temperatures less than 20ºC, hard substrate, and bottom light intensities about 1 percent that of the surface (North 1971; Foster and Schiel 1985). Kelp beds extend low-relief, hard-bottom habitat from the seafloor to the surface, creating a vertically structured habitat for fish, invertebrates, and marine mammals. As shown in Figure P-1, the 40-meter depth contour is approximately 0.4 mile inshore from where the diffuser would be located; therefore, the closest kelp forests would be expected to be at least 0.4 mile from the diffuser.

A study by the Southern California Coastal Water Research Project found that demersal and pelagic fish communities in shallow-water areas (236- to 279-foot [72- to 85-meter] water depth) along the Southern California coast are typified by sanddabs (*Citharichthys* spp.), California lizardfish (*Synodus lucioceps*), plainfin midshipman (*Porichthys notatus*), bigmouth sole (*Hippoglossina stomata*), California tonguefish (*Symphurus atricaudus*), hornyhead turbot



San Luis Drainage Feature Re-evaluation

Point Estero Outfall Location, Ocean Disposal Alternative

Figure P-1

(*Pleuronichthys verticalis)*, rex sole (*Errex zachirus)*, English sole (*Pleuronectes vetulus)*, and pink surfperch (*Zalembius rosaceus)* in all studies at these depths (SCCWRP 1993).

See Master Response SW-12 for a discussion of special-status species that may potentially be found in the area and Master Response SW-10 in regard to potential effects to the abalone farm in the area.

SW-9 Ecotoxicity from Ocean Disposal Alternative Discharge

Comment Summary: *The Draft EIS fails to adequately analyze the potential for toxicity to aquatic organisms as a result of discharges under the Ocean Disposal Alternative. Specific sources of toxicity could include salinity; chromium (concentrations of less than 10 µg/L could cause effects to giant kelp photosynthesis); chronic toxicity to marine microorganisms; plankton; and toxic effects potentially caused by Se, boron, pesticides (including diazinon and chlorpyrifos), herbicides, molybdenum, chromium, nitrates, phosphates, and other trace metals and organics.*

As discussed in Master Response SW-13, some constituents in the effluent are expected to exceed water quality standards listed in the California Ocean Plan at the discharge point. These constituents include cadmium, chromium, copper, lead, nickel, silver, and ammonia.

Because the water quality standards are based on protection of aquatic life (including algae, plants, invertebrates, and fish), it is expected that some toxicity to aquatic organisms may occur within the ZID before these constituents are diluted to levels below the water quality standards. However, as shown in Master Response SW-13, even for the worst-case constituent (chromium), the resulting plume is predicted to reach a concentration below the lowest WQO at a height of less than 16 meters above the diffuser, and the area of this plume would be less than 130 square meters, or 0.03 acre. Because this area is so small, direct toxicity effects to aquatic organisms are not expected to be significant.

For a number of constituents mentioned in the comments, no WQOs are listed in the California Ocean Plan. For each of these constituents, the following sections provide a qualitative evaluation of the potential for toxicity in the marine environment. In addition, toxicity data on methomyl are also provided, as it was the only organic constituent detected in drainwater representative of the effluent.

Although organophosphate herbicides were not detected in drainwater, the reporting limits for these organic compounds were higher than toxic thresholds. Limited data are available on effects of these compounds in the marine environment, but diazinon is known to be toxic to fish. In rainbow trout, the diazinon LC50 (the concentration that causes mortality to 50 percent of the exposed group) was reported as 2.6 to 3.2 mg/L. In hard water, lake trout and cutthroat trout are somewhat more resistant. Warm water fish such as fathead minnows and goldfish are even more resistant, with diazinon LC50 values ranging up to 15 mg/L. There is some evidence that saltwater fish are more susceptible than freshwater fish (EcoTox Extension Toxicology Network Pesticide Information Profiles website 2006 http://extoxnet.orst.edu/pips/diazinon.htm).

Chlorpyrifos is also toxic to freshwater fish, aquatic invertebrates, and estuarine and marine organisms. The 96-hour LC50 for chlorpyrifos was reported as 0.009 mg/L in mature rainbow trout, 0.098 mg/L in lake trout, 0.806 mg/L in goldfish, 0.01 mg/L in bluegill, and 0.331 mg/L in fathead minnow. Smaller organisms appear to be more sensitive than larger ones (EcoTox

Extension Toxicology Network Pesticide Information Profiles website 2006 http://extoxnet.orst.edu/pips/diazinon.htm).

At this time, no data indicate that chlorpyrifos or diazinon would be present in detectable concentrations in the effluent discharged under the Ocean Disposal Alternative. In addition, many new restrictions on applications of these pesticides have taken effect over the last few years, which will make discharges of these pesticides less likely. No significant ecotoxicity effects in the ocean environment are expected due to these constituents.

Phosphates and nitrates are both nutrients for which no WQO is listed in the Ocean Plan. Little data exist on the toxicity of phosphates in the marine environment, but phosphates are generally not considered toxic. The acute and chronic toxicity of nitrate (NO_3-N) to *Ceriodaphnia dubia, Daphnia magna,* and *Pimephales promelas* was investigated in 48-hour to 17-day laboratory exposures. The 48-hour median lethal concentration (LC50) of nitrate to *C. dubia* and *D. magna* neonates was 374 mg/L NO_3-N and 462 mg/L NO_3-N. The no-observed-effect concentration (NOEC) and the lowest-observed-effect concentration (LOEC) for neonate production in *C. dubia* were 21.3 and 42.6 mg/L NO_3-N, respectively. The NOEC and LOEC values for neonate production in *D. magna* were 358 and 717 mg/L NO_3-N, respectively. The 96-hour LC50 for larval fathead minnows (*P. promelas*) was 1,341 mg/L NO_3-N. The NOEC and LOEC for 7-d larval and 11-d embryo–larval growth tests were 358 and 717 mg/L NO_3-N, respectively (http://entc.allenpress.com/entconline/?request=get-document&doi=10.1897%2F1551-5028(2000)019%3C2918:AACTON%3E2.0.CO%3B2). The flow-weighted average concentration of nitrate (NO_3) for drainwater from the project area is 141 mg/L (see Appendix C, Table C2-7). This value is below all LC50 and most NOEC and LOEC values discussed above. The flow-weighted average exceeds the LOEC for neonate production in *C. dubia*, indicating that limited reproductive effects to invertebrates may occur in the immediate vicinity of the plume as a result of elevated nitrate concentrations. Because the plume size is small and no mortality is expected based on nitrate concentrations, no significant ecotoxicity effects are expected to occur as a result of nitrate or phosphate discharges.

Data are limited for aquatic invertebrates and boron, although available data suggest that the no-observable-effect levels were 13.6 mg /L for freshwater organisms and 37 mg/L for marine biota. At current industrial discharge levels of about 1.0 mg/L, no hazard is clear to oysters and aquatic vertebrates (Thompson et al. 1976).

The most sensitive aquatic vertebrates tested for which data are available were coho salmon (*Oncorhynchus kisutch*), with an LC50 (16-day) value of 12 mg/L in seawater, and sockeye salmon (*O. nerka*), showing elevated tissue residues after exposure for 3 weeks in seawater containing 10 mg/L. Boron concentrations between 0.001 and 0.1 mg/L had little effect on survival of rainbow trout embryos after exposure for 28 days. Birge and Black (1977; in USGS 2006) reported that concentrations of 100 to 300 mg/L killed all species of aquatic vertebrates tested, embryonic mortality and teratogenesis were greater in hard water than in soft water, although larval mortality of fish and amphibians was higher in soft water than in hard water, and boron compounds were more toxic to embryos and larvae than to adults. The flow-weighted average concentration of boron in drainwater from the project area is 8.314 mg/L (see Appendix C, Table C2-7). This value is below all LC50 and LOEC values discussed above. No significant ecotoxicity effects are expected to occur as a result of boron discharges.

Molybdenum is considered essential for aquatic plant growth, but the concentrations required are not known with certainty and are considered lower than those for any other essential element. Molybdenum starvation restricts nitrogen fixation in algae, thereby limiting photosynthetic production during depleted conditions (USGS 2006). Limited data suggest that aquatic invertebrates were very resistant to molybdenum; adverse effects were observed on survival at >60 mg /L and on growth at >1,000 mg /L. Tailings from a pilot molybdenum mine on the North American Pacific coast were acutely lethal at concentrations of >61,000 mg tailings solids/1 seawater to larvae of the mussel *Mytilus edulis*, and to adults of the amphipod *Rhepoxynius abronius* and the euphausiid *Euphausia pacifica*; acute sublethal effects were observed at >277,000 mg/LL (USGS 2006). The lowest tailing concentration tested at which a deleterious effect was observed was 100 mg/LL for depression of respiration in the copepod *Calanus marshallae*, and 560 mg/LL for increased mortality in copepods and the euphausiid *Euphausia pacifica* (USGS 2006).

Freshwater and marine fishes were generally extremely resistant to molybdenum; LC50 (96 hour) values ranged between 70 mg/L and <3,000 mg/L. The exception was newly fertilized eggs of rainbow trout exposed for 28 days through day 4 posthatch; the LC50 (28 day) value was only 0.79 mg/L. In general, molybdenum was more toxic to teleosts in freshwater than in seawater and more toxic to younger fish than to older fish (USGS 2006). The flow-weighted average concentration of molybdenum for drainwater from the project area is 0.091 mg/L (see Appendix C, Table C2-7). This value is below all toxicity threshold values discussed above. No significant ecotoxicity effects are expected to occur as a result of molydenum discharges.

Erickson and Turner (2003) reviewed acute and chronic toxicity data for methomyl for estuarine fish and invertebrates. The lowest LC50 or EC50 reported for invertebrates was 19 µg/L for pink shrimp (*Penaeus duorarum*), and the only acute value reported for fish was 1160 µg/L for sheepshead minnow (*Cyprinodon variegatus*). The lowest LOEC reported was 59 µg/L for the mysid shrimp (*Mysidopsis bahia*), with an associated NOEC of 29 µg/L. The highest detected value of methomyl in drainwater from the project area is 15 µg/L (see Table C2-7a in Master Response SW-3 and Appendix C). This value is below all toxicity threshold values discussed above. No significant ecotoxicity effects are expected to occur as a result of methomyl discharges.

No marine ecotoxicity data could be found for bromide, strontium, or sulfate, and these constituents are generally not considered highly toxic. Because the plume size is small, no significant ecotoxicity effects are expected to occur as a result of nitrate or phosphate discharges.

SW-10 Effects to Humans from the Ocean Disposal Alternative

Comment Summary: *The Draft EIS contains inadequate information about potential impacts to humans living in the Ocean Disposal Alternative discharge vicinity. These impacts include health effects from consumption of fish and shellfish such as clams and mussels; loss of income from fisheries; economic losses for the abalone and kelp industries; economic losses related to diminished tourism; and impacts to recreation such as swimming, kayaking, scuba diving, and windsurfing. The Draft EIS inaccurately dismisses ocean, commercial, and sport fishing as a beneficial use of potentially affected surface water. It is important to evaluate the long-term impacts to humans over the life of Ocean Disposal Alternative.*

Table 5.1-10 presents the designated beneficial uses of the ocean waters under the Ocean Disposal Alternative. In the Draft EIS, this table inadvertently omitted ocean, commercial, and sport fishing as a beneficial use. This omission has been corrected in the Final EIS.

Red abalone beds previously existed in Morro Bay but have since disappeared after commercial harvesting in the late 1960s. Currently, red abalone is farmed at the Abalone Farm in tanks located on a cliff overlooking Estero Bay. Seawater is pumped through a pipe in the surf zone, through a series of filters, and then into the tanks. The filters ensure that water clarity and quality standards are met (http://www.abalonefarm.com). As described in Master Response SW-13, the Ocean Disposal Alternative would discharge drainwater approximately 1.4 miles offshore of Point Estero, and water quality in the surf zone is not expected to be affected. Therefore, no economic effects to the abalone industry would be expected to occur as a result of the Ocean Disposal Alternative.

Red dulce (*Palmaria mollis*) is cultured and fed to baby abalone, and after approximately 1 year the abalone are fed kelp, which is harvested from offshore natural kelp beds (http://www.biosbcc.net/ocean/marinesci/06future/abfarm.htm). Kelp is also harvested commercially and recreationally for other purposes. As described in Master Response SW-8, kelp is found at depths up to 40 meters, which corresponds with a distance of about 0.5 mile (or 800 meters) inshore from the discharge location. As described in Master Response SW-13, the maximum plume length under worst-case conditions is predicted to be less than 50 meters, and the shallowest depth the plume would reach would be approximately 50 meters. Therefore, kelp beds in the region are not expected to be impacted by operation of the Ocean Disposal Alternative, and no economic effects to the kelp industry would be expected to occur as a result of the Ocean Disposal Alternative.

Shellfish such as clams and mussels would not be found at the depth of the discharge location and are generally harvested at the shoreline or close to the shoreline. No impacts to these organisms, or significant increases in bioaccumulation of any constituents, would be expected to occur due to operation of the Ocean Disposal Alternative. Therefore, no adverse effects to humans that consume shellfish in the area would be expected to occur as a result of the Ocean Disposal Alternative.

As described in Master Response SE-1, no significant effects due to bioaccumulation in fish would be expected to occur as a result of the Ocean Disposal Alternative.

Based on information presented in Master Response SW-13, discharges under the Ocean Disposal Alternative would not be expected to result in exceedances of water quality standards outside of the ZID. For the worst-case constituent (chromium), the resulting plume is predicted to reach a concentration below the lowest WQO at a height of less than 16 meters above the diffuser, well below the water surface, and the area of this plume would be less than 130 square meters, or 0.03 acre. No reason exists to expect that discharges under the Ocean Disposal Alternative would affect recreational activities such as swimming, kayaking, scuba diving, and windsurfing.

SW-11 Nutrient Discharge Under the Ocean Disposal Alternative

Comment Summary: *The untreated discharge of fertilizer- or nutrient-rich agricultural drainage under the Ocean Disposal Alternative may contribute to or exacerbate harmful algal* *blooms. The Draft EIS failed to address the environmental, health, and economic impacts of algal blooms stimulated by an ocean outfall. The growth of toxic algal blooms would harm marine mammals, humans, and birds and could create a hypoxic dead zone.*

It has been documented that increased nutrient enrichment to ocean waters has caused detrimental environmental impacts to aquatic ecosystems. Increased nutrients have been linked to hypoxic "dead zones" and harmful algal blooms along the U.S. coastal waters (Kudela and Cochran 2000).

The creation of a hypoxic "dead zone" is not completely understood but is known to be influenced by many oceanographic factors. The "dead zone" in the Gulf of Mexico has been attributed primarily to the inputs of nitrogen from the Mississippi River. However, the bathymetry, circulation, and environmental conditions are completely different from Estero Bay. The Gulf of Mexico naturally is a permanently stratified, oligotrophic (nutrient poor), subtropical sea. Estero Bay is well mixed, with upwelling events occurring in the spring at the flow discharge location. In recent years, a hypoxic zone has been observed off the coast of Oregon (Oregon State University 2004). The area is not influenced by any point source, nonpoint source, or wastewater discharges. These events have been linked to upwelling and changing ocean currents.

Phytoplankton serve as the base of the marine food web, but unusually high levels of nutrients together with abundant sunlight can spur rapid growth, or blooms. While most blooms are not harmful, a small number of phytoplankton species can produce potent neurotoxins when they form into a bloom, sometimes poisoning or killing higher life forms such as zooplankton, shellfish, fish, birds, marine mammals, and even humans as the toxin is transferred up the food chain. In 1995, the largest toxic phytoplankton bloom found off California's coast since 1902 extended from the upper Baja Peninsula in Mexico to Monterey Bay. Data suggested that the bloom was triggered or sustained by nutrient inputs from urban runoff (Kudela and Cochran 2000).

The input from the San Luis Drain to the Ocean Disposal Alternative outfall would increase nutrient concentrations in the immediate vicinity of the discharge flow diffuser; however, based on modeling results, it is expected that nitrate concentrations will be diluted to approximately 3.53 mg/L from an initial concentration of 383 mg/L within a plume approximately 7 meters wide and 284 meters long. The discharge water would have to meet the NPDES permit requirements that would be obtained if this alternative were chosen. This small plume would create an insignificant impact on the surrounding ocean environment. No effects to the economy or human health are expected.

SW-12 Effects to Special-Status Species from the Ocean Disposal Alternative

Comment Summary: *The Draft EIS includes insufficient analysis of potential effects to special-status species and marine mammals from discharge under the Ocean Disposal Alternative, especially from increased exposure to Se and other constituents such as pesticides that may be present in the effluent. The EIS should identify potential effects to California brown pelican; southern sea otter; other marine mammals, including sea lions, elephant seals, whales, and harbor seals; steelhead; boccacio; canary rockfish; black abalone; and limpets.*

Potential effects to special-status species and marine mammals from discharge under the Ocean Disposal Alternative are discussed by species below. The discussions focus on potential impacts from ingestion of prey items that have elevated Se concentrations due to discharge and bioaccumulation of drainwater. Acute impacts from direct toxicity (rather than bioaccumulation) are not predicted to occur because the concentrations of potential toxicants that special-status species would encounter are well below the acute toxicity thresholds.

California Brown Pelican

The California brown pelican (*Pelecanus occidentalis californicus*) is Federally listed as endangered. Large groups of pelicans roost in the general area, at locations such as Año Nuevo Island, Elkhorn Slough, and Point Lobos, although they are not known to breed in Monterey Bay National Marine Sanctuary or nearby (http://bonita.mbnms.nos.noaa.gov/reports/2003/eco/endangered.html). The brown pelican eats mainly fish, especially menhaden, mullet, sardines, pinfish, and anchovies. They feed mostly in shallow estuarine waters, less often up to 40 miles from shore (http://ecos.fws.gov/docs/life_histories/B02L.html). As described in Master Response SE-1, no significant effects due to bioaccumulation in fish would be expected to occur as a result of the Ocean Disposal Alternative. Because the size of the Se plume would be less than half an acre, it is unlikely that many fish would forage in this area for a long enough period of time to accumulate significant Se levels. Even if the pelican does ingest some fish with elevated Se levels, this portion of the diet would be small. No significant effects to the California brown pelican are expected to occur as a result of the Ocean Disposal Alternative.

Southern Sea Otter and Other Marine Mammals

All marine mammals are protected under the Marine Mammal Protection Act, and some marine mammals are also listed under the California and/or Federal Endangered Species Act. The marine mammals most commonly observed in the general area are similar to those found throughout Southern California coastal waters. The short-beaked common dolphin (*Delphinus delphis*) has been sighted year-round and is the most common marine mammal in the area. Bottle-nose dolphins (*Tursiops truncates*), Risso's dolphins (*Grampus griseus*), and Pacific white-sided dolphins (*Lagenorhynchus obliquidens*) are also sighted in coastal waters. In the fall and spring, transient populations of blue whales (*Balaenoptera musculus*) and humpback whales (*Megaptera novaeangliae*), both Federally listed as endangered, are found foraging off the coastal waters (MEC 2002).

Southern Sea Otter. The southern sea otter is listed as threatened under the Endangered Species Act. Sea otters occupy hard- and soft-sediment marine habitats from the littoral zone to depths of less than 100 meters (330 feet), including protected bays and exposed outer coasts. Most individuals occur between shore and the 20-meter (65-foot) depth contour (Service 2003). Thus, it is unlikely that sea otters would obtain a substantial portion of their diet from the discharge vicinity, which would be approximately 1.4 miles from shore and about 200 feet deep.

Harbor Seal. Harbor seals generally forage within 50 km of haul-outs and tend to be benthic feeders. While harbor seals are capable of diving to depths over 500 meters, most dives are less than 100 meters (http://www.wildlife.alaska.gov/management/mm/3a.pdf). A study found that harbor seals in Monterey Bay consume rockfish, octopus, spotted cusk-eel, white croaker, market squid, flatfish, staghorn sculpin, and plainfin midshipman. In the Channel Islands off of Southern California, the most common prey were rockfish, octopus, spotted cusk-eel, and plainfin midshipman. On the Southern California mainland, octopus and plainfin midshipman were the most commonly consumed food. Seals also consumed market squid, rockfish, flatfish, Pacific whiting, and spotted cusk-eel (http://www.nwfsc.noaa.gov/publications/techmemos/tm28/mammal.htm).

Steller Sea Lion. The Steller sea lion is Federally listed as threatened. Steller sea lions usually spend most of their time onshore. They regularly travel great distances, sometimes up to 250 miles from home, to find food. Their diet consists of seafood such as fish, squid, and octopus, which they eat at night close to shore (http://www.npca.org/marine_and_coastal/marine_wildlife/sealion.asp). Steller sea lions have been known to prey on harbor seal, and possibly sea otter pups, but this component would represent only a supplement to the diet (http://nmml.afsc.noaa.gov/AlaskaEcosystems/sslhome/StellerDescription.html).

Elephant Seal. The elephant seal is protected by the Marine Mammal Protection Act of 1972 and the Elephant Seal Closure Law. The Marine Mammal Protection Act makes it illegal to hunt marine mammals, including elephant seals. The Elephant Seal Closure Law states that humans must be at least 20 feet away from elephant seals at all times. Northern elephant seals are found in the eastern and north-central North Pacific. Breeding takes place on offshore islands and at a few mainland localities from central Baja California to Northern California. Northern elephant seals migrate to and from their rookeries twice a year, returning once to breed from December to March, and again later for several weeks to molt, at different times depending on sex and age. They also show up at additional coastal sites as far north as southern Oregon for molting. Their post-breeding and post-molt migrations take most seals north and west to oceanic areas of the North Pacific and Gulf of Alaska twice a year. Adult males tend to travel further north and west than adult females. The diet of the elephant seal is varied; however, the primary food source is from squid. Other prey includes various fishes, such as Pacific whiting, several species of rockfish, and a variety of small sharks and rays. They have also been reported to feed on pelagic red crabs. The habitat of 70 percent of their prey is open ocean and includes species from surface, mid, and deep water zones.

Whales. Five whale species occur in California that are listed by the U.S Fish and Wildlife Service. These species include the sperm whale (*Physeter catodon=macrocephalus*), humpback whale (*Megaptera novaeangliae*), finback whale (*Balaenoptera physalus*), blue whale (*Balaenoptera musculus*), and Sei whale (*Balaenoptera borealis*).

Humpback Whale. Humpback whales migrate from warm water winter breeding grounds in low latitudes (places like Hawaii, Australia, and the Caribbean) to colder-water summer feeding grounds in higher latitudes (e.g., Alaska, Antarctica, and New England, respectively). Humpback whales are generalists, eating krill (shrimp-like animals; their primary diet in the southern hemisphere), copepods, fish, and cephalopods. Humpbacks rarely feed in winter, foraging during summer in areas of prey concentration such as upwelling regions.

In the North Pacific, four stocks of humpback whale are believed to exist. The first winters off the coast of Mexico (Baja California, Gulf of California, mainland) and summers off the coasts of California, Oregon, and Washington. The second winters in offshore Mexican waters, near the Revillagigedo Islands; summer grounds are unknown. The third winters in the central North Pacific and Hawaiian Islands and summers in Alaska (Prince William Sound) and British Columbia. The fourth winters in the western North Pacific, near Japan and Taiwan and summers in the Bering Sea and the coast of the Aleutian Islands, west of the Kodiak Archipelago.

Blue Whale. Populations migrate seasonally, moving poleward in spring to exploit the high productivity of the cold waters and traveling into the subtropics in fall to reduce energy expenditures, avoid ice entrapment, and reproduce in warmer waters. When feeding in cold waters, blue whale distribution is largely determined by food availability. Individuals do not stay in one area for very long, traveling solitarily or in pairs, and are found in both coastal and pelagic environments. Blue whales feed almost exclusively on crustaceans, particularly euphausiids (krill). Blue whales may ingest two to four tons of food per day. Blue whales are known to feed on the surface and at depth, and in some places have been recorded exploiting deep scattering layers in which plankton are concentrated.

Fin Whale. Fin whales migrate poleward in summer to exploit rich, cold waters, and are found in warmer waters in winter, where they reproduce. They can be found from 20^{o}-75^{o}N and 20^{o}-75^{o}S. Fin whales are the fastest of the great whales, having been recorded traveling almost 300 km in one day. Adult females reportedly arrive at summer feeding grounds first and leave last. In the eastern North Pacific, fin whales have been observed in the Chukchi Sea, Gulf of Alaska, Prince William Sound, off the coast of the Aluetian Islands in the north, and off the coast of Baja California in the south. One population appears to be resident to the Gulf of California. The fin whale has a broad diet dominated by invertebrates, fish and squid. The fin whale will eat both fish and krill; capelin, sandlance, and herring being of particular importance. Fin whales in the southern oceans feed almost exclusively on krill. This whale feeds on the surface and at depth.

Sperm Whale. Sperm whales are found year-round in California waters (Dohl et al. 1983; Barlow 1995; Forney et al. 1995), but they reach peak abundance from April through mid-June and from the end of August through mid-November. Sperm whales are somewhat migratory and are distributed from the tropics to the pack ice edges in both hemispheres, although generally only large males venture to the extreme northern and southern portions of the range (poleward of 40° latitude). Deep divers, sperm whales tend to inhabit oceanic waters, but they do come close to shore where submarine canyons or other physical features bring deep water near the coast. An amazing variety of cephalopods, deep-sea fish, and non-food items have been found in the stomachs of sperm whales from around the world. Cephalopods (squid and octopuses), however, are considered to be the major prey items. Major prey species include squids of the genera *Architeuthis*, *Moroteuthis*, *Gonatopsis*, *Histioteuthis*, and *Galiteuthis*), as well as fishes like lumpsuckers and redfishes. Like all odontocetes, they seize individual prey items. In some areas, sperm whales take fish from longlines.

Sei Whale. Sei whales are open-ocean whales, not often seen near the coast. They occur from the tropics to polar zones in both hemispheres, but are more restricted to mid-latitude temperate zones than are other rorquals. They do undergo seasonal migrations, although they apparently are not as extensive as those of some other large whales. Sei whales have been known to eat a wide variety of prey, including many fish species and squid. However, their primary diet seems to be plankton, especially copepods. As such, they are often found in the same area as other copepod feeding whales, including right whales. Sei whales skim copepods and other small prey types, rather than lunging and gulping, like other rorquals.

Summary of Effects on Whales. Whales feed on a wide variety of animals including krill, copepods, fish, and cephalopods. Krill appears to be a particularly important food item for several of the whales. As described in Master Response SE-1, no significant effects due to bioaccumulation in krill, copepods, fish, or cephalopods would be expected to occur as a result of the Ocean Disposal Alternative. Because the size of the Se plume would be less than half an acre, it is unlikely that many of the whale prey items would forage in this area for a long enough period of time to accumulate significant Se levels. Even if whales were to ingest some prey with elevated Se levels, this portion of the diet would be small. Additionally, due to their migratory nature and movements, whales and their prey are not expected to linger in the areas of elevated Se level for significant periods of time. No significant effects to whales are expected to occur as a result of the Ocean Disposal Alternative.

Summary of Effects to Marine Mammals. Based on this information, it can be concluded that the marine mammals listed above may forage on fish and other prey in the discharge vicinity and potentially within the plume containing elevated levels of Se and other constituents. As described in Master Response SE-1, no significant effects due to bioaccumulation in fish would be expected to occur as a result of the Ocean Disposal Alternative. Bioaccumulation in squid (the primary prey source for the elephant seal) has not been measured. However, because the size of the Se plume would be less than half an acre (as described in Master Response SW-13), it is unlikely that many fish or squid would forage in this area for a long enough period of time to accumulate significant Se levels. Even if marine mammals do ingest some fish with elevated Se levels, this portion of their diet would be small. No significant effects to marine mammals are expected to occur as a result of the Ocean Disposal Alternative.

Steelhead and Other Fish

Steelhead. Steelhead spawn in rivers and streams where the fry (young) spend one to three years before migrating through estuaries to the ocean. Typically the steelhead spend two to three years in the open ocean where they consume fish, but they are likely to remain in the vicinity of California. As described in Master Response SE-1, no significant bioaccumulation effects in steelhead or their prey would be expected to occur as a result of the Ocean Disposal Alternative. Because the size of the Se plume would be less than half an acre, it is unlikely that many fish would forage in this area for long enough period of time to accumulate significant Se levels.

Bocaccio and Canary Rockfish. Bocaccio and canary rockfish are not listed as threatened or endangered, but specified stocks of shelf and slope rockfish (bocaccio, cowcod, canary, and yelloweye rockfishes) and lingcod, which are generally found deeper than 20 fathoms (120 feet), are currently assessed as overfished, with rebuilding of populations expected to take several decades in the case of some species of rockfish. These species may be found in the discharge vicinity, but it is unlikely that many fish would forage in this area for a long enough period of time to accumulate significant Se levels. As described in Master Response SE-1, no significant effects due to bioaccumulation in fish would be expected to occur as a result of the Ocean Disposal Alternative.

Abalone. Abalone is a member of the phylum Mollusca, a gastropod marine shellfish whose relatives include clams, scallops, octopuses, and squid. In North America, abalone is found only on the Pacific Coast, from Alaska to Baja Mexico. White abalone (*Haliotis sorenseni*) is listed as endangered and is the only species that is found at depths greater than the intertidal zone. They have been found at depths down to at least 200 feet, but are currently only observed along the Channel Islands (http://www.werc.usgs.gov/coastal/abalone.html). It is unlikely that white abalone would be found in the discharge vicinity, but if the Ocean Disposal Alternative were advanced for further consideration, biological surveys would confirm their absence.

Limpet. No threatened or endangered limpet species are known to occur in the outfall vicinity. Limpets such as the owl limpet (*Lottia gigantea*) generally occur in shallower habitats such as cliff faces, rocks of surf-beaten shores, high and middle intertidal zones, and less frequently in shallow subtidal habitats (http://www.dfg.ca.gov/MRD/ci_ceqa/pdfs/ appendix4.pdf#search='owl%20limpet%20endangered%20california).

SW-13 Water Quality Effects of the Ocean Disposal Alternative

Comment Summary: *The EIS should provide additional information about effects related to the water quality of the effluent that would be discharged offshore from Point Estero under the Ocean Disposal Alternative. Comments specifically referenced pesticides and herbicides; nutrients, including nitrates, ammonia, and/or phosphates; inorganics, including arsenic, boron, bromide, chromium, copper, lead, mercury, molybdenum, nickel, strontium, and sulfate; petroleum; and salinity and temperature. The EIS should address how the Ocean Disposal Alternative discharge would comply with existing water quality regulations, including the Federal Clean Water Act, the California Porter-Cologne Water Quality Control Act, and/or the California Ocean Plan, as well as specific requirements of those regulations.*

Some commenters also expressed concern regarding potential effects to water quality and/or biological resources within the Monterey Bay National Marine Sanctuary.

This Master Response addresses only the concerns related to water quality under the Ocean Disposal Alternative and compliance of discharged drainwater with existing water quality regulations. Other issues related to the effects of drainwater discharged under the Ocean Disposal Alternative are addressed in other Master Responses, including SW-8 (discharge environment), SE-1 (bioaccumulation), SW-11 (nutrients), SW-14 (salinity and temperature), SW-9 (ecotoxicity), SW-12 (special-status species), and SW-10 (humans).

The State Board is authorized to administer and enforce effluent limitations established pursuant to the Federal Clean Water Act. Effluent limitations established under CWA Sections 301, 302, 306, 307, 316, 403, and 405 are included in the California Ocean Plan by reference. Compliance with effluent limitations in the California Ocean Plan, or the EPA’s Effluent Limitations Guidelines for industrial discharges, based on Best Practicable Control Technology, are considered the minimum level of treatment acceptable under the California Ocean Plan. The California Ocean Plan requirements are used as the basis for the evaluation of water quality impacts under the Ocean Disposal Alternative.

The Draft EIS accounts for the time, cost, and feasibility of meeting the California Ocean Plan water quality standard for Se. Because EPA has delegated authority to the State of California to regulate water quality, these requirements are consistent with CWA’s requirements. As the Draft EIS diffuser analysis demonstrates (see Section 5.2.8.3), Se concentrations will be diluted to the Ocean Plan criterion of 15 µg/L at the edge of the zone of initial dilution (ZID). Since the Ocean Plan explicitly allows for criteria to be met after initial dilution, no additional analytical effort is required for a screening level analysis such as that presented in the Draft EIS.

In regard to comments on other constituents, Table C2-7a has been added to Appendix C and is also included in Master Response SW-3 to provide additional existing water quality data on subsurface drainage from the drainage area. These data were collected for the Grassland Bypass Project EIS/EIR (Reclamation 2001c). Samples were collected from the Grassland Bypass Project discharge from the San Luis Drain into Mud Slough (Station B) and would represent the quality of water that would be discharged into the Northerly Reuse Area. The fate of the organic compounds is difficult to judge following discharge into the reuse area because many compounds tend to sorb to soil due to their hydrophobic nature. As such, the concentrations would represent a maximum possible concentration in the discharge from the reuse areas to the ocean. Note that these data supplement those presented in Draft EIS Appendix C, Tables C2-7 and C2-8. Similar data do not exist for the Westlands drainage-impaired lands because the lands are not currently drained and no collection point is available to collect a sample. Sampling of shallow groundwater could have been performed for organic compounds similar to the sampling described in Appendix E-2. However, due to the lack of detectable concentrations of organic compounds found when samples were collected from Station B (shown in Table C2-7a), it was thought that such samples were not likely to yield useful data for the EIS.

It should be noted that the effluent discharged under the Ocean Disposal Alternative would consist of subsurface agricultural drainage, which is different from surface runoff. Subsurface drainage is less likely than surface runoff to contain pesticides and other chemicals that are used in agriculture.

As shown in Appendix C, Tables C2-7, C2-7a, and C2-8, some data exist to estimate typical effluent concentrations for all constituents specifically listed in the comments, with the exception of petroleum. These estimated concentrations are compared to California Ocean Plan standards (if available) in Section 5, Table 5.1-11, of the Draft EIS.

Estimated concentrations of the following constituents exceed one or more of the California Ocean Plan standards:

- Cadmium – flow-weighted average of 2 µg/L exceeds the 6-month median standard of 1 µg/L.
- Chromium – flow-weighted average of 52 µg/L exceeds the 6-month median standard of 2 µg/L, the daily maximum of 8 µg/L, and the instantaneous maximum of 20 µg/L.
- Copper – flow-weighted average of 19 µg/L exceeds the 6-month median standard of 3 µg/L and the daily maximum of 12 µg/L.
- Lead – flow-weighted average of 8 µg/L exceeds the 6-month median standard of 2 µg/L.
- Nickel – flow-weighted average of 35 µg/L exceeds the 6-month median standard of 5 µg/L and the daily maximum of 20 µg/L.
- Silver – flow-weighted average of 2 µg/L exceeds the 6-month median standard of 0.7 µg/L.
- Ammonia – flow-weighted average of 1 mg/L exceeds the 6-month median standard of 0.6 mg/L.

It is important to note that a diffuser can be designed so that concentrations of key constituents would quickly be diluted to low levels through diffusion and ocean mixing. Once discharged to the ocean, the agricultural drainwater will diffuse, or spread, into the surrounding ocean environment. The diffuser design analysis demonstrates that the concentration of effluent, and concentrations of particular constituents of concern in the effluent, will be diluted to levels below appropriate water quality standards very quickly after discharge and, thus, surrounding ocean areas will experience relatively low levels of effluent. For example, even under the infrequently (<1 percent of the time) occurring condition when zero ocean currents are above the diffuser, Se concentrations would reach the applicable water quality criterion of 15 µg/L between 6 and 12 meters above the diffuser. With maximum expected currents, diffusion to the water quality criterion would be achieved only 2 meters above the diffuser (see Section 5.2.8.3). Thus, the water quality criterion for Se would be met very quickly after discharge. At locations farther from the diffuser dilution would reduce constituent concentrations to levels well below water quality standards.

The 6-month median marine aquatic life criterion of 2 ppb for chromium reported in the California Ocean Plan was used as the worst-case standard for evaluating the Ocean Disposal Alternative diffuser design and resultant plume. Since the initial discharged chromium concentration is projected to be 52 ppb, a dilution of approximately 26:1 is required to meet the Ocean Plan criterion. This ratio is greater than the corresponding ratios for Se and other constituents listed above. Because the chromium WQO is more restrictive than objectives for other constituents, the chromium objective governs the analysis.

As described in Section 5.2.2 of the EIS, the EPA Visual Plumes (VP) program was used to evaluate the ability of the two diffuser designs specified in the EIS (designed to meet a Se criterion of 15 ppb at the edge of the ZID to meet a chromium target of 2 ppb within a reasonable ZID. Key diffuser design parameters are listed in Final EIS Table 5.2-6.

Under *maximum* ocean current conditions, the resulting chromium plume would reach a concentration of 2 ppb at a height of less than 2 meters above the diffuser for both designs, in both summer and winter temperature conditions. At this elevation, under summer and winter conditions, the plumes would be less than 2.5 meters wide for both designs, and would be 24 and 50 meters long for the 15-cm and 10-cm port design alternatives, respectively.

Under stagnant (worst-case) ocean current conditions, the resulting chromium plume would reach a concentration of 2 ppb at a height of less than 16 meters above the diffuser for the 15-cm design, and approximately 8 meters above the diffuser for the 10-cm design, in both summer and winter temperature conditions. At these elevations, under summer and winter conditions, the plume would be approximately 5 meters wide and 26 meters long for the 15-cm design, and would be 3 meters wide and 52 meters long for the 10-cm design.

Table 5.2-6a in Section 5 summarizes the estimated concentrations of relevant constituents at the edge of the ZID for both the 15-cm and 10-cm diffuser design alternatives. Since chromium requires the greatest dilution to achieve its Ocean Plan water quality criterion of 2 ppb, and since the ZID was calculated to achieve that concentration, other relevant constituents are estimated to be below their respective Ocean Plan criteria. Ocean Plan criteria are included in Table 5.2-6a for comparison.

The California Ocean Plan has no numerical standards for many water quality constituents. Of the constituents that were specifically mentioned in the comments, no standards exist for organophosphate pesticides including diazinon and chlorpyrifos, phosphates, nitrates, boron, bromide, molybdenum, strontium, and sulfate. Only one organic constituent (methomyl) was detected in drainwater, but the Ocean Plan has no standard for this constituent.

Because no water quality standards for the above constituents are included in the Ocean Plan, the potential for toxicity and bioaccumulation of these constituents is addressed in Master Responses SW-9 and SE-1, respectively.

Although no other organic constituents were detected, reporting limits were significantly higher than the corresponding Ocean Plan standards (for constituents for which standards exist).

Therefore, no conclusions can be drawn from these data about the likelihood that organic constituent levels in effluent would exceed standards. No evidence exists that the standards would be exceeded. It should be noted that the lack of adequate detection limits is a problem inherent to the EPA-approved laboratory methods for organic compounds referenced in 40 CFR Part 136 and not an issue specific to the monitoring conducted for the Grassland Bypass Project EIR/EIS. To address these issues, Appendix II-4 of the Ocean Plan lists desirable minimum levels. However, for the 1997 sampling results, minimum levels were not provided by the laboratory.

It should be noted that although limited data are currently available from which to predict concentrations of each constituent in effluent water, if the Ocean Disposal Alternative were selected in the Record of Decision, additional water quality data would need to be collected to meet discharge permitting requirements. These data are likely to include additional water quality monitoring of the proposed effluent and baseline studies of the existing marine system.

Water quality impairment of Monterey Bay National Marine Sanctuary is unlikely given its distance from the discharge site (11 miles) and the rapid dilution of effluent that occurs immediately after discharge into the ocean. Once discharged to the ocean, the agricultural drainwater will mix rapidly with and be diluted by surrounding ocean water. However, the diffuser design analysis demonstrated that the concentration of effluent, and concentrations of Se and other constituents in the effluent, will be diluted to levels below appropriate water quality standards very quickly after discharge and, thus, surrounding ocean areas will experience relatively low levels of effluent. For example, even under the infrequently (< 1 percent of the time) occurring condition when zero ocean currents are above the diffuser, Se concentrations would reach the applicable water quality criterion of 15 µg/L between 6 and 12 meters above the diffuser. With maximum expected currents, diffusion to the water quality criterion would be achieved only 2 meters above the diffuser (see Section 5.2.8.3). Thus, the water quality criterion would be met very quickly after discharge. At locations farther from the diffuser (e.g., Monterey Bay National Marine Sanctuary), dilution would reduce concentrations to levels well below the water quality standard.

Potential effects to species that may move between the outfall location and Monterey Bay National Marine Sanctuary are discussed in Master Responses SE-1 (bioaccumulation), SW-9 (ecotoxicity), and SW-12 (special-status species).

SW-14 Water Temperature Changes from the Ocean Disposal Alternative

Comment Summary: *The analysis of the Ocean Disposal Alternative should discuss how changes in temperature within the zone of initial dilution could affect the marine environment.*

The Draft EIS diffuser analyses assumed that drainwater temperatures *entering the conveyance system* would range from 10°C in winter to 26°C in summer. No formal analysis of heat transfer during conveyance to discharge locations has been conducted, but soil is a very good insulator, and relatively little heat transfer would be expected from portions of the conveyance system that are underground. Some heat loss might be expected for the Ocean Disposal Alternative (211 miles of buried pipeline), where the last mile of conveyance would be an underwater pipeline. Therefore, use of the two discharge temperatures cited above (10°C in winter to 26°C in summer) was a reasonable modeling assumption. For comparison, at the Point Estero discharge location, winter receiving water temperatures are approximately 10°C and summer temperatures range from 11°C (at 60 meters, the discharge depth) to 17°C (at the water surface). Thus, during winter, no expected difference would be expected between the discharge and receiving water temperatures (zero temperature impact), and during the summer the difference would be 15°C or less (assuming the 11°C ocean temperature at 60-meter depth). However, given the 15:1 dilution accomplished within the ZID, at the edge of the ZID the summer temperature difference would be expected to be less than 1°C, a negligible difference (the winter difference is of course zero at the ZID's edge). Furthermore, if moderate heat transfer in the pipeline is assumed, summer temperature differences would diminish even further. Thus, differences between ambient and effluent temperatures would be relatively small outside of the ZID.

Thermal tolerance data for a number of fish species (primarily freshwater fishes) were compiled in the Portlands Energy Centre environmental documents (Portlands Energy Centre 2003). Upper temperature tolerances ranged from approximately 22°C for juvenile coho salmon to as much as 38°C for bluegill. The temperatures to which the fish are acclimated can have an effect on the upper tolerance ranges, with fish acclimated at higher temperatures having generally higher temperature tolerances. Van Maaren et al. (1999) studied temperature tolerances in juvenile southern flounder (*Paralichthys lethostigma*), a saltwater species, and found a maximum tolerable temperature of about 34°C for fish acclimated at 13°C. Discharge temperatures from the Ocean Disposal Alternative, particularly once mixing has begun, would not approach upper temperature tolerances for fish. In addition, the plume of elevated temperature would be very small relative to the surrounding ocean environment, and fish could easily avoid the plume.

As discussed in Master Response SE-1, some fish may be attracted to the warmer waters of the thermal plume, though given the mixing and movement of the plume with the currents, it would seem unlikely that fish would sustain themselves within the plume for long periods of time.

SW-15 Ocean Disposal Alternative Pipeline Leaks and Breaks

Comment Summary: *Identify the engineering and construction measures that are planned to prevent leakage from the pipeline; how leaks would be detected and responded to; how spills would be mitigated or cleaned up; and the associated costs of detection, mitigation, damages, and liability.*

It should be noted that drainwater is not a hazardous substance. Any effects from a leak in the drainwater conveyance pipeline on sensitive wildlife receptors would generally require a food chain to be established, which takes weeks to occur. It is standard engineering practice to use construction materials and design methods for pipelines, joints, and associated conveyance features to ensure that pipelines do not leak and are resistant to breakage. If the Ocean Disposal Alternative were advanced for further consideration, these design features would be more fully developed and applied. Details of specific design features are not required for the environmental analysis presented in the Final EIS.

Considering the pipe sizes required for the Ocean Disposal Alternative, several pipe materials and joints are available that approach being leak-proof. In addition, the design would require making joints watertight, such as welding steel pipe, welding high-density polyethylene (HDPE) pipe, and double-gasketing joints in other types of pipe. While the appraisal design for the project (see Master Response GEN-1) used polyvinyl chloride (PVC) for most of the piping, subsequent designs would use the most economically attractive pipe that fulfills the requirements of a particular location. In addition to these design features, the use of pump stations to provide pressure to lift water over hills and grades provides an opportunity to monitor pipeline pressure and control flow in response to pressure drops that might indicate potential pipeline ruptures. The pipeline operators would continually monitor the pump stations. Where leaks in buried pipelines are of great concern due to the presence of sensitive receptors such as a water supply reservoir that would be significantly impacted by a failure, standard leak detection methods could be employed, or the pipeline could be rerouted to avoid the risk. If a leak were to occur, Reclamation would take action to shut down the pipeline, diagnose the problem, and apply any necessary corrective action including appropriate clean-up measures.

Cost estimates for pipeline monitoring and spill contingency planning are presented in Appendix O.

SW-16 San Joaquin River Baseline Conditions

Comment Summary: *More current data for baseline conditions of the San Joaquin River should have been used when modeling the water quality impacts of the Delta Disposal Alternatives. One comment questioned the use of 1986-1997 water quality data in Section 5.1.2 because of changes in the San Joaquin River system over the past decade and noted that frequent violations of Vernalis WQOs in one period followed by no violations in the subsequent period point to changes in baseline flows.*

As described in Appendix D4, Reclamation used baseline information on water quality and flow in the San Joaquin River from the draft TMDLs for salt and boron developed by the Regional Board and the flows from DWRSIM for CALFED Study 771. For the purpose of analyzing water quality effects, these flow and water quality conditions are considered adequate for the following reasons:

- Additional improvements in water quality and flow have occurred since the baseline period used by the Regional Board in developing the TMDLs.
- All project alternatives (including No Action) assume removal of drainage flows currently discharged to the San Joaquin River via the Grassland Bypass Project. All alternatives would have the same beneficial effects on water quality in the San Joaquin River.
- Because the change in water quality would be beneficial under all alternatives, additional modeling using more recent monitoring data for baseline would not change the conclusion on the effects of the alternatives on San Joaquin River water quality. However, Reclamation has revised Sections 5.1 and 5.2 to include more recent data on the quality of the San Joaquin River.

Changes in flow in the San Joaquin River are presented in the Final EIS in Section 5.2 and Appendix D2 based on additional analysis performed using CALSIM II.

SW-17 Reverse Osmosis Product Water Quality and Use

Comment Summary: *The EIS should provide information about the quality and use of reclaimed water from the RO system and include estimates on the required use of CVP water for blending.*

Appendix C2 has been expanded to provide an estimate of the quality of reclaimed product water that would be produced under the In-Valley Alternatives by the RO treatment system. Product water would likely be used to supplement agricultural supply in the area. Blending with CVP water would be necessary to reduce the concentration of boron (which is not efficiently removed by RO) to levels that would not impair plant growth. This would require blending 1 part reclaimed water with between 8 and 36 parts CVP water. Note that Reclamation is currently investigating new membranes for their ability to remove boron from drainwater. If successful, blending requirements would be lower than described above. The specific place of use for the reclaimed water would depend on the final location of the RO treatment plant and access to supply canals.