Final Environmental Impact Report

Covering General Waste Discharge Requirements for

Biosolids Land Application

Prepared for:

California State
Water Resources Control Board

Prepared by:

Jones & Stokes

June 30, 2000

Final
Statewide Program EIR Covering General Waste Discharge Requirements for Biosolids Land Application

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Chapter 1. Introduction

PURPOSE OF THE FINAL ENVIRONMENTAL IMPACT REPORT

This final environmental impact report (EIR) has been prepared to respond to agency and public comments received on the draft EIR on the proposed general waste discharge requirements for biosolids land application (the General Order, or GO). The State Water Resources Control Board (SWRCB), as lead agency under the California Environmental Quality Act (CEQA), is required to prepare a final EIR that responds to all environmental comments received on the draft EIR.

CEQA REQUIREMENTS

The content and format of this final EIR meet the requirements of CEQA and the State CEQA Guidelines (Section 15132), which require that a final EIR consist of:

- the draft EIR or a revision of the draft EIR (the draft EIR is hereby incorporated by reference);
- comments and recommendations received on the draft EIR, either verbatim or in summary (Chapter 3 contains the 53 comment letters received and a summary of the oral comments made at the public hearings);
- a list of persons, organizations, and public agencies commenting on the draft EIR (in Chapter 3);
- the responses of the lead agency to significant environmental points raised in the review and consultation process (in Chapter 3); and
- any other information added by the lead agency (Chapter 2).

A lead agency is required to recirculate an EIR when significant new information is added to the EIR after public notice is given of the availability of the draft EIR for public review but before the EIR is certified. Such information can include changes to the project or environmental setting, as well as additional data. New information added to an EIR is not considered significant unless the EIR is changed in a way that deprives the public of a meaningful opportunity to comment on a substantial adverse environmental effect of the project or a feasible way to mitigate or avoid such an effect (including a feasible project alternative) that the project proponents have declined to implement.

The SWRCB has added new information to the draft EIR to provide additional detail on implementation of the proposed GO, clarify analysis and background information, and include additional measures in the proposed GO to further minimize impacts based on public input. The revisions to the proposed GO, described below under "Minor Modifications to the General Order" do not meet the criteria for recirculation because the changes do not introduce new, significant environmental issues or deprive the public of a meaningful opportunity to comment on a feasible mitigation measure that the SWRCB declines to implement. Therefore, recirculation of the document is not required. Appendix A provides a copy of the proposed GO.

MINOR MODIFICATIONS TO THE GENERAL ORDER

Since the publication of the draft EIR, minor modifications have been made to the proposed GO to respond to public comments. Additional changes were made to further protect air quality, refine the definitions of "high potential for public exposure" and "low potential for public exposure", add a definition for "grower", allow for salmonella testing once more sensitive methods are approved by the EPA, more clearly describe how soil background is addressed, and reduce erosion (related to provisions for structures conveying tailwater). These minor changes do not result in any significant impacts that were not previously disclosed in the draft EIR.

PUBLIC REVIEW

The draft EIR was published on June 28, 1999, and circulated for a 72-day public review period. Copies of the draft EIR were available at 18 public libraries, and the executive summary of the draft EIR was available on the Internet. The SWRCB held five public hearings to receive comments on the draft EIR: two meetings were held each in Palmdale on August 16, 1999, and Bakersfield on August 17, 1999, and one meeting was held in Sacramento on August 23, 1999. Transcripts of these meetings and responses to comments raised at the meetings are provided in Chapter 4, "Comments and Responses to Comments". The public review period closed on September 10, 1999.

This document and the draft EIR, which has been circulated separately, constitute the final EIR. Copies of the draft EIR and additional copies of the final EIR are available by contacting Todd Thompson at the SWRCB (at the address provided on the title page of this document). A copy of the final EIR has been provided to all those who commented on the draft EIR.

As lead agency, the SWRCB must certify that the final EIR has been completed in compliance with CEQA and that the SWRCB has reviewed and considered the information contained in the final EIR before approving the project. The SWRCB will consider the final EIR for certification in August 2000.

FORMAT OF THE FINAL ENVIRONMENTAL IMPACT REPORT

In addition to this introduction, this final EIR contains the following chapters:

- # Chapter 2, "Master Responses to Frequent Comments", provides in-depth information to supplement or clarify information in the draft EIR in response to comments that were raised by multiple commenters during the public comment period.

- # Chapter 3, "Comments and Responses to Comments", contains the letters submitted to the SWRCB during the public comment period and transcripts of the public hearings. Several comment letters were submitted with supporting literature and articles. Supporting information was not reproduced in this document and can be obtained by contacting Todd Thompson at the SWRCB (at the address provided on the title page of this document) (specifically for comment letters from Kern Food Growers Against Sludge [letter 26] and Greenberg Glusker Fields Claman & Machtinger LLP [letter 40]). Responses are provided to significant environmental points raised during the public review process on the draft EIR. Each comment letter is included in this chapter, followed by responses to comments contained in that letter. Comments received at the public meetings are addressed at the end of the written comments. This chapter also identifies comment letters that were received after the comment period. These letters were reviewed; however, detailed responses were not provided for these letters.

- # Chapter 4, "Revisions to the Draft EIR", contains a summary of revisions to the text of the draft EIR to update sections of the original document. This chapter is structured as errata to the draft report and can be inserted into the draft EIR to provide a complete record of the final text of the EIR.

- # Chapter 5, "Citations", contains information on all printed references and personal communications referred to in this final EIR.

- # Chapter 6, "List of Preparers", identifies the organizations and people who prepared the draft and final EIR.

This final EIR also includes Appendix A, "General Order", the revised text of the proposed GO; Appendix B, "Revised Draft EIR Public Health Technical Appendix E"; and Appendix C, a revised version of the Mitigation Monitoring Program, Table 15-1, from the draft EIR.

Chapter 2. Master Responses to Frequent Comments

The final EIR provides information on the following areas to respond to multiple comments received on the draft EIR during the public comment period. To avoid redundant explanations in response to frequent comments, Chapter 3 refers the reader to relevant portions of this chapter in the responses to individual comments. When a comment resulted in a change to the draft EIR, the response refers to the location in the text of the draft EIR where the change is to be made. Added text is indicated with double underlining (additions) and deleted text is struck out (~~deletions~~).

The following issues are addressed in this chapter:

- Master Response 1. Funding and Staffing Sources at RWQCBs
- Master Response 2. Effects of the Proposed GO on Existing Land Application Programs and Sites
- Master Response 3. Setbacks and Buffer Zones
- Master Response 4. Regulation of Chromium, Molybdenum, Copper, and Lead
- Master Response 5. Travel Limitations on Paved and Unpaved Roads (Mitigation Measures 10-1 and 10-2 from the Draft EIR)
- Master Response 6. Monitoring of Fecal Coliform versus Salmonella
- Master Response 7. Grazing Period Restrictions (Mitigation Measure 4-2 from the Draft EIR)
- Master Response 8. Extension of Grazing Period Related to Public Health (Mitigation Measure 5-2 from the Draft EIR)
- Master Response 9. Visible Airborne Particulate Matter
- Master Response 10. Basis for Size Restrictions on Application Sites
- Master Response 11. High/Low Potential for Public Exposure to Biosolids
- Master Response 12. United States versus European Standards for Land Application of Biosolids

- # Master Response 13. Surface Water and Groundwater Quality Impact Conclusions
- # Master Response 14. Validity of Groundwater Quality Analyses Given the Controversy over the Part 503 Regulations
- # Master Response 15. Validity of the Groundwater Analysis Given the Depth to Groundwater Requirements
- # Master Response 16. Groundwater Quality Analysis and Preferential Flow Paths
- # Master Response 17. Setback Distances, Flooding, and Relationships to Water Quality Impact Analyses for Surface Water Resources
- # Master Response 18. Ohio Study

Master Response 1. Funding and Staffing Sources at RWQCBs

Several commenters voiced concern that there may be inadequate staffing or funding at the regional water quality control boards (RWQCBs) to oversee the proposed GO land application program and its various mitigation and monitoring requirements. Staffing is frequently an issue for new programs. Currently, annual fees received for issuing the proposed GO are specified in Section 2200, Article 1, Chapter 9 of Title 23 of the California Code of Regulations. Those annual fees are $1,200 for sites greater than 40 acres and $400 for sites less than 40 acres. Some sites will require more oversight, thus raising the oversight costs above that location's annual fee. The proposed GO is written to minimize complaints and unscheduled site inspections/investigations by requiring practices that prevent nuisances and afford environmental protection. Noncompliance may result in enforcement (including fines that include staff costs). The goal has been to minimize the need for constant oversight. Given the fee structure, the SWRCB does not anticipate that the proposed GO program will place an unworkable burden on RWQCB resources.

Master Response 2. Effects of the Proposed General Order on Existing Land Application Programs and Sites

All existing land application sites under the Superior Court Order will be required to comply with the proposed GO if it is adopted. The interim application of biosolids at these sites is a part of the existing conditions described on page 2-1 of the draft EIR. To comply, these permit holders will need to submit a new notice of intent and preapplication report to the RWQCB and go through the application process. If the operation is in compliance with provisions in the proposed GO, the RWQCB will be able to issue a notice of applicability to the project. If the project does not comply with the proposed GO, the applicant may need to pursue an individual waste discharge permit. The need to review other existing land application operations (not affected by the Superior Court Order) will be determined by the RWQCB on a case-by-case basis, but the proposed GO is not intended to regulate every biosolids use site in California.

Master Response 3. Setbacks and Buffer Zones

Setbacks and buffer zones have been developed for the proposed GO on a "best professional judgment" basis. The setback and buffer requirements contained in existing regulations and guidance documents were reviewed before the proposed GO restrictions were set. The regulations and other sources reviewed included the California Department of Health Services' Drinking Water Source Assessment and Protection (DWSAP) Program, Final Review Draft (August 1998); Water Well Standards: State of California Bulletin 74-81; and existing regulations and standards from other states. The use of standards and practices that have been in place and have proven to be effective precludes the need for lengthy research projects to establish new setbacks or buffers for land application of biosolids.

Master Response 4. Regulation of Chromium, Molybdenum, Copper, and Lead

The proposed GO contains several metal limits that differ from those in the Part 503 regulations and identifies metals that currently are not regulated. This condition raised numerous questions about the proposed GO. Since the draft EIR was issued, one metal (chromium) has been removed from the regulation. Because no adverse effects have been observed from chromium in sludges, the regulation of chromium is being deleted from the proposed GO. In contrast, molybdenum, a pollutant that may cause adverse effects in ruminant animals, will remain in the proposed GO. Use of biosolids for growing animal feed and use on pastureland are two of the intended uses applicable for this proposed GO. Although removed from the Part 503 regulation by the court system for its conservative approach, the original risk-based limit for the molybdenum cumulative pollutant loading rate is the best scientific limit and has been incorporated into the proposed GO to protect animal health. The ceiling concentration is performance-based and derived from the National Sewage Sludge Survey. Background information on the Part 503 risk assessment is provided in Appendix B.

Other limits different from those included in the Part 503 regulations are the ceiling concentrations for lead (Pb) and copper (Cu). These limits are taken from the California Health and Safety Code, Section 25157.8, which states that any waste containing total lead in excess of 350 parts per million (ppm) or copper in excess of 2,500 ppm must be disposed of in a Class I hazardous waste landfill. Section 25157.8 contains an exclusion that requires that any such wastes be handled on an individual basis.

Refer to Appendix A of this final EIR for a list of metals to be regulated.

Master Response 5. Travel Limitations on Paved and Unpaved Roads (Mitigation Measures 10-1 and 10-2 from the Draft EIR)

Several changes have been made to the text of Chapter 10, "Air Quality", so that the text better reflects the programmatic nature of the biosolids EIR. In response to several comments, the last paragraph on the thresholds of significance for air quality on page 10-6 has been deleted and replaced with the following:

> Project-related emissions typically are considered significant if they exceed specific thresholds established by individual air districts. Those thresholds are generally for land use development projects that would result in permanent long-term emissions. In contrast, biosolids application at any one site would be short term because increased traffic volumes and associated air emissions would occur only during the brief period when the biosolids are delivered and applied. Even though traffic and air emissions for any single biosolids application project would be short-term, areawide emissions from several biosolids application projects have the potential to create significant air quality impacts.

In addition, the first impact and associated mitigation measures have been deleted and replaced with the following:

> **Impact: Significant Increase in ROG, NOx, and PM10 from Biosolids Transport Vehicles and Biosolids Spreaders**
>
> > Transporting biosolids from wastewater treatment plants to farms and spreading and mixing biosolids into the soil would generate vehicle emissions and fugitive dust from the use of heavy-duty transport vehicles and farm vehicles. Individually, such actions from a single biosolids project would occur on a short-term basis and would likely have less-than-significant air quality impacts. However, a large number of these actions occurring concurrently have the potential to generate substantial quantities of ozone precursors and PM10.
> >
> > Individual air districts classified as nonattainment areas for the state or federal ozone or federal PM10 ambient standards are required to prepare state implementation plans (SIPs) and air quality management plans (AQMPs) showing how they will come into compliance with the ambient standards. Those plans include emission budgets for vehicles and nonvehicular sources. Emissions from heavy-duty vehicles, including biosolid transport vehicles, are included within the emission budgets prepared as part of ozone and PM10 AQMPs. Emissions from farm activities, including off-road vehicle travel and wind-blown dust, are also included in the emission budgets of those plans (O'Bannon pers. comm.). Consequently, both on-road and off-road vehicular emissions associated with biosolids application projects are included in the

emission budgets in the applicable air quality plans. Because those plans describe the measures that would be used to attain the ambient standards, no additional mitigation measures are needed and the proposed project is considered to have less-than-significant air quality impacts from on- and off-road vehicle emissions.

Mitigation Measure: No mitigation is required.

Master Response 6. Monitoring of Fecal Coliform versus Salmonella

In developing the Part 503 regulations, the Natural Resources Council Committee of the National Academy of Sciences peer-reviewed the U.S. Environmental Protection Agency's (EPA's) risk assessment and methodologies. Afterward, it made the following recommendation: "Until a more sensitive method for the detection of salmonella is developed, the present test should be used for support documentation, but not be substituted for the fecal coliform test in evaluating sludge as class A." As such, the discharger is free to test for salmonella and use that information for support documentation, but those data will not be used to determine Class A biosolids. It is acknowledged that the EPA is working on a more sensitive test for salmonella. However, until a more sensitive test is developed, no test is sensitive enough to definitively determine class A biosolids. The proposed GO has been modified to exclude current testing methods for salmonella for Class A Part 503 compliance determinations but to allow for future EPA-approved methods of testing for salmonella.

Master Response 7. Grazing Period Restrictions (Mitigation Measure 4-2 from the Draft EIR)

Many commenters (mainly from municipal wastewater treatment plants and professional associations of sanitation districts) questioned Mitigation Measure 4-2 and the need to extend the grazing waiting period after biosolids application from the 30 days required by Part 503 regulations to the recommended 60-90 days. In the commenters' view, the Part 503 regulations were based on thorough scientific research. Given this, many commenters requested justification for this mitigation measure. Points made included the fact that synthetic organic compounds (SOCs) in biosolids typically are detected in very low concentrations or not at all because the sludge treatment process destroys them, as it does pathogens, such as viruses. The commenters felt that extension of the waiting period was unnecessary and potentially placed biosolids at an economic disadvantage compared to other mulches and soil amendments that might be used on pastureland and grazing land.

The mitigation measure was proposed because of continuing uncertainty over the occurrence and persistence in the soil environment of pathogens and SOCs associated with biosolids that could potentially affect the health of grazing animals and short-term land productivity. Animal health is a land productivity issue because unhealthy grazing animals may not gain weight as rapidly as desirable or may not produce as much milk; in cow-calf operations, offspring or the quality of the meat may be inferior or unacceptable. These conditions would reduce land productivity.

Many letters supported by references that included reprints of scientific reports came from commenters who were equally convinced that potentially dangerous and environmentally damaging levels of SOCs and disease pathogens are indeed present in biosolids, including “exceptional quality” (EQ) biosolids. After these and other readily accessible articles were reviewed, several were found to be sufficiently convincing to raise uncertainty and questions about the persistence of pathogens and SOCs and their potential impacts on grazing animal health.

Articles reviewed included the following:

Duarte-Davidson, R., and K. C. Jones. 1996. Screening the environmental fate of organic contaminants in sewage sludge applied to agricultural soils: The potential for transfers to plants and grazing animals. The Science of the Total Environment 185:59-70.

Alcock, R. E., A. Sweetman, and D. C. Jones. 1998. Assessment of organic fate in wastewater treatment plants, selected compounds and physicochemical properties. Chemosphere 38(10):2247-2262.

Because of continuing uncertainty and controversy among members of the scientific community regarding this issue, the SWRCB staff recommends a conservative approach that results in an extended grazing waiting period. This extension allows for natural soil bioremediation of any SOCs and disease pathogens that are incorporated into the soil with biosolids. The 30-day grazing waiting period was reviewed by the National Academy of Sciences (1996); it recommended that additional research be conducted.

Several commenters pointed out that the EPA, when it released the Part 503 regulations, termed them as “works in progress” that would be updated as additional research is conducted. Several other commenters noted that the regulations were minimum standards (as most EPA regulations are) designed to be tailored to each state’s individual needs. One commenter contrasted EPA’s approach to biosolids regulation with its more conservative approach to pesticide regulation, where in the face of uncertainty and unknown scientific information, a conservative approach is warranted and the burden of proof rests with the regulated industry to demonstrate environmental safety. The SWRCB is considering a similar conservative approach with Mitigation Measure 4-2 in extending the grazing waiting period until additional research is completed.

One of the objectives of the proposed GO is to streamline the technical and environmental review and approval process for land application of biosolids for those sites and kinds of biosolids and management approaches that do not have significant issues requiring more in-depth evaluation and public comment. Because of this desire for streamlining, the proposed GO process must, by necessity, be conservative. In fact, in releasing the Part 503 regulations, the EPA encouraged and assumed that state and local agencies will address additional site-specific issues.

One of the mitigation measures included in the draft EIR is screening of soils and site conditions to eliminate problematic situations that require more in-depth technical information and analysis from being permitted under the proposed GO. Along with being conservative, there may be certain site-specific conditions under which the proposed GO's conditions and mitigation measures may not be necessary.

An individual seeking waste discharge requirements from an RWQCB has the choice of submitting an individual permit application for biosolids land application for those sites and biosolid compositions where the applicant does not believe the proposed GO and these recommended additional mitigation measures should apply. One example may be where the applicant believes "very clean" biosolids could be applied directly to pasture grass, and not incorporated into the soil, allowing grazing to be initiated after 30 days. The RWQCB could, on an individual project basis, confirm the quality of the material, based on land uses in the wastewater treatment service area or additional testing of the biosolids, and then, after technical review, approve such an application plan under an individual waste discharge requirement.

Also see Response to Comment 1-3 on the issue of detection of SOCs in biosolids and Response to Comment 16-13 on competitive disadvantages of waiting.

Master Response 8. Extension of Grazing Period Related to Public Health (Mitigation Measure 5-2 from the Draft EIR)

Numerous comments were received regarding the scientific justification for Mitigation Measure 5-2 (on page 5-29 of the draft EIR). This measure would extend the mandatory waiting period between the time biosolids are applied to grazing land and when animals can be allowed back on the land. The EPA Part 503 regulations and the proposed GO each require a 30-day waiting period. Mitigation Measure 5-2 would extend the period to 60 or 90 days, depending on average temperatures at the application site. Commenters felt that there is not adequate scientific justification for extending the waiting period beyond that required by EPA.

The mitigation measure has been proposed because of ongoing uncertainty and differences of opinion in the scientific literature regarding the occurrence and persistence of pathogens and SOCs in lands receiving biosolids (see also Master Response 7). There is a related concern regarding disease transmission via grazing animals.

When analyzing the public health risks associated with grazing animals, the main exposure pathway of concern is via the food chain (grazing animal ingestion of soil material and pathogens, and hence human ingestion of contaminated, undercooked meat). This exposure route is complex and the likelihood of exposure varies greatly with the pathogen.

Key factors are management of the site to prevent exposure and the ability of the particular pathogen to survive outside of the host. The longest-lived pathogens have typically been helminths such as *Ascaris* and *Taenia*, which have been found viable in biosolids-amended fields for up to many months and even years (Feachem et al. 1980). There is little evidence of actual transfer of such parasites from sludge to animals (Eastern Research Group 1992), but research conducted in Europe makes it clear that the pathway potential cannot be totally discounted (Isole et al. 1991). In the

United States, the only documented cases of transfer of tapeworms from sludge to animals to humans involved the surface application of large quantities of untreated sludge to a cattle grazing area of a prison farm in Virginia (Hammerberg et al. 1978, see Appendix E).

Appendix E in the draft EIR discusses the helminths of concern and their known or suspected presence in biosolids. Tapeworm (*Taenia* spp.) are primarily a hazard to livestock (beef and hogs) if the eggs are ingested from biosolids-amended fields that have not been properly managed (biosolids not tilled in and insufficient time allowed for die-off of any viable eggs). Ingestion of the eggs (from the soils/biosolids mixture at the surface) and the hatching of larvae and formation of cystercerci can damage the animal's organs. Humans can ingest the cysts from poorly cooked meat and develop the tapeworms.

Of the helminths, ova of *Ascaris* sp. (the human roundworm) survive up to 7 years under favorable environmental conditions (U.S. Environmental Protection Agency 1985). Work on the concentrations of Ascaris ova in sludges showed that this species had the highest concentration of all the helminths, with up to 10 ova per gram of sludge (Reimers et al. 1981).

Data on the presence and viability of helminth ova in digested sludges are shown below:

Helminth Egg Density in Treated Municipal Sludge

	Southern States[1]		Chicago[2]	
Helminth	Mean Ova/g dry weight	Viability	Mean Ova/g dry weight	Viability
Ascaris spp.	9.6	69%	2.03	`64%
Trichuris spp.	3.3	48-64%	0.360	20%
Toxocara spp.	0.7	52%	1.73	53%
Toxascarsi leonina	–	–	0.48	63%

[1] Source: Reimers et al. 1981.
[2] Source: Arthur et al. 1981.

The size of protozoa and helminth eggs make them less likely to find their way into aerosols or groundwater at land application sites (Kowal 1985). The concern is for surface contact and possible ingestion if the biosolids are not incorporated into the soil.

The National Research Council's (NRC's) review entitled "Use of Reclaimed Water and Sludge in Food Crop Production" recommended that "EPA should re-evaluate the adequacy of the

30-day waiting period following the application of Class B sludge to pastures used for grazing animals." This recommendation is based largely on concern about beef and pork tapeworm, whose ova have a greater potential to remain viable when applied to fodder or grazing land. According to Feachem et al. (1983) and the EPA model (SANDIA), 30 days should be sufficient time to destroy these ova. However, the NRC cites a single study done in Denmark (Isole et al. 1991) that showed that a small portion of the ova remained viable for 5-6 months. They were nonviable after 8-10 months of soil exposure.

In considerations of such data, climatic conditions are important. In a drier climate, such as California's, dessication and death of potential pathogens will occur more quickly and at a much higher rate. However, NRC noted that in this country, we depend on consumer cooking of meat to destroy any helminth cysts. Managing land application of biosolids and meat inspections provide additional controls. NRC further notes, "Generally, the fewer viable eggs of Taenia species allowed on grazing land, the better; however, the actual risk of a too short waiting period may not be measurable." The draft EIR with Mitigation Measure 5-2 recommends extending the 30-day period to 60 or 90 days as a precaution until better scientific evidence is available to indicate that the risk is minimal from the potential exposure.

Based on the information presented above and in Master Response 8, and the ongoing controversy over the fate of pathogens and SOCs in soils receiving biosolids, Mitigation Measure 5-2 has been left unmodified.

Master Response 9. Visible Airborne Particulate Matter

Many comments were received regarding the need for a wind speed restriction in the proposed GO. It is acknowledged that all dust from land application sites is not biosolids, the prohibition stated in the proposed GO is qualitative and that specifying a moisture content and a maximum-allowed wind gust threshold is an alternative means of addressing the same issue. This issue was given considerable thought. Ultimately, the proposed GO has been changed to modify the requirement to be less qualitative. The proposed GO now specifies that all biosolids sites must use material that is greater than 50% moisture content. For sites where tilling is proposed, biosolids must be incorporated within 24 hours in arid areas and within 48 hours in other climate zones. Also, a requirement to cover biosolids stored in the field for more than 24 hours has been added to control windblown material. By requiring a minimum moisture content, covering, and incorporation in an expedient manner, the potential for biosolids movement offsite will be reduced. A wind gust threshold was deemed inappropriate because of the difficulty of calibrated measurement applications statewide and the site-specific nature of wind events.

The text of the proposed GO, as found in Prohibition No. 14 of Appendix A, is changed to read as follows:

> ~~Any visible airborne particulate leaving the application site during biosolids applications or during incorporation of biosolids at the permitted site~~ The application of biosolids containing a moisture content of less than 50% is prohibited.

Also, the following text is added to the proposed GO, as found in Discharge Specification No. 6 of Appendix A:

> If biosolids are applied to sites where the field will be tilled, biosolids shall be incorporated within 24 hours after application in arid areas and within 48 hours in nonarid areas. Tillage practices shall be used that minimize the erosion of soils from the application site by wind, stormwater, or irrigation water.

The text of the proposed GO, as found in Biosolids Storage and Transportation Specifications No. 6 of Appendix A, is modified as follows:

> Biosolids ~~storage facilities that contain biosolids between October 1 and April 30 shall be covered during periods of runoff-inducing precipitation~~ placed onsite for more than 24 hours shall be covered.

The text for page ES-9, bullet 10 of the draft EIR is revised as follows:

> ~~application or incorporation into the soil is permitted when wind may reasonably be expected to cause airborne particulate to drift from the site~~ no application of biosolids containing a moisture content of less than 50%;

Master Response 10. Basis for Size Restrictions on Application Sites

Several commenters asked why the SWRCB had established 2,000 acres as the maximum size or operation to be permitted under one GO permit. Two thousand acres is a large operation, occupying more than 3 square miles. This size restriction, taken from the original Central Valley GO, was based on the average size of large-scale land application sites in the Central Valley. It was deemed undesirable to permit larger operations under a single permit because of the likely change in site conditions across such an expansive area.

Master Response 11. High/Low Potential for Public Exposure to Biosolids

Several commenters requested that the proposed GO contain an expanded definition of "high potential for public exposure". The text of the proposed GO in Finding No. 3(q.) of Appendix A is revised as follows:

> High Potential for Public Exposure Areas: Land located within one-half mile of ~~a developed border of a populated area~~. educational facilities, facilities designated for recreation activities other than hunting, fishing, or wildlife conservation, places of public assembly, hospital, or similar sensitive receptors.

Because the definition for "high potential for public exposure" has been revised, the definition for "low potential for public exposure" in the proposed GO is revised as follows:

> Low Potential for Public Exposure Areas: Land not ~~located within one-half mile of a developed border of a populated area~~ meeting the definition of high potential for public exposure areas.

Because of the modification to the definition of "high potential for public exposure" in the proposed GO, page 6-7 of the draft EIR, first impact and Mitigation Measure 6-1, are revised as follows:

> **Impact: Application of Class B Biosolids at Locations That May Conflict with Existing Land Uses in Urban Area; Recreation Areas; or Other Sensitive Areas, Including Schools, Hospitals, and Recreation/Public Assembly Areas**
>
> The proposed GO contains specifications, exclusions, and prohibitions designed to minimize conflicts with land uses adjacent to application sites. For example, it specifies areas of the state identified as "unique and valuable public resources" that are not regulated by the proposed GO and for which site-specific permits would be required; it requires compliance with the provisions of Part 503 regulations regarding the land application of biosolids that meet provisions for vector reduction; ~~it prohibits the dissemination from biosolids application sites of visible airborne biosolids particles~~, it stipulates the use of tillage procedures that minimize wind erosion; and it prohibits application within 500 feet of residential buildings. ~~However, the GO does not include setbacks from facilities for recreation activities; places of public assembly; hospitals; or other sensitive receptors that could be included under the definition of "populated areas" provided under "High Potential for Public Exposure Areas" in the definition section of the GO.~~ Although the proposed GO identifies the types of land uses where the high potential for public exposure could occur, it does not prohibit the use of biosolids adjacent to these areas. (The application of Class A biosolids would not conflict with these potential adjacent land uses because Class A biosolids have been treated to meet more stringent pathogen reduction standards than Class B biosolids.) The application of Class B biosolids near these sensitive

receptors could conflict with the land use (activities could be disturbed as a result of increased noise or traffic). This impact is considered potentially significant. To reduce this impact to a less-than-significant level, the SWRCB shall implement Mitigation Measure 6-1.

~~**Mitigation Measure 6-1. Require setbacks from areas defined as having a high potential for public exposure**. The GO will be modified to state that:~~

~~(a) no application of Class B biosolids shall be permitted within an area defined in the GO as having a high potential for public exposure unless the biosolids are injected into the soil and~~

~~(b) educational facilities; facilities designed for recreation activities other than hunting, fishing, or wildlife conservation; places of public assembly; hospitals; or similar sensitive receptors shall be included in the definition of "populated area" as used in conjunction with the designation "High Potential for Public Exposure Areas."~~

Mitigation Measure 6-1. Require injection of biosolids in areas defined as having a high potential for public exposure for Class B biosolids. The proposed GO will be modified to state that no application of Class B biosolids shall be permitted within an area defined in the proposed GO as having a high potential for public exposure unless the biosolids are injected into the soil.

Master Response 12. United States versus European Standards for Land Application of Biosolids

Several commenters were concerned that the SWRCB was using the federal Part 503 regulation as a starting point for its proposed GO regulating land application of biosolids, when most European countries have adopted controls that are much more restrictive. Canada and much of Europe have limits on the levels of heavy metals that can be applied to land that are, in most instances, lower than those proposed in the GO. In some instances, they are considerably lower. The differences are generally attributed to the method used to establish the limits.

The EPA developed its cumulative limitations based on an assessment of the various pathways for metals transfer from biosolids to soils and thence to humans or animals, with the goal of protecting humans, plants, and animal health. This approach allows for a gradual buildup of metals in the soil up to a point where an unacceptable health risk would occur. European and Canadian standards have been established using a variety of other standards and goals. For some, a policy of no accumulation or no net increase in background levels of metals in the soils was used to guide creation of limits. Because the natural attenuation of metals in soils is extremely slow, allowable amounts of intentional additions from biosolids are extremely small. Other countries have based their metals limits on the results of field studies or actual land application operations where an adverse effect on humans, plants, animals or soil microorganisms was observed. Limits have been established below those concentrations where effects were observed after allowing for a variable safety margin (McGrath et al. 1994).

The scientific basis for the above approaches has been questioned in the technical literature surrounding land application of biosolids. There appears to be no stronger scientific basis for the European and Canadian standards than there is for the standards contained in the United States' Part 503 regulations; there is primarily a difference in the choice of target organisms for the health risk analysis and willingness to accept some health risk to support the reuse of treated sewage sludge. SWRCB staff has taken the Part 503 metals limitations, which are designed to protect human, plant, and animal health, and increased restrictions on metals application by requiring that soil background metals concentrations be included in the calculation of cumulative limits. Federal (EPA) and state (SWRCB-proposed GO) regulations also allow for modification as ongoing research into the effects of biosolids land application continues to better define the health risks and the effects on soil sustainability.

Master Response 13. Surface Water and Groundwater Quality Impact Conclusions

Several comments were received that generally questioned and recommended changes to the conclusions reached in the EIR regarding the CEQA level of significance for surface water and groundwater quality impacts. The analysis of water quality impacts that could occur from implementing the proposed GO, and the identification of their significance determination according to CEQA guidelines, was based partially on the comparative analysis conducted for development of the federal Part 503 regulation. Conservative assumptions of biosolids land application rates, duration of land application, contaminant concentrations, and environmental thresholds formed the basis of Part 503's rule development process.

Based on each chemical contaminant's fate and transport characteristics in the soil and aquatic environment, the risk of contamination through either the surface water or the groundwater pathway was evaluated in the Part 503 risk assessments and determined not to be limiting for any contaminant. Fourteen environmental pathways were evaluated for the Part 503 regulations. The concentrations of the regulated trace metals in biosolids deemed protective under these conservative fate and transport assumptions were limited by environmental pathways. These pathways involved long-term application of biosolids, and direct ingestion of biosolids by children, human consumption of food grown in biosolids, plant phytotoxicity, or animal toxicity.

Risk assessments were also performed for a wide variety of SOCs. However, based on the extremely low probability of occurrence and minimal concentrations of SOCs in biosolids samples from around the country, EPA determined that regulations for SOCs in the final Part 503 regulations were unnecessary.

The proposed GO includes several prohibitions and restrictions that are more conservative than the federal Part 503 regulations:

- # Land application of mixed wastes composed of EQ biosolids are regulated under the proposed GO; Part 503 risk assessments found that EQ biosolids do not pose an environmental risk and therefore are not regulated under the federal rules.

- # Land application is limited by setback distances from selected water resources such as wells and water bodies, runoff restrictions and slope. The risk assessments and resulting concentration limits for Part 503 regulations are based on assumptions that application occurs continuously on lands directly adjacent to water resources.

- # Land application is prohibited on steep slopes unless a certified erosion control plan is implemented.

- # Monitoring is required if groundwater is within 25 feet of ground surface. The Part 503 regulations determined that no monitoring of groundwater was necessary to ensure protection of groundwater resources.

- # The cumulative limitations for heavy metals coming from biosolids are more conservative than under the Part 503 regulations.

A comprehensive preapplication report must be submitted that includes requirements for background soils testing of metals and testing of selected organic compounds in the biosolids that will be applied.

The conservative assumptions and extensive risk assessments performed for development of the Part 503 regulations, combined with the additional conservative provisions, policies, and procedures contained in the proposed GO, provide a comprehensive basis for evaluating potential environmental impacts to surface water and groundwater resources for the EIR and determining that those impacts would be less than significant. Implementation policies and procedures under the proposed GO provide adequate flexibility for RWQCB staff to issue notices of application, with any additional allowable permit or enforcement conditions deemed necessary for protection of site-specific resources, for each notice of intent and preapplication report for land application. The general provisions, prohibitions, restrictions and minimum standards for land application under the proposed GO would be protective of water quality and consistent with RWQCB basin plans, state and federal water quality standards, and provisions of the state water code.

The proposed GO would be applicable for 15 years, after which it would be evaluated for necessary changes. In contrast, the risk assessments conducted for the Part 503 regulations were based on application of biosolids occurring continuously for 20 years, with exposed individuals obtaining all their drinking water from an affected well for 70 years. Therefore, biosolids application under the proposed GO has a low probability of exceeding threshold assumptions used for risk assessments in the Part 503 regulation development process.

The proposed GO requires RWQCB staff to ensure that application projects conducted under the proposed GO do not cause or contribute to any violation of water quality standards. Therefore, the potential impacts were considered less than significant, given that RWQCB staff are trained to identify potential water quality contamination processes and have available knowledge of the resources in their jurisdiction. They would use professional judgment for each application to land-apply biosolids to ensure that the proposed practices and site conditions protect the local water resources.

Master Response 14. Validity of Groundwater Quality Analyses Given the Controversy over the Part 503 Regulations

Several commenters questioned the validity of the analysis of potential groundwater quality impacts in the EIR, given that there is some controversy over assumptions used for the Part 503 regulations regarding the fate and transport processes of regulated contaminants and other contaminants that were not addressed under Part 503 regulations. With respect to different chemicals typically present in treated biosolids and geohydrologic conditions in California, the analysis of potential groundwater quality impacts for the EIR were primarily based on the risk assessments prepared for the Part 503 regulation development process (as described in Master Response 13) and the level of protection afforded by the proposed GO for the fate and transport of nitrate nitrogen.

Nitrates were used as a key indicator of potential groundwater quality impacts that could occur under the proposed GO because nitrates are readily soluble in water, they are readily present in biosolids or are rapidly produced from conversion of ammonia, and their transport is relatively unimpeded after water has infiltrated beyond the root zone where plant uptake can occur. Nitrate that infiltrates beyond the root zone is relatively unaffected by physical adsorption, structural modification, or decay processes. Other regulated and nonregulated chemical and biological contaminants have fate and transport characteristics governed by numerous factors. These generally restrict or impede transport in soil to some degree, including photodegradation; oxidation and reduction; solubility in water; affinity for organic matter, clay particles, and inorganic complexes; death and decay rates; biological uptake, absorption or degradation; and other physical/chemical degradation processes. The fate and transport of trace metals, SOCs and biological constituents are generally impeded to some extent by these various processes. Although some constituents may have transport characteristics similar to nitrate, there are no other chemical constituents with greater transport rates in the soil-water column than nitrate and other similar inorganic ions, such as chloride, that are conservative of their mass in the aquatic environment.

In addition, analysis of the potential effects of proposed GO implementation on groundwater quality based on nitrate is considered a conservative approach. It is regulated with state and federal primary drinking standards; California also has applicable numerical water quality objectives for nitrate in groundwater used for municipal supplies. Nitrate is relatively unaffected by typical drinking water treatment plant processes, such as coagulation and filtration; therefore, standards must protect the source water because nitrate cannot easily be removed. Other inorganic constituents with similar properties, including chloride, salinity and total dissolved solids, are regulated by certain RWQCBs and EPA, with less stringent water quality objectives or secondary drinking water standards. For many trace metals and SOCs, either there are no established state groundwater quality objectives, or regulation of these constituents is through state and federal drinking water standards, for which compliance is required after water has passed through treatment processes. Many contaminants are readily removed as water infiltrates from the soil surface down to the groundwater or are downgraded to less harmful compounds through various physical, chemical, and biological processes.

Consequently, nitrate fate and transport were considered limiting factors for the analysis of potential impacts and protection of groundwater from contaminants in biosolids that could be land-applied under the proposed GO. The impact analysis therefore presumes that if a complete biosolids application program, pursuant to conditions of the proposed GO and in compliance with appropriate mitigation measures, would reduce transport of the highly mobile nitrate contaminants, then there would be very low probability of contamination from other less-mobile contaminants. The primary measure in the proposed GO that ensures minimal risks to groundwater impairment requires land application to not exceed the agronomic rate of nitrogen uptake. If nitrate is not allowed to infiltrate past the root zone at concentrations that would impair groundwater quality, then there would be low risk from transport of other contaminants. The proposed GO provides RWQCB staff with the regulatory provisions and scientifically based assurances that groundwater impairment from other less-mobile contaminants would not occur. In addition, if RWQCB staff determines that a biosolids application project could contribute to an area of existing regional groundwater nitrate contamination, the project can be required to modify application practices to further reduce the potential contributions to those existing problems or issue a site-specific WDR to address a unique site.

Master Response 15. Validity of the Groundwater Analysis Given the Depth-to-Groundwater Requirements

Comments were received that questioned the validity of impact analyses for groundwater quality, given that no minimum depth to groundwater is specified in the proposed GO for land application areas, recommended minimum depths to groundwater where biosolids application should not be allowed, or both. The risk assessments conducted for the Part 503 regulations were extremely conservative with respect to the distance of application of biosolids from groundwater resources on a horizontal and vertical basis. Potential transport of contaminants via the groundwater pathway were based on depth to groundwater of 1 meter (3.2 feet) and no lateral separation (human drinking water from a well located directly within the area of biosolids application). In practice, the prohibition of application to saturated lands and normal agricultural practices would preclude application to lands that have groundwater tables within the 1 meter zone because landowners would not typically grow crops in soils where the root zone is saturated. In addition, as described in Master Response 14, nitrate is a readily soluble compound within biosolids (or formed from ammonia in biosolids) that can infiltrate to groundwater unimpeded by soil interactions. There would be very low probability of groundwater impairment from trace metals and SOCs in biosolids that are considerably less mobile if nitrate is not land applied at levels that would become detrimental in groundwater.

The proposed GO requires monitoring to be performed on areas that do have high groundwater levels (less than 25 feet from ground). Groundwater monitoring was not considered adequate mitigation for potential groundwater quality impacts because it would not sufficiently reduce, avoid or minimize the impacts under the State CEQA Guidelines. However, water quality monitoring is a particularly useful tool for the RWQCB staff that is responsible for implementing the biosolids permitting programs under the proposed GO because it will allow identification and tracking of whether land application in those areas is causing water quality impairment. Nitrate is therefore a good indicator for monitoring biosolids application sites because it is highly mobile compared to other regulated and nonregulated trace metals, pathogens, and SOCs. An RWQCB executive officer can impose more restrictive water quality monitoring requirements on applicators as well. If water quality impairment occurred and was detected, the RWQCB could enforce cleanup and abatement orders under provisions of the state water code. Consequently, SWRCB staff considers the impact analysis and CEQA significance conclusions justifiable given the very conservative conditions imposed upon land application projects that would be conducted under the proposed GO.

Concerns about migration of microbes into groundwater have also been considered in the EIR analysis. EPA is considering the need for microbial monitoring as part of its upcoming groundwater rule. When EPA issues its final rule, the SWRCB will review it and determine whether microbial monitoring requirements should be added to the GO.

Master Response 16. Groundwater Quality Analysis and Preferential Flow Paths

Some commenters are concerned that groundwater impacts may be underestimated, given that several research studies indicate that large pores in soil created by worms, roots, other burrowing animals, or physical processes may create preferential flow paths for infiltrating water and soluble contaminants. SWRCB staff does not disagree with the premise that preferential flow paths may facilitate or increase contaminant transport rates to groundwater. However, as described in Master Response 15, the Part 503 risk assessments for the groundwater pathway were based on an extremely conservative depth to groundwater assumption of 1 meter in sandy soils. The presence of macropores would not substantially affect the groundwater depth impact assessment; with respect to depth the increased transport of constituents in macropores would have a relatively small effect on groundwater quality given that the very shallow groundwater conditions were evaluated for the Part 503 regulations.

In addition, Master Response 14 describes the relationship between fate and transport of soluble nitrate to less-soluble contaminants, and the effect that relationship has on the evaluation of potential groundwater quality impacts. Because all contaminants would be subject to the same preferential flow paths as for nitrate over the distance of 1 meter, the potential groundwater quality impacts from contamination with different chemicals would not be expected to be any greater than for nitrate.

Master Response 17. Setback Distances, Flooding, and Relationships to Water Quality Impact Analyses for Surface Water Resources

Several commenters questioned the level of protection afforded surface water resources by setback distances required in the proposed GO. Master Response 13 describes some of the major assumptions for the impact analysis in the EIR. With respect to biosolids application that occurs within certain setback distances, potential surface water quality impacts were primarily evaluated based on the existing evidence from the Part 503 risk assessments and rule development process and on the site-specific information and protective measures that RWQCB staff would have at its disposal to ensure that an application project complies with waste discharge requirements. In particular, under the proposed GO, each notice of intent and preapplication report would be reviewed by RWQCB staff members who are trained in the implementation of waste discharge permitting procedures, have access to site-specific information, and have discretionary authority to determine whether the project would be protective under and consistent with state water quality standards and provisions of the water code.

Nothing in the proposed GO would preclude RWQCB staff members from requiring individual waste discharge requirements (WDRs) if they determine that there would be an unacceptable risk to water quality. The setback distances, requirements for erosion control plans on steep slopes, and other general provisions of the proposed GO are consistent with typical best management practices (BMPs) required for WDRs approved for other similar waste discharges. Therefore, SWRCB staff considers the evaluation methods and assumptions for potential surface water quality impacts appropriate and CEQA significance conclusions justified.

With respect to biosolids application in areas subject to flooding, potential water quality impacts were considered minimal because the proposed GO prohibits land application of biosolids in areas subject to erosive events. This condition will prohibit land application of biosolids in stream floodways and lands adjacent to streams subject to erosive floodflows or causing gully erosion. SWRCB staff is confident that RWQCB staff members have the necessary skills and resources to identify areas susceptible to erosive forces; placement of biosolids in these areas would be avoided through review of the preapplication report information required under the proposed GO. Areas subject to erosive forces can be distinguished using information such as the location of defined streambanks and terraces and mapped information required in the preapplication report.

Recommendations in comment letters to increase the restricted area for biosolids application beyond the designated 100-year floodplain are not considered necessary by SWRCB to ensure water quality protection. The Federal Emergency Management Agency determines and maps the 100-year floodplains. Floodplain areas between the main floodway channel and outer floodplain boundary are subject to varying probabilities of being exposed to flooding. The outer fringes of defined floodplains in the generally level Central Valley or near larger rivers typically are subject to inundation or erosion events infrequently. Areas outside of 100-year floodplains have a statistical probability of flooding that is less than once every 100 years; these are considered extremely unlikely events. Floodwaters on floodplains of larger rivers in flat valleys such as the Central Valley are often shallow and have low flow velocities; biosolids that may be applied in such areas would have a low probability of washing off of the site. Determining a setback restriction based solely on a statistically defined floodplain would be arbitrary. When used to determine whether there is a significant risk that biosolids would be carried from a specific land application, site floodplain mapping should be evaluated in concert with local topography, distance from active stream channels, and physical evidence of erosive floodflows. Isolated and infrequent inundation of biosolids application sites, provided they are not areas of gully erosion and washout, would not pose a significant threat to water quality.

Master Response 18. Ohio Study

Two commenters noted that information cited in the draft EIR from a study by Dorn et al. (1985) was not accurately portrayed. The Dorn et al. report, also referred to as the Ohio farm study and the Ohio health study, presented epidemiological results of a comparative study of farms in Ohio. Some of the farms were using biosolids for crop fertilization; others were using conventional fertilizers for a source of plant nutrients.

The concerns raised about the use of the Ohio farm study are noted, and it is agreed that the information from the study could have been presented more clearly. The mathematical calculations made in converting metric tons per hectare to wet tons per acre were made incorrectly and are revised. The precautionary notes on the use of these data to predict health risks are noted. The text on draft EIR page 5-26, paragraph four, and page 5-27, first paragraph, are amended as follows to address the concerns expressed:

> Incidental human contact and farmworker and family contact with biosolids were evaluated in an extensive study reported by Dorn et al. (1985). The 3-year study covered three geographical areas in Ohio and included 47 farms (164 persons in 78 families were evaluated) receiving annual applications of treated sludge (average of 2-10 dry metric tons/hectare/year; average of ~~20-90~~ 3.6-17.8 wet tons per acre per year at 25% solids) (Dorn et al. 1985). The illness rates in the families at their farms were compared with 46 control farms (130 persons from 53 families), all of whom initially participated by cooperating with monthly questionnaires concerning their health and their animals' health, annual tuberculin testing, and quarterly blood sampling for serological testing. It should be noted that the number of participating farms dropped as the study went on, and only 27% of the 93 original farms completed participation in the 3-year study.

A summary of the two study groups and their numbers over the years is shown below:

Unit	Study Group	Number Started	Number Participating		
			1 Year	2 Years	3 Years
Farms	Sludge	47	47	36	13
	control	46	46	37	13
Participants	Sludge	165	165	126	53
	control	130	130	109	37

Source: Comment letter 43, page 17 as cited from Dorn et al. 1985.

The study found that the estimated risks of respiratory illness, digestive illness, or general symptoms were not significantly different between sludge farm and control farm residents (Dorn et al. 1985). It also found no observed differences between disease occurrence in domestic animals on sludge and on control farms. The frequency of serological conversions (fourfold or greater rise in antibody) to a series of 23 test viruses and the frequency of associated illnesses were similar among persons on sludge and control farms. The absence of observed human or animal health effects resulting from sludge application in this study of Ohio farms should be considered with the knowledge that relatively low sludge application rates were used on these farms; the rates ~~are consistent with~~ were lower than typical application rates for agricultural uses in California (which may be as high as 30-40 wet tons per acre per year). Necropsy data and analyses of tissues found significant cadmium and lead accumulations in the kidneys of calves grazing sludge-treated pastures. The consequences of this are not known in terms of either animal health or human health, assuming humans consume the kidney tissue on a regular basis in animals that bioaccumulate trace metals in their organs.

The authors reported that "the possibility of PCB and other toxic organics reaching crop land is an issue of concern to farmers" and indicated that "more research is needed." They further noted that "caution should be exercised in using these data to predict health risks associated with sludges containing higher levels of disease agents and with higher sludge application rates and larger acreages treated per farm than used in this study" (Dorn et al. 1985). No similar subsequent studies have been conducted because the risks were deemed to be low and the costs for such studies are very high.

While the Ohio study does not present information that is completely applicable to the situation in California, it does represent the most thorough epidemiological study of biosolids land application in the United States. Its results, therefore, have been reported. Determinations of health risks reported in this EIR are not based on the results of the Ohio study; rather, they are based on a review of available technical literature and the health risk assessments conducted by EPA to support the Part 503 regulations.

Chapter 3. Comments and Responses to Comments

This chapter documents the responses to each of the comments received on the draft EIR. When a comment resulted in a change to the draft EIR, the response refers to the location in the text of the draft EIR where the change is to be made. Added text is indicated with double underlining (additions) and deleted text is struck out (~~deletions~~). Agencies and individuals who submitted comments on the draft EIR are identified in Table 3-1; the comments in these letters have been responded to. Persons who submitted written comment after the public review period are listed on Table 3-2; however, responses to these comments have not been provided because the comments were received after the close of the comment period.

The draft EIR also was discussed at a series of public hearings held at the following locations:

- Palmdale, California: August 16, 1999,
- Bakersfield, California: August 17, 1999, and
- Sacramento, California: August 23, 1999.

Commenters who attended the public hearings are listed in Table 3-3, and comments received at those meetings are addressed following the responses to the written comments. The master responses referred to in some responses are provided in Chapter 2 of this final EIR.

Table 3-1. Written Comments Received during the Public Review Period

Agency/Person	Date	Letter Number
Federal		
U.S. Environmental Protection Agency - Region IX / Lauren V. Fondahl	9/10/99	1
State		
Delta Protection Commission / Margit Aramburu	6/29/99	2
California Department of Fish and Game / W.E. Loudermilk	9/10/99	3
California Department of Health Services / James M. Waddell	9/10/99	4
Local Agencies		
Antelope Valley APCD / Eldon Heaston	7/12/99	5
Tuolumne County Board of Supervisors / Laurie Sylwester	8/17/99	6
Palmdale Water District / Dennis LaMoreaux	8/19/99	7
Jamestown Sanitary District / Ron Boyd-Snee	8/29/99	8
Sacramento Regional County Sanitation District / Craig Lekven	9/7/99	9
Antelope Acres Town Council / Virginia M. Stout	9/8/99	10
Imperial Irrigation District / Vickie Doyle	9/8/99	11
Kern County - University of California Extension / Ralph L. Phillips, PhD.	9/8/99	12
Las Virgenes Water District / James E. Colbaugh	9/8/99	13
City of Los Angeles Dept. of Public Works / Raymond J. Kearney	9/8/99	14
Ventura County Resources Mgmt. Agency / Terrence O. Gilday	9/8/99	15
East Bay Municipal Utility District / David R. Williams	9/9/99	16
Imperial County Planning Dept. / Jurg Heuberger, AICP	9/9/99	17
Vallejo Sanitation & Flood Control District / Charles Mosley	9/9/99	18
City of Watsonville, City Utilities Customer Service Division / David Koch	9/9/99	19

Table 3-1. Continued

Agency/Person	Date	Letter Number
L.A. County Board of Supervisors (Antelope Valley) / Michael D. Antonovich	9/10/99	20
Central Delta Water Agency / Dante John Nomellini, Jr.	9/10/99	21
Eastern Municipal Water District / Anne Briggs	9/10/99	22
L.A. County Sanitation Districts / Michael Sullivan	9/10/99	23
City of San Jose / Environmental Services Dept. / William K. Rudman, Jr.	9/10/99	24
Other Organizations and Individuals		
Harper & Shell Associates / William P. Harper	8/17/99	25
Kern Food Growers Against Sewage Sludge	8/17/99	26
A.V. United Water Purveyors, Inc. / Jim Barletta	8/17/99	27
Columbine Vineyards / M. Caratan, Inc.	8/20/99	28
Bonnie Saiz	8/24/99	29
DHJ Engineering / Dan Hinrichs	9/1/99	30
Terry Noonan	8/2/99	31
Sally Radics	8/3/99	32
Marilyn E. Brown	8/4/99	33
Daniel Villenga	8/4/99	34
Anne Villenga	8/4/99	35
Sierra Club - Santa Lucia Chapter / Holly Sletteland	9/5/99	36
Jeanne Davies	9/6/99	37
Citizens of Fig Street / Tom & Linda Stockstill	9/6/99	38
John & Noreen Cade	9/7/99	39
Greenberg Glusker Fields Claman & Machtinger LLP (Kernross Estates)	9/7/99	40
G. L. Lannum	9/7/99	41
Superior Resources LLC / John M. Sullivan	9/8/99	42

Table 3-1. Continued

Agency/Person	Date	Letter Number
Center for Sludge Information (CSI) / David Broadwater	9/9/99	43
Desert Citizens Against Pollution	9/9/99	44
RPI / Bio Gro / Heidi Marks	9/9/99	45
Bay Area Dischargers Association / David R. Williams	9/10/99	46
Consumers Food Protection Association	9/10/99	47
Hi-CAP / Desert Citizens Against Pollution / Lyle Talbot	9/10/99	48
Tri-Tac / SCAP	9/10/99	49
California Farm Bureau Federation / Ronald Liebert	9/10/99	50
Heather Mitchell	Undated	51
Raymond V. Clampitt	Undated	52
California Grape & Tree Fruit League/Richard Matoian	9/10/99	53

Table 3-2. Written Comments Received after the Public Review Period

Agency/Person	Date Received
Senator Pete Knight	September 13, 1999
Ironhouse Sanitary District	September 13, 1999
Fresno County Human Health Services	September 16, 1999
James Bort	September 20, 1999
Assemblyman George Runner	September 20, 1999
Carla Callings	September 22, 1999
Supervisor Michael Antonovich	September 27, 1999

Table 3-3. Commenters Who Attended Public Hearings

Number	Commenter	Organization
	Palmdale—August 16, 1999, 1 p.m.	
P1	Harry Broddock	Quartz Hill Council
P2	Joseph Yore	Individual
P3	Noreen Cade	Individual
P4	John Cade	Individual
P5	Joseph Yore	Individual
P6	Layne Baroldi	California Association of Sanitation Agencies
	Palmdale—August 16, 1999, 6 p.m.	
P7	Wendy Reed	Individual
P8	Michael Currado	Individual
P9	Michael Currado, Jr.	Individual
	Bakersfield—August 17, 1999, 1 p.m.	
P10	Edwin Camp	Kern Food Growers Against Sludge
P11	Paul Giboney	Kern Food Growers Against Sludge
P12	William Harper	Harper & Shell
P13	Anton Caratan	Individual
P14	Layne Baroldi	California Association of Sanitation Agencies
P15	Gary Karr	Individual
P16	Steve Stockton	Responsible Biosolids Management
	Bakersfield—August 17, 1999, 6 p.m.	
P17	Arthur Unger	Sierra Club
P18	Dennis Fox	Individual
P19	Diane Gilbert	City of Los Angeles
	Sacramento—August 23, 1999, 10 a.m.	
P20	Ron Boyd-Shee	Jamestown Sanitation District
P21	Don Nessl	Tuolumne Utilities District

Table 3-3. Continued

Number	Commenter	Organization
P22	Dan Hinrichs	BJH Engineering
P23	Mike Sullivan	Los Angeles County Sanitation District
P24	Craig Levken	Sacramento Regional County Sanitation District
P25	John Sullivan	Superior Resources

Chapter 4. Revisions to the Draft EIR

This chapter, which identifies all changes to be made to the draft EIR in response to public and agency comments, is errata to be inserted into the draft EIR to provide a complete record of the EIR's final text. This chapter organizes the changes for each chapter in the draft EIR. All changes indicated in this chapter are reflected in the Responses to Comments in Chapter 3. The location of each change is identified, and the revised text is provided. Added text is indicated with double underlining (additions) and deleted text is struck out (~~deletions~~).

Executive Summary

The first paragraph on draft EIR page ES-2 is hereby revised to include the following final sentence:

> Biosolids is defined as sewage sludge that has been treated and tested and shown to be capable of being beneficially and legally used as a soil amendment for agriculture, silviculture, horticulture, and land reclamation activities as specified under 40 CFR Part 503.

The third paragraph on page ES-2, fifth sentence is revised to read:

> The IWMB designates a reasonable ~~local~~ agency ~~in each county~~...

The beginning of the final paragraph on page ES-3 and other occurrences are revised as follows:

> The California Association of ~~Sanitary~~ Sanitation Agencies (CASA) . . .

The following text has been added to page ES-6, under "Overview," immediately before the last sentence:

> Projects that fail to meet the criteria established by the GO may still apply for an individual permit from the RWQCB.

Text on page ES-6, second paragraph under Applicability, first sentence: Change to read:

> Under the GO, the discharger is primarily defined as the landowner

and generator but also may include the individual business, or organization involved in the ~~generation,~~ transportation, use, and application of biosolids.

Text on page ES-6, third paragraph under Applicability, second sentence: Change to read:

In addition, each landowner involved with a biosolids application project must file a separate NOI, ~~and~~ pay a separate filing fee and list each generator associated with the proposed operation as co-dischargers.

The text for the 10th bullet on page ES-9 of the draft EIR now reads:

~~no application or incorporation into the soil is permitted when wind may reasonably be expected to cause airborne particulate to drift from the site~~ the application of biosolids containing a moisture content of less than 50 percent is prohibited;

The text on page ES-10, last paragraph, third sentence of the draft EIR is revised as follows:

The proposed GO defines short-term...for ~~more than~~ longer than 48 hours but less than . . .

The first impact on page 3 of Table ES-1:

Potential soil degradation at recreation-area ~~apploication~~ application sites

Chapter 1. Introduction

Text on page 1-2, second paragraph under Existing Regulations for Land Application of Biosolids, fifth sentence, revise to read:

The IWMB designates a responsible ~~local~~ agency ~~in each county~~ as the local enforcement agency (LEA), which sets standards and enforces solid waste regulations. On the local level, ~~S~~some...

Chapter 2. Program Description

The last complete sentence on page 2-6 of the draft EIR is hereby revised to read:

Biosolids are considered Class A Exceptional Quality (EQ) if they meet all of the pollutant concentration limits and vector attraction reduction options 1-8 in Part 503.88, as well as Class A pathogen reduction standards.

The following text has been added to page 2-10, under "Overview," immediately before the last sentence:

> Projects that fail to meet the criteria established by the GO may still apply for an individual permit from the RWQCB.

Text on page 2-10, second paragraph under Applicability, first sentence: change to read:

> Under the GO, the *discharger* is defined as primarily the landowner and generator but could also include the individual business, or organization involved in the ~~generation,~~ transportation, use, and application of biosolids.

Text on page 2-10, third paragraph under Applicability, second sentence: change to read:

> In addition, each landowner involved with a biosolids application project must file a separate NOI, pay a separate filing fee and list each generator associated with the proposed operatoin as co-dischargers.

Text on page 2-15, fifth line under "Monitoring, Reporting, and Record Keeping", is modified as follows:

> ...~~disposal~~ application site is...

The second sentence of the last paragraph on page 2-15 has been revised as follows:

> Sampling must be conducted using approved methods, accurate and properly calibrated equipment, and ~~certified~~ laboratories certified by the California State Department of Health Services.

The citation for Figure 2-2 has been revised as follows:

> California Association of Sanitation Agencies. 1999; Fondahl, Brisco, and Thurber pers. comms.

Chapter 3. Soils, Hydrology, and Water Quality

Page 3-8 of the draft EIR, last sentence, is hereby revised:

> This is approximately the equivalent of the state and federal drinking water standard, 10 mg/l of nitrate expressed as nitrogen (~~NO_3-~~N).

The following information has been added to Table 5-3, at the end of the list of human pathogens:

Cyclospora cayetanesis	Cyclosporiasis (severe Diarrhea)	None known

The draft EIR, page 3-35, last sentence of second paragraph, is hereby revised as follows:

> In areas with shallow groundwater and frequent biosolids application, monitoring is required that would result in early detection if leaching of substantial quantities of pollutants were occurring.

Chapter 4. Land Productivity

The first paragraph of Mitigation Measure 4-1 on page 4-5 is revised as follows:

> The GO Pre-Application report......2) metals related phytotoxicity does not occur, 3) metals related forage toxicity or mineral deficiencies and other trace metals related problems do not occur on hay lands and pasture lands, 4) increases in salinity............

The third paragraph of Mitigation Measure 4-1 is revised as follows to eliminate the "applicant" from those qualified to perform the analysis, unless of course the applicant is also a qualified soil scientist or agronomist:

> This information should be used by a certified soil scientist~~;~~ or a certified agronomist to evaluate the above potential effects on land productivity. The soil scientist and/or agronomist should make recommendations in a letter report to accompany the Pre-Application report regarding the proper rate of biosolids applications, any soil management (such as supplemental fertilizers and pH adjustment), appropriate crop, and grazing practice recommendations, considering the nature of the application site soils and biosolids characterization data, and the need to preserve short term and long term land productivity.

- Mitigation Measure 4-1 is revised to prohibit known bioaccumulative crops, as follows:

  At sites having a "moderate" limitation, biosolids may be applied only where the crop is not known to be particularly sensitive to metals and nutrient imbalances, or is not known to be bioaccumulative of heavy metals.

- Table 15-1, Mitigation Measure 4-1 (under the Monitoring and Enforcement Action column) of the draft EIR is hereby revised such that "phototoxicity" is changed to "Phytotoxicity."

- The text in the last sentence, third paragraph on page 4-7 is revised as follows:

  ...., making impacts more than additive in some cases.

- The statement on page 4-9 is hereby revised as follows:

  However, biosolids have been land applied to California soils for over 20 years in some areas and no significant land productivity problems related to heavy metals have been documented.

- The second sentence of Mitigation Measure 4-2 on page 4-12 should be revised as follows:

  The proposed GO should also be revised to ~~prohibit grazing animals from using a site~~ require that grazing of animals be deferred for at least 60 days after.....

- The following text is added to the end of Mitigation Measure 4-2 on page 4-12 of the draft EIR:

  Refer also to Mitigation Measure 4-1, which requires comprehensive testing and analysis of soils and biosolids by qualified professionals.

Chapter 5. Public Health

- Page 5-1, the second sentence of the first paragraph, has been changed as follows:

  Pathogens (or pathogenic organisms) are disease-causing organisms, including certain bacteria, parasites, and viruses.

- Page 5-3, second sentence of the second paragraph, "Emerging pathogens are briefly described . . . (there have been no reported disease outbreaks)" has been replaced with the following:

  Emerging pathogens are organisms responsible for new, reemerging, or drug-resistant infections whose incidence in humans has increased within the past two decades or whose incidence threatens to increase in the near future. Included are such pathogens as *E. coli* O157:h7 and *Cyclospora*, which have caused several outbreaks in California.

Page 5-3, in the second paragraph, the following has been added to the second-to-last sentence:

> (for example, by travelers or by importation of contaminated food or animals).

In Table 5-1, the number of types of salmonella in left column has been changed to (>2,000 types) from (1700 types).

Table 5-1, "infectious" has been changed to "infective" in the heading for the last table column.

The units of measure for the column headed Density of Biosolids should be (no/gm dry wt) as shown in Tables 5-2 and 5-3. The units of measure for the column headed Survival Time should be Days as shown in Tables 5-2 and 5-3. The units of measure for the column headed Infectious Dose should be Numbers of Organisms and should be included in Tables 5-1, 5-2, 5-3 and 5-4.

Table 5-3, *Cyclospora* has been added to the list of human pathogens.

Table 5-3, column 3, entitled Nonhuman Reservoir is amended to include the following vectors for the human pathogens *Cryptosporidium*: feral hogs, coyotes, squirrels and rats ; and *Giardia* spp.: cattle, feral hogs, coyotes, squirrels and rats.

The first full paragraph on page 5-4, starting with the 12th line, has been changed as follows:

> Tables 5-1 through 5-4 list the specific disease organisms, diseases they cause, host organisms, and the ~~infection~~ infective dose....

With the sentence beginning on line 17, make the following changes:

> The infective dose for some ~~salmonellae~~ salmonella serotypes and other pathogenic . . . organisms can ~~increase~~ multiply in high numbers. . . The infective dose for *Salmonella* sp. varies by serotype and host factors.

The following text has been added to page 5-5, after the first paragraph, before the heading Emerging Pathogens of Concern:

> As an example of the unavoidable uncertainty associated with the impacts

from pathogens in biosolids, the authors of the study, "Hazards from Pathogenic Microorganisms in Land-Disposed Sewage Sludge," explain the following:

> It should be recognized that the list of pathogens is not constant. As advances in analytical techniques and changes in society have occurred, new pathogens are recognized and the significance of well-known ones changes. Microorganisms are subject to mutation and evolution, allowing for adaptation to changes in their environment. In addition, many pathogens are viable but nonculturable by current techniques [cite], and actual concentrations in sludge are probably underestimated. Thus, no assessment of the risks associated with the land application of sewage sludge can ever be considered to be complete when dealing with microorganisms. As new agents are discovered and a greater understanding of their ecology is developed, we must be willing to reevaluate previous assumptions.

The following text replaces the first paragraph on page 5-5:

In most outbreaks of unknown cause or unknown source, a single or small list of organisms is normally suspected. If the causative agent is not identified or confirmed, it is because (1) the patient not seeking medical attention, (2) no laboratory diagnostic tests (including stool cultures and examination) are performed, and (3) either late or nonreporting of illnesses occurs that hinders the investigation of individual cases or outbreaks. Although most outbreaks are attributable to bacterial causes, limitations on our present diagnostic capabilities may also hinder a confirmatory diagnosis. New techniques using genetic markers and electron microscopy have improved laboratory capabilities to detect and identify pathogens, particularly viruses. There continue to be numerous sporadic cases of diseases (particularly gastroenteritis) of unknown cause or unknown source that arise and may be associated with a number of agents or sources. A literature review of disease outbreaks on a worldwide basis was performed to determine some of the emerging pathogens and their modes of transmission. The results of this search are summarized in Appendix E. The results indicated that the reported cases are normally associated with poor sanitation, poor food preparation and handling practices, or drinking contaminated water. Information on emerging pathogens of concern (bacteria, parasitic microsporidians, viruses, and bovine spongiform encephalophathy) is presented in Appendix E. These are in addition to those pathogens such as *E. coli* O157:h7 and Cyclospora that which have caused several outbreaks in California.

Revisions to the text starting on paragraph 3 of page 5-6 and ending with paragraph 2 on page 5-7 are as follows:

> Data on the diseases of interest (those listed in Tables 5-1 through 5-4) were obtained from the ~~DHS~~ Department of Health Services (DOHS) (descriptions of the diseases of interest are provided in Appendix E). These data consisted of records on reportable diseases that are ~~voluntarily~~ provided by local county and city health departments (Starr pers. comm.). The diseases for which data were obtained are those with causative agents that could be derived from biosolids; therefore, certain diseases that were rare, not reported, or not related to biosolids were not included (AIDS, fungal diseases, and nonspecific gastroenteritis). The ~~DHS~~ DOHS information consisted of 46,159 records representing 300,818 cases of disease and covering the period from ~~1991~~ 1990 though 1998 for some diseases and ~~1993~~ 1992 to 1998 for Enterotoxic *E. coli* O157:h7 ~~others of more recent origin/or reporting requirements~~. The information was sorted by county, year, and disease (and broken down by pathogenic organisms) and is presented in Tables E-1a and E-1b through E-16 a and E-16b in Appendix E for the number of cases and the incidence rate per 100,000 people by county and summarized on a statewide basis by year in Tables 5-6a and 5-6b. The summary data show that the number of cases of a particular disease and incidence rates ~~varies~~ vary from year to year as conditions favor its occurrence in a particular population.
>
> The incidence of diseases presented on a statewide basis in Table 5-6a are shown by county for the past ~~6 to 8~~ 6-9 years (depending upon when the reporting was started for a particular disease) in Tables 5-7a and 5-7b and 5-8a and 5-8b. Also shown next to each county name (in parentheses) is the county's ranking in the state from the highest (1) to the lowest in terms of the amount of biosolids applied on land in that county in 1998. ~~Table~~ Tables 5-7a and 5-7b ~~contains~~ contain a summary of the bacterial and viral diseases. ~~Table~~ Tables 5-8a and 5-8b ~~summarizes~~ summarize the data on parasitic protozoan and ~~worm~~ helminth diseases that are reported.
>
> As noted in ~~Tables~~ Table 5-5 ~~7 and 5-8~~, the Central Valley counties of Kern, Merced, and Kings ranked first, second, and third in terms of the amount of biosolids that were land applied. The amounts applied ~~(see Table 5-5)~~ were 32%,13%, and 13%, respectively, of the statewide total, or about 58% of the statewide total that was land applied. ~~These three counties had no reported cases of salmonellosis or shigellosis, the two most prevalent bacterial diseases, in 6 years.~~
>
> The comparison of the number of reported outbreaks of acute infectious disease and the listing of counties where biosolids reuse occurs showed no apparent association between the highest biosolids use and any unusual

illness outbreaks or patterns. Furthermore~~, no incidents of acute or chronic disease associated with the use or handling of biosolids were found through examination of these data,~~ discussions with public health officials and a ~~, or~~ review of available literature and discussions with other experts in the field revealed no reported disease problems associated with biosolids land application operations. Again, the types of diseases that might occur are not those that would normally be reported unless it was a severe case involving a visit to a doctor or hospital.

The third paragraph of page 5-6, third sentence is revised by striking out the word "voluntarily".

Page 5-6, the last sentence of the fourth paragraph, "worm" has been changed to "helminthes".

The following change was made to page 5-9:

~~"Living things have evolved with these natural substances ("endocrine disruptors") and have mechanisms to metabolize or degrade them so they do not bioaccumulate."~~

Page 5-14, in the fourth paragraph, the following changes have been made:

No reported cases of airborne transmission of disease ~~were identified~~ have been documented in California as it related to biosolids management although the potential exists.

The following items are added to the list of regulations in Chapter 5, page 5-22:

California Health and Safety Code, Division 104, Part 5 (Sherman Food, Drug and Cosmetic Law)

California Uniform Retail Food Facilities Law (CURFFL; Health and Safety Code Sections 27500 et seq.)

The following item is deleted from the list of regulations in Chapter 5, page 5-22:

~~Model Food Code (42 U.S.C. 243 and 311 and 31 U.S.C. 686 authorities)~~

The text on page 5-26, paragraph four, and page 5-27, first paragraph, is amended as follows:

Incidental human contact and farmworker and family contact with biosolids were evaluated in an extensive study reported by Dorn et al. (1985). The 3-year study covered three geographical areas in Ohio and included 47 farms (164 persons in 78 families were evaluated) receiving annual applications of treated sludge (average of 2-10 dry metric tons/hectare/year; average of ~~20-90~~ 3.6-17.8 wet tons per acre per year at 25% solids) (Dorn et al. 1985). The illness rates in the families at their farms were compared with 46 control farms (130 persons from 53 families), all of whom initially participated by cooperating with monthly questionnaires concerning their health and their animals' health, annual tuberculin testing, and quarterly blood sampling for serological testing. It should be noted that the number of participating farms dropped as the study went on, and only 27% of the 93 original farms completed participation in the 3-year study.

A summary of the two study groups and their numbers over the years is shown below:

Unit	Study Group	Number Started	Number Participating: 1 Year	2 Years	3 Years
Farms	Sludge	47	47	36	13
	control	46	46	37	13
Participants	Sludge	165	165	126	53
	control	130	130	109	37

Source: Comment letter 43, page 17 as cited from Dorn et al. 1985.

The study found that the estimated risks of respiratory illness, digestive illness, or general symptoms were not significantly different between sludge farm and control farm residents (Dorn et al. 1985). It also found no observed differences between disease occurrence in domestic animals on sludge and on control farms. The frequency of serological conversions (fourfold or greater rise in antibody) to a series of 23 test viruses and the frequency of associated illnesses were similar among persons on sludge and control farms. The absence of observed human or animal health effects resulting from sludge application in this study of Ohio farms should be considered with the knowledge that relatively low sludge application rates were used on these farms; the rates ~~are consistent with~~ were lower than typical application rates for agricultural uses in California (which may be as high as 30-40 wet tons per acre per year). Necropsy data and analyses of tissues found significant cadmium and lead accumulations in the kidneys of calves grazing sludge-treated pastures. The consequences of this are not known in terms of either animal health or human health, assuming humans consume the kidney tissue on a regular basis in animals that bioaccumulate trace metals in their organs.

The authors reported that "the possibility of PCB and other toxic organics reaching crop land is an issue of concern to farmers" and indicated that "more research is needed." They further noted that "caution should be exercised in using these data to predict health risks associated with sludges containing higher levels of disease agents and with higher sludge application rates and larger acreages treated per farm than used in this study" (Dorn et al. 1985). No similar subsequent studies have been conducted because the risks were deemed to be low and the costs for such studies are very high.

- The second sentence of the last paragraph on p. 5-34 is amended as follows:

  The proposed GO contains sufficient provisions to prevent such occurrences (setbacks, minimum distances to wells, ~~minimum depth to groundwater,~~ runoff controls, and prohibitions to long-term storage piles where concentrations of pathogens might be higher if leached to groundwater.

- Chapter 5 of the EIR is modified to include the following on page 5-36 after the last paragraph:

  It is noteworthy to add that research on this issue is continuing and that the present lack of information or reported disease associated with exposure to aerosols near biosolids land application sites should not be taken as an indication that there are no risks. Everything that humans do has risks, but as stated in the draft EIR, these risks are considered less than significant for the general population. For active workers in the vicinity of biosolid mixing and application sites, it can be anticipated that exposure to higher levels of potential aerosols (mainly fine particles to which pathogenic microorganisms could attach) is likely.

  Under high wind conditions or when Class B biosolids or certain compost products are loaded or spread, there may be exposure of applicators or workers to aerosols or dusts that can contain potentially viable pathogenic microorganisms. To date, health risks are not deemed to be significant; therefore, this impact is considered less than significant. However, the following mitigation measure is recommended and is not required to reduce the level of significance for this impact.

  Mitigation Measure 5-3. As part of good management practices, it is recommended that workers who are loading or working near sites where Class B biosolids are mixed or loaded or are applied by surface spreading wear respirators or masks to protect against inhalation of aerosols or fine particles derived from the biosolids being handled.

The third sentence of the first paragraph on page 5-38 of the draft EIR is hereby revised as follows:

Use of Class A biosolids for larger scale landscaping projects would be subject to the proposed GO if the material were applied at high rates.

The second sentence of Mitigation Measure 5-2 has been revised as follows:

The proposed GO should also be revised to ~~prohibit grazing animals from using a site~~ require that grazing of animals be deferred for at least 60 days after.....

Chapter 6. Land Use and Aesthetics

The fourth and sixth sentences on page 6-3 of the draft EIR are hereby revised as follows:

Types of crops commonly grown on agricultural biosolids ~~disposal~~ land application sites are row crops that are not typically used for human or dairy animal consumption . . . The visual impact of such sites is limited, and because they are located away from urban centers and major highways, most people are unaware of their status as biosolids ~~disposal~~ land application sites.

Page 6-7 of the draft EIR, first impact and Mitigation Measure 6-1, are revised as follows:

Impact: Application of Class B Biosolids at Locations That May Conflict with Existing Land Uses in Urban Area; Recreation Areas; or Other Sensitive Areas, Including Schools, Hospitals, and Recreation/Public Assembly Areas

The proposed GO contains specifications, exclusions, and prohibitions designed to minimize conflicts with land uses adjacent to application sites. For example, it specifies areas of the state identified as "unique and valuable public resources" that are not regulated by the proposed GO and for which site-specific permits would be required; it requires compliance with the provisions of Part 503 regulations regarding the land application of biosolids that meet provisions for vector reduction~~; it prohibits the dissemination from biosolids application sites of visible airborne biosolids particles~~, it stipulates the use of tillage procedures that minimize wind erosion; and it prohibits application within 500 feet of residential buildings. ~~However, the GO does not include setbacks from facilities for recreation activities; places of public~~

~~assembly; hospitals; or other sensitive receptors that could be included under the definition of "populated areas" provided under "High Potential for Public Exposure Areas" in the definition section of the GO.~~ Although the proposed GO identifies the types of land uses where the high potential for public exposure could occur, it does not prohibit the use of biosolids adjacent to these areas. (The application of Class A biosolids would not conflict with these potential adjacent land uses because Class A biosolids have been treated to meet more stringent pathogen reduction standards than Class B biosolids.) The application of Class B biosolids near these sensitive receptors could conflict with the land use (activities could be disturbed as a result of increased noise or traffic). This impact is considered potentially significant. To reduce this impact to a less-than-significant level, the SWRCB shall implement Mitigation Measure 6-1.

~~**Mitigation Measure 6-1. Require setbacks from areas defined as having a high potential for public exposure**. The GO will be modified to state that:~~

~~(a) no application of Class B biosolids shall be permitted within an area defined in the GO as having a high potential for public exposure unless the biosolids are injected into the soil and~~

~~(b) educational facilities; facilities designed for recreation activities other than hunting, fishing, or wildlife conservation; places of public assembly; hospitals; or similar sensitive receptors shall be included in the definition of "populated area" as used in conjunction with the designation "High Potential for Public Exposure Areas."~~

Mitigation Measure 6-1. Require injection of biosolids in areas defined as having a high potential for public exposure for Class B biosolids. The proposed GO will be modified to state that no application of Class B biosolids shall be permitted within an area defined in the proposed GO as having a high potential for public exposure unless the biosolids are injected into the soil.

Chapter 7. Biological Resources

Mitigation Measure 7-1 on page 7-12 of the draft EIR has been modified by adding the following text immediately after the word "species" in line four:

; this report must be forwarded to the appropriate regional office of the DFG and the Endangered Species Unit of the USFWS in Sacramento for review and approval of the mitigation strategy.

#	The following statement has been added to Mitigation Measure 7-2 on page 7-12 of the draft EIR, immediately following the word "habitats" in the last line of the mitigation:

> ; this report must be forwarded to the appropriate regional office of the DFG and the Endangered Species Unit of the USFWS in Sacramento for review and approval of the mitigation strategy.

Chapter 8. Fish

#	Mitigation Measure 8-1 on page 8-4 of the draft EIR is modified by adding the following statement at the end of the paragraph:

> There are several species of pupfish in southern California. Their current occupied habitat is confined to several small springs, Salt Creek and the Amargosa River in southern Inyo and northern San Bernardino counties in the vicinity of Death Valley National Monument, and San Felipe Creek and the Salton Sea in Imperial County. Exact locations of habitat can be found in Moyle et al. 1989.

Chapter 10. Air Quality

#	The text for page 10-5, last paragraph, first sentence in the draft EIR is revised as follows:

> ~~The proposed GO also prohibits the release of any visible airborne particles from the application site during biosolids application or during incorporation of biosolids into the soil.~~ The proposed GO also requires biosolids to be at least 50 percent moisture and to be incorporated within 24 hours in arid areas and 48 hours in all other areas.

#	The last paragraph on the thresholds of significance for air quality on page 10-6 has been deleted and replaced with the following:

> Project-related emissions typically are considered significant if they exceed specific thresholds established by individual air districts. Those thresholds are generally for land use development projects that would result in permanent long-term emissions. In contrast, biosolids application at any one site would be short term because increased traffic volumes and associated air emissions would occur only during the brief period when the biosolids are delivered and applied. Even though traffic and air emissions for any single biosolids

application project would be short-term, area-wide emissions from several biosolids application projects have the potential to create significant air quality impacts.

The first impact on page 10-7 and associated mitigation measures (Mitigation Measures 10-1 and 10-2) have been deleted and replaced with the following:

Impact: Significant Increase in ROG, NOx, and PM10 from Biosolids Transport Vehicles and Biosolids Spreaders

Transporting biosolids from wastewater treatment plants to farms and spreading and mixing biosolids into the soil would generate vehicle emissions and fugitive dust from the use of heavy-duty transport vehicles and farm vehicles. Individually, such actions from a single biosolids project would occur on a short-term basis and would likely have less-than-significant air quality impacts. However, a large number of these actions occurring concurrently have the potential to generate substantial quantities of ozone precursors and PM10.

Individual air districts classified as nonattainment areas for the state or federal ozone or federal PM10 ambient standards are required to prepare state implementation plans (SIPs) and air quality management plans (AQMPs) showing how they will come into compliance with the ambient standards. Those plans include emission budgets for vehicles and nonvehicular sources. Emissions from heavy-duty vehicles, including biosolid transport vehicles, are included within the emission budgets prepared as part of ozone and PM10 AQMPs. Emissions from farm activities, including off-road vehicle travel and wind-blown dust, are also included in the emission budgets of those plans (O'Bannon pers. comm.). Consequently, both on-road and off-road vehicular emissions associated with biosolids application projects are included in the emission budgets in the applicable air quality plans. Because those plans describe the measures that would be used to attain the ambient standards, no additional mitigation measures are needed and the proposed project is considered to have less-than-significant air quality impacts from on- and off-road vehicle emissions.

Mitigation Measure: No mitigation is required.

Chapter 14. Alternatives Analysis

The last bullet on page 14-2 of the EIR has been revised as follows:

> Land application of Class B biosolids shall be prohibited, under the GO, within ½ mile of areas defined as having a 'high potential for public exposure'.

After the last paragraph on Public Health, page 14-14, add the following:

> Animal manures may pose a threat to human health. Farm animals such as cattle, pigs, and chickens become infested and excrete a number of human pathogens in their feces. These include *Salmonella*, *Campylobacter*, *Yersinia*, *E. coli 0157:H7*, *Listeria* spp., and the protozoan parasite *Cryptosporidium.* Cattle manure is believed to be the major source of both water- and food-borne outbreaks of *E. coli* in the United States associated with lettuce and apples.
>
> Although animals have not been known to be a source of human enteric viruses, recent studies shown that hepatitis E infects pigs and can be found in their feces. Two recent cases of hepatitis E in the United States are believed to have been associated with water- and food-borne outbreaks in the developing world (Meng et al. 1998).

Appendix A

Appendix A is the proposed GO. Revisions to this document made since issuance of the draft EIR can be reviewed in Appendix A; the entire revised text has been included in this final EIR.

Appendix E

Appendix E in the draft EIR, the Public Health Technical Appendix, has been revised and included in this final EIR as Appendix B. Refer to Appendix B for changes to the Public Health Technical Appendix.

Chapter 5. Citations

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Appendix A. General Order

STATE WATER RESOURCES CONTROL BOARD
WATER QUALITY ORDER NO. 2000-___-DWQ

GENERAL WASTE DISCHARGE REQUIREMENTS FOR THE DISCHARGE OF BIOSOLIDS TO LAND FOR USE AS A SOIL AMENDMENT IN AGRICULTURAL, SILVICULTURAL, HORTICULTURAL, AND LAND RECLAMATION ACTIVITIES (GENERAL ORDER)

The State Water Resources Control Board (hereinafter referred to as the SWRCB) finds that:

1. Applications for the use of treated municipal sewage sludge meeting the requirements specified in Part 503 in Title 40 of the Code of Federal Regulations (CFR) (hereinafter referred to as biosolids) as a soil amendment have been received and waste discharge requirements (WDRs) have been issued by several of the nine Regional Water Quality Control Boards (RWQCBs). Section 13274 of the California Water Code (CWC) requires the SWRCB or RWQCBs to prescribe General WDRs for the discharge of biosolids used as a soil amendment. This General Order is intended- to satisfy the requirements of CWC ~~S~~section 13274 ~~of the California Water Code~~ and is intended for discharges of biosolids for use as a soil amendment. This General Order assists in streamlining the regulatory process for such discharges but may not be appropriate for all sites using biosolids due to particular site-specific conditions or locations. Such sites are not precluded from being issued individual WDRs. For the purposes of this General Order, biosolids do not include septage. Biosolids material applicable for coverage under this General Order is as described below:

   a. All Class A biosolids not meeting the requirements contained in Table 3 of 40 CFR Part 503.13 and Class B biosolids that are land applied for agricultural, silvicultural, ~~and~~ horticultural ~~activities~~, and land reclamation activities;

   b. All Exceptional Quality (EQ) biosolids-derived mixtures consisting of more than or equal to 50 percent biosolids (dry weight) applied at more than _____ 10 dry-tons per acre per year for use as a soil amendment to continuous fields/plots greater than 20 acres for agricultural, silvicultural, ~~and~~ horticultural ~~activities~~, and land reclamation activities and where the said fields/plots are owned or operated by the same person, company, or partnership;

c. All EQ biosolids-derived mixtures consisting of ~~less than~~ 50 percent biosolids or less (dry weight) applied at more than 20 dry-tons per acre per year for use as a soil amendment to continuous fields/plots greater than 20 acres for agricultural, silvicultural, ~~and~~ horticultural ~~activities~~, and land reclamation activities and where the said fields/plots are owned or operated by the same person, company, or partnership.

2. EQ biosolids may not necessitate regulation in the future. However, ~~public acceptance t~~it is believed that~~e~~ large scale uses ~~has indicated the need for~~currently require oversight ~~at this time,redundant~~ regardless of the actual threat to water quality while done at agronomic rates and using best management practices. ~~The perception~~Accordingly, this General Order can be applied to such sites to ensure that biosolids are being properly used ~~of~~ and are not used in an activity of unregulated dumping ~~activity~~. ~~necessitates that~~This regulatory tool may be used to regulate material that is land applied at a high loading rate in order to discourage poor biosolids management and to reduce risk to the public and the environment.

3. Within this General Order, the following terms are described as follows:

a. Agriculture: The practice, science, or art of using the soil for the production of crops and/or raising livestock for human~~'s~~ use.

b. Agricultural Mineral: Any material containing nitrogen, available phosphoric acid, or soluble potash, singly or in combination, in amounts less than 5 percent~~,~~ or any substance containing essential secondary nutrients or micronutrients that is distributed for use in agriculture, silviculture, horticulture, and land reclamation activities for the purpose of promoting plant growth.

c. Agronomic Rate: The nitrogen requirements of a plant needed for optimal growth and production, as cited in professional publications for California by the County Agricultural Commissioner or recommended by a Certified Agronomist or Certified Soil Scientist.

d. Applier: Person, group of persons, or company that applies biosolids for use as a soil amendment.

e. Arid: Arid lands are those areas where the long-term annual average rainfall is below 250 millimeters (less than 10 inches).

f. Biosolids: Sewage sludge that has been treated and tested and shown to be capable of being beneficially and legally used as a soil amendment for agriculture, silviculture, horticulture, and land reclamation activities as specified under 40 CFR Part 503.

g. Buffer Zones: An area of land that provides a separation distance between the land application site and an area of concern.

h. Class A Biosolids: Biosolids meeting the ~~pathogen and~~ vector attraction, ~~reduction standards~~ and meeting pollution concentration limits specified in 40 CFR Part 503 and pathogen reduction standards specified in 40 CFR Part 503.32(a).

i. Class B Biosolids: Biosolids meeting the vector attraction and meeting pollution concentration limits specified in 40 CFR Part 503 and pathogen ~~and vector attraction~~ reduction standards specified in 40 CFR Part 503.32(b) ~~and meeting pollution concentration limits. specified in 40 CFR Part 503.32(b).~~

j. Depth to Ground Water: The distance from the land surface elevation to the seasonal high water table.

k. Domestic Water Supply Well: A well that provides water used for human consumption.

l. EQ Biosolids: Biosolids which meet metals standards, Class A pathogen reduction standards, and vector attraction reduction standards contained in 40 CFR Part 503.13 (Table 3), 40 CFR Part 503.32, and 40 CFR Part 503.33, respectively.

m. Fertilizing Material: Biosolids with 5 percent or more of nitrogen, available phosphoric acid, or soluble potash, singly or in combination.

n. Generator: Municipal Wastewater Treatment Facility or Sewage Sludge Treatment Facility.

o. Grower: Person or entity primarily responsible for planting, maintaining, and harvesting or allowing the use of crops and/or range land for domestic animal or human use.

p. Gully erosion: Erosion cut by a concentrated but intermittent flow of water usually during and immediately following heavy rains or after ice/snow melt. A gully generally is an obstacle to wheeled vehicles and too deep (e.g., > 0.5 meter) to be obliterated by ordinary tillage.

q. High Potential for Public Exposure Areas: Land located within one-half mile of ~~a developed border of a populated area~~ educational facilities, facilities designated for recreational activities other than hunting, fishing, or wildlife conservation, places of public assembly, hospitals, or similar sensitive receptors.

r. Horticulture: The practice, science, or art of cultivating the soil to produce fruit, vegetables, or ornamental plants for human use.

s. Key Operating Personnel: Those individuals responsible for the oversight of daily operations, management decisions, and planning of biosolids land application projects.

t. Low Potential for Public Exposure Areas: Land not ~~located within one-half mile of a developed border of a populated area~~meeting the definition of High Potential for Public Exposure Areas.

u. Label: The display of all written, printed, or graphic matter on the immediate container of, or a statement~~,~~ including the guaranteed analysis, accompanying fertilizing material as required by the California Department of Food and Agriculture.

v. Land Reclamation: The practice of revitalizing or restoring lands that are damaged from past or present human land use practices.

w. Long-Term Storage Facility: Site which holds biosolids for more than ~~7~~ seven days consecutively.

x. Micronutrients: Refers to boron, chloride, cobalt, copper, iron, manganese, molybdenum, sodium, or zinc.

y. Municipal Wastewater Treatment Facilities (treatment facilities): Facilities designed to collect and treat wastewater generated from primarily domestic sources for environmentally safe reuse or disposal.

z. Notice of Applicability: Written notice that a biosolids land application site is required to comply with the provisions of this General Order and that applications according to the General Order may commence.

aa. Notice of Intent (NOI): Application for coverage under this General Order, as attached. The NOI is also a notification form for the public and interested parties for this General Order.

ab. Notice of Termination (NOT): Request form to discontinue coverage of this General Order.

ac. Nuisance: Nuisance means anything which meets all of the following requirements:

(1) Is injurious to health, or is indecent and offensive to the senses~~,~~ or is an obstruction to the free use of property so as to interfere with the comfortable enjoyment of life and property.

(2) Affects at the same time an entire community or neighborhood~~,~~ or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.

(3) Occurs during, or as a result of, the treatment or disposal of wastes.

ad. Pathogens: ~~A d~~Disease causing agents including helminths, bacteria, viruses, and protozoa.

ae. Pathogen Reduction: Process used to destroy pathogenic material contained in ~~biosolids~~sewage sludge.

af. Pollution: Means an alteration of the quality of the waters of the State by waste to a degree which unreasonably affects either of the following:

(1) The waters for beneficial uses.

(2) Facilities which serve these beneficial uses.

ag. Secondary Nutrients: The elements of calcium, magnesium, and sulfur.

ah. Septage: Waste material removed from a septic tank, cesspool, portable toilet, Type III marine sanitation device, or similar wastewater handling device that has not passed through a municipal wastewater treatment facility.

ai. Sewage Sludge: The solid, semisolid, or liquid residue generated during the treatment of domestic sewage in a municipal wastewater treatment facility. Sewage sludge includes solids removed or used during primary, secondary, or advanced wastewater treatment processes. Sewage sludge does not include grit or screening material generated during preliminary treatment of domestic sewage at a municipal wastewater treatment facility.

aj. Short-Term Storage: Biosolids storage sites used as a temporary holding facility for less than or equal to ~~7~~ seven days.

ak. Silviculture: The practice, science, or art of managing, developing, and harvesting forests and trees for human use.

al. Soil Amendment: Applications of a fertilizing material or agricultural mineral for the purpose of promoting utilization by plants and other living organisms with the goal of a net gain in soil productivity.

am. Staging Area: Area used to hold biosolids for less than 48 hours prior to use for the specified activity listed in the NOI.

an. Tailwater: Excess water from crop irrigation resulting in a discharge~~d~~ off site to a surface water ~~bodies~~ body ~~and resulting from crop irrigation~~.

ao. Vector Attraction: Characteristic of biosolids that attracts potential pathogen transmitters such as flies, rodents, and other animals or organisms ~~capable of transmitting pathogens~~.

ap. Water-saturated soil: Water content of the soil such that any further addition of water will result in runoff, standing water, or percolation of water through the displacement of existing soil water.

4. ~~Municipal wastewater t~~Treatment facilities serve urban and suburban population areas by collecting and treating municipal wastewater and reusing or disposing of wastewater effluent. While serving the public in this manner, significant amounts of sewage sludge are generated. This material is typically further treated (stabilized) and dewatered and can be managed using a variety of options including: (a) disposal in a sanitary landfill, (b) incineration, (c) ~~being placed~~ placement into a landfill dedicated for this purpose, ~~or~~ (d) use as daily landfill cover, and (e) use in land application operations, including ~~land~~ reclamation, horticulture, agriculture, and silviculture ~~applications~~.

5. Particularly in urban areas, industrial sources discharge into wastewater collection systems. Many of these discharges are regulated by pretreatment programs implemented pursuant to 40 CFR Part 403. These programs restrict- industries from discharging toxic pollutants in concentrations creating concerns for the ~~municipal wastewater treatment facilities (~~treatment facilities~~)~~.

6. As a result of domestic and industrial uses, pollutants enter the collection system of ~~municipal wastewater~~ treatment facilities ~~(treatment facilities)~~. The majority of the pollutant load treated at the ~~municipal wastewater~~ treatment ~~plants~~ facilities is organic matter. This material is removed through flotation and/or settling or is converted to biological solids and then removed through settling prior to discharge. The settled material is then further treated to stabilize organic matter which constitutes the majority of the domestic sewage sludge. Metals from domestic and industrial sources are also present in the waste stream at the treatment facility. These pollutants are removed from the waste stream and concentrated in the sewage sludge. Organic chemicals can also be present from domestic and industrial uses of water. The fate of these pollutants is variable. Some are removed and destroyed

through physical and biological processes at the treatment facility. Others may concentrate in the sewage sludge. Some pass through the treatment facilities unchanged and are subsequently discharged from the treatment process. A portion of the organic chemicals concentrated in the sewage sludge ~~are~~ is degraded during sludge stabilization processes. Some organic chemicals can remain in the sewage sludge unchanged. For these reasons, testing of sewage sludge is necessary prior to ~~their~~ it being classified as biosolids.

7. Biosolids are a source of organic matter, nitrogen, phosphorus, and micronutrients. These materials are beneficial to agriculture, silviculture, horticulture, and land reclamation activities and they improve agricultural productivity. More specifically, the benefits derived from biosolids used as a soil amendment are as follows:

   a. Nitrogen is a basic nutrient for plant growth. In biosolids, it is present in the forms of ammonia, nitrates, and organic nitrogen at concentrations from two~~2~~ to 10 percent by weight on a dry weight basis. The ammonia and nitrate forms of nitrogen are immediately available for plant usage. Organic nitrogen is released slowly (mineralized) over many months, providing a continuous~~ing~~ supply of nitrogen for crops and minimizing the potential for movement of nitrogen to the ground water. The nitrogen available for plant usage at any given time is the sum of the ammonia, nitrate, and mineralized organic nitrogen.

   b. Phosphorus is a basic nutrient for plant growth and is present in all biosolids in varying concentrations.

   c. Micronutrients, including a variety of salts and metals, are necessary for plant growth and are present in biosolids in varying amounts.

   d. The addition of biosolids to soils can also be beneficial by enhancing soil structure, increasing water retention capability, promoting soil aggregation, and reducing the bulk density. Organic matter assists in maintaining soil pores which allow water and air to pass through the soil medium. Such pores can be lost at sites under continuous cultivation and they are critical in maintaining an aerobic environment within the plant root zone.

   e. Organic matter helps soils retain water. Additional water retention can reduce the need for frequent water applications and can facilitate water conservation.

   f. Liming agents are available when the biosolids have been chemically stabilized with lime. Liming agents increase soil pH and can improve the permeability of the soils. Higher pH soils have a greater propensity to bind most heavy metals, decreasing the chance of the metals migrating to the ground water.

8. Biosolids have the following characteristics which can create water quality and public health problems if improperly treated, managed, and regulated during use as a soil amendment:

a. Pathogens ~~(disease causing organisms)~~ can be present. Unless the biosolids are specially treated or disinfected to destroy pathogens, significant concentrations of bacteria, viruses, and parasites can remain. Public health problems can be prevented with appropriate control over public access to the application areas and restrictions on the type and use of crops grown on the application sites. Buffer zones around water supply wells, surface water drainage courses, and public areas are designated to prevent transmission of pathogens to the public.

b. Heavy metals will be present. If heavy metals are over-applied to a field, they can cause ground water pollution, toxicity to plants, ~~cause~~ toxicity/adverse effects to soil microorganisms, or buildup in the plant tissues. A buildup of metals in plant tissues may allow transmission of the metals into the food chain~~, that~~ which is the cause of toxicity/adverse effects to animals eating plants or animals containing elevated metals. Future cropping or other land uses could be restricted. Only some of the metals commonly found in biosolids are known to cause water quality or public health problems. Application rates for those metals have been established to avoid the problems.

c. Nitrogen can be over-applied, allowing a buildup of nitrogen in soils. Excess nitrogen will eventually be converted to the nitrate form and it can migrate to ground water. Excess nitrate in the ground water can result in the exceedance of drinking water standards and a public health threat. Nitrogen over-application can be prevented by biosolids application at an agronomic rate, that is, by matching the application rate of the nitrogen to the nitrogen usage rate of the crops and to soil permeability and soil retention capability.

d. Odor and insect nuisances can be caused if the biosolids have not been adequately treated (stabilized) prior to application or if wet biosolids are allowed to remain- on the ground surface for several days. Compliance with State and f~~F~~ederal standards for stabilization of the biosolids will minimize the potential for odors and insect nuisances. Proper management at the application site will prevent odor or insect nuisances. Properly stabilized biosolids will generate limited, transient odors in the immediate vicinity of the application operations. Adequate buffer zones around residences and public areas, therefore, should be provided.

e. Discharge of organic matter, metals, and pathogens to surface waters can affect water quality. These effects can be prevented by controlling field runoff. The water quality threat of organic matter of biosolids origin affecting surface water is no greater than for a similar quantity of other organic soil amendments.

9. The U. S. Environmental Protection Agency (~~U.S.~~EPA) has promulgated 40 CFR Part 503 for the use of biosolids as a soil amendment. These regulations establish ceiling concentrations for metals and pathogen and vector attraction reduction standards; management criteria for the protection of water quality and public health; and annual and cumulative discharge limitations of persistent pollutants, such as heavy metals, to land for the protection of livestock, crop, and human health and water quality protection. The requirements of 40 CFR Part 503 are based on a risk-based evaluation using 14 different pathways.

10. ~~10.~~ The National Research Council established a committee to review the methods and procedures used by the ~~U.S.~~EPA while forming the basis of the 40 CFR Part 503. The National Research Council's members are drawn from the National Academy of Sciences, National Academy of Engineering, and the Institute of Medicine. Committee members included university professors from the schools of law, science, and agriculture; a state health official; a food industry professional; a professional from a sanitation agency; and a professional consultant. After a three-year study (starting in 1993), the committee made some recommendations for improvement of the regulations and data from which they are based but also stated: "Established numerical limits on concentration levels of pollutants added to cropland by sludge are adequate to assure the safety of crops produced for human consumption." As a result of the peer review, monitoring for organic chemicals and using fecal coliform testing as a parameter for determining Class A level pathogen reductions is included in this General Order.

11. Due to the extensive work done by the ~~U.S.~~EPA, this General Order is using the 40 CFR Part 503 requirements as baseline requirements for compliance. However, this General Order is applicable to sites where biosolids are applied to land and is not intended to solely regulate the generator (unless the generator is also the landowner or land applier). The 40 CFR Part 503 requirements are only intended for and enforceable against the generator. Therefore, this General Order does not constitute compliance with 40 CFR Part 503. Since the SWRCB is not delegated with authority for the Federal Biosolids Program, the USEPA is the only authority to determine compliance with ~~the~~ 40 CFR Part 503.

12. Each discharger covered by this General Order shall submit an annual fee and an application fee equal to the annual fee, pursuant to CWC ~~S~~section 13260 ~~California Water Code~~. The amount of the fee is currently determined by the type of order issued ~~and~~ the threat to water quality, and complexity of the specific discharge, as detailed in Section 2200, Chapter 9, Division 3, Title 23, California Code of Regulations (CCR). Biosolids application projects greater than 40 acres are deemed as Non-Chapter 15 WDRs with a Category "II" threat to water quality rating and a Category "b" complexity rating. Biosolids projects consisting of less

than 40 acres are deemed Category "III" threat to water quality rating and a Category "b" complexity rating.

13. This General Order may be periodically revised to reflect changes in ~~F~~federal or State laws or regulations or policies of the SWRCB or RWQCB.

14. Under CWC s~~S~~ection 13263~~-of the California Water Code~~, the SWRCB can prescribe General WDRs for~~to~~ categories of discharges which involve the same or similar waste type or those which -are produced by the same or similar operations.

15. This General Order shall primarily apply to both the landowner of sites using biosolids and the biosolids generator, but may also include, as determined by those involved in the operation, the individuals, or companies, ~~or municipalities generating,~~ transporting~~,~~ and placing the biosolids in the field~~(Class A or Class B)~~ and the land lessee in conjunction with the landowner and the generator. To obtain coverage under the General Order, a complete NOI and an appropriate fee must be submitted to the RWQCB. Once a completed application is submitted, RWQCB staff will evaluate the project to determine if it is suitable for regulation under this General Order and the corresponding California Environmental Quality Act (CEQA) document. Only after a determination of applicability is made will the discharger be issued a Notice of Applicability by the RWQCB Executive Officer. Only applicants (dischargers) who submit a complete NOI, appropriate fee, and are issued ~~an~~ Notice of Applicability are authorized to land apply biosolids at an agricultural, horticultural, silvicultural, or land reclamation site as a soil amendment onto the land specified in the NOI in compliance with the terms and conditions of this General Order. If it is determined that a local agency already adequately regulates the activity subject to this permit, the RWQCB may choose not to issue this General Order in order to avoid any duplicative regulation.

16. A separate NOI and filing fee must be filed for each biosolids ~~reuse~~ project to be eligible for coverage under this General Order. A separate NOI and filing fee must be filed for each landowner involved in a reuse project. Attachment A to this General Order contains an NOI form which details the minimum contents of the NOI. A single reuse project will be limited to sites comprising not more than 2,000 net acres available for application. Net acreage is the land available for application, excluding roads, surface water drainage, and required buffer areas. The sites comprising a single reuse project shall be contained within a ten-mile radius of a given location. There is no restriction on~~f~~ the number of NOIs which may be filed for reuse within any geographic area. A single reuse project may be a one-time application or may be repetitive applications to the same parcel. Filing fees are annual fees. Projects will be billed for an annual fee equaling the filing fee until the project is completed and coverage under the General Order has been terminated.

17. This General Order sets minimum standards for the use of biosolids as agricultural, horticultural, silvicultural, or reclamation site soil amendments, and it does not preempt or supersede the authority of local agencies to prohibit, restrict, or control

the use of biosolids subject to their control, as allowed under current law. It is the responsibility of the discharger to make inquiry and to obtain any local governmental agency permits or authorizations prior to the application of biosolids at each site.

18. Some areas in California have been designated as unique and valuable public resources. Such areas have been defined in the State law and the ~~California Code of Regulations~~CCR as jurisdictional waters or preserves or ~~are~~ have been addressed through acts specifically intended to preserve and manage the resource. This General Order is not applicable to those areas as described below:

    a. The Lake Tahoe Basin.

    b. The Santa Monica Mountains Zone as defined by ~~S~~section 33105 of the Government Code.

    c. The California Coastal Zone, as defined in and mapped pursuant to Public Resources Code (PRC) ~~S~~section 30103 ~~of the Public Resources Code~~.

    d. An area within one quarter mile of a wild and scenic river, as defined by PRC ~~S~~section 5093.5 ~~of the Public Resources Code~~.

    e. The Sacramento-San Joaquin Delta, as defined in ~~Water Code~~ CWC ~~S~~section 12220.

    f. The Suisun Marsh, as defined in ~~Public Resources Code~~(PRC) section 29101.

    g. The jurisdiction of the San Francisco Bay Conservation and Development Commission, as defined in Government Code section 66610.

    h. The following prohibition areas contained in the Water Quality Control Plan[1] of the Lahontan ~~Basin Regional Water Quality Control Board~~RWQCB:

        (1) Glenshire and Devonshire Subdivisions, Town of Truckee~~.~~

        (2) Areas southwest of Piute Creek and north of Susan River and included in Sections 21, 25, 26, 27, 28, 33, 34, 35, and 36, T30N, R11E, MDB&M~~.~~

        (3) Eagle Lake Basin-Spaulding Tract, Stones-Bengard Subdivision, and Eagle's Nest Summer Home Tract~~.~~

        (4) Mono-Owens Planning Area

[1] A detailed description of the prohibition areas can be found in the Lahontan RWQCB's Wate Quality Control Plan (Basin Plan)

(a) Rush Creek Watershed above the outlet of Grant Lake

(b) Mammoth Creek Watershed, including the drainage area of the community of Mammoth Lake, and the Sherwin Creek Watershed upstream of the confluence of Sherwin and Mammoth Creeks

(c) Inyo County Service Area No. 1

i. Assessment District No. 1
ii. Assessment District No. 2
iii. Rocking K Subdivision
iv. City of Bishop

(5) Antelope Valley Planning Area

(a) ~~i.~~ The Antelope Hydrologic Unit above an elevation of 3,500 feet

(6) Mojave River Planning Area

(a) The Silverwood Lake Watershed

(b) The Deep Creek Watershed above an elevation of 3,200 feet

(c) The Grass Valley Creek Watershed above an elevation of 3,200 feet

(d) Area north of State Highway 18 within the area commonly known as Apple Valley and Desert Knolls

(7) Hilton Creek/Crowley Lake communities

19. The biosolids applied to land under this General Order are non-hazardous decomposable wastes applied as a soil amendment pursuant to best management practices and, as such, are exempt from the requirements of Title 23, ~~California Code of Regulations (~~CCR~~)~~, Section 2510, et seq., (Chapter 15), in accordance with Section 2511(f).

20. The construction and use of biosolids storage facilities allowed by this General Order are for short-term storage of biosolids in the event that biosolids cannot be immediately applied to the ground surface because of an unanticipated event, such as mechanical breakdown of equipment or an unseasonable rainstorm. Because of the short period of storage allowed by this General Order, the stockpiled biosolids are not a threat to the quality of underlying ground water; thus, the storage basins need not be regulated as either a waste pile or surface impoundment under

Title 27 of the CCR. If ~~longer~~ long-term storage is proposed, the discharger will need to apply for a separate WDR for the long-term biosolids storage facility. Biosolids application to land associated with a project using a permitted long-term biosolids storage basin may be conducted under this General Order, if appropriate.

21. Ground water and surface waters of California have been evaluated for their maximum potential beneficial uses. Those use categories are discussed below:

    a. The designated beneficial uses of surface waters within the State are:

        (1) Municipal Supply (MUN)
        (2) Agricultural Supply (AGR)
        (3) Aquaculture (AQUA)
        (4) Fresh Water Replenishment of Salton Sea (FRSH)
        (5) Industrial Service Supply (IND)
        (6) Ground Water Recharge (GWR)
        (7) Water Contact Recreation (REC I)
        (8) Noncontact Water Recreation (REC II)
        (9) Warm Water Habitat (WARM)
        (10) Cold Freshwater Habitat (COLD)
        (11) Wildlife Habitat (WILD)
        (12) Hydropower Generation (POW)
        (13) Preservation of Rare, Endangered, or Threatened Species (RARE)

    b. The designated beneficial uses of ground waters in California are:

        (1) ~~Municipal Supply (~~MUN~~)~~
        (2) ~~Industrial Service Supply (~~IND~~)~~
        (3) ~~Agricultural Supply (~~AGR~~)~~
        (4) AQUA
        (5) WILD

Some ground water and surface waters have fewer beneficial uses. Beneficial uses for specific water bodies can be found in the applicable RWQCB's Water Quality Control Plan (Basin Plan).

22. On ______________, in accordance with ~~the California Environmental Quality Act~~CEQA (~~Public Resources Code~~PRC, Section 21000, et seq.), the SWRCB adopted a Mitigated Environmental Impact Report No.________for these General WDRs.

23. The SWRCB has notified all known interested agencies and persons of its intent to prescribe General WDRs for the reuse of biosolids as a soil amendment and has provided them with an opportunity for a public hearing and an opportunity to submit comments.

24. The SWRCB, in a public meeting on ____________________, heard and considered all comments pertaining to the General Order.

IT IS HEREBY ORDERED that all dischargers that file an NOI indicating their intention to be regulated under provisions of this General Order, and all heirs, successors, or designees, in order to meet the provisions contained in Division 7 of ~~the California Water Code~~CWC and regulations adopted thereunder, shall comply with the following:

A. PROHIBITIONS

1. The discharge of biosolids is prohibited unless the discharger has submitted an NOI, filing fee, and a pre-application report and in response to these submittals, the RWQCB has issued a Notice of Applicability, individual WDRs, or a waiver of WDRs for the discharge.

2. Applications of biosolids shall be confined to the designated use areas stated and shown in the NOI and pre-application report.

3. The discharge shall not cause or threaten to cause pollution, as defined in CWC ~~S~~section 13050~~ of the California Water Code~~.

4. The application of any material that results in a violation of the Safe Drinking Water and Toxic Enforcement Act (Health and Safety Code s~~S~~ection 25249.5) is prohibited.

5. The storage, transport, or application of biosolids shall not cause a nuisance, as defined in CWC ~~S~~section 13050~~ of the California Water Code~~.

6. There shall be no discharge of biosolids from the storage or application areas to adjacent land areas not regulated by this General Order, to surface waters, or to surface water drainage courses.

7. ~~Surface water runoff~~ From the permitted site, ~~resulting from~~ irrigation water runoff ~~of sites to which biosolids has been applied~~ is prohibited for 30 days after application of biosolids if vegetation in the application area and along the path of runoff does not provide 33 feet of unmowed grass or similar vegetation ~~in the application area and along the path of runoff~~ to prevent the movement of biosolids from the application site.

8. Application of biosolids at rates in excess of the nitrogen requirements of the vegetation or at rates that would degrade ground water is prohibited except as allowed by Prohibition A.9.

9. Application of biosolids at rates in excess of the nitrogen requirements of the vegetation may be allowed for soil reclamation projects (as defined by land reclamation on page 7) as part of an overall plan for reclamation of sites (such as abandoned mine tailings and gravel quarries), provided the discharger can demonstrate that the application of excess nitrogen will not result in unacceptable degradation of underlying ground waters. A report prepared by a Certified Agronomist, Certified Soil Scientist, Registered Agricultural Engineer, or Registered Civil Engineer providing this demonstration shall be submitted to and approved by the RWQCB Executive Officer prior to the application of biosolids to reclamation sites at greater than agronomic rates.

10. The discharge of biosolids except as allowed for authorized storage, processing, and application sites is prohibited.

11. The application of "hazardous waste," as defined in Chapter 11, Division 4.5, Title 22 of the ~~California Code of Regulations~~, is prohibited.

12. Discharge of biosolids with pollutant concentrations greater than those shown below is prohibited.

Constituent	Ceiling Concentration mg/kg dry weight
Arsenic	75
Cadmium	85
~~Chromium~~	~~3,000~~
Copper	2,500
Lead	350
Mercury	57
Molybdenum	75
Nickel	420
Selenium	100
Zinc	7,500

13. The application of biosolids to water-saturated or frozen ground or during periods of precipitation that induces run-off from the permitted site is prohibited.

14. The application of biosolids containing a moisture content of less than

50 percent is prohibited. ~~Any visible airborne particulates leaving the application site during biosolids applications or during incorporation of biosolids at the permitted site is prohibited.~~

15. The application of biosolids in areas where biosolids are subject to gully erosion or washout off site is prohibited.

16. The application of biosolids to slopes exceeding 25 percent is prohibited.

B. DISCHARGE SPECIFICATIONS

1. All biosolids subject to this General Order shall comply with the applicable pathogen reduction standards listed in 40 CFR Part 503.32. In addition to those standards, all biosolids meeting Class A standards shall not have a maximum fecal coliform concentration greater than 1,000 ~~M~~most ~~P~~probable ~~N~~number (MPN) per gram of biosolids; or the density of salmonella, sp.[2] shall not be greater than three MPN per four grams.

2. All biosolids subject to this order shall comply with one of the applicable vector attraction reduction requirements specified in 40 CFR Part 503.33.

3. Biosolids application rates shall not exceed the agronomic rate for nitrogen for the crop being planted except as allowed by Prohibition No. 9 or for biosolids research projects.

4. ~~Biosolids shall not be applied to land in amounts that cause the following cumulative loadings (including background soils metals and metals additions from biosolids) to be exceeded:~~

~~Cumulative Loadings:~~		
~~Constituent~~	~~Kilograms per hectare~~	~~pounds per acre~~
~~Arsenic~~	~~41~~	~~36~~
~~Cadmium~~	~~39~~	~~34~~
~~Copper~~	~~1,500~~	~~1,336~~
~~Lead~~	~~300~~	~~267~~
~~Mercury~~	~~17~~	~~15~~
~~Molybdenum~~	~~18~~	~~16~~
~~Nickel~~	~~420~~	~~374~~

2 As determined by ~~an~~ USEPA approved method other than a method listed in "Standard Methods for the Examination of Water and Wastewater" 18th Edition, 1992, American Public Health Association, 1015 15th Street, NW., Washington, DC 2005; and other than the method found in Kenner, B. A. and H. P. Clark, "Detection and Enumeration of Salmonella and Pseudomonas aeruginosa," Journal of Water Pollution Control Federation, Vol. 46, No. 9, September 1974, pp. 2163-2171. Water Environment Federation, Water Environment Federation, 601 Wythe Street, Alexandria, VA 22314.

~~Selenium~~	~~100~~	~~89~~
~~Zinc~~	~~2,800~~	~~2,494~~

4.~~5.~~ Biosolids shall not be applied in amounts exceeding the Risk Assessment Acceptable Soil Concentration as described below:

$$BC = RP - 1.78(BS)$$

Where: BC= Background Cumulative Adjusted Loading Rate (Lbs./Acre)
RP = 40 CFR Part 503 Cumulative Pollutant Loading Rate (Lbs./Acre)
BS = Actual Site Background Site Soil Concentration (mg/Kg)

And Where the Values for RP on a pollutant specific basis are given below:

Pollutant	Cumulative Pollutant Loading Rate (RP) (Lbs./Acre)
Arsenic	36
Cadmium	34
Copper	1336
Lead	267
Mercury	15
Molybdenum	16
Nickel	374
Selenium	89
Zinc	2,494

~~6~~55. If biosolids are applied to a site where the soil will be~~incorporated into the ground~~ tilled, biosolids shall be incorporated within 24 hours after application in arid areas and within 48 hours in non-arid areas. ~~t~~Tillage practices shall be used which minimize the erosion of soils from the application site by wind, storm water, or irrigation water.

~~7~~66. If biosolids are applied to ground surfaces having a slope greater than ten percent (10%) or if required by the RWQCB Executive Officer, a report, including an erosion control plan, shall be prepared by a Certified Soil Scientist, Certified Agronomist, Registered Agricultural Engineer, Registered Civil Engineer, or a Certified Professional Erosion and Sediment

Control Specialist and submitted to the RWQCB for approval with the NOI. This report shall describe the site conditions that justify application of biosolids to the steeper slopes and shall specify the application and management practices necessary (a) to assure containment of the biosolids on the application site and (b) to prevent soil erosion.

7~~8~~. Structures conveying tail water shall be designed and maintained to minimize any field erosion. Tail water structures shall be boarded and wrapped with plastic prior to any biosolids application but removed after biosolids incorporation into the soil.

8~~97~~. Biosolids distinguished as "Class B" in 40 CFR Part 503 must comply with the following:

a. The discharge of tail water or field runoff is prohibited within 30 days after application of biosolids ~~is prohibited~~ for ~~application~~ areas where biosolids have not been incorporated into the soil~~,~~ and where there is not a minimum of 33 feet of unmowed grass or similar vegetation bordering the application area and along the path of runoff to prevent movement of biosolids particles from the application site.

b. After an application of biosolids in any field, the discharger shall ensure the following:

(1) For at least 30 days:

(a) Public access to the application sites is restricted for sites with a low potential for public exposure;
(b) Food, feed, and fiber crops are not harvested; and
(c) Animals are not grazed.

(2) For at least 12 months:

(a) Public access to the site is restricted for sites with a high potential for public exposure;
(b) Turf is not to be harvested if the harvested turf is placed on land with a high potential for contact by the public as defined in 40 CFR Part 503.11; and
(c) Grazing of milking animals used for producing unpasteurized milk for human consumption is prevented if the field is used as pasture.

(3) For at least 14 months:

Food crops with harvested parts that touch the biosolids/soil mixture and are totally above the land surface are not harvested.

(4) For at least 20 months:

Food crops with harvested parts below the land surface are not harvested~~,~~ when the biosolids remain exposed on the surface for four months or longer prior to incorporation.

(5) For at least 38 months:

Food crops with harvested parts below the land surface are not harvested~~,~~ when the biosolids remained exposed on the ground surface for less than four months prior to incorporation into the soil.

9~~108~~.—— Staging and biosolids application~~s~~ areas shall be at least:

a. 10 feet from property lines,
b. 500 feet[3] from domestic water supply wells,
c. 100 feet[4] from non-domestic water supply wells,
d. 50 feet from public roads and occupied onsite residences[5],
e. 100 feet from surface waters[6], including wetlands, creeks, ponds, lakes, underground aqueducts, and marshes,
~~feet from agricultural buildings,~~
f. 33 feet from primary agricultural drainage ways,
g. 500[7] feet from occupied non-agricultural buildings and off-site residences,
h. 400 feet from a domestic water supply reservoir,
i. 200 feet from a primary tributary to a domestic water supply, and
j. 2,500 feet from any domestic surface water supply intake.

[3] For sites where the topography slopes are greater than 10 percent, the minimum width of vegetative border shall be proposed in accordance to Discharge Specification No. 6 above.

[4] A lesser setback distance from domestic supply wells (not to be less than 100 feet) may be used if the discharger can demonstrate to the Executive Officer that the ground water, geologic, topographic, and well construction conditions at the specific site are adequate to protect the health of individuals using the supply well.

[5] A lesser setback distance (not to be less than 25 feet) may be used if the discharger can demonstrate to the RWQCB Executive Officer that the ground water, geologic, topographic, and well construction conditions at the specific site are adequate to protect the ground water. Not including agricultural drains.

[6] Applies to biosolids storage facilities at the reuse site, not biosolids storage facilites which are part of a wastewater treatment plant or which are covered by separate WDRs.

[7] Applications in a such proximity to on site residences must be approved by the resident.

C. BIOSOLIDS[2] STORAGE AND TRANSPORTATION SPECIFICATIONS

Biosolids shall be considered to be "stored" if they are placed on the ground or in non-mobile containers (i.e., not in a truck or trailer) at the application site or an intermediate storage location away from the generator/processing for more than 48 hours. Biosolids shall be considered to be "staged" if placed on the ground for brief periods of time solely to facilitate transfer of the biosolids between transportation and application vehicles.

1. Biosolids shall not be stored for more than seven (7) consecutive days prior to application.

2. Biosolids containing free liquids shall not be placed on the ground prior to application on an approved site, excluding equipment cleaning operations.

3. Biosolids shall not be stored directly on the ground at any one location for more than seven (7) consecutive days.

4. Sites for the storage of Class B biosolids shall be located, designed, and maintained to restrict public access to the biosolids.

5. Biosolids storage facilities that contain biosolids between October 1 and April 30 shall be designed and maintained to prevent washout or inundation from a storm or flood with a return frequency of 100 years.

6. Biosolids ~~storage facilities that contain biosolids between October 1 and April 30 shall be covered during periods of runoff inducing precipitation.~~ placed on site for more than 24 hours shall be covered.

7. Biosolids[2] storage facilities shall be designed, maintained, and operated to minimize the generation of leachate and the effects of erosion.

8. If biosolids are to be stored at the site, a plan describing the storage program and means of complying with this General Order shall be submitted for RWQCB Executive Officer approval with the NOI. The storage plan shall also include an adverse weather plan.~~not less than 60 days prior to the storage of biosolids. The storage of biosolids shall not commence until after approval of the plan.~~

9. The discharger shall operate the biosolids[2] storage facilities in accordance with the approved biosolids[2] storage plan.

10. The discharger shall immediately remove and relocate any biosolids stored or applied on site in violation of this General Order.

11. All biosolids shall be transported in covered vehicles capable of containing the designated load. ~~and~~

12. All biosolids having a water content that is capable of leaching liquids shall be transported in leak proof vehicles.

13~~2~~. Each biosolids[2] transport driver shall be trained as to the nature of its~~their~~ load and the proper response to accidents or spill events and shall carry a copy of an approved spill response plan.

D. PROVISIONS

1. To obtain coverage under this General Order and terminate coverage thereof, the following must take place:

   a. Coverage:

   A complete NOI form and filing fee must be filed by the discharger for each proposed application site covered by these General WDRs. The NOI form may be modified by the RWQCB Executive Officer as the need arises. An NOI form is attached (Attachment A) to this General Order. Coverage does not begin until a ~~n~~Notice of ~~a~~Applicability has been issued by the applicable RWQCB's Executive Officer. No discharge shall occur until 15 days after submission of the Pre-Application Report as required in the Monitoring and Reporting Program.

   b. Coverage Termination:

   (1) A biosolids application project covered by these General WDRs may be terminated by submittal of the Final Monitoring and Reporting Program technical report and an ~~Notice of Termination (NOT)~~, as shown on Attachment B of these General WDRs. The discharger(s) will be responsible for paying all annual fees for coverage under these General WDRs until approval of the NOT is granted by the RWQCB Executive Officer. For sites using Class B biosolids, termination shall not take place until 38 months after the last Class B biosolids application. The NOT form may be modified by the RWQCB Executive Officer as the need arises.

   (2) If an individual WDR Order is issued to the discharger for a project covered by this General Order, the applicability of this General Order to the discharger is automatically terminated on the effective date of the individual WDR Order.

2. Where ground water monitoring is required, as specified by the RWQCB Executive Officer or as contained in ~~the~~ Monitoring and Reporting Program, the ground water monitoring program must be in place prior to any application of biosolids.

3. The discharger shall submit copies of each NOI to the appropriate regional office(s) of the Department of Fish and Game, local water district, City Planning Department, County Health Department(s), County Planning Department(s), and County Agricultural Commissioner(s) with jurisdiction over the proposed application site(s). Also, the discharger shall notify adjacent property owners with parcels abutting the subject land application site and, where applicable, te~~n~~nants. The ~~D~~discharger shall submit proof to the RWQCB~~Regional Board~~ that all the above agencies and persons were notified. Other than compliance evaluations, the RWQCB~~Regional Board~~ is not responsible for the notification process.

4. The discharger shall comply with the Monitoring and Reporting Program No. 2000~~-XX-XXX~~ which is part of this General Order and any plans required and contained within, and any revisions thereto.

5. The discharger must notify the RWQCB Executive Officer in writing at least 30 days in advance of any proposed transfer of this General Order's responsibility and coverage to a new discharger. The notice must include a new NOI for the proposed discharger, an NOT for the existing discharger, and a specific date for the transfer of this General Order's responsibility. This agreement shall include an acknowledgment that the existing discharger is liable for compliance with this General Order and for all violations up to the transfer date and that the new discharger is liable for compliance with this General Order and all violations after the transfer date.

6. Where the discharger becomes aware that it failed to submit any relevant facts in an NOI or submitted incorrect information in an NOI or in any report to the RWQCB, it shall promptly submit such facts or information.

7. The discharger shall be responsible for informing all biosolids transporters, appliers, and growers using the site of the conditions contained in this General Order.

8. The discharger must comply with all conditions of this General Order, including timely submittal of technical and monitoring reports as directed by the RWQCB Executive Officer. Violations may result in enforcement action, including RWQCB or court orders requiring corrective action or imposing civil monetary liability or revision or rescission of the applicability of this General Order to a specific project.

9. Individuals and companies responsible for site operations retain primary responsibility for compliance with these requirements, including day-to-day operations and monitoring. Individual property owners and property managers retain primary responsibility for crop selection and any access or harvesting restrictions resulting from biosolids application. Individual owners of the real property at which the discharge will occur are ultimately responsible for ensuring compliance with these requirements. Enforcement actions for violations of this General Order may be taken against all dischargers required to comply with this General Order.

10. A copy of this General Order shall be kept at the discharge facility for reference by operating personnel. Key operating personnel shall be familiar with its contents.

11. This General Order does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property, do not protect the discharger from his liability under ~~F~~federal, State, or local laws, nor do they create a vested right for the discharger to continue the waste discharge.

12. Provisions of these WDRs are severable. If any provision of these requirements is found invalid, the remainder of these requirements shall not be affected.

13. The SWRCB will review this General Order periodically and will revise requirements when necessary.

14. The discharger at all times shall properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with conditions of this General Order. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this General Order.

15. The discharger shall allow the RWQCB or an authorized representative upon the presentation of credentials, valid identification with photograph, and other documents as may be required by law to:

    a. Enter upon the discharger's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this General Order;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this General Order;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this General Order; and

d. Sample or monitor at reasonable times, any substances or parameters at any location for the purposes of assuring compliance with this General Order or as otherwise authorized by the ~~California Water Code~~CWC.

16. All monitoring instruments and devices used by the discharger to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary to ensure their continued accuracy. All measurement devices shall be calibrated at least once per year or more frequently to ensure continued accuracy of the devices.

Unless otherwise permitted by the RWQCB~~'s~~ Executive Officer, all analyses shall be conducted at a laboratory certified for such analyses by the California Department of Health Services. The RWQCB~~'s~~ Executive Officer may allow use of any uncertified laboratory under exceptional circumstances, such as when the closest laboratory to the monitoring location is outside the State boundaries and therefore is not subject to certification. All analyses shall be ~~required to be~~ conducted in accordance with ~~the latest edition of "Guidelines Establishing Test Procedures for Analysis of Pollutants" (40 CFR Part 136) or "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW - 846) as established by the U. S. EPA~~those methods specified in 40 -CFR Part 503.8(1) through 40 CFR Part 503.8(4), 40 CFR Part 503.8(6), and 40 CFR Part 503.8(7).

17. The discharger shall report any noncompliance which may endanger human health or the environment. Any such information shall be provided orally to the RWQCB~~'s~~ Executive Officer within 24 hours from the time the discharger becomes aware of the circumstances. A written submission shall also be provided within five days of the time the discharger becomes aware of the circumstances. The written submission shall contain (a) a description of the noncompliance and its cause; (b) the period of noncompliance, including exact dates and times; and, (c) if the noncompliance has not been corrected, the anticipated time the noncompliance is expected to continue and steps being taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance with a time schedule that includes milestone dates. The RWQCB Executive Officer or an authorized representative may waive the written report on a case-by-case basis if the oral report has been received within 24 hours. Also, the discharger shall notify the Office of Emergency Services (1-800-852-7550), the State Department of Health Services, Food and Drug Branch, (916) 445-2263).

and the local health department as soon as practical but within 24 hours after the incident.

18. The discharger shall retain records of all monitoring information including all calibration and maintenance records for on-site monitoring equipment (if applicable), copies of all reports required by this General Order, and records of all data used to complete the application for this General Order. Records shall be maintained for a minimum of three years from the date of the sample, measurement, report, or application. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the RWQCB Executive Officer.

    Records of monitoring information shall include:

    a. The date, exact place, and time of sampling or measurements;
    b. The individual(s) who performed the sampling or measurements;
    c. The date(s) analyses were performed:
    d. The individual(s) who performed the analyses;
    e. The analytical techniques or methods used; and
    f. The results of such analyses.

19. All application reports or information to be submitted to the RWQCB Executive Officer shall be signed and certified as follows:

    a. For a corporation--by a principal executive officer or at least the level of vice president.
    b. For a partnership or sole proprietorship--by a general partner or the proprietor, respectively.
    c. For a municipality, State, ~~F~~federal, or other public agency--by either a principal executive officer or ranking elected official.

20. A duly authorized representative of a person designated in Provision No. 19 of this provision may sign documents if:

    a. The authorization is made in writing by a person described in Provision No. 19, above.
    b. The authorization specifies either an individual or position having responsibility for the overall operation of the regulated facility or activity; and
    c. The written authorization is submitted to the RWQCB Executive Officer.

    Any person signing a document under these Provisions shall make the following certification:

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

CERTIFICATION

The undersigned, Administrative Assistant to the Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on ______________________.

AYE:

NO:

ABSENT:

ABSTAIN:

____
Maureen Marché
Administrative Assistant to the Board

STATE WATER RESOURCES CONTROL BOARD
MONITORING AND REPORTING PROGRAM NO. 2000-~~XX-XXXX~~-DWQ
GENERAL WASTE DISCHARGE REQUIREMENTS (WDRs) FOR THE
DISCHARGE OF BIOSOLIDS TO LAND FOR USE IN AGRICULTURAL,
SILVICULTURAL, HORTICULTURAL, AND LAND RECLAMATION ACTIVITIES

PRE-APPLICATION REPORT

As required in Provision 1.a. of the General Order, ~~A~~a P~~p~~re-A~~a~~pplication R~~r~~eport shall be submitted for each field or distinct application area prior to the ~~initial~~ application of biosolids ~~in proposed application areas~~ in accordance with the WDRs. Where biosolids are applied on a continuing basis to a single area, the P~~p~~re-A~~a~~pplication R~~r~~eport may cover ongoing operations and may not need to ~~not~~ be submitted for each load applied. A p~~P~~re-a~~A~~pplication r~~R~~eport should be submitted 15 days prior to the date of the proposed application. The Pre-Application Report shall be signed by the o~~O~~wner/o~~O~~perator of the biosolids~~2~~ application operation and by the ~~P~~property ~~O~~owner. The ~~PP~~property ~~O~~owner may submit written authorization to allow a representative of the ~~P~~property ~~O~~owner, such as a tenant or land management company, to sign the Pre-Application Report.

Information in the Pre-Application Report found in **bold type** is a required field to be submitted in the Pre-Application Report. Otherwise, information that was submitted in the Notice of Intent (NOI) and has not changed or will not change is not required. The following items shall be included in the Pre-Application Report and shall be submitted to the appropriate Regional Water Quality Control Board (RWQCB):

Waste Discharge Identification System No.__________________________

This number is established at the time the initial Notice of Intent (NOI) is submitted to the RWQCB and can be obtained at the RWQCB.

1. Site Location/Applier Information–A separate Pre-Application Report must be completed~~filled out~~ for each different site.

~~Applier~~ Landowner:	
Address:	
Contact:	**Phone:**
Site Location (including address, if any):	
Nearest Cross Street(s):	
County:	**Total Size of Site**
Section(s)/Township/Range/Meridian:	
Latitude (from field center):	**Longitude (from field center):**

Applier	
Address:	
Contact:	Phone:

Attach a U.S. Geological Survey~~S~~ 7.5 Minute map or similar map (1:24000 or larger) showing the proposed application site and surrounding properties within 2,500 feet from site boundaries. The map should show:

a. Site topography
b. Run-on/runoff controls
c. Storage areas
d. Nearby surface waters, wells, residences, and public roads
e. Application area(s) including buffer zones (setbacks)
f. Ground water monitoring wells (if required)
g. Elevation

2. **Biosolids Source**-- ~~A separate Pre-Application Report~~The section below must be completed~~filled out~~ **for each source of~~different~~ biosolids~~[2] source~~**. If additional space is required, copy this section and attach.

Wastewater Treatment Plant				
Mailing Address				
City	County	Zip	State	Phone
Contact Person				

Level of P~~p~~athogen T~~t~~reatment: Class A__________ Class B__________
Description of ~~treatment and how~~ vector attraction reduction ~~was achieved~~achievement:

____

3. **Constituent Concentrations (Each Source)**

Constituent	Concentration in Biosolids, mg/kg, dry weight	~~Concentration in Soil, mg/kg, dry weight~~
Arsenic		
Cadmium		
~~**Chromium**~~		
Copper		
Lead		
Mercury		
Molybdenum		

Nickel		
Selenium		
Zinc		
pH		
~~**Cation Exchange Capacity**~~	~~**N/A**~~	~~**meq/100g**~~
Salinity		
Total Solids Content	**%**	~~**N/A**~~
Total Nitrogen		
Fecal Coliform (if applicable)	**MPN/gram**	~~**N/A**~~
Ammonia Nitrogen, as N		
Total Phosphorus, as P **Total Potassium**		
SW 846[1] Method 8080 for PCB Aroclors, Aldrin/Dieldrin		
EPA Method 8270 Semi–Volatile Organics		

Date samples collected ______________ ______________
Date samples analyzed ______________ ______________
Attach copies of all lab reports.

4. **Application Area Information**

Subject	Value	Applicable Unit/ Type of Measure
Quantity of Biosolids to be Applied		~~dry tons per year~~
~~Total Biosolids Application Proposed~~		~~dry tons~~
Land Use Zone		
Adjacent Land Use Zones		
Application Area Size		A~~a~~cres
Proposed Nitrogen Loading		L~~l~~b. p~~P~~lant a~~A~~vailable ~~N~~nitrogen/acre
Residual Nitrogen from Previous F~~f~~ertilizer and B~~b~~iosolids A~~a~~pplications[2]		Lb. ~~P~~per ~~A~~acre
Proposed Crop, Use		C~~c~~rop type, human/animal/neither
Crop Nitrogen Usage		L~~l~~b.

1 The Discharger shall use the most recent version of SW 486 methods for detecting PCB constituents and list all Aroclor concentrations with the summation of total PCBs.

2 Attach a sheet showing calculations and all assumptions used for calculating residual Nitrogen from previous fertilizer and biosolids applications.

		~~N~~nitrogen/acre/year
Nitrogen Usage Reference		
Anticipated Average ~~Daily~~ Application Rate		D~~d~~ry tons/~~day~~application
Average Annual Precipitation		~~I~~inches/year

Attach an anticipated annual time schedule for the field operations including anticipated biosolids applications windows, seeding operations, supplemental fertilization, and cultivation/harvest.

5. **Ground Water Monitoring**

For biosolids[2] application operations where minimum depth to useable ground water[3] is less than 25 feet or as specified by the RWQCB Executive Officer and where special circumstances would warrant ground water monitoring, a ground water monitoring program. ~~shall,~~ at a minimum, shall consists of three monitoring wells (one up gradient, two down gradient) for each application area ~~is required~~ and shall be in place prior to any application of biosolids if the discharger intends to or does apply biosolids more than twice within a five-year period at any particular location. A report specifying location, construction, and development details of ground water monitoring wells shall be submitted to the RWQCB for approval by the RWQCB Executive Officer prior to the installation. In addition, a mean sea level (MSL) reference elevation shall be established for each well in order to determine water elevations. The RWQCB Executive Officer, after reviewing the information submitted, may waive this requirement if it is determined that the benefit of such monitoring is not commensurate to the level of protection.

Results shall be submitted to the RWQCB 30 days prior to any biosolids[2] application at each site and annually thereafter. Samples shall be collected from each of the monitoring wells annually and shall be analyzed for the following parameters:

Parameter	Units
Static Water Level	feet (MSL)
Total Dissolved Solids	mg/L
Sodium	mg/L
Chloride	mg/L
Nitrate	mg/L as N
Total Nitrogen	mg/L as N
pH	pH units

3 Useable ground water: Ground water is defined as having either an agricultural or domestic supply source as described in the ~~Regional Water Quality Control Board~~RWQCB Basin Plan.

Initial testing shall also include the following parameters:

Arsenic	mg/L
Cadmium	mg/L
~~Chromium~~	~~mg/L~~
Copper	mg/L
Lead	mg/L
Mercury	mg/L
Molybdenum	mg/L
Nickel	mg/L
Selenium	mg/L
Zinc	mg/L

6. Biosolids[2] Storage Plan (as required by Storage and Transportation Spec. No. 8)

A biosolids[2] storage plan must be attached (even if no *on-site* biosolids storage will be provided). The biosolids[2] storage plan should include at a minimum:

If on-site storage will be provided:

a. Size of biosolids storage ~~(or staging)~~ area
b. How frequently it will be used (emergency basis only or routine use)
c. Leachate controls
d. Erosion controls
e. Run-on/runoff controls

If no on-site storage will be provided:

a. Location of off-site storage facilities
b. Emergency storage plans

7. **Erosion Control Plan (~~if applicable~~as required by Discharge Specification No. 6)**

Biosolids applied to ground surfaces having a 10 percent or greater slope requires an Erosion Control Plan. The Plan should outline conditions that justify application of biosolids to the 10 percent or greater slopes and specify the application and management practices to be used to assure containment of the biosolids on the application site.

8. **Spill Response and Traffic Plan (as required by Biosolids Storage and Transportation Specification No. 13)**

a. The Spill Response Plan should include at a minimum:

(1) Emergency contacts and notification procedures
(2) Personal protective equipment requirements.
(3) Response instructions for spill during biosolids transport.
(4) Response instructions for storage facility failure.
(5) Response instructions if hazardous or other unauthorized material is found.

b.____The Traffic Plan should include at a minimum:

(1) The proposed route for all vehicles handling biosolids.
(2) The anticipated maximum vehicle weight.
~~3. Identify all load restrictions for each traveled roadway~~

9. Adverse Weather and Alternative Plan

Submit an Adverse Weather and Alternative Plan that details procedures to address times when biosolids cannot be applied to the site(s) due to adverse weather or other conditions (wind, precipitation, field preparation delays, access road limitations, etc.).

ANNUAL REPORTING

1. **Ground Water Monitoring** (if required in the P~~p~~re-A~~a~~pplication ~~r~~Report)

   Samples shall be collected from each of the monitoring wells annually and shall be analyzed for the following parameters:

Parameter	Units
Static Water Level	feet (MSL)
Total Dissolved Solids	mg/1
Sodium	mg/1
Chloride	mg/1
Nitrate	mg/1 as N
Total Nitrogen	mg/1 as N
pH	pH units

2. **Application Information**

Quantity of Biosolids Applied		D~~d~~ry tons
Application Area Size		A~~a~~cres
Total Nitrogen Concentration in Biosolids		mg/kg
Nitrogen Loading		L~~l~~b. p~~P~~lant a~~A~~vail. Nitrogen per ~~/~~a~~A~~cre
Residual Nitrogen[4]		Lbs. ~~P~~per ~~A~~acre
Crop		
Amount of Crop Produced		~~s~~Specify units

3. **Pollutant Loadings for Each Application Site**

Pollutant	Total Loadings from Previous Years~~,~~ (kg/ha)	Loading This Year~~,~~ (kg/ha)	Background Soils Conc. (kg/ha) (6" depth)	Cumulative Metal Load to Date~~,~~ (kg/ha)	Percent Cumulative Limit to Date
Arsenic					
Cadmium					
~~Chromium~~					
Copper					
Lead					

4 Attach a sheet showing calculations and all assumptions used for calculating residual nitrogen from previous fertilizer and biosolids applications.

Mercury					
Molybdenum					
Nickel					
Selenium					
Zinc					

4. **Constituent Concentrations (Each Source)**

Constituent	Concentration in Biosolids, (mg/kg, dry weight)
Arsenic	
Cadmium	
Chromium	
Copper	
Lead	
Mercury	
Molybdenum	
Nickel	
Selenium	
Zinc	
Total Solids Content	%
Total Nitrogen	
Fecal Coliform	MPN/gram
Ammonia Nitrogen, as N	
Total Phosphorus, as P Total Potassium	
SW 846[5] Method 8080 for PCB Aroclors, Aldrin/Dieldrin	
EPA Method 8270 Semi-Volatile Organics	

5. **Site Map**

Provide a site map identifying the area(s) of application clearly showing each field to which biosolids have been applied and crop planted.

6. **40 CFR Part 503**

Attach a copy of the generator's monitoring report for compliance with the 40 CFR Part 503.

[5] The discharger shall use the most recent version of SW 486 methods for detecting PCB constituents and list all Aroclor concentrations with the summation of total PCBs.

GENERAL REPORTING

1. Pre-Application Reports shall be submitted for RWQCB staff review and approval at least 30 days prior to application of biosolids. Annual Reports covering the period between January 1 to December 31 shall be submitted by ~~January~~ February 15 of ~~every~~ the following year. If no applications occurred during the year, the discharger shall submit a report indicating that no discharge occurred during the year.

2. The collection, preservation, and holding times of all samples shall be in accordance with U.S. Environmental Protection Agency approved procedures. All analyses shall be conducted by a laboratory certified by the California Department of Health Services to perform the required analyses. The RWQCB~~'s~~ Executive Officer may allow use of an uncertified laboratory in accordance with Provision No. 16.

3. If there is no discharge during a required reporting period, the discharger shall submit a letter report to the RWQCB indicating that there has been no activity during the required reporting period.

4. Each report shall be signed and contain the following certification:

   "I certify~~declare~~ under ~~the~~ penalty of law that I have personally examined and am familiar with the information submitted in this document~~;~~and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment ~~for knowing violations.~~"

5. A duly authorized representative of the discharger may sign the documents if:

   a. The authorization is made in writing by the person described above;

   b. The authorization specified an individual or person having responsibility for the overall operation of the regulated disposal system; and

   c. The written authorization is submitted to the RWQCB~~'s~~ Executive Officer.

6. The discharger shall arrange the data in tabular form so that the specified information is readily discernible. The data shall be summarized in such a manner as to clearly illustrate whether the facility is operating in compliance with waste discharge requirements.

7. Report immediately (within 24 hours) to the RWQCB Executive Officer and Director of County Environmental Health by telephone with a follow-up letter any discharge which threatens the environment or human health ~~to the RWQCB Executive Officer and Director of County Environmental Health~~. During non-business hours, report to the Office of Emergency Services by telephone ~~the Office of Emergency Services~~ at 1-800-852-7550.

8. The results of any monitoring done more frequently than required at the locations specified in the Monitoring and Reporting Program shall be reported to the RWQCB.

CERTIFICATION

The undersigned, Administrative Assistant to the Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on ______________________.

AYE:

NO:

ABSENT:

ABSTAIN:

____

Maureen Marché
Administrative Assistant to the Board

State of California

State Water Resources Control Board

NOTICE OF INTENT

TO COMPLY WITH THE TERMS OF GENERAL PERMIT ORDER NO. XIX-XX
FOR THE DISCHARGE OF BIOSOLIDS TO LAND
FOR USE IN AGRICULTURAL, SILVICULTURAL, HORTICULTURAL AND LAND RECLAMATION ACTIVITIES

ATTACHMENT A

Mark Only One Item	1. ☐ New Discharge Under MODEL Permit 2. ☐ Change of Information-WDID # ______________

I. Property Owner (Required)

Name				
Mailing Address				
City	County	State	Zip	Phone
Contact Person		(check one) Owner ________ Operator ________ Owner/operator ________		

II. Generator (Required . If more than one generator, attach the information and ensure that the signature block is copied, signed and attached.)

Name				
Mailing Address				
City	County	State	Zip	Phone
Contact Person				

III. Site Operator/Property Manager (If any)

Name				
Mailing Address				
City	County	State	Zip	Phone
Contact Person				

IV. Billing Address

Name				
Mailing Address				
City	County	State	Zip	Phone
Contact Person				

STATE USE ONLY

WDID: ☐☐☐☐☐☐☐☐☐☐☐	Regional Board Office: ☐☐	Date NOI Received: ______________	Date NOI Processed: ______________
	Fee Amount Received:		Check #:

V. Site Operator

Name				
Mailing Address				
City	County	State	Zip	Phone
Contact Person				

VI. Hauler Information

Name				
Mailing Address				
City	County	State	Zip	Phone
Contact Person				
Type of Transportation				

VII. Site Location

Street (including address, if any)	
Nearest Cross Street(s)	
County:	Total Size of Site (acres):
Township/Range/Section	T ________, R ________, Section ________, ___ ___B&M
Latitude/Longitude (From Center): ________ Sec. W	________ Deg. ________ Min. ________ Sec N. ________ Deg. ________ Min.

Attach a map of at least 1:24000 (1" = 2000") showing the proposed application site (e.g., USGS 7.5" topographic map). The map should also show run-on/runoff controls, storage areas, nearby surface waters, wells and residences, the application areas including setback and buffer zones .

VIII. Application Area Information

Subject	Value	Applicable Unit/ Type of Measure
Quantity of Biosolids to be Applied		dry tons per year
Total Biosolids Application Proposed		dry tons
Land Use Zone		
Adjacent Land Use Zones		
Application Area Size		acres
Proposed Nitrogen Loading		lb. Plant Available Nitrogen/acre
Proposed Crop, Use		crop type, human/animal/neither
Crop Nitrogen Usage		1b. Nitrogen/year
Nitrogen Usage Reference		
Depth of Root Zone for Crop Being Planted		inches
Will Setback Limits Be Met?		Yes or No
Distance to Nearest Inhabited Dwelling		feet/miles
Public Access Controls		Specify Type

Runoff Controls		Attach plans
Prevailing Wind Direction		
Minimum Depth to Ground Water		feet
How Minimum Depth to Ground Water is Determined		
Anticipated Average Daily Application Rate		dry tons/day
Source of Water for Crop		
Average Annual Precipitation		inches/year

Attach an anticipated annual time schedule for the field operations including anticipated biosolids applications windows, seeding operations, supplemental fertilization, and cultivation/harvest.

IX. Soil Constituent Concentrations (Each Source)

Constituent	Concentration in Soil, mg/kg, dry weight
Arsenic	
Cadmium	
Copper	
Lead	
Mercury	
Molybdenum	
Nickel	
Selenium	
Zinc	
pH	
Estimated Permeability	cm/sec
Cation Exchange Capacity	meq/100g
Total Nitrogen	
Ammonia Nitrogen, as N	
Total Phosphorus, as P	
Total Potassium	

X Biosolids Storage Plan (as required by Biosolids Storage an Transportations Spec. No, 8)

A biosolids storage plan must be attached (if no *on-site* biosolids storage will be provided, a contingency plan for inclement weather operation must be provided). The biosolids' storage plan should include at a minimum:

If on-site storage will be provided:

a. Size of biosolids storage area
b. How frequently it will be used (emergency basis only or routine use)
c. Leachate controls
d. Erosion controls
e. Run-on/runoff controls

If no on-site storage will be provided:

a. Location of off-site storage facilities

b. Emergency storage plans

XI Erosion Control Plan (if applicable) (as required by Discharge Specification No, 6)

Biosolids applied to ground surfaces having a 10 percent or greater slope requires an Erosion Control Plan. The Plan should outline conditions that justify application of biosolids to the 10 percent or greater slopes and specify the application and management practices to be used to assure containment of the biosolids on the application site.

XII. Spill Response and Traffic Plan (as required byBiosolids Storage and Transportation Spec. No. 13)

a. The Spill Response Plan should include at a minimum:

1 Emergency contacts and notification procedures
2. Require personal protective equipment requirement
3. Response instructions for spill during biosolids transport
4. Response instructions for storage facility failure
5. Response instructions if hazardous or other unauthorized material is found

b. The Traffic Plan should include at a minimum:

1. The proposed route for all vehicles handling biosolids
2. Describe the anticipated maximum vehicle weight

XIII. Adverse Weather and Alternative Plan: (as required by Biosolids Storage and Transportation Spec. No. 8)

Submit an Adverse Weather and Alternative Plan that details procedures to address times when biosolids cannot be applied to the site(s) due to adverse weather or other conditions (wind, precipitation, field preparation delays, access road limitations, etc.).

XIV. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment." In addition, I certify that the provisions of the permit, including the criteria for eligibility, will be complied with.

Signature of Owner/Operator of Spreading Operations	Title
Printed or Typed Name	Date
Signature of Property Owner	Title
Printed or Typed Name	Date
Signature of Site Operator/Manager (if any)	Title
Printed or Typed Name	Date

Appendix B. Revised Draft EIR Public Health Technical Appendix E

Appendix B. Revised Draft EIR Public Health Technical Appendix E

Introduction

This appendix provides detailed information supporting the analysis presented in Chapter 5, “Public Health”. Part 1 describes the potential pathogenic microorganisms that have been known to be present in sewage sludges and provides data on the incidence of reportable diseases in California on a county-by-county basis and for each year for the past 6 to ~~8~~ 9 years. Part 2 describes the U.S. Environmental Protection Agency’s (EPA’s) development of the national sewage sludge regulations (Part 503 regulations). Part 3 provides information on endocrine disruptors, an issue of increasing concern with regard to long-term impacts of chemicals in the environment.

Part 1. Diseases of Interest

This section discusses each of the groups of potential pathogens of concern or specific potential pathogens of concern that may be found in biosolids and summarizes available information on the incidence of diseases they cause in California. This discussion is intended to provide background information for the impact analysis presented in Chapter 5. The information on disease incidence reflects the data collected by the existing statewide ~~voluntary~~ public health reporting system, in which local health departments (~~two~~ three city and all county health departments) participate. The diseases that are reported are those that are diagnosed by a physician or at a hospital or clinic and represent only a small percentage of the actual cases which go largely unreported (for example the flu or an attack of gastroenteritis). For many diseases (amebiasis, campylbacteriosis, giardiasis, salmonellosis [other than typhoid fever], only summary counts of cases are reported to DHS and a thorough investigation by the local health department into each case of these diseases is not always conducted. Disease data is only reported for those whose illness results in a visit to a physician or local clinic or hospital, thus represents only a small percentage of the actual cases of illness that may occur. The true incidence of disease from pathogens causing gastroenteritis and other general symptoms that are normally treated with over-the-counter drugs will be underestimated and thus greatly affect any conclusions drawn from the disease incidence data reported herein.

The EIR reports only those cases reported and has contacted local health department personnel who might be knowledgeable about specific cases which might involve biosolids to obtain potential reports of interest to the GO evaluation of impacts.

NOTE: Many statistical tables previously presented (Numbered E1 through E16 in the text have been revised and corrected to include all available data are now at the end of the appendix in order. There are revised tables (E-1a through E-16a) for all reported diseases which include data for the years 1990-1998 (provisional statistics for the years 1996, 1997 and 1998 are included since minor adjustments to the records are still occurring). Each disease type has two tables. The first designated by a number and an "a" shows the number of reported disease cases by county or local health department. The second designated by a "b" (numbered E-1b through E-16b) shows the same information converted to an incidence rate based on the population of the city of county in which the disease was reported. This information was added at the request of the California Department of Health. Note that these numbers were calculated based on population estimates from the California Department of Finance. The disease statistics were provided by the California Department of Health Services. The data base they provided has been sorted and tabulated. Minor adjustments were made to the 1990 data to account for changes in the combined Humboldt/Del Norte County separation of reporting in subsequent years.

Bacterial Diseases

Enterotoxic *E. coli* O~~0~~157

This mutant form of *E. coli* first appeared in the United States in 1982 and is one of hundreds of varieties of *E. coli* found in the ~~guts~~ intestinal tract of mammals (Padhye and Doyle 1992). It is mainly an infection in cattle that can be passed to humans who eat foods contaminated by cattle manure (even in organic gardens using uncomposted manure) or who eat inadequately cooked meat (Cieslak et al. 1992, Centers for Disease Control 1993, Nelson 1997). This particular variety, according to Wells et al. (1991), can be found in 1%–3% of all cattle in the United States but causes them no harm. The infection can be serious for a human host, however, causing severe, often bloody diarrhea. In the worst cases, particularly in young children, *E. coli* can kill. Most often, *E. coli* illnesses are associated with eating undercooked hamburger or uncooked fruits (apples and cantalopes) and vegetables (lettuce in particular) or with person-to-person contact (Belongia et al. 1993, Nelson 1997). Contaminated water supplies are also of growing concern (Jones and Roworth 1996). This particular bacterial strain is of growing concern as more outbreaks occur (Koutkia 1997).

The most well-publicized recent case of illness from *E. coli* is that of three children who died in Washington in 1993 after eating contaminated hamburgers at a fast-food restaurant (Centers for Disease Control 1993). In summer 1997, 25 million pounds of hamburger, potentially tainted with *E. coli* ~~0~~O157:H7, were recalled by Hudson Foods in Columbus, Nebraska, after consumer illnesses were reported. Illness caused by *E. coli* ~~0~~O157:H7 has been a reportable disease in California since 1993 after the first case was reported in San Diego County in 1992; the annual number of cases has ranged from ~~0~~ 1 to ~~33~~ 264, and occasional outbreaks have occurred ~~in major urban areas~~ throughout California (Table E-1a). Table E-1b shows the incidence rates for the various reporting entities.

[Note: draft EIR Table E-1 has been deleted and is being replaced by Tables E-1a and E-1b at the end of document.]

Like other pathogens of concern, the enterotoxic form of *E. coli* has a low infectious dose (estimated to be as low as 10 bacteria).

The present detection method for *E. coli* ~~0~~O157:H7 requires growing the bacteria in laboratory cultures, which takes days. A group of Montana researchers led by Dr. Gordon McFeters has developed a new method using an antibody test kit. The test takes only 4 hours; is highly sensitive; and works in food, feces, and water. The method could be adapted to detect other foodborne pathogens, such as *Salmonella*, and could be used at various points in beef supply processing to check for contamination.

Campylobacteriosis

Campylobacter jejuni, like *E. coli*, can cause severe cases of gastroenteritis (campylobacteriosis) and has been consistently listed as a pathogen of concern in relation to sludge management (U. S. Environmental Protection Agency 1985) despite a lack of information on its densities in sludges. This pathogen has ~~at times~~ outranked *Salmonella* as a leading cause of bacterial diarrhea (as in 1996), particularly in infants (Table E-2a). The reported incidence of gastroenteritis attributable to *C. jejuni* in California has ranged from ~~864~~ 6296 to ~~2,477~~ 8220 cases annually since ~~1993~~ 1990 (Table E-2a). ~~Most of~~ A large percentage of the cases ~~(81%)~~ were reported to have occurred in Los Angeles County. ~~No~~ Several hundred cases were reported in the three counties of the Central Valley where most of the biosolids land application occurs (see Chapter 5). Table E-1b shows the incidence rates for the various reporting entities.

Little has been reported in scientific literature about the levels of this pathogen in feces shed by ill people, its removal in treatment, levels in biosolids, infectious dose, or longevity in the environment (Feachem et al. 1980, U.S. Environmental Protection Agency 1985) as indicated in (Table 5-1 of Chapter 5).

[Note: draft EIR Table E-2 has been deleted and is being replaced by Tables E-2a and E-2b at the end of document.]

Salmonellosis and Typhoid Fever

The bacterial genus *Salmonella* consists of more than 2,000 known serotypes found in different reservoirs and locations, many of which are pathogenic to humans and other animals (Argent et al. 1977, 1981; Ayanwale 1980; Mishu et al. 1994). Ingestion of an infectious dose of *Salmonella* (usually a large number of bacteria is required, as shown in Table 5-1 in Chapter 5) can result in gastroenteritis, enteric fever, and/or septicemia. The two major disease syndromes associated with *Salmonella* are salmonellosis (gastroenteritis) and typhoid fever (enteric fever).

Salmonellosis. The major vehicle of salmonellosis is food (St. Louis et al. 1988, Mishu et al. 1994), although waterborne outbreaks have occurred. There are many zoonotic reservoirs for salmonellosis, including such domestic and wild animals as poultry, swine, cattle, rodents, dogs, cats, ~~turtles~~, and ~~tortoises~~ reptiles. Waterborne outbreaks of salmonellosis occur worldwide and are associated primarily with fresh water.

Salmonellosis is characterized by acute abdominal pain, diarrhea, nausea, fever, and dehydration and is sometimes accompanied by vomiting. The illness can lead to complications and more serious infections. Death is not common except in the very young, the very old, or the debilitated.

It has been estimated that 400,000 to 3.7 million cases (17.3 cases per 100,000) of salmonellosis (including foodborne and waterborne transmission) occur every year in the United States (EOA 1995), with as many as 70% of the cases being imported from foreign travelers. Between ~~1,010~~ 4739 and ~~1,894~~ 6544 cases have been reported yearly in California over the past ~~six~~ nine years (Table E-3a), with over ~~90~~ 25% of the total being reported in Los Angeles County. ~~No cases were reported to have occurred in those counties in the Central Valley where the highest amounts of biosolids are being land applied.~~ Table E-1b shows the incidence rates for the various reporting entities. The incidence rates for California counties are typical of those reported nationwide ranging from 0 - 151.7 cases/100,000 with the highest rates being found the rural counties with low populations where a single case makes a big difference. Central valley counties were biosolids use is extensive do not appear to have any higher rates in recent years than other localities.

Recent research on the causes of a *Salmonella* outbreak among chickens has raised concern about the importance of *Salmonella* in wastewater management and indicates the need for constant vigilance and monitoring of the effectiveness of management techniques and disinfection methods (Kinde et al. 1996, 1997). Concern also exists regarding the transmission of *Salmonella* from biosolids to animals (Jones et al. 1980; Argent et al. 1977, 1981) and the ability of the pathogen to survive under hostile environmental conditions (Droffner and Brinton 1995); this ability makes them the indicator of choice for monitoring the effectiveness of biosolids pathogen reduction (U.S. Environmental Protection Agency 1992). In developing the Part 503 regulations, the EPA based its requirements for pathogen reduction and its risk assessments for protection of public health on *Salmonella* because of its high incidence rates, its ability to regrow, and its correlation with coliform bacteria (about 1.4 *S. typhi* per million 100,0000 coliforms based on a morbidity rate of ~~0.18/million~~ 0.0018/100,0000 persons).

Typhoid Fever. Typhoid is transmitted via water or food contaminated by the feces or urine of a carrier. Fruits, vegetables, and milk contaminated by sewage or by the hands of carriers are also modes of transmission. The case-fatality rate for typhoid fever can reach 10% if symptoms go untreated; there are approximately 500 fatalities per year (0.2 per 100,000 deaths per year) in the United States.

[Note: draft EIR Table E-3 has been deleted and is being replaced by Tables E-3a and E-3b at the end of document.]

Shigellosis

The genus *Shigella* is made up of four species of rod-shaped bacteria that are all pathogenic in humans and other primates. The four species are characterized as groups or types: Group A, *S. dysenteriae* (10 serovars); Group B, *S. flexneri* (17 serovars); Group C, *S. boydii* (15 serovars); and Group D, *S. sonnei* (1 serovar). Shigellosis, an acute bacterial disease caused by *Shigella*, occurs worldwide, with outbreaks common under conditions of crowding and poor sanitation (i.e., jails, institutions for children, mental hospitals, crowded camps and ships). The reporting for the disease distinguishes between the four groups to help identify the sources and potential severity of the infection. From 1967 to 1988, annual isolation rates of *Shigella* reported to the Centers for Disease Control (CDC) varied between about 5 and 10 per 100,000 persons. It has been estimated that 5% of all symptomatic cases of shigellosis are reported to the national surveillance system. *Shigella* is considered the most highly communicable of the bacterial diarrheas; as few as 10 organisms have been reported to cause clinical illness (U. S. Environmental Protection Agency 1985).

For *S. dysenteriae* (Shiga bacillus) infection, case-fatality rates approach 20%; for *S. sonnei infection*, the infection is short-lived and the fatality rate is almost negligible, except in immunocompromised persons. Few cases are reported in California. The annual number of cases reported in the state ranges from ~~0~~ 24 to ~~17~~ 110 cases a year for Group A, ~~196~~ 770 to ~~796~~ 1957 for Group B, ~~2~~ 87 to ~~45~~ 232 for Group C, and ~~388~~ 1522 to ~~873~~ 3144 for Group D (Tables E-4a, E-5a, E-6a, and E-7a, respectively). Some ~~62–178~~ 572 - 817 cases a year were unidentified as to type (Table E-8a). ~~Overall, some 701 to 1,530 cases per year have been reported from 1993 to 1998.~~ Incidence rates for the counties in which cases were reported for the various types are shown in Tables E-4b, E-5b, E-6b, and E-7b. Reported incidence rates are low except for a few counties in urban areas or where remote outbreaks occur in the rural counties. None of these cases has been associated with biosolids.

Shigella spp. has in the past been the most common bacterial pathogen implicated in waterborne outbreaks in the United States, but its occurrence has declined over time (Moore et al. 1993). Shigellosis also has been implicated in outbreaks associated with recreational swimming (Blostein 1991, Sorvillo et al. 1988).

Shigellosis is transmitted via the fecal-oral route, directly or indirectly, primarily from person to person via contaminated food and water. In areas of poor sanitation, food and water may play a greater role in transmission. Flies have been shown to be a vector in the transmission of the disease (Dunaway et al. 1983).

The survival of *Shigella* in water, soils, and plants depends on factors such as temperature and the concentration of other bacteria, nutrients, and oxygen. In various studies, *Shigella* has been shown to survive for up to 22 days in well water and even longer in colder temperatures (47 days) and up to 135 days in permafrost soils of Siberia (EOA 1995).

One detailed review of the scientific literature performed by EOA (1995) found no *Shigella* outbreaks associated with water where the source met the coliform standards at the time of exposure.

[Note: draft EIR Tables E-4 to E-8 have been deleted and are being replaced, respectively, by Tables E-4a and E-4b, E-5a and E-5b, E-6a and E-6b, E-7a and E-7b, and E-8a and E-8b. All sets of tables appear at the end of document.]

Protozoan Diseases

Am~~o~~ebiasis

Am~~o~~ebiasis, an infection caused by the environmentally resistant pathogen *Entamoeba histolytica,* is acquired by mouth contact. Symptoms can vary from minor abdominal cramps to severe diarrhea alternating with constipation. The incidence of disease from this protozoan is low; between ~~127~~ 698 and ~~237~~ 1646 cases per year have been reported in California over the past ~~six~~ nine years (Table E-9a) with a general decline in the rate over time.. None of the reported cases have been associated with biosolids or wastewater management, however, most cases are not investigated t the extent to make a definitive association. ~~Over 94%~~ A majority of the reported cases in California were in Los Angeles County (including Long Beach and Pasadena), San Francisco and Santa Clara counties reflecting the size of the population and high number of travelers from these areas. This disease is associated often with travel in other countries, particularly in areas of Mexico. Incidence rates are shown in Table E-9b which show that San Francisco and Santa Barbara have experienced the highest reported rates in recent years.

[Note: draft EIR Table E-9 has been deleted and is being replaced by Tables E-9a and E-9b at the end of document.]

Crytosporidiosis

Cryptosporidiosis is a gastrointestinal infection that is caused by the protozoan *Cryptosporidium* spp. *Cryptosporidium* oocysts are shed by humans and animals in feces.

The infectious dose in humans is thought to be small; it is 10–400 oocysts in species other than humans. Little is known about the concentrations of viable oocysts in biosolids (Gerba pers. comm.) and the viability of oocysts in the environment, but oocysts are known to have the potential to survive months following their excretion (EOA 1995) and have the potential to survive more than a month following sludge treatment and land application (Whitmore and Robertson 1995). However, it has been found that conventional treatment and anaerboic digestion are effective in reducing the numbers of oocsysts in biosolids (Whitmore and Robertson 1995).

Modes of transmission for cryptosporidiosis include person-to-person contact, zoonotic transmission, and contaminated food and water. Person-to-person transmission is probably the most important mode and has been documented among family/household members, sexual partners, health workers and their patients, and children in day care centers. *Cryptosporidium* readily crosses host-species barriers as well, though, and human infections are often the result of zoonotic transmission. *Cryptosporidium* is harbored by more than 40 mammals. Reservoir hosts include calves, dogs, cats and rodents (Tzipori 1988).

Several waterborne outbreaks of cryptosporidiosis have been reported in the United States where the filtration component of water treatment was suboptimal (Milwaukee, for example - see below) (McKenzie et al. 1994). Cryptosporidiosis also has been associated with recreational use of swimming pools (Joce et al. 1991). Disease incidence in England associated with chlorinated water supplies and swimming pools indicates cryptosporidiosis resistance to chlorination (Furtado et al. 1998).

During a waterborne outbreak of cryptosporidiosis resulting from contamination of a public water supply that affected an estimated 13,000 people in Georgia, routine samples from the water system were found to meet EPA and State of Georgia standards for coliform bacteria (Robertson and Smith 1992). During another cryptosporidiosis outbreak associated with public water supply that led to an estimated 403,000 cases of diarrhea in Milwaukee, coliforms were not detected in samples of treated water (McKenzie et al. 1994). It should be noted that it is generally recognized that *Cryptosporidium* oocysts are removed or inactivated by effective and reliable water treatment practices where the water supply is not contaminated by dairy or pasture runoff (most often from flooding).

Cryptosporidium is found worldwide. Human cryptosporidiosis has been reported in at least 60 countries on six continents, with widely varying prevalence among those seeking medical care for diarrhea (EOA 1995). The prevalence is highest in non-industrialized regions: Europe,1% to 2%; North America, 0.6% to 4.3%; and Asia, Australia, Africa, and Central and South America, 3% to 20%. Seroprevalence rates in immunocompetent individuals are between 25% and 35% in the United States and are well over 50% in Latin America. Children generally have a significantly higher prevalence than adults, and infections are often seasonal, with a higher prevalence during warmer, wetter months.

No outbreaks associated with biosolids use have been reported in scientific literature or with the health agencies consulted during the preparation of this EIR. This disease is rare, with ~~31~~ 311 to ~~212~~ 6141 cases a year reported in California for both types of Cryptosporidiosis, ~~none~~ few of which are from areas where biosolids have been land applied (Tables E-10a and

E-11a). Tables E-10b and E-11b show the incidence rates fo the two types of Cryptosporidiosis which have been their highest in remote Sierra County and in the San Francisco area and otherwise are quite low.

[Note: draft EIR Tables E-10 and E-11 have been deleted and are being replaced, respectively, by Tables E-10a and E-10b, and E-11a and E-11b at the end of document.]

Giardiasis

Giardia lamblia is a protozoan that principally infects the upper small intestine in humans, who can often be asymptomatic. *Giardia* infection, or giardiasis, manifests itself in the form of chronic diarrhea, abdominal cramps, weight loss, and fatigue that can last for months with relapses. It can progress to cause malabsorption syndrome, in which digestion is impaired and weight loss occurs. Certain immunodeficiency syndromes also may be associated with *Giardia* infection, and the infection is particularly devastating in immunocompromised persons. Carriers can shed *Giardia* for years, but a self-cure usually occurs within 2 to 3 months. The numbers of *Giardia* cysts shed in feces are highly variable but have been measured to be as high as 900 million per day (Feachem et al. 1983).

Before leaving the intestine, *Giardia* generally forms a resistant cyst, which is highly resistant to traditional disinfection techniques (EOA 1995). The cysts can remain viable in water for several months and can remain viable in soils as well, but cannot tolerate freezing (EOA 1995). It has been found that the presence of traditional bacterial indicators does not correlate with the presence of cysts, particularly in unfiltered but disinfected drinking water (EOA 1995). Negative coliform tests do not provide assurance that water is free of *Giardia* cysts; however, positive coliform results often correlate with *Giardia* outbreaks (EOA 1995).

The major reservoir of *Giardia* is humans, but there is evidence that humans may acquire infections from other animals. Beavers may be a reservoir and have been implicated in waterborne outbreaks (EOA 1995). Dogs, gerbils, guinea pigs, beavers, raccoons, bighorn sheep, and muskrats have all been shown to be carriers of *Giardia* (EOA 1995).

Giardia infection is transmitted through contaminated water supplies, foodborne outbreaks, and person-to-person contact, with the later being the most prevalent means of transmission. Individuals with impaired immune function appear to have increased susceptibility to *Giardia* infection.

The numbers of *Giardia* cysts in biosolids have been estimated to range from 10 to 10^3 per gram with no removal via treatment. However, significant viability reduction occurs during digestion, estimated in laboratory studies to be as high as 99.9% inactivation (Straub et al. 1993, Cravaghan et al. 1993). Class A treatment requires that treated biosolids contain less than one protozoan cyst per gram. For Class B sludge generated in Australia, it has been found that anaerobically digested and mechanically dewatered sludge had cysts present at levels of public health concern after 1 year, but that cysts were destroyed after only 12 weeks following soil amendment (Hu et al. 1996).

Giardia is found worldwide. The prevalence of *Giardia* infection worldwide has been estimated to be about 7%, and infection is more common in children than adults. Prevalence rates vary between less than 1% and 50% and depend on the population sampled, infection rates being highly dependent upon sanitation and the quality of drinking water. Areas of the United States known to be associated with increased risk of infection are usually mountainous and include New England, the Pacific Northwest, and the Rocky Mountains.

The number of cases reported in California is variable, ranging from ~~510~~ 4029 to ~~1,335~~ 7850 per year (Table 5-6 in Chapter 5) and Table E-12a. The incidence in California is the highest in Los Angeles County.~~, where more than 88% of the cases were reported.~~ The number of ~~No cases were~~ reported in Kern, Merced, and Kings Counties, where the majority of the biosolids application currently occurs (Table E-12a) have shown a slight declining trend and moderate incidence rates. No cases of the illness associated with biosolids operations have been reported (Cook and Shaw pers. comms.). Overall incidence rates are highly variable as shown in Table E-12b.

[Note: draft EIR Table E-12 has been deleted and is being replaced by Tables E-12a and E-12b at the end of document.]

Viruses

Hepatitis A

The hepatitis A virus (HAV) is a virus physically resembling an enterovirus that causes hepatitis A, an illness with the symptoms of fever, nausea, malaise, anorexia, and abdominal discomfort, followed by jaundice. The disease can be mild, lasting 1 to 2 weeks, or severe, with disabling effects lasting months in rare cases. The recovery period is usually prolonged. The case-fatality rate has been reported to range from 0.04% in children 5–14 years old to 2.7% in adults over 49 years old, with typical case-fatality rates of 0.1–0.5%. Relapse rates can be as high as 20%. Hepatitis A can be diagnosed by the detection of virus in the stool or the presence of IgM antibodies against HAV in the serum of persons who are acutely ill. There is currently no specific treatment for HAV.

The normal reservoir of HAV is acute-phase humans; there is no known carrier state. Mode of transmission is via the fecal-oral route, with person-to-person transmission being the most frequent means of transmission, usually via water or food. HAV can survive for long periods on inanimate objects and on human hands; therefore, food contamination by infected persons is a major area of concern. In the United States, waterborne outbreaks have been estimated to contribute 0.4%–8% of all HAV incidence, and no waterborne disease outbreaks have been shown to have been directly associated with biosolids. The majority of waterborne outbreaks in the United States involve small private or semiprivate water supplies with or without chlorination; these outbreaks are usually attributable to plumbingsewage cross-contamination or to a raw-water source being so grossly polluted with sewage that virus levels cannot be eliminated by treatment of the water using conventional methods. The infectious dose is estimated to be in the range of 1 to 10 plaque-forming units (PFUs).

Little is known about persistence of hepatitis A in the environment. Survival in water has been recorded for as long as 40 days in surface waters and 70 days in groundwaters (EOA 1995). Levels in biosolids have not been reported in anaerobically digested sludge.

There is no known direct correlation between HAV and indicator organisms such as coliform bacteria, fecal streptococci, acid-fast bacteria, or coliphage.

Hepatitis A has a worldwide distribution. Since 1920 in the United States, there have been about 15 reported outbreaks of HAV associated with drinking water, most of which are reported from areas with poor sanitation or contaminated water supplies (Singh et al. 1998). In California, the number of Hepatitis A cases has ranged from ~~474~~ 4197 to ~~1,415~~ 6773 annually over the past ~~eight~~ nine years (Table E-13a) with a relatively variable incidence rates (Table E-13b) in individual areas with only a few cases contributing to high rates in the smaller counties (Del Norte, Sierra, and Humbolt counties).

Incidences in counties where biosolids are being land applied have not increased since land application was intensified in recent years, and no cases have been reported in most instances in the past ~~seven~~ nine years. None of the cases reported can be related to the handling or use of biosolids.

[Note: draft EIR Table E-13 has been deleted and is being replaced by Tables E-13a and E-13b at the end of document.]

Viral Meningitis

"Viral meningitis" is the general term that refers to all serious viral diseases (not gastroenteritis of unknown origin) that have been reported. Included as causative agents and reportable as viral meningitis are the Coxsackievirus A and B, Echovirus, and new enteroviruses (acquired orally). It is unknown how many viruses cause gastroenteristis and flu-like symptoms that are unreported. The reportable cases of viral infections have ranged from ~~119~~ 1146 to ~~485~~ 3648 per year (Table E-14a). Most of the cases are reported in the more urbanized counties and the numbers of reported cases are largely proportional to population. ~~Only two~~ Recent years have shown a decline in the number of reported cases in Kern County where large-scale land application is presently practiced. ~~cases have been reported in the three largest land application areas, both in Kern County.~~ There is no reported information indicating ~~evidence~~ that any of the cases are associated with biosolids land application operations. Incidence rates over time have been highly variable in most areas and generally moderate as shown in Table E-14b.

[Note: draft EIR Table E-14 has been deleted and is being replaced by Tables E-14a and E-14b at the end of document.]

Gastroenteritis

Gastroenteritis is a widespread disease that can be caused by numerous known and unknown viral agents. Person-to-person transmission is the principal mechanism for the spread of many infections; therefore, the most important element in preventing and controlling outbreaks is improved environmental hygiene (i.e., food, water, and sanitation).

When foods other than shellfish are implicated in viral gastroenteritis outbreaks, the contamination has usually taken place near the point of consumption (shellfish are not discussed in this EIR because of the nature of the project). Ill food handlers were identified in nine of the 15 documented Norwalk outbreaks reported to the CDC from 1985 to 1988 for which adequate epidemiologic data were available (Centers for Disease Control unpublished data). Foods that require handling and no subsequent cooking (e.g., salads) constitute the greatest risk. Among Norwalk-confirmed foodborne outbreaks from 1976 to 1980 that were not attributable to shellfish, salad was the most commonly implicated food (Centers for Disease Control 1999).

The long list of foods implicated in outbreaks of viral gastroenteritis reflects the variety of foods handled by food-service personnel and the low infectious dose (10–100 particles) of most viral agents of gastroenteritis. In contrast to the factors important in amplifying bacterial contamination, practices such as leaving foods unrefrigerated or warming them for prolonged periods are not direct risk factors for increased viral transmission because the viruses do not multiply outside the human host.

The Norwalk agent can remain infective even if frozen for years or heated to 60EC for 30 minutes. Cooking temperatures at 100EC or above are probably adequate to inactivate Norwalk and most other enteric viral pathogens.

Outbreaks of viral gastroenteritis have been associated with various sources of contaminated water, including municipal water, well water, stream water, commercial ice, lake water, and pool water (Centers for Disease Control 1999). Disinfection of municipal supplies may not be adequate to kill the Norwalk agent, which can remain highly infective despite 30-minute exposure to concentrations of chlorine as high as 6.25 milligrams per liter (mg/l) and levels of 10 mg/l (Centers for Disease Control 1999); this helps explain why this virus is predominant in waterborne disease outbreaks. Rotavirus, for which only one waterborne outbreak has been documented in the United States, is more sensitive to chlorine than the Norwalk agent.

Because rotaviruses can survive for several days on nonporous materials in conditions of low temperature and humidity, objects may contribute to their transmission. A recent study of a Norwalk viral outbreak on a cruise ship implicated toilets shared between staterooms as a risk factor for infection, suggesting that surfaces contaminated by Norwalk particles from spattered or aerosolized material may play a role in transmission of Norwalk-like viruses causing gastroenteritis.

Aerosolized rotavirus has also been observed to cause~~d~~ diarrheal illness in experimental mice. Studies are needed to address the efficacy of barrier precautions (e.g., face shields, respirators) in interrupting transmission of these agents (Centers for Disease Control 1999).

Contaminated hands (hands contaminated directly or through contact with contaminated surfaces) may be the most important means by which enteric viruses are transmitted; thus, any people involved with biosolids should avail themselves of handwashing with soap on a routine basis to control the spread of all enteric pathogens.

Nearly all the agents of viral gastroenteritis in humans have related strains that can cause diarrhea in animal species. These strains appear to be highly host-specific, however, and zoonotic transmission has not been documented as having an important role in human disease, either endemically or in outbreaks.

Acquired Immune Deficiency Syndrome (AIDS/HIV Virus)

No discussion of viruses would be complete without a discussion of acquired immune deficiency syndrome (AIDS), which is caused by HIV (human immunodeficiency virus). It is noteworthy that HIV has never been recovered from wastewater samples into which it has not been artificially introduced (Ansari et al. 1992, Casson et al. 1992, Moore 1993). Researchers have recovered viral nucleic acid fragments in wastewater but none in biosolids (Preston et al. 1991). However, the detection of nucleic acid sequences does not represent the presence of viable HIV. No intact HIV has been recovered from either raw sewage or biosolids. The CDC contends that wastewater treatment professionals, as well as members of the public who may contact wastewater or biosolids, are not at risk of contracting AIDS as a result of this contact (Centers for Disease Control 1999).

Parasitic Worms

Several parasitic intestinal worms are found in wastewater (Straub et al. 1993, ABT Associates 1993). These parasites are a potential hazard to the public health in general and to treatment plant and biosolids workers in particular. The beef tapeworm (*Taenia saginata*) can cause taeniasis if ingested with poorly cooked meat. Tapeworm eggs are detectable in biosolids, but there is no evidence that they have contributed to distribution of the disease except in one reported case discussed below.

Toxoplasmosis

Toxoplasmosis is a very rare disease that affects only unborn fetuses. The disease is derived from cat feces. As shown in Table E-15a, between 9 and ~~42~~ 192 cases per year have been reported in California, ~~none~~ one of which were in areas (Merced County) where biosolids are being extensively land applied. ~~All cases but one~~ A majority of the cases were in Los Angeles County except for an outbreak in San Francisco in 1990 where 148 cases were reported that year~~; the exception was in San Diego County~~. Incidence rates for this disease are very low as shown in Table E-15b.

[Note: draft EIR Table E-15 has been deleted and is being replaced by Tables E-15a and E-15b at the end of document.]

Roundworms

Ascariasis is caused by the presence of roundworms (*Ascaris lambricoides*) in the intestinal tract. The disease results from the ingestion of roundworm eggs, which survive for months to years in biosolids (Table 5-1 in Chapter 5) and were a primary focus of the EPA Part 503 regulation risk management practices. This disease ~~is rare and is not reported.~~ occasionally occurs and is not a reportable disease in California.

Hookworms

Hookworm disease, rare in California but still present in the southeastern United States, is generally acquired when the larvae of *Necator americanus* enter through the bare skin, usually the feet. Infections also have occurred following ingestion of foods contaminated by wastewater. No cases of transmission related to biosolids land application have been reported. Symptoms include malnutrition, loss of energy, and anemia. This disease is rare and has not been reported in the past 6 years.

Tapeworms

There are two species of tapeworms (*Taenia saginata* [beef] and *T. solium* [pork]) that live in the intestinal tract, where they can cause abdominal pain, weight loss, and digestive disturbances (Straub et al. 1993). Humans serve as the definitive host for the adults, and the eggs, which are passed in feces, may not be completely destroyed by all sludge treatment processes (Feachem et al. 1983), thus leading to the potential for their application to land in biosolids. If cattle graze on this land and ingest viable larvae, the disease may be transmitted to cattle. Humans have to become infected from eating incompletely cooked meat containing the larval stage of the tapeworm. A single recorded case of beef tapeworm transmission through the fertilization of land with untreated sludge has been reported in the United States; this case was reported more than 20 years ago, however, before the development of the Part 503 regulations and the improvements in treatment mandated under the Clean Water Act (Hammerberg et al. 1978).

Tapeworm infections are relatively rare in California; a maximum of ~~14~~ 46 cases per year have been reported when an outbreak of 27 cases was reported in Santa Clara County ~~all in Los Angeles County~~ (Table E-16a). A single case was reported in Kern County in 1997. Incidence rates for this diseare are very low as shown in Table E-16b.

[Note: draft EIR Table E-16 has been deleted and is being replaced by Tables E-16a and E-16b at the end of document.]

Fungal Diseases

Fungal pathogens include several species that have been identified in biosolids, as listed below.

Fungal Species	Disease
Aspergillus fumigatus	Aspergillosis
Candida albicans	Candidiasis
Cryptococcus neoformans	Subacute chronic meningitis
Epidermophton spp. and *Trichophyton* spp.	Ringworm and athlete's foot
Trichosporon spp.	Infection of hair follicles
Phialophora spp.	Deep tissue infections

Most of these fungal species have been found associated with composting operations, where they are enhanced by the favorable conditions created (wood chips and heat).

Aspergillosis is illness caused by the *Aspergillus* fungus, which is found commonly growing on dead leaves, stored grain, compost piles, or other decaying vegetation. The fungus can cause illness in three ways: as an allergic reaction in people with asthma (pulmonary aspergillosis, allergic bronchopulmonary type); as a colonization in an old lung cavity that has healed from previous disease such as tuberculosis or in a lung abscess, where it produces a fungus ball called aspergilloma; and as an invasive infection with pneumonia that is spread to other parts of the body by the blood stream (pulmonary aspergillosis; invasive type). The invasive infection can affect the eye, causing blindness, and any other organ of the body, but especially the heart, lungs, brain, and kidneys. The third form occurs almost exclusively in people whose immune systems are suppressed by high doses of cortisone drugs, chemotherapy, or a disease that reduces the number of normal white blood cells. Those at risk include organ transplant recipients and people with cancer, AIDS, or leukemia (Rosenberg and Minimato 1996).

The A*spergillus* group of fungi is generally less prevalent than other fungal species, but it can be pathogenic to people under conditions of high exposure. Normal background levels of *Aspergillus fumigatus* outdoors rarely exceed 150 spores per cubic meter.

Composting facilities do represent sites where there occurs a massive culturing of *Aspergillus fumigatus* organisms in relatively small areas compared with most "natural" or background circumstances. Studies have found concentrations of *A. fumigatus* 10 times higher than background levels in active commercial composting facilities, but the concentrations fell off sharply within 500 feet of the operational site (Clark et al. 1983) If the nearest human receptor is beyond the point at which concentrations fall to background levels, no elevated exposure is occurring.

The use of bark or wood chips (e.g., as a bulking agent for sewage sludge composting) typically raises the onsite level of airborne *A. fumigatus* spores (Millner et al. 1977, 1980; Clark et al. 1983). In one study in Maryland, *A. fumigatus* levels in sewage sludge rose from 10^2 or 10^3 colony forming units per gram dry weight (CFU/gm dry wt) to 2.6 x 10^6 to 6.10 x 10^7 CFU/gm dry wt when mixed with wood chips that were stockpiled for various lengths of time. The increase appeared to be caused by wood chips being stored in moist piles that were allowed to generate heat (Millner et al. 1977).

Increased *A. fumigatus* spore concentrations have been observed also in screened compost; the concentrations may have been increased as a result of reinoculation by spores as compost passed through contaminated screens multiple times (Olver 1979); others have suggested that multiple screenings may break up spore clusters, causing more spores to be released.

Numerous researchers (Raper and Fennel 1965; Sinski 1975; Olver 1979; Epstein and Epstein 1985, 1989; Maritato et al. 1992; Epstein 1993) have presented persuasive arguments regarding the lack of health risk from *A. fumigatus* for certain outdoor workplace environments. In enclosed compost facilities without dust control, there is an elevated risk of worker exposure to spores. In a worst-case scenario, a respiratory model developed by Boutin et al. (1987) estimated that a completely unprotected worker shoveling mature compost at a highly contaminated site could inhale 25,000 to 30,000 viable spores per hour. However, elevated exposure is not automatically synonymous with an elevated health risk for compost workers (or neighboring communities). Epstein (1993) discusses several composting facilities in the United States in which health monitoring (physical examinations) of compost workers has been conducted; the results of the physical examinations did not reveal any illnesses directly associated with composting.

Many public health specialists, scientists, and engineers in North America and Europe believe that properly operated composting and co-composting operations present little health risk to normal compost facility employees and present a negligible risk or no risk to nearby residences (Millner et al. 1977, Clark et al. 1983, Epstein and Epstein 1985, Boutin et al. 1987, Maritato et al. 1992). Diaz et al. (1992) stated:

> The existence of hazard from the spores of *A. fumigatus* [at commercial composting facilities] is yet to be demonstrated. The infectivity of the spores is low. Consequently, any danger posed by it would be of significance only to the unusually susceptible individual. Nevertheless, use of respirators by workers and the siting of such facilities in areas remote from residential dwellings and areas where potentially sensitive receptors work of live is warranted as a prudent land use planning practice.

Reducing the dispersal of *A. fumigatus* spores appears to be the best way to reduce exposure and help protect the health of compost workers and the neighboring communities. The following management practices can help reduce the dispersal of spores into the air during commercial aerobic composting operations (whether they involve windrows, aerated static piles, or the various types of in-vessel reactors— vertical, horizontal, or rotating drum):

- suitable siting, design, and construction (berms, vegetation, etc.) of composting facilities;

- implementation of facility operational practices such as dust suppression, modification of time of operation, etc.);

- engineering and administrative controls (enclosed cabs, use of amendment materials, health checks for workers); and

- use of personal protective equipment (respirators or protective masks).

The California Integrated Waste Management Board's current green waste composting regulations require a setback of at least 300 feet of the facility's active compost materials areas from any residence, school, or hospital, excluding onsite residences, unless a variance is granted from the local enforcement agency. More stringent requirements can be applied where there are sensitive receptors; high winds; or other factors related to health risks, such as the health status of the community potentially affected.

Pathogens of Emerging Concern

Research techniques continue to be developed for determining the pathogenic microorganisms responsible for human and animal disease outbreaks. New genetic techniques and electron microscopy have improved our ability to detect and identify pathogens, particularly new viruses. Because approximately 50% of all cases of gastroenteritis are of unknown origin, such research is vital to development of our understanding of disease and disease prevention.

This section describes the results of a literature review of recent outbreaks of disease (worldwide) undertaken to identify some of the emerging pathogens and their possible modes of transmission. Emerging pathogens are organisms responsible for new, reemerging or drug-resistant infections whose incidence in humans has increased within the past two decades or whose incidence threatens to increase in the near future. Included are such pathogens as *E.coli* O157:h7 and *Cyclospora* which have caused several outbreaks in California. The results of this search are summarized in Tables E-17 and E-18 for bacteria and viruses, respectively. Table E-19 provides information on parasites. None of these potential pathogens of concern have yet been identified with the use or handling of biosolids. Most outbreaks are associated with poor sanitation or food preparation and handling or drinking of contaminated water.

The patterns of incidence and pathways of spread for various pathogens are poorly understood. Epidemiological studies have revealed some interesting findings with regard to crytposporidiosis that show how incidence of disease and causative factors are difficult to identify: evaluation of health records and water treatment plant records revealed that outbreaks of cryptosporidiosis were occurring in Milwaukee for more than a year before the large documented outbreak in 1993 (when high runoff occurred, the water treatment plant turbidity levels became very high, and treatment levels declined) (Morris et al. 1998).

Table E-17. Bacterial Pathogens of Emerging Concern

Pathogen	Disease	Source	Environmental Sources	Outbreaks Reported	Literature
Aeromonas spp. (332 types)	Gastroenteritis	Pigs, chickens, ground beef, human feces, fish, milk, vegetables	Drinking water, fresh water, and wastewater	None from biosolids	Wadstrom and Ljungh 1991, Hanninen and Siitonen 1995
Pleisomonas shigelloides	Gastroenteritis	Seafoods	Contaminated seawater	None from biosolids	Wadstrom and Ljungh 1991
Hepatitis E	Hepatitis	Human feces	Sewage-contaminated water supply	None from biosolids; water related only.	Singh et al. 1998
Helicobacter sp.	Unknown	Wastewater, treated water, well water	Contaminated supplies	None from biosolids	Hulten et al. 1998
Salmonella enteritidis PT6	Salmonellosis	Eggs	Foodborne contamination	None from biosolids	Evans 1998, St. Louis et al. 1988, Mishu et al. 1994
Salmonella enteritidis PT4	Salmonellosis	Wastewater to mice to chickens	Treated secondary effluent discharged to surface water	None from biosolids	Kinde et al. 1996, Kinde et al. 1997

Table E-18. Viral Pathogens of Emerging Concern

Pathogen	Disease	Source	Environmental Sources	Outbreaks Reported	Literature
Adenoviruses 40 and 41	Gastroenteritis	Humans	Unknown	None from biosolids	Enriques et al. 1995
Human torovirus	Gastroenteritis and diarrhea	Children	Unknown	None from biosolids	Jamieson et al. 1998
Picobirnavirus	Diarrhea	Adults and children, chickens, rabbits	Unknown	None from biosolids	Cascio et al. 1996; Chandra 1997; Ludert et al. 1995; Gallimore et al. 1995a, 1995b
Coxsachieviruses (new serotypes)	Association with diabetes mellitus	Children	Fecal-oral contact	None from biosolids	Roivainen et al. 1998
Small round structured virus (SRSV)	Influenza	Infants, children, elderly	Unknown	None from biosolids	Dedman et al. 1998
Norwalk-like virus (calicivirus)	Unknown	Pigs	Unknown	None from biosolids	Sugieda et al. 1998
Swine HEV (hepatitis E virus in pigs)	Unknown	Pigs	Unknown	None from biosolids	Meng et al. 1998
Torovirus-like particles related to Berne virus, BEV, and Breda virus (BRV)	Gastroenteritis	Humans, horses, and cattle	Unknown	None from biosolids	Duckmanton et al. 1997

Table E-19. Other Parasitic Pathogens of Emerging Concern

Pathogen	Disease	Source	Environmental Sources	Outbreaks Reported	Literature
Mircrosporidia	Gastroenteritis	Unknown	Unknown	None from biosolids	Johnson and Gerba 1997
Crytosporidium (Genotypes 1 and 2)	Gastroenteritis and diarrhea	Cattle	Unknown, water supply, swimming pools	None from biosolids	Patel et al. 1998, Furtado et al. 1998

Parasitic Microsporidians

Microsporidia are protozoan parasites that can infect humans and cause chronic diarrhea; they are of particular concern because of their being found in patients with AIDS (Johnson and Gerba 1997). They have only recently been discovered (seven species discovered so far) and identified as potential human pathogens, and only recent research indicates that they can be measured in environmental samples (water and wastewater) (Dowd et al. 1998). They are similar to other protozoan parasites such as *Giardia* and *Cryptosporidium* because of their small size, ability to infect different mammals, and spread through the environment; these characteristics, combined with their ability to form spores resistant to heat inactivation and drying, make them a pathogen of emerging concern with a potential to be waterborne (Johnson and Gerba 1997).

Rotaviruses

Rotaviruses are small RNA viruses that have been found to be associated with gastroenteritis in humans and a wide range of animal species (De Leon and Gerba 1990). It has yet to be shown that animal rotaviruses are pathogenic for man; furthermore, there is no evidence for species cross-infection in nature (Conklin 1981). The human rotavirus has two serotypes. Rotavirus has been associated with as many as 50% of hospitalized cases of diarrheal illness in infants and young children (EOA 1995).

Rotavirus gastroenteritis occurs worldwide both in sporadic and epidemic outbreaks. The primary targets are infants and children, particularly in the 6- to 24-month age group. Cases in adults are relatively infrequent but have been reported, mainly in countries other than the United States (EOA 1995). The most common route of rotavirus transmission is the fecal-oral route, with person-to-person transmission being the most frequent. Most individuals have acquired antibodies to both serotypes of rotavirus by the age of 2 and are therefore protected from the disease as they grow older.

In the United States, rotavirus infections are responsible for 100,000 hospitalizations per year (EOA 1995).

Rotavirus has been isolated from untreated drinking water, treated drinking water, and various foods, but the occurrence of infections from these sources has been rare (De Leon and Gerba 1990). There have been only two occurrences in the United States and these have been traced to improperly treated water (EOA 1995). No cases have been attributed to biosolids.

Rotavirus is persistent in the environment and can survive for as long as 10 days in raw fresh water and as long as 64 days in municipal treated tap water (free chlorine = 0.05 mg/l) (EOA 1995). Rotavirus has been shown to survive more than 14 days in estuarine and heavily polluted fresh water (EOA 1995). Rotavirus can survive as long as 2 weeks on inanimate surfaces, the length of survival depending on relative humidity and temperature (EOA 1995). The length of survival of rotavirus, together with its low infectious dose, leads to concerns over its possible presence in biosolids (Table 5-2 in Chapter 5). No cases of infection have been attributed to biosolids, however.

Other Viruses

Research continues to reveal the presence of previously unknown viruses that may play an important role in the large number of gastroenteritis cases of unknown origin. Among the new discoveries about which little is known are the human toroviruses (Duckmanton et al. 1997, Koopmans et al. 1997, Jamieson et al. 1998), picobirnaviruses (Gallimore et al. 1995a, 1995b; Chandra 1997), coxsachieviruses, small round structured viruses (SRSV) (Dedman et al. 1998), caliciviruses, Norwalk-like viruses (Sugieda et al. 1998), hepatitis E virus (Meng et al. 1998), Berne and Breda virus (also of animal origin), and adenoviruses. Table E-18 summarizes information on these viruses, their potential sources, and their reporting in scientific literature. Little is known about their transmission, epidemiology, environmental fate, or presence in biosolids or wastewater. However, their reporting is noted here as an indication that new pathogens continue to be discovered and that constant assessment of existing management practices is needed to ensure that biosolids are not contributing to the spread of disease. To date, no evidence indicates that they are.

Picobirnaviruses are a novel group of viruses recently found in the feces of several species of vertebrates. They have been detected in the feces of humans suffering from cryptosporidiosis and, although they have not been associated with any outbreaks attributable to water or food, are a pathogen of emerging concern. The prevalence of picnovirus in those studied in the United Kingdom was found to be 9%-13% in a wide range of patients (ages 3 to more than 65) in those both with and without the symptom of gastroentiritis (Gallimore et al. 1995b). No outbreaks caused by these viruses have been reported in the United States.

Toroviruses alone or in combination with enteroaggregative *E. coli* may play a pathogenic role in acute and possibly persistent diarrhea in children. Further studies are warranted to determine the etiologic role of toroviruses in gastroenteritis.

Other Diseases

Bovine Spongiform Encephalopathy

Well-publicized news reports in 1996 suggested that consumption of beef from diseased cattle in Britain may have caused a fatal human brain disease (Floyd 1996, Pattison 1998). The condition in the British cattle, commonly referred to as “mad cow disease” in these reports, is a disease called bovine spongiform encephalopathy, or BSE. Cattle with BSE have a degenerative brain condition that develops slowly over a 2- to 8-year period. BSE is similar in its effects on the cattle brain to other spongiform encephalopathy (SE) diseases in the brains of other animals. These include Kuru and Creutzfeldt-Jacob disease (CJD) in humans, scrapie in sheep, transmissible mink encephalopathy (TME), chronic wasting disease of mule deer and elk, feline spongiform encephalopathy (FSE), and a few others. Experimental studies have demonstrated that animals can contract some of the SE diseases by ingesting nervous system tissues (brain, spinal cord, etc.) from affected animals. It is suspected (although there is still much debate) that the causative agent in the SE diseases may be a prion, or a filterable glycoprotein devoid of detectable nucleic acid that is resistant to typical means of sterilization (Pattison 1998). These agents have survived 3 years of burial in outside soil and heating to high temperatures. An unidentified virus is also theorized as a cause.

BSE was first seen and diagnosed in Britain in 1986. It may have arisen as a result of rendered sheep byproducts being fed to cattle as protein supplements. Some of these sheep may have been infected with scrapie, an SE disease that has been known for more than 200 years. The number of BSE cases increased to a peak of about 1,000 new cases per weak by January 1993 and then began to decrease. The epidemic may have worsened because initially it was possible for cattle that had been affected with BSE to be rendered into protein supplements for other cattle. The British government banned feeding of ruminant-derived animal proteins to other ruminants in 1989. Because of the 2- to 8-year “incubation” period of development of BSE, cases continued to occur after this ban went into effect. In any event, the number of cases has decreased significantly and continues to decrease as a result of regulatory interventions, such as the offal feeding ban, which is now effectively applied.

Muscle tissue and milk have not been demonstrated to transmit BSE, but brain and spinal cord tissue have. Therefore, steps taken in Britain to ensure that nervous tissues from cattle do not enter the human food supply should effectively prevent any transmission; it is unknown whether such transmission ever actually occurred. These steps also have been taken in the United States.

To prevent the possibility of BSE entering the country, in 1989 the United States banned imports of live cattle and zoo ruminants from the United Kingdom and any country with BSE; imports of sheep and goats from the United Kingdom had already been banned because of scrapie.

No case of BSE has been diagnosed in the United States, despite aggressive efforts on the part of the U.S. Department of Agriculture and other surveillance programs for BSE.

Included in the search are examinations at the National Services Veterinary Laboratory of the brains of cattle diagnosed with nervous system disease (postmortem microscopic examination of brain tissue) and periodic examinations of all live cattle in the United States that came from the United Kingdom before the import ban was instituted.

No research has been conducted to measure the presence of prions in the environment and there are no known means of measurement. Gale (1998) assessed the likelihood of prions being a risk if water from an aquifer were contaminated by a cattle-rendering plant discharging effluent to the aquifer, and found the risk of infection to be in the range of 1 in 100 million to 1 in 1 billion. Because the disease is not present in the United States, such an analysis provides further assurance that this disease represents a minimal threat to public health.

Part 2. EPA Part 503 Risk Assessment for the Land Application of Sewage Sludge

The EPA conducted extensive risk assessments for application of sewage sludge onto agricultural land and nonagricultural land (i.e., forest land, reclamation !and, and public contact sites). These assessments, based on a number of different exposure pathways and various “worst-case” (highly exposed individual or HEI) exposure assumptions, formed the basis for the sewage sludge pollutant loading limits specified in Section 503.13 of 40 CFR Part 503 Standards for the Use or Disposal of Sewage Sludge and used as minimum requirements in the SWRCB General Order (GO). The risk assessments and all the calculations and assumptions used are described in detail in technical support documents (U. S. Environmental Protection Agency 1992, Volumes 1 and 2).

Risk assessments were conducted for 14 exposure pathways for agricultural land and 12 exposure pathways for nonagricultural land. Pathway 2, human toxicity from ingesting plants grown in the home garden, and pathway 11, human exposure through inhalation of particulates resuspended by tilling of sewage sludge, were not analyzed for nonagricultural application because these are not appropriate exposure scenarios for nonagricultural land. These pathways are described in Table E-20.

The EPA assembled a national peer review committee of 35 recognized academic, government, and private industry experts in the field of sludge application to land for 10 of the risk assessments (pathways 1-10). This committee critically evaluated the methodology and data used to assess risk as part of developing criteria for land application of potentially toxic chemicals in municipal sewage sludge. The EPA’s Office of Water conducted the risk assessment for pathway 11. The risk assessments for pathways 12, 13, and 14 were conducted for the EPA by the consulting firm ABT Associates (ABT Associates 1993).

Charles Henry of the University of Washington conducted thc risk assessments for pathways 1 through 10 for nonagricultural land (except for pathway 2 for home gardening). Pathways 12, 13, and 14 are identical for agricultural and nonagricultural land, so ABT Associates’ assessment of agricultural pathways 12, 13, and 14 was also used for the nonagricultural pathways (U.S. Environmental Protection Agency 1992).

In undertaking the assessments, the EPA relied on numerous assumptions and decisions regarding the data to be used and what the exposure evaluations were to be based on. It was decided to use the concept of the highly exposed individual (HEI) as a target organism to be protected by the limits on individual pollutants. Depending on the pathway of exposure, the HEI could be a human, plant, animal, or environmental end point, such as surface water or groundwater, and is assumed to remain for an extended period at or adjacent to the site where the maximum exposure occurs.

Table E-20. Environmental Pathways of Concern
Identified for Application of Sewage Sludge to Agricultural Land

Pathway	Description of Highly Exposed Individual
1. Sewage Sludge-Soil-Plant-Human	Human ingesting plants grown in sewage sludge-amended soil
2. Sewage Sludge-Soil-Plant-Human	Residential home gardener
3. Sewage Sludge-Human	Children ingesting sewage sludges
4. Sewage Sludge-Soil-Plant-Animal-Human	Farm households producing a major portion of the animal products they consume; it is assumed that the animals eat plants grown in soil amended with sewage sludge
5. Sewage Sludge-Soil-Animal-Human	Farm households consuming livestock that ingest sewage sludge while grazing
6. Sewage Sludge-Soil-Plant-Animal	Livestock ingesting crops grown on sewage sludge-amended soil
7. Sewage Sludge-Soil-Animal	Grazing livestock ingesting sewage sludge
8. Sewage Sludge-Soil-Plant	Plants grown in sewage sludge-amended soil
9. Sewage Sludge-Soil-Soil Organism	Soil organisms living in sewage sludge-amended soil
10. Sewage Sludge-Soil-Soil Organism-Soil Organism Predator	Animals eating soil organisms living in sewage sludge-amended soil
11. Sewage Sludge-Soil-Airborne Dust-Human	Tractor operator exposed to dust while plowing large areas of sewage sludge-amended soil

Pathway	Description of Highly Exposed Individual
12. Sewage Sludge-Soil-Surface Water-Human	Person who consumes 0.04 kg/day of fish and 2 liters/day of water.
13. Sewage Sludge-Soil-Air-Human	Human breathing volatile pollutants from sewage sludge
14. Sewage Sludge-Soil-Groundwater-Human	Human drinking water from wells contaminated with pollutants leaching from sewage sludge-amended soil to groundwater

The risk-based models developed for the Part 503 regulations were designed to limit potential exposure of an HEI. Originally, in the 1989 proposed Part 503 rule, the concept for "worst-case" exposure was based on the "most exposed individual" (MEI), but the EPA changed this to be consistent with a statement in the rule's legislative history that calls for protecting individuals and populations that are "highly exposed to reasonably anticipated adverse conditions". In developing Subpart B of the rule, the EPA used different HEIs in evaluating each pathway of potential exposure.

The details for each of the HEIs selected and the assumptions used in the various risk scenario calculations are all contained in the technical support documents, which are voluminous (U. S. Environmental Protection Agency 1992). Examples are given here to provide an illustration of the HEIs for both the agricultural and nonagricultural settings for pathway 1, which was designed to protect consumers who eat food grown in sewage sludge-amended soil. For agricultural land application, the HEI was assumed to live in a region where a relatively high percentage of the available cropland receives sludge applications. To approximate realistic conditions, it was assumed that the HEI eats a mix of crops from land on which sludge was applied and crops from land on which sludge was not applied rather than eating foods that were all grown on sludge-amended soils.

For nonagricultural settings for pathway 1, the HEI was a person who regularly harvests edible wild plants (i.e., berries and mushrooms) from forests or rangelands that have been amended with sewage sludge. This food was assumed to be preserved by drying, freezing, or canning and, hence, to be available for consumption throughout the year. It was also assumed that an individual could continue with this practice for a lifetime (70 years).

Pathway 2 evaluated the effects on home gardeners of consuming crops grown in residential home gardens amended with sewage sludge. The major difference between pathways 1 and 2 was the fraction of food assumed to be grown on sewage sludge-amended soil. The HEI for pathway 2 was the home gardener who produced and consumed potatoes, leafy vegetables, fresh legumes, root vegetables, garden fruits (e.g., tomatoes, eggplants), sweet corn, and grains.

The HEI for pathway 3 was a young person (less than 6 year of age) ingesting sewage sludge from storage piles or from the soil surface.

For pathway 4, the HEI was an individual consuming foraging animals that consumed feed crops or vegetation grown on sewage sludge-amended soils. The HEI was assumed to consume daily quantities of the various animal tissue foods and to be exposed to background levels of pollutants from sources other than sludge. For the agricultural setting, the affected animal foods evaluated were beef, beef liver, lamb, pork, poultry, dairy, and eggs. In the nonagricultural setting, the HEI was assumed to be a hunter who preserved meat (including liver) for consumption throughout the year. The animals were assumed to have been hunted in the forest and eaten were deer and elk (because of their size and greater possibility of impact on intake through consumption compared with other animals).

Pathway 5 involved the application of sewage sludge to the land; the direct ingestion of this sewage sludge by animals; and, finally, the consumption of contaminated animal tissue by humans. The HEI was assumed to consume various animal tissue foods and be exposed to a background intake of pollutants.

Pathway 6 evaluated animals that ingest plants grown on sewage sludge-amended soil. The HEI used for both the agricultural and nonagricultural settings is a highly sensitive herbivore that consumed plants grown on sewage sludge-amended soil. Background intake was taken into account by considering background concentration of pollutants in forage crops. In a forest application site, the HEI was two grazing domestic animals and small herbivorous mammals (deer mice) that lived their entire lives in a sewage sludge-amended area feeding on seeds and small plants close to the layer of soil amended with sewage sludge. In the agricultural setting, the HEI was a sheep.

The HEI for pathway 7 was an herbivorous animal incidentally consuming sewage sludge adhering to forage crops and/or sewage sludge on the soil surface. Background intake was considered to be from ingesting soil having background levels of pollutant. Because forest animals more typically browse rather than graze, the HEI for agricultural settings was used as a reasonable worst-case surrogate for the nonagricultural HEI.

Pathway 8 was the plant phytotoxicity pathway and assumed as the HEI a plant sensitive to the pollutants in sewage sludge. Sensitivity was determined through a literature search including information on nonagronomic species, which were shown to be no more sensitive than agronomic species. Because sensitivity was found to be the same for agronomic and nonagronomic species, the limits set for agricultural species also protect wild species found in nonagricultural settings.

The HEI for pathway 9 is a soil organism sensitive to the pollutants in sewage sludge, an earthworm. Because all soil organisms are wild species, the same HEI was used for the nonagricultural and agricultural settings.

Pathway 10 assumed that the HEI was a shrew mole that consumed soil organisms that have been feeding on sewage sludge-amended soil. Pathway 9 had the same HEI for both the nonagricultural and agricultural pathways.

The HEI for pathway 11, which was designed to protect humans from the effects of airborne dusts containing sewage sludge, was a tractor driver tilling a field. This pathway evaluated the impact of particles that have been resuspended by the driver's tilling of dewatered sewage sludge into the soil. This pathway applies only to the agricultural setting because plowing is not normally performed in nonagricultural settings such as forests.

Pathway 12, the soil erosion pathway, used as an HEI a human who consumed 2 liters per day of drinking water from surface water contaminated by soil eroded from a site where sewage sludge was land applied. This individual was assumed to ingest 0.04 kilograms per day of fish from surface waters contaminated by sewage sludge pollutants. The HEI was the same for agricultural and nonagricultural practices.

Pathway 13 had as an HEI a human who inhaled the vapors of any volatile pollutants that may be in the sewage sludge when it is applied to the land. The HEI was assumed to live on the downwind side of the site with no change in wind direction ever occurring (constant exposure). The same plume air contaminant dispersion model was used for both the agricultural and nonagricultural settings.

The HEI for pathway 14 for agricultural and nonagricultural settings was an individual who obtained drinking water from ground water located directly below a field to which sewage sludge has been applied. Consumption was assumed to be 2 liters per day for a lifetime.

All the exposure scenarios involving ingestions included what is referred to as an oral reference dose (RfD). The RfD of a pollutant is a threshold below which effects adverse to human health are unlikely to occur. The EPA has a computerized listing of these human health criteria in its Integrated Risk Information System (IRIS), which it uses for many different purposes in developing health protection standards based on the latest scientific information.

Another key assumption that can change the risk assumption calculations is the recommended dietary allowances (RDAs). These are defined as the levels of intake of essential nutrients that, on the basis of scientific knowledge, are judged by the Food and Nutrition Board to be adequate to meet the known nutrient needs of practically all healthy persons. Although RfDs were generally used to determine the concentrations of inorganic pollutants that are protective of human health, the RDA was used in the case of zinc and copper.

Part 3. Endocrine Disruptors

Introduction

A wide range of chemicals, including some in common, often unregulated, undisclosed use are now associated with effects on the health, reproduction, and behavior of animals. At present, many of the effects are nonspecific in terms of the link to a particular environmental chemical, but the trends in research on hormone-affecting diseases indicate that it is probable that endocrine disruptors are contributing to human diseases and dysfunction.

The EPA has been directed by Congress to look into the issue of endocrine disruptors, focusing first on transmission in drinking water. An interagency task force of national experts has been assembled and a research plan has been developed.

Compounds termed "endocrine disruptors" can include both natural compounds and synthetic chemicals. Some, called phytoestrogens, occur naturally in a variety of plants; animals have evolved mechanisms to metabolize these, and they therefore do not accumulate and have adverse effects. A number of compounds that act as synthetic estrogens are now produced either through industrial manufacture (pesticides) or as byproducts of such processes or burning (such as dioxins). Testing for estrogenic activity is conducted in the lab using cultures of breast cancer cells. It has been found that some chemicals can cause effects at levels of parts per trillion—levels at which most chemicals have never been tested.

Table E-21 lists a variety of suspected hormone disruptors, which are discussed below.

Table E-21. List of Known and Suspected Hormone Disruptors:
Pollutants with Widespread Distribution Reported to Have Reproductive and Endocrine-Disrupting Effects

<u>Persistent Organohalogens</u>	dicofol
Dioxins and furans	dieldrin
PCBs	endosulfan
PBBs	esfenvalerate
Octachlorostyrene	ethylparathion
Hexachlorobenzene	fenvalerate
Pentachlorophenol	lindane
	heptachlor
<u>Pesticides</u>	h-epoxide
2,4,5-T	kelthane
2,4-D	kepone
alachlor	malathion
aldicarb	mancozeb
amitrole	maneb
atrazine	methomyl
benomyl	methoxychlor
beta-HCH	metiram
carbaryl	metribuzin
chlordane	mirex
cypermethrin	nitrofen
DBCP	oxychlordane
DDT	permethrin
DDT metabolites	synthetic pyrethroids

toxaphene
transnonachlor
tributyltin oxide
trifluralin
vinclozolin
zineb
ziram

Phenolic Compounds
Penta- to Nonyl-Phenols
Bisphenol A

Phthalates
Di-ethylhexyl phthalate (DEHP)
Butyl benzyl phthalate (BBP)
Di-n-butyl phthalate (DBP)
Di-n-pentyl phthalate (DPP)Di-hexyl phthalate (DHP)
Di-propyl phthalate (DprP)
Dicyclohexyl phthalate (DCHP)
Diethyl phthalate (DEP)

Other Organics
Styrene dimers and trimers
Benzo(a)pyrene

Heavy Metals
Cadmium
Lead
Mercury

Source: Natural Resources Defense Council Endocrine Disruptors Web Page (www.nroc.org/nrdc/nrdc/proreports.html).

Pesticides

Many pesticides have been found to be estrogenic. These include the herbicides 2,4-D and 2,4,-T and the boat-fouling paint additive tributyl tin, and the traditional pesticides used widely in the past, such as carbaryl, chlordane, DDT, lindane, malathion, parathion, aldicarb, DBCP, and synthetic pyrethroids. Exposure can occur during application, through consumption of contaminated produce and other foods, through contaminated drinking water, or even from house dust in agricultural areas. Production of DDT for use in the

United States was banned in 1972. However, other countries, especially tropical countries such as Mexico, still use it for mosquito control to combat malaria. DDT and its metabolites bioaccumulate in wildlife, and humans can be exposed through the food chain.

Soaps, Shampoos, and Hair Colors

Many industrial and consumer products contain alkylphenol ethoxylates (APEs), which break down into alkylphenols such as nonylphenol, which has been found in sewage and rivers near outfalls. One of the main uses of these compounds is in liquid detergents. In Europe, these products have been replaced by the more expensive but much safer alcohol ethoxylates. Denmark based its phaseout of alkyphenol exthoxylate on research conducted in the United Kingdom, which found that its breakdown products, alkylphenols, caused male fish to take on female characteristics. Alkylphenols do not biodegrade easily and bioaccumulate and therefore may cause problems when sewage sludge is applied to land.

Plastics and Plasticizers

Plastics contain additives, such as phthalates, bisphenol-A, and nonylphenols, usually present as plasticizers to increase flexibility and durability. They can leach out into liquids and foods. Heating speeds up this leaching process, which is why microwaving of foods in plastic is discouraged. Estrogenic butyl benzyl phthalate is found in vinyl floor tiles, adhesives, and synthetic leathers. The related compound di-butyl phthalate is present in some food-contact papers. Bisphenol-A is a breakdown product of polycarbonate plastics, which are used in water bottles, baby bottles, and the linings of some food cans.

Polychlorinated Biphenyls (PCBs)

PCBs are a family of toxic industrial chemicals commercialized in 1929 by Monsanto. Although their production in the United States stopped in 1977, world production continued. PCBs are still present in the United States in electrical equipment and are frequently found at toxic waste sites and in contaminated sediments. A recent study confirmed that children exposed to low levels of PCBs in the womb because of their mother’s fish consumption grow up with low IQs, poor reading comprehension, difficulty paying attention, and memory problems.

Dioxins

Chlorinated dioxins and dibenzofurans are byproducts of the chlorine bleaching of paper; the burning of chlorinated hydrocarbons such as pentachlorophenol, PCBs, and polyvinyl chloride; the incineration of municipal and medical wastes; and natural events, such as forest fires and volcanic eruptions. They often contaminate toxic wastes sites, especially where there have been fires. They bioaccumulate in fish and other wildlife, and the most common human route of exposure is through the food chain.

Spermicides

Many spermicides contain nonoxynol-9, a nonylphenol that kills sperm. This compound can be carried into the sewer system and hence into biosolids, although the concentrations are probably not measurable.

Preservatives

BHA, butylated hydroxyanisole, is added to foods such as breakfast cereal, or its packaging, to prevent the foods from becoming rancid.

Metals

Lead, methyl mercury, and cadmium can disrupt the endocrine system by causing problems in steroid production.

In addition, a number of other pollutants with widespread distribution in the environment are reported to bind to hormone receptors and therefore are suspected to have reproductive and endocrine-disrupting effects. These pollutants include the following:

- 2,4-dichlorophenol
- diethylhexyl adipate
- benzophenone
- N-butyl benzene
- 4-nitrotoluene

The compounds listed above are only suspected of being endocrine disruptors. All of these compounds have had wide uses in the past and are present in the environment, although only a few are likely to be found. Their presence in biosolids, soils, water, food, or animals is variable and depends on the historical use of the chemicals and the means of environmental distribution. At present, there is no evidence that their presence in biosolids would increase health risks.

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Personal Communications

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Table E-1a Reported Incidence of Enterotoxic E coli O157 in California (1992-1998)

Local Health Department	1992	1993	1994	1995	1996	1997	1998
ALAMEDA		3	12	11	16	14	28
AMADOR				3		2	
BERKELEY		1	3				1
BUTTE				2	1	6	1
CALAVERAS						2	2
COLUSA				1			
CONTRA COSTA			1		4	8	14
EL DORADO				2		1	3
FRESNO		1	6	10	4	3	4
GLENN			1			1	
HUMBOLDT			1		9	3	5
IMPERIAL							2
INYO			2				
KERN				1	2		3
KINGS					2	1	
LONG BEACH (City)				1	4	1	
LOS ANGELES		9	13	6	18	20	24
MADERA			1		1	3	1
MARIN			1	1	8	3	5
MENDOCINO			1		2	1	2
MERCED				1	1		4
MODOC		1					
MONO		1	1				
MONTEREY		2	1	1	3	2	2
NAPA					3	2	4
NEVADA				1	1	1	1
ORANGE		6	1	6	6	6	11
PASADENA (City)					2		
PLACER				3	3	4	3
PLUMAS					1		
RIVERSIDE		1	1	2		4	2
SACRAMENTO		2	7	10	18	8	16
SAN BENITO		1		1	3		
SAN BERNARDINO		2	2	2		5	1
SAN DIEGO	1	26	17	12	15	15	24
SAN FRANCISCO		4	4	2	5	1	12
SAN JOAQUIN		1	14	6	10	7	14
SAN LUIS OBISPO		3	5	5	2	4	2
SAN MATEO		1	7		5	11	19
SANTA BARBARA		2	2	8	3	3	6
SANTA CLARA		9	7	4	15	11	19
SANTA CRUZ			2	1	6	2	5
SHASTA						1	
SISKIYOU			1				1
SOLANO				1	1	3	2
SONOMA		1		3	5	4	9
STANISLAUS		3		4		8	5
TULARE				3	2	2	
TUOLUMNE						1	5
VENTURA			4			6	2
YOLO				4	1	1	
YUBA					4		
Grand Total	1	80	118	118	186	181	264

Table E-1b Reported Incidence of Enterotoxic E coli O157 in California (1992-1998)

	Disease Incidence/100,000 by Year						
Local Health Department	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	0.0	0.2	1.0	0.9	1.3	1.1	2.1
AMADOR	0.0	0.0	0.0	9.2	0.0	6.0	0.0
BERKELEY (City)	0.0	1.0	2.9	0.0	0.0	0.0	0.9
BUTTE	0.0	0.0	0.0	1.0	0.5	3.0	0.5
CALAVERAS	0.0	0.0	0.0	0.0	0.0	5.4	5.2
COLUSA	0.0	0.0	0.0	5.6	0.0	0.0	0.0
CONTRA COSTA	0.0	0.0	0.1	0.0	0.5	0.9	1.5
EL DORADO	0.0	0.0	0.0	1.4	0.0	0.7	2.0
FRESNO	0.0	0.1	0.8	1.3	0.5	0.4	0.5
GLENN	0.0	0.0	3.8	0.0	0.0	3.7	0.0
HUMBOLDT	0.0	0.0	0.8	0.0	7.2	2.4	4.0
IMPERIAL	0.0	0.0	0.0	0.0	0.0	0.0	1.4
INYO	0.0	0.0	10.8	0.0	0.0	0.0	0.0
KERN	0.0	0.0	0.0	0.2	0.3	0.0	0.5
KINGS	0.0	0.0	0.0	0.0	1.7	0.9	0.0
LONG BEACH (City)	0.0	0.0	0.0	0.2	0.9	0.2	0.0
LOS ANGELES	0.0	0.1	0.1	0.1	0.2	0.2	0.3
MADERA	0.0	0.0	1.0	0.0	0.9	2.7	0.9
MARIN	0.0	0.0	0.4	0.4	3.3	1.2	2.0
MENDOCINO	0.0	0.0	1.2	0.0	2.4	1.2	2.3
MERCED	0.0	0.0	0.0	0.5	0.5	0.0	2.0
MODOC	0.0	10.0	0.0	0.0	0.0	0.0	0.0
MONO	0.0	9.8	9.5	0.0	0.0	0.0	0.0
MONTEREY	0.0	0.5	0.3	0.3	0.8	0.5	0.5
NAPA	0.0	0.0	0.0	0.0	2.5	1.7	3.3
NEVADA	0.0	0.0	0.0	1.2	1.2	1.1	1.1
ORANGE	0.0	0.2	0.0	0.2	0.2	0.2	0.4
PASADENA (City)	0.0	0.0	0.0	0.0	1.5	0.0	0.0
PLACER	0.0	0.0	0.0	1.5	1.5	1.9	1.4
PLUMAS	0.0	0.0	0.0	0.0	4.9	0.0	0.0
RIVERSIDE	0.0	0.1	0.1	0.1	0.0	0.3	0.1
SACRAMENTO	0.0	0.2	0.6	0.9	1.6	0.7	1.4
SAN BENITO	0.0	2.5	0.0	2.4	6.9	0.0	0.0
SAN BERNARDINO	0.0	0.1	0.1	0.1	0.0	0.3	0.1
SAN DIEGO	0.04	1.0	0.6	0.5	0.6	0.5	0.9
SAN FRANCISCO	0.0	0.5	0.5	0.3	0.7	0.1	1.5
SAN JOAQUIN	0.0	0.2	2.7	1.2	1.9	1.3	2.6
SAN LUIS OBISPO	0.0	1.3	2.2	2.2	0.9	1.7	0.8
SAN MATEO	0.0	0.1	1.0	0.0	0.7	1.6	2.7
SANTA BARBARA	0.0	0.5	0.5	2.1	0.8	0.8	1.5
SANTA CLARA	0.0	0.6	0.4	0.3	0.9	0.7	1.1
SANTA CRUZ	0.0	0.0	0.8	0.4	2.5	0.8	2.0
SHASTA	0.0	0.0	0.0	0.0	0.0	0.6	0.0
SISKIYOU	0.0	0.0	2.2	0.0	0.0	0.0	2.3
SOLANO	0.0	0.0	0.0	0.3	0.3	0.8	0.5
SONOMA	0.0	0.2	0.0	0.7	1.2	0.9	2.1
STANISLAUS	0.0	0.7	0.0	1.0	0.0	1.9	1.2
TULARE	0.0	0.0	0.0	0.9	0.6	0.6	0.0
TUOLUMNE	0.0	0.0	0.0	0.0	0.0	1.9	9.5
VENTURA	0.0	0.0	0.6	0.0	0.0	0.8	0.3
YOLO	0.0	0.0	0.0	2.7	0.7	0.7	0.0
YUBA	0.0	0.0	0.0	0.0	6.5	0.0	0.0

Table E-2a Reported Incidence of Campylobacter in California (1990-1998)

Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	319	375	365	395	515	380	537	450	346
ALPINE				1				1	
AMADOR	5	4	8	2	15	6	12	6	13
BERKELEY	64	86	56	68	61	74	110	83	61
BUTTE	24	36	26	34	58	58	38	72	54
CALAVERAS	6	3	3	6	8	8	11	9	7
COLUSA	2				3	3	2	6	1
CONTRA COSTA	342	380	275	357	430	344	313	322	188
DEL NORTE	2	6	7	2	4	3	4	1	4
EL DORADO	9	6	10	8	11	10	15	12	10
FRESNO	101	183	184	186	199	231	181	182	225
GLENN	4	2	2	5	4	6	4	8	6
HUMBOLDT	20	26	29	57	48	47	36	38	32
IMPERIAL		3	1	3	25	20	19	19	23
INYO	6	9	8	3	6	4	6	2	5
KERN	52	106	132	86	101	131	164	150	173
KINGS	1	2	2	12	18	24	13	25	18
LAKE	3		5	4	4	4	11	4	3
LASSEN	2	6	1	1	4	3	4	2	2
LONG BEACH	79	84	89	73	61	56	93	92	67
LOS ANGELES	1193	1251	1432	1417	1350	1249	1752	1606	1236
MADERA	13	3	28	26	32	17	36	32	35
MARIN	66	237	214	135	138	186	167	128	71
MARIPOSA	1	3	3	1	4	2	3	1	1
MENDOCINO	17	11	14	20	12	32	26	30	21
MERCED	28	73	68	64	93	76	95	81	40
MODOC		1	2						3
MONO	2	2	1	3	11		3	1	
MONTEREY	93	107	79	95	100	83	94	85	67
NAPA	56	60	79	68	70	63	66	73	44
NEVADA	6	21	13	17	10	11	21	14	7
ORANGE	338	303	308	340	193	445	447	403	284
PASADENA	22	28	32	22	37	24	17	23	26
PLACER	29	32	43	51	35	21	39	60	37
PLUMAS	3	7	5	4	4	6	2	4	
RIVERSIDE	133	128	186	174	151	129	210	217	136
SACRAMENTO	256	375	240	147	254	106	86	137	156
SAN BENITO	4	9	10	15	21	18	18	7	9
SAN BERNARDINO	80	107	117	148	181	193	243	227	162
SAN DIEGO	444	471	547	566	881	715	697	540	465
SAN FRANCISCO	774	714	711	625	614	560	603	584	427
SAN JOAQUIN	246	255	225	228	213	202	233	212	156
SAN LUIS OBISPO	31	36	40	53	52	53	61	61	34
SAN MATEO	304	389	370	383	461	382	340	344	291
SANTA BARBARA	57	67	100	83	84	66	58	71	70
SANTA CLARA	392	435	473	561	578	500	431	420	327
SANTA CRUZ	52	53	28	109	100	91	100	108	73
SHASTA	24	11	12	18	39	22	9	18	20
SIERRA			2	2	3	1	1	2	1
SISKIYOU	7	8	8	14	15	11	13	2	7
SOLANO	69	86	93	109	128	98	110	104	74
SONOMA	98	102	152	227	171	147	170	165	137
STANISLAUS	88	93	92	119	166	137	143	143	158
SUTTER	12	12	8	14	19	18	19	13	13
TEHAMA	1	2	4	6	6	2	2	6	6
TRINITY		2		5	2	1	3		2
TULARE	66	51	59	61	101	96	115	99	96
TUOLUMNE	2	3	2	8	5	4	7	4	7
VENTURA	73	85	86	131	127	119	133	117	78
YOLO	52	39	43	44	40	48	64	41	63
YUBA	7	9	9	14	9	16	10	10	7
Grand Total	6196	6998	7141	7430	8085	7362	8220	7677	6085

Table E-2b Reported Incidence of Campylobacter in California (1990-1998)

	Disease Incidence/100,000 by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	27.2	31.5	30.3	32.3	41.7	30.7	42.9	35.3	26.5
ALPINE	0.0	0.0	0.0	88.5	0.0	0.0	0.0	84.0	0.0
AMADOR	16.6	13.0	25.4	6.3	46.3	18.5	36.6	18.1	39.0
BERKELEY	62.3	83.3	53.7	65.3	58.5	70.8	105.1	78.1	56.4
BUTTE	13.2	19.5	13.8	17.9	30.1	29.8	19.4	36.5	27.1
CALAVERAS	18.8	9.1	8.7	17.0	22.2	21.9	29.8	24.3	18.4
COLUSA	12.3	0.0	0.0	0.0	17.1	16.9	11.1	32.6	5.4
CONTRA COSTA	42.6	46.6	33.2	42.3	50.2	39.8	35.9	36.3	20.7
DEL NORTE	8.5	23.8	26.4	7.4	14.6	10.9	14.5	3.6	14.2
EL DORADO	7.1	4.6	7.5	5.8	7.8	7.0	10.4	8.3	6.7
FRESNO	15.1	26.7	26.1	25.7	27.1	30.9	23.8	23.5	28.8
GLENN	16.1	7.9	7.8	19.3	15.3	22.8	15.0	29.9	22.3
HUMBOLDT	16.8	21.6	23.8	46.2	38.7	37.8	28.8	30.3	25.4
IMPERIAL	0.0	2.6	0.8	2.4	18.9	14.8	13.6	13.5	16.1
INYO	32.8	49.2	43.7	16.3	32.5	21.7	32.7	10.9	27.3
KERN	9.5	18.9	22.8	14.5	16.7	21.4	26.4	23.8	27.2
KINGS	1.0	1.9	1.9	10.9	16.1	21.1	11.3	21.4	14.9
LAKE	5.9	0.0	9.4	7.4	7.3	7.3	20.0	7.3	5.4
LASSEN	7.2	21.5	3.6	3.5	14.0	10.5	13.1	5.8	5.9
LONG BEACH	18.4	19.1	20.1	16.6	13.9	12.8	21.2	20.9	15.0
LOS ANGELES	14.4	14.9	16.8	16.4	15.5	14.3	19.9	18.1	13.7
MADERA	14.8	3.3	29.1	25.9	30.8	16.1	33.2	28.6	30.7
MARIN	28.7	102.2	91.4	57.2	58.2	78.1	69.8	53.0	29.1
MARIPOSA	7.0	20.3	19.8	6.4	25.3	12.6	18.9	6.3	6.3
MENDOCINO	21.2	13.5	17.0	24.1	14.4	38.1	30.8	35.1	24.4
MERCED	15.7	39.8	36.2	33.4	47.5	38.4	47.9	40.5	19.7
MODOC	0.0	10.2	20.3	0.0	0.0	0.0	0.0	0.0	30.1
MONO	20.1	19.9	10.0	29.3	104.3	0.0	28.4	9.5	0.0
MONTEREY	26.1	29.6	21.5	25.6	27.3	23.0	26.0	23.0	17.6
NAPA	50.6	53.5	69.5	59.0	60.1	53.8	55.7	60.8	36.1
NEVADA	7.6	26.1	15.8	20.3	11.8	12.8	24.2	16.0	7.8
ORANGE	14.0	12.4	12.4	13.4	7.5	17.1	17.0	15.1	10.4
PASADENA	16.7	21.1	24.0	16.3	27.3	17.6	12.4	16.6	18.5
PLACER	16.8	17.9	23.4	26.9	18.0	10.5	18.9	28.2	16.9
PLUMAS	15.2	35.3	24.7	19.5	19.4	29.3	9.8	19.7	0.0
RIVERSIDE	11.4	10.5	14.7	13.3	11.3	9.5	15.2	15.5	9.4
SACRAMENTO	24.6	35.2	22.1	13.4	22.9	9.5	7.6	12.0	13.5
SAN BENITO	10.9	24.1	26.2	38.1	51.9	43.1	41.5	15.5	19.2
SAN BERNARDINO	5.6	7.3	7.8	9.6	11.6	12.3	15.3	14.1	9.9
SAN DIEGO	17.8	18.5	21.2	21.7	33.4	26.9	26.0	19.8	16.6
SAN FRANCISCO	106.9	97.7	96.7	83.9	81.6	74.5	79.4	75.6	54.5
SAN JOAQUIN	51.2	52.0	45.0	45.0	41.5	38.9	44.1	39.4	28.5
SAN LUIS OBISPO	14.3	16.4	18.1	23.8	23.1	23.3	26.6	26.2	14.4
SAN MATEO	46.8	59.3	55.7	57.0	67.9	55.7	49.0	48.8	40.6
SANTA BARBARA	15.4	17.9	26.4	21.7	21.8	17.0	14.8	17.9	17.4
SANTA CLARA	26.2	28.7	30.8	36.0	36.5	31.4	26.6	25.4	19.4
SANTA CRUZ	22.6	22.9	12.0	46.2	42.1	37.9	41.2	44.0	29.3
SHASTA	16.3	7.3	7.7	11.4	24.5	13.7	5.6	11.1	12.2
SIERRA	0.0	0.0	60.6	60.2	89.6	29.7	29.6	59.5	29.9
SISKIYOU	16.1	18.3	18.3	31.7	33.7	24.6	29.3	4.5	15.8
SOLANO	20.3	24.5	25.9	29.9	34.7	26.5	29.6	27.7	19.4
SONOMA	25.2	25.9	37.9	55.7	41.4	35.3	40.3	38.5	31.4
STANISLAUS	23.8	24.3	23.5	29.7	40.8	33.3	34.4	33.9	36.9
SUTTER	18.6	18.1	11.7	20.0	26.5	24.7	25.6	17.2	17.0
TEHAMA	2.0	4.0	7.7	11.4	11.3	3.7	3.7	11.0	10.9
TRINITY	0.0	15.3	0.0	37.9	15.0	7.5	22.4	0.0	15.2
TULARE	21.2	16.0	18.0	18.2	29.6	27.7	32.7	27.8	26.7
TUOLUMNE	4.1	6.1	4.0	15.7	9.7	7.7	13.6	7.7	13.3
VENTURA	10.9	12.6	12.6	18.9	18.1	16.8	18.6	16.2	10.6
YOLO	36.8	27.2	29.6	30.0	27.1	32.1	42.2	26.7	40.5
YUBA	12.0	15.1	14.9	22.8	14.6	25.8	16.3	16.4	11.5

Table E-3a Reported Incidence of Salmonellosis in California (1990-1998)

	Reported Cases by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	254	189	250	234	200	225	280	250	208
ALPINE			1						
AMADOR	5	4	1	3	3	4	3	3	7
BERKELEY	20	15	28	17	15	20	33	23	15
BUTTE	36	24	36	29	32	35	28	23	16
CALAVERAS	3	1	2	2	3	1	5	6	5
COLUSA	1	1	1	1	1	2	3	1	1
CONTRA COSTA	182	124	96	162	124	135	111	148	109
DEL NORTE		5	7	6	3		2	3	1
EL DORADO	17	9	12	14	13	16	30	17	20
FRESNO	66	132	94	81	135	91	103	119	97
GLENN	7	2	4	2	1	6	6	6	1
HUMBOLDT	10	25	19	27	16	13	14	9	12
IMPERIAL	46	38	36	60	48	24	40	34	31
INYO	5	7	9	3	15	9	6	6	
KERN	76	68	79	88	96	93	136	69	102
KINGS	9	13	6	25	10	14	17	14	5
LAKE	6	4	6	4	2	14	11	7	6
LASSEN	4	11	6	3	2		4	4	2
LONG BEACH	100	71	88	89	107	107	104	102	82
LOS ANGELES	1607	1555	1681	1583	2140	2007	1774	1699	1406
MADERA	9	13	22	29	28	24	22	19	14
MARIN	43	30	59	31	33	36	35	50	44
MARIPOSA		3	1	1	5	5	3	1	
MENDOCINO	5	9	13	15	14	5	10	9	9
MERCED	28	19	33	44	31	69	44	44	41
MODOC	1	1		1	3	1	1	1	
MONO				5	8	4	16	4	
MONTEREY	45	40	45	47	39	48	72	46	39
NAPA	20	12	15	23	21	31	24	17	10
NEVADA	13	15	12	14	10	8	22	11	11
ORANGE	369	316	388	412	277	625	555	551	334
PASADENA	41	34	42	36	49	33	35	36	22
PLACER	25	19	36	32	28	16	49	31	54
PLUMAS	1	2	8	6	5	4	7	2	2
RIVERSIDE	183	185	215	213	289	265	229	205	166
SACRAMENTO	247	205	213	193	121	114	180	126	135
SAN BENITO	10	7	4	3	11	6	7	8	8
SAN BERNARDINO	186	184	228	266	418	361	279	247	145
SAN DIEGO	450	584	540	492	539	570	620	574	424
SAN FRANCISCO	215	181	218	200	199	193	184	216	186
SAN JOAQUIN	144	90	99	112	105	66	90	70	84
SAN LUIS OBISPO	36	23	22	27	28	45	43	35	33
SAN MATEO	187	151	169	150	132	140	167	208	102
SANTA BARBARA	65	69	79	48	47	80	87	62	59
SANTA CLARA	372	288	307	391	273	352	484	372	282
SANTA CRUZ	38	34	58	45	50	44	60	57	37
SHASTA	17	18	21	25	12	8	6	14	6
SIERRA				3				1	
SISKIYOU	6	5	5	5	12	2		6	4
SOLANO	69	32	49	71	31	52	63	43	47
SONOMA	57	54	59	77	52	52	64	71	56
STANISLAUS	100	61	63	52	62	68	95	129	58
SUTTER	7	16	13	7	10	8	15	7	8
TEHAMA	4	7	2	6	7	2	5	7	3
TRINITY	1	1	2		5	2		1	
TULARE	55	67	70	66	183	83	68	66	64
TUOLUMNE	8	4	4	11	3	3	11	6	5
VENTURA	84	75	98	75	93	106	156	81	109
YOLO	15	25	21	25	17	6	14	11	8
YUBA	6	4	10	5	10	3	12	5	4
Grand Total	5616	5181	5705	5697	6226	6356	6544	5993	4739

Table E-3b Reported Incidence of Salmonellosis in California (1990-1998)

	Disease Incidence/100,000 by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	21.6	15.9	20.7	19.1	16.2	18.1	22.4	19.6	15.9
ALPINE	0.0	0.0	88.5	0.0	0.0	0.0	0.0	0.0	0.0
AMADOR	16.6	13.0	3.2	9.4	9.3	12.3	9.2	9.0	21.0
BERKELEY	19.5	14.5	26.9	16.3	14.4	19.1	31.5	21.6	13.9
BUTTE	19.8	13.0	19.2	15.2	16.6	18.0	14.3	11.6	8.0
CALAVERAS	9.4	3.0	5.8	5.7	8.3	2.7	13.5	16.2	13.1
COLUSA	6.1	6.0	5.9	5.8	5.7	11.3	16.6	5.4	5.4
CONTRA COSTA	22.6	15.2	11.6	19.2	14.5	15.6	12.7	16.7	12.0
DEL NORTE	0.0	19.8	26.4	22.2	10.9	0.0	7.3	10.7	3.6
EL DORADO	13.5	6.9	8.9	10.2	9.2	11.2	20.8	11.8	13.4
FRESNO	9.9	19.2	13.3	11.2	18.4	12.2	13.5	15.4	12.4
GLENN	28.2	7.9	15.6	7.7	3.8	22.8	22.5	22.4	3.7
HUMBOLDT	8.4	20.7	15.6	21.9	12.9	10.5	11.2	7.2	9.5
IMPERIAL	42.1	33.5	30.2	47.5	36.3	17.7	28.7	24.1	21.7
INYO	27.4	38.3	49.2	16.3	81.3	48.8	32.7	32.8	0.0
KERN	13.9	12.1	13.6	14.8	15.9	15.2	21.9	11.0	16.0
KINGS	8.9	12.5	5.6	22.8	8.9	12.3	14.7	12.0	4.1
LAKE	11.9	7.7	11.3	7.4	3.7	25.5	20.0	12.7	10.9
LASSEN	14.5	39.5	21.3	10.5	7.0	0.0	13.1	11.6	5.9
LONG BEACH	23.3	16.2	19.9	20.2	24.4	24.5	23.7	23.1	18.4
LOS ANGELES	19.4	18.5	19.8	18.3	24.6	22.9	20.2	19.1	15.6
MADERA	10.2	14.1	22.9	28.9	27.0	22.7	20.3	17.0	12.3
MARIN	18.7	12.9	25.2	13.1	13.9	15.1	14.6	20.7	18.0
MARIPOSA	0.0	20.3	6.6	6.4	31.6	31.5	18.9	6.3	0.0
MENDOCINO	6.2	11.0	15.8	18.1	16.7	6.0	11.8	10.5	10.5
MERCED	15.7	10.4	17.5	22.9	15.8	34.9	22.2	22.0	20.2
MODOC	10.3	10.2	0.0	10.0	29.9	10.0	10.0	9.9	0.0
MONO	0.0	0.0	0.0	48.8	75.8	37.7	151.7	38.1	0.0
MONTEREY	12.7	11.1	12.3	12.7	10.6	13.3	19.9	12.5	10.2
NAPA	18.1	10.7	13.2	19.9	18.0	26.5	20.3	14.2	8.2
NEVADA	16.6	18.7	14.6	16.7	11.8	9.3	25.3	12.5	12.3
ORANGE	15.3	12.9	15.6	16.3	10.8	24.1	21.1	20.6	12.2
PASADENA	31.2	25.7	31.4	26.7	36.2	24.2	25.5	26.0	15.7
PLACER	14.5	10.7	19.6	16.9	14.4	8.0	23.8	14.6	24.6
PLUMAS	5.1	10.1	39.5	29.2	24.3	19.5	34.3	9.8	9.8
RIVERSIDE	15.6	15.1	16.9	16.3	21.7	19.5	16.6	14.6	11.5
SACRAMENTO	23.7	19.3	19.6	17.5	10.9	10.2	16.0	11.1	11.7
SAN BENITO	27.3	18.7	10.5	7.6	27.2	14.4	16.1	17.8	17.0
SAN BERNARDINO	13.1	12.6	15.1	17.3	26.8	23.0	17.6	15.4	8.9
SAN DIEGO	18.0	23.0	20.9	18.8	20.4	21.4	23.1	21.0	15.2
SAN FRANCISCO	29.7	24.8	29.6	26.9	26.5	25.7	24.2	28.0	23.7
SAN JOAQUIN	30.0	18.4	19.8	22.1	20.5	12.7	17.0	13.0	15.4
SAN LUIS OBISPO	16.6	10.5	10.0	12.1	12.4	19.8	18.7	15.0	14.0
SAN MATEO	28.8	23.0	25.4	22.3	19.4	20.4	24.1	29.5	14.2
SANTA BARBARA	17.6	18.4	20.8	12.6	12.2	20.6	22.2	15.6	14.6
SANTA CLARA	24.8	19.0	20.0	25.1	17.3	22.1	29.9	22.5	16.7
SANTA CRUZ	16.5	14.7	24.8	19.1	21.0	18.3	24.7	23.2	14.9
SHASTA	11.6	11.9	13.5	15.9	7.5	5.0	3.7	8.6	3.7
SIERRA	0.0	0.0	0.0	90.4	0.0	0.0	0.0	29.8	0.0
SISKIYOU	13.8	11.4	11.4	11.3	26.9	4.5	0.0	13.6	9.0
SOLANO	20.3	9.1	13.7	19.5	8.4	14.0	17.0	11.5	12.3
SONOMA	14.7	13.7	14.7	18.9	12.6	12.5	15.2	16.6	12.8
STANISLAUS	27.0	16.0	16.1	13.0	15.2	16.5	22.8	30.6	13.5
SUTTER	10.9	24.2	19.1	10.0	13.9	11.0	20.2	9.3	10.5
TEHAMA	8.1	13.8	3.9	11.4	13.2	3.7	9.2	12.8	5.5
TRINITY	7.7	7.7	15.3	0.0	37.5	14.9	0.0	7.5	0.0
TULARE	17.6	21.0	21.3	19.7	53.7	24.0	19.3	18.5	17.8
TUOLUMNE	16.5	8.1	8.0	21.5	5.8	5.8	21.3	11.6	9.5
VENTURA	12.6	11.1	14.3	10.8	13.2	14.9	21.9	11.2	14.9
YOLO	10.6	17.5	14.4	17.0	11.5	4.0	9.2	7.2	5.1
YUBA	10.3	6.7	16.5	8.1	16.2	4.8	19.5	8.2	6.6

Table E-4a Reported Incidence of Shigellosis Type A in California (1990-1998)

	Reported Cases by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	8	2	4	5	1	3	3	10	2
BUTTE					2	1			
COLUSA		1							
CONTRA COSTA	3		1		1			1	
EL DORADO						2			
FRESNO		3	1	6	6	1			
IMPERIAL		1				1			
KERN	2		1	2					
KINGS		2			1	2			
LASSEN							1		1
LONG BEACH	5		1	1		1	1		
LOS ANGELES	32	22	21	14	10	9	16	2	5
MADERA			1	1		1			
MARIN	1						1		4
MERCED	1		1				2		
MODOC								1	
MONTEREY	1			1	1			2	
NAPA	1	1							
ORANGE	9	13	7	8	3	3	3	4	2
PASADENA	1	1			1	1			
PLACER	1								1
RIVERSIDE	3	2	6	1	1	1	1	1	1
SACRAMENTO	1			1	1		1	1	
SAN BENITO					3	2			
SAN BERNARDINO	3	4	1	1	3	3	1		1
SAN DIEGO	11	11	6	10	6	9	3	1	1
SAN FRANCISCO	3	1	3	2	3	2	3	2	
SAN JOAQUIN	2	2	1	1	1				1
SAN LUIS OBISPO			1		1				
SAN MATEO	1	3	2	1	3	1			
SANTA BARBARA				2		1	1		
SANTA CLARA	4	3	6	3	3	4		2	2
SANTA CRUZ	3		1		1		1		
SHASTA							1		
SOLANO	4	1	1						1
SONOMA	3						1		1
STANISLAUS	1		3	1					
SUTTER		1					1		
TEHAMA			1						
TULARE	3	1	1			1			1
VENTURA	3	2	1		2	1			
Grand Total	110	77	72	61	54	50	41	27	24

Table E-4b Reported Incidence of Shigellosis Type A in California (1990-1998)

	Disease Incidence/100,000 by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	0.7	0.2	0.3	0.4	0.1	0.2	0.2	0.8	0.2
BUTTE	0.0	0.0	0.0	0.0	1.0	0.5	0.0	0.0	0.0
COLUSA	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CONTRA COSTA	0.4	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.0
EL DORADO	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0
FRESNO	0.0	0.4	0.1	0.8	0.8	0.1	0.0	0.0	0.0
IMPERIAL	0.0	0.9	0.0	0.0	0.0	0.7	0.0	0.0	0.0
KERN	0.4	0.0	0.2	0.3	0.0	0.0	0.0	0.0	0.0
KINGS	0.0	1.9	0.0	0.0	0.9	1.8	0.0	0.0	0.0
LASSEN	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	3.0
LONG BEACH	1.2	0.0	0.2	0.2	0.0	0.2	0.2	0.0	0.0
LOS ANGELES	0.4	0.3	0.2	0.2	0.1	0.1	0.2	0.0	0.1
MADERA	0.0	0.0	1.0	1.0	0.0	0.9	0.0	0.0	0.0
MARIN	0.4	0.0	0.0	0.0	0.0	0.0	0.4	0.0	1.6
MERCED	0.6	0.0	0.5	0.0	0.0	0.0	1.0	0.0	0.0
MODOC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.9	0.0
MONTEREY	0.3	0.0	0.0	0.3	0.3	0.0	0.0	0.5	0.0
NAPA	0.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ORANGE	0.4	0.5	0.3	0.3	0.1	0.1	0.1	0.1	0.1
PASADENA	0.8	0.8	0.0	0.0	0.7	0.7	0.0	0.0	0.0
PLACER	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
RIVERSIDE	0.3	0.2	0.5	0.1	0.1	0.1	0.1	0.1	0.1
SACRAMENTO	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.0
SAN BENITO	0.0	0.0	0.0	0.0	7.4	4.8	0.0	0.0	0.0
SAN BERNARDINO	0.2	0.3	0.1	0.1	0.2	0.2	0.1	0.0	0.1
SAN DIEGO	0.4	0.4	0.2	0.4	0.2	0.3	0.1	0.0	0.0
SAN FRANCISCO	0.4	0.1	0.4	0.3	0.4	0.3	0.4	0.3	0.0
SAN JOAQUIN	0.4	0.4	0.2	0.2	0.2	0.0	0.0	0.0	0.2
SAN LUIS OBISPO	0.0	0.0	0.5	0.0	0.4	0.0	0.0	0.0	0.0
SAN MATEO	0.2	0.5	0.3	0.1	0.4	0.1	0.0	0.0	0.0
SANTA BARBARA	0.0	0.0	0.0	0.5	0.0	0.3	0.3	0.0	0.0
SANTA CLARA	0.3	0.2	0.4	0.2	0.2	0.3	0.0	0.1	0.1
SANTA CRUZ	1.3	0.0	0.4	0.0	0.4	0.0	0.4	0.0	0.0
SHASTA	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0
SOLANO	1.2	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.3
SONOMA	0.8	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2
STANISLAUS	0.3	0.0	0.8	0.2	0.0	0.0	0.0	0.0	0.0
SUTTER	0.0	1.5	0.0	0.0	0.0	0.0	1.3	0.0	0.0
TEHAMA	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0
TULARE	1.0	0.3	0.3	0.0	0.0	0.3	0.0	0.0	0.3
VENTURA	0.4	0.3	0.1	0.0	0.3	0.1	0.0	0.0	0.0

Table E-5a Reported Incidence of Shigellosis Type B in California (1990-1998)

	Reported Cases by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	44	42	33	27	26	23	27	59	28
ALPINE					1				
AMADOR				1					
BERKELEY	6	6	1	4	4	3	2	1	1
BUTTE	1	2	1			1	2		
COLUSA					1		1	3	1
CONTRA COSTA	18	3	7	15	15	9	14	15	8
EL DORADO						1			
FRESNO	40	22	29	27	42	36	25	22	16
GLENN	3	4	3						
HUMBOLDT			1	1	1			2	
IMPERIAL	10		4	5	8	4	7	1	1
INYO	3			1			1		
KERN	12	16	10	6	6	4	5	2	
KINGS	1		5	4	5	1		1	
LAKE					1				
LONG BEACH	32	24	39	36	46	28	29	26	19
LOS ANGELES	686	685	704	526	516	470	390	313	234
MADERA	2	11	12	10	4	11	12		1
MARIN	14	7	4	6	2	3	5	8	6
MARIPOSA						1			
MENDOCINO			2	1			1	4	2
MERCED	2		4	2	1	1	2	1	2
MODOC	1				1				
MONO					1	1	1		1
MONTEREY	26	42	25	11	14	13	11	9	6
NAPA	4	8		4	4	2	5	4	9
NEVADA	1							1	
ORANGE	153	132	133	135	90	127	124	70	61
PASADENA	7	7	12	4	9	5	6	6	4
PLACER	3	1	2	3	3	1	1		2
PLUMAS		1	3						
RIVERSIDE	44	43	53	54	41	43	29	16	40
SACRAMENTO	26	19	20	11	8	4	11	11	14
SAN BENITO	2		2	2	5	4	10	2	3
SAN BERNARDINO	67	73	46	44	68	38	48	22	19
SAN DIEGO	202	153	138	155	139	154	161	139	67
SAN FRANCISCO	221	140	149	129	127	96	88	111	73
SAN JOAQUIN	46	43	30	15	20	31	31	16	18
SAN LUIS OBISPO	2	4	4	4	4	1	2	5	2
SAN MATEO	51	41	32	22	27	21	16	20	34
SANTA BARBARA	24	19	18	18	10	17	17	16	14
SANTA CLARA	65	66	68	66	61	50	39	42	35
SANTA CRUZ	17	3	17	9	18	5	3	10	3
SHASTA	5	2	1	1	1				
SOLANO	19	10	6	6	2	4	3	11	3
SONOMA	12	11	9	4	10	5	6	7	11
STANISLAUS	17	12	13	18	6	11	15	7	14
SUTTER	5	3	4	3	3	2	2	2	1
TEHAMA			1	1					
TULARE	35	19	42	29	32	23	4	3	7
VENTURA	25	19	12	13	10	17	10	12	8
YOLO	3	1	2		1				2
YUBA		3	1	2	3				
Grand Total	1957	1697	1702	1435	1397	1271	1166	1000	770

Table E-5b Reported Incidence of Shigellosis Type B in California (1990-1998)

Local Health Department	Disease Incidence/100,000 by Year								
	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	3.7	3.5	2.7	2.2	2.1	1.9	2.2	4.6	2.1
ALPINE	0.0	0.0	0.0	0.0	88.5	0.0	0.0	0.0	0.0
AMADOR	0.0	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0
BERKELEY	5.8	5.8	1.0	3.8	3.8	2.9	1.9	0.9	0.9
BUTTE	0.5	1.1	0.5	0.0	0.0	0.5	1.0	0.0	0.0
COLUSA	0.0	0.0	0.0	0.0	5.7	0.0	5.5	16.3	5.4
CONTRA COSTA	2.2	0.4	0.8	1.8	1.8	1.0	1.6	1.7	0.9
EL DORADO	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0
FRESNO	6.0	3.2	4.1	3.7	5.7	4.8	3.3	2.8	2.0
GLENN	12.1	15.9	11.7	0.0	0.0	0.0	0.0	0.0	0.0
HUMBOLDT	0.0	0.0	0.8	0.8	0.8	0.0	0.0	1.6	0.0
IMPERIAL	9.1	0.0	3.4	4.0	6.1	3.0	5.0	0.7	0.7
INYO	16.4	0.0	0.0	5.4	0.0	0.0	5.4	0.0	0.0
KERN	2.2	2.9	1.7	1.0	1.0	0.7	0.8	0.3	0.0
KINGS	1.0	0.0	4.7	3.6	4.5	0.9	0.0	0.9	0.0
LAKE	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0
LONG BEACH	7.5	5.5	8.8	8.2	10.5	6.4	6.6	5.9	4.3
LOS ANGELES	8.3	8.1	8.3	6.1	5.9	5.4	4.4	3.5	2.6
MADERA	2.3	12.0	12.5	10.0	3.9	10.4	11.1	0.0	0.9
MARIN	6.1	3.0	1.7	2.5	0.8	1.3	2.1	3.3	2.5
MARIPOSA	0.0	0.0	0.0	0.0	0.0	6.3	0.0	0.0	0.0
MENDOCINO	0.0	0.0	2.4	1.2	0.0	0.0	1.2	4.7	2.3
MERCED	1.1	0.0	2.1	1.0	0.5	0.5	1.0	0.5	1.0
MODOC	10.3	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0
MONO	0.0	0.0	0.0	0.0	9.5	9.4	9.5	0.0	9.5
MONTEREY	7.3	11.6	6.8	3.0	3.8	3.6	3.0	2.4	1.6
NAPA	3.6	7.1	0.0	3.5	3.4	1.7	4.2	3.3	7.4
NEVADA	1.3	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0
ORANGE	6.3	5.4	5.3	5.3	3.5	4.9	4.7	2.6	2.2
PASADENA	5.3	5.3	9.0	3.0	6.6	3.7	4.4	4.3	2.9
PLACER	1.7	0.6	1.1	1.6	1.5	0.5	0.5	0.0	0.9
PLUMAS	0.0	5.0	14.8	0.0	0.0	0.0	0.0	0.0	0.0
RIVERSIDE	3.8	3.5	4.2	4.1	3.1	3.2	2.1	1.1	2.8
SACRAMENTO	2.5	1.8	1.8	1.0	0.7	0.4	1.0	1.0	1.2
SAN BENITO	5.5	0.0	5.2	5.1	12.3	9.6	23.1	4.4	6.4
SAN BERNARDINO	4.7	5.0	3.0	2.9	4.4	2.4	3.0	1.4	1.2
SAN DIEGO	8.1	6.0	5.3	5.9	5.3	5.8	6.0	5.1	2.4
SAN FRANCISCO	30.5	19.1	20.3	17.3	16.9	12.8	11.6	14.4	9.3
SAN JOAQUIN	9.6	8.8	6.0	3.0	3.9	6.0	5.9	3.0	3.3
SAN LUIS OBISPO	0.9	1.8	1.8	1.8	1.8	0.4	0.9	2.1	0.8
SAN MATEO	7.9	6.2	4.8	3.3	4.0	3.1	2.3	2.8	4.7
SANTA BARBARA	6.5	5.1	4.7	4.7	2.6	4.4	4.3	4.0	3.5
SANTA CLARA	4.3	4.4	4.4	4.2	3.9	3.1	2.4	2.5	2.1
SANTA CRUZ	7.4	1.3	7.3	3.8	7.6	2.1	1.2	4.1	1.2
SHASTA	3.4	1.3	0.6	0.6	0.6	0.0	0.0	0.0	0.0
SOLANO	5.6	2.9	1.7	1.6	0.5	1.1	0.8	2.9	0.8
SONOMA	3.1	2.8	2.2	1.0	2.4	1.2	1.4	1.6	2.5
STANISLAUS	4.6	3.1	3.3	4.5	1.5	2.7	3.6	1.7	3.3
SUTTER	7.8	4.5	5.9	4.3	4.2	2.7	2.7	2.7	1.3
TEHAMA	0.0	0.0	1.9	1.9	0.0	0.0	0.0	0.0	0.0
TULARE	11.2	5.9	12.8	8.7	9.4	6.6	1.1	0.8	1.9
VENTURA	3.7	2.8	1.8	1.9	1.4	2.4	1.4	1.7	1.1
YOLO	2.1	0.7	1.4	0.0	0.7	0.0	0.0	0.0	1.3
YUBA	0.0	5.0	1.7	3.3	4.9	0.0	0.0	0.0	0.0

Table E-6a Reported Incidence of Shigellosis Type C in California (1990-1998)

	Reported Cases by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	6	3	1		2	2	3	3	2
BERKELEY				1	1				
COLUSA							1		
CONTRA COSTA	3			1	1	4	1	1	
DEL NORTE			1						
FRESNO	3	3		2	1			1	1
IMPERIAL	3			4		1	1	1	
KINGS						1			
LASSEN							1		
LONG BEACH	3	5		1	2		3	2	2
LOS ANGELES	91	56	61	43	38	25	26	28	31
MADERA		2							
MARIN		2				1		2	1
MENDOCINO							5		
MERCED				1			1		
MONO						1			
MONTEREY	2	1	4			1		3	1
NAPA		1	1		1				
ORANGE	12	15	11	10	10	8	15	11	5
PASADENA	2						2	1	
PLACER	1		2				1		
PLUMAS									3
RIVERSIDE	1	4	3	1	2	6	3	6	
SACRAMENTO	1	2	3			1	2	2	1
SAN BENITO				4		1	4	2	
SAN BERNARDINO	7	3	3	5	3	3	2	8	3
SAN DIEGO	28	25	14	14	10	14	12	17	12
SAN FRANCISCO	8	6	2	3	5	4	5	1	5
SAN JOAQUIN	3	5	1	2		2	3		1
SAN LUIS OBISPO				1		1			
SAN MATEO	8	5	5	3	4	2	1	4	
SANTA BARBARA	3	3	1			1			2
SANTA CLARA	24	10	14	1	3	4	8	7	22
SANTA CRUZ			1	1					2
SOLANO	7		2	1		2		1	
SONOMA				1	1	1			
STANISLAUS	2	2	2		1	2			1
SUTTER						1			1
TEHAMA				1					
TULARE	6	3	1	1	2	1		1	
VENTURA	7			1		1	2	1	3
YOLO	1		1					2	
YUBA			1						
Grand Total	232	156	135	103	87	91	102	105	99

Table E-6b Reported Incidence of Shigellosis Type C in California (1990-1998)

	Disease Incidence/100,000 by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	0.5	0.3	0.1	0.0	0.2	0.2	0.2	0.2	0.2
BERKELEY	0.0	0.0	0.0	1.0	1.0	0.0	0.0	0.0	0.0
COLUSA	0.0	0.0	0.0	0.0	0.0	0.0	5.5	0.0	0.0
CONTRA COSTA	0.4	0.0	0.0	0.1	0.1	0.5	0.1	0.1	0.0
DEL NORTE	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0
FRESNO	0.4	0.4	0.0	0.3	0.1	0.0	0.0	0.1	0.1
IMPERIAL	2.7	0.0	0.0	3.2	0.0	0.7	0.7	0.7	0.0
KINGS	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0
LASSEN	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	0.0
LONG BEACH	0.7	1.1	0.0	0.2	0.5	0.0	0.7	0.5	0.4
LOS ANGELES	1.1	0.7	0.7	0.5	0.4	0.3	0.3	0.3	0.3
MADERA	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MARIN	0.0	0.9	0.0	0.0	0.0	0.4	0.0	0.8	0.4
MENDOCINO	0.0	0.0	0.0	0.0	0.0	0.0	5.9	0.0	0.0
MERCED	0.0	0.0	0.0	0.5	0.0	0.0	0.5	0.0	0.0
MONO	0.0	0.0	0.0	0.0	0.0	9.4	0.0	0.0	0.0
MONTEREY	0.6	0.3	1.1	0.0	0.0	0.3	0.0	0.8	0.3
NAPA	0.0	0.9	0.9	0.0	0.9	0.0	0.0	0.0	0.0
ORANGE	0.5	0.6	0.4	0.4	0.4	0.3	0.6	0.4	0.2
PASADENA	1.5	0.0	0.0	0.0	0.0	0.0	1.5	0.7	0.0
PLACER	0.6	0.0	1.1	0.0	0.0	0.0	0.5	0.0	0.0
PLUMAS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.7
RIVERSIDE	0.1	0.3	0.2	0.1	0.2	0.4	0.2	0.4	0.0
SACRAMENTO	0.1	0.2	0.3	0.0	0.0	0.1	0.2	0.2	0.1
SAN BENITO	0.0	0.0	0.0	10.2	0.0	2.4	9.2	4.4	0.0
SAN BERNARDINO	0.5	0.2	0.2	0.3	0.2	0.2	0.1	0.5	0.2
SAN DIEGO	1.1	1.0	0.5	0.5	0.4	0.5	0.4	0.6	0.4
SAN FRANCISCO	1.1	0.8	0.3	0.4	0.7	0.5	0.7	0.1	0.6
SAN JOAQUIN	0.6	1.0	0.2	0.4	0.0	0.4	0.6	0.0	0.2
SAN LUIS OBISPO	0.0	0.0	0.0	0.4	0.0	0.4	0.0	0.0	0.0
SAN MATEO	1.2	0.8	0.8	0.4	0.6	0.3	0.1	0.6	0.0
SANTA BARBARA	0.8	0.8	0.3	0.0	0.0	0.3	0.0	0.0	0.5
SANTA CLARA	1.6	0.7	0.9	0.1	0.2	0.3	0.5	0.4	1.3
SANTA CRUZ	0.0	0.0	0.4	0.4	0.0	0.0	0.0	0.0	0.8
SOLANO	2.1	0.0	0.6	0.3	0.0	0.5	0.0	0.3	0.0
SONOMA	0.0	0.0	0.0	0.2	0.2	0.2	0.0	0.0	0.0
STANISLAUS	0.5	0.5	0.5	0.0	0.2	0.5	0.0	0.0	0.2
SUTTER	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	1.3
TEHAMA	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0
TULARE	1.9	0.9	0.3	0.3	0.6	0.3	0.0	0.3	0.0
VENTURA	1.0	0.0	0.0	0.1	0.0	0.1	0.3	0.1	0.4
YOLO	0.7	0.0	0.7	0.0	0.0	0.0	0.0	1.3	0.0
YUBA	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0

Table E-7a Reported Incidence of Shigellosis Type D in California (1990-1998)

Local Health Department	Reported Cases by Year 1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	95	69	69	97	88	93	89	77	80
AMADOR						1			
BERKELEY	12	12	6	9	5	4	6	5	2
BUTTE	3	13	10	33	7	7		1	
CALAVERAS				2	1				1
COLUSA				1		3		1	3
CONTRA COSTA	34	1	23	58	40	62	16	32	29
DEL NORTE			1						
EL DORADO	1		3	4	4	2		2	1
FRESNO	56	37	79	39	37	112	106	36	30
GLENN	5		4	3		1			
HUMBOLDT		2		4	4		1	12	2
IMPERIAL	12	4	10	28	6	28	11	5	1
INYO			2			3			1
KERN	25	18	20	12	8	20	16	4	5
KINGS	3	3		6		3	7	7	
LAKE	1	1		2	1				1
LASSEN									2
LONG BEACH	52	33	55	102	30	64	46	61	42
LOS ANGELES	900	501	934	824	557	910	671	425	418
MADERA	5	2	15	14	5	11	10		15
MARIN	16	9	9	12	6	16	4	9	9
MARIPOSA			2	1					
MENDOCINO	2	2		3		4	2		55
MERCED	10	7	16	37	13	48	15	1	6
MODOC			3					1	
MONO			1			1			1
MONTEREY	6	10	16	19	4	30	12	8	18
NAPA	4	4	4	6	2	7	5	5	5
NEVADA	4		1			1	2	3	
ORANGE	174	103	169	127	55	266	167	125	133
PASADENA	29	7	18	13	41	40	16	20	10
PLACER	6	3	9	10	2	2	1	3	2
RIVERSIDE	91	37	86	99	45	95	60	51	33
SACRAMENTO	50	27	72	187	85	42	36	43	66
SAN BENITO	3		2	4	1	10	5	6	9
SAN BERNARDINO	99	74	61	130	108	175	75	62	35
SAN DIEGO	324	136	205	210	198	300	188	170	156
SAN FRANCISCO	129	89	183	110	103	223	160	96	50
SAN JOAQUIN	67	43	97	122	74	96	76	46	67
SAN LUIS OBISPO	16	8	15	5	1	3	1	3	5
SAN MATEO	56	59	66	105	60	113	58	51	61
SANTA BARBARA	30	13	29	13	5	20	11	10	28
SANTA CLARA	117	75	89	87	38	131	57	50	69
SANTA CRUZ	21	10	13	12	3	20	15	7	7
SHASTA	1	1	17	8	9	4	1		4
SISKIYOU			1	5					
SOLANO	20	22	9	27	13	34	6	13	14
SONOMA	10	3	7	7	8	10	6	9	12
STANISLAUS	34	22	57	52	11	49	31	20	26
SUTTER	5	4	6	6	4	2		2	2
TEHAMA				3	1	1			1
TRINITY					1			1	
TULARE	43	22	59	73	27	41	18	10	9
TUOLUMNE				1		2			
VENTURA	55	21	48	28	20	26	9	9	39
YOLO	4	3	6	4	2	3	4	4	1
YUBA	2	12	1	4	4	5		2	
Grand Total	2632	1522	2608	2768	1737	3144	2020	1508	1566

Table E-7b Reported Incidence of Shigellosis Type D in California (1990-1998)

	Disease Incidence/100,000 by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	8.1	5.8	5.7	7.9	7.1	7.5	7.1	6.0	6.1
AMADOR	0.0	0.0	0.0	0.0	0.0	3.1	0.0	0.0	0.0
BERKELEY	11.7	11.6	5.8	8.6	4.8	3.8	5.7	4.7	1.9
BUTTE	1.6	7.0	5.3	17.3	3.6	3.6	0.0	0.5	0.0
CALAVERAS	0.0	0.0	0.0	5.7	2.8	0.0	0.0	0.0	2.6
COLUSA	0.0	0.0	0.0	5.8	0.0	16.9	0.0	5.4	16.1
CONTRA COSTA	4.2	0.1	2.8	6.9	4.7	7.2	1.8	3.6	3.2
DEL NORTE	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0
EL DORADO	0.8	0.0	2.2	2.9	2.8	1.4	0.0	1.4	0.7
FRESNO	8.4	5.4	11.2	5.4	5.0	15.0	13.9	4.6	3.8
GLENN	20.2	0.0	15.6	11.6	0.0	3.8	0.0	0.0	0.0
HUMBOLDT	0.0	1.7	0.0	3.2	3.2	0.0	0.8	9.6	1.6
IMPERIAL	11.0	3.5	8.4	22.2	4.5	20.7	7.9	3.5	0.7
INYO	0.0	0.0	10.9	0.0	0.0	16.3	0.0	0.0	5.5
KERN	4.6	3.2	3.5	2.0	1.3	3.3	2.6	0.6	0.8
KINGS	3.0	2.9	0.0	5.5	0.0	2.6	6.1	6.0	0.0
LAKE	2.0	1.9	0.0	3.7	1.8	0.0	0.0	0.0	1.8
LASSEN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.9
LONG BEACH	12.1	7.5	12.4	23.2	6.8	14.6	10.5	13.8	9.4
LOS ANGELES	10.8	6.0	11.0	9.5	6.4	10.4	7.6	4.8	4.6
MADERA	5.7	2.2	15.6	14.0	4.8	10.4	9.2	0.0	13.1
MARIN	7.0	3.9	3.8	5.1	2.5	6.7	1.7	3.7	3.7
MARIPOSA	0.0	0.0	13.2	6.4	0.0	0.0	0.0	0.0	0.0
MENDOCINO	2.5	2.5	0.0	3.6	0.0	4.8	2.4	0.0	63.9
MERCED	5.6	3.8	8.5	19.3	6.6	24.3	7.6	0.5	3.0
MODOC	0.0	0.0	30.4	0.0	0.0	0.0	0.0	9.9	0.0
MONO	0.0	0.0	10.0	0.0	0.0	9.4	0.0	0.0	9.5
MONTEREY	1.7	2.8	4.4	5.1	1.1	8.3	3.3	2.2	4.7
NAPA	3.6	3.6	3.5	5.2	1.7	6.0	4.2	4.2	4.1
NEVADA	5.1	0.0	1.2	0.0	0.0	1.2	2.3	3.4	0.0
ORANGE	7.2	4.2	6.8	5.0	2.1	10.2	6.3	4.7	4.9
PASADENA	22.0	5.3	13.5	9.6	30.3	29.3	11.7	14.4	7.1
PLACER	3.5	1.7	4.9	5.3	1.0	1.0	0.5	1.4	0.9
RIVERSIDE	7.8	3.0	6.8	7.6	3.4	7.0	4.3	3.6	2.3
SACRAMENTO	4.8	2.5	6.6	17.0	7.7	3.8	3.2	3.8	5.7
SAN BENITO	8.2	0.0	5.2	10.2	2.5	24.0	11.5	13.3	19.2
SAN BERNARDINO	7.0	5.1	4.0	8.4	6.9	11.1	4.7	3.9	2.1
SAN DIEGO	13.0	5.4	7.9	8.0	7.5	11.3	7.0	6.2	5.6
SAN FRANCISCO	17.8	12.2	24.9	14.8	13.7	29.7	21.1	12.4	6.4
SAN JOAQUIN	13.9	8.8	19.4	24.1	14.4	18.5	14.4	8.6	12.3
SAN LUIS OBISPO	7.4	3.7	6.8	2.2	0.4	1.3	0.4	1.3	2.1
SAN MATEO	8.6	9.0	9.9	15.6	8.8	16.5	8.4	7.2	8.5
SANTA BARBARA	8.1	3.5	7.6	3.4	1.3	5.1	2.8	2.5	6.9
SANTA CLARA	7.8	4.9	5.8	5.6	2.4	8.2	3.5	3.0	4.1
SANTA CRUZ	9.1	4.3	5.6	5.1	1.3	8.3	6.2	2.9	2.8
SHASTA	0.7	0.7	11.0	5.1	5.7	2.5	0.6	0.0	2.4
SISKIYOU	0.0	0.0	2.3	11.3	0.0	0.0	0.0	0.0	0.0
SOLANO	5.9	6.3	2.5	7.4	3.5	9.2	1.6	3.5	3.7
SONOMA	2.6	0.8	1.7	1.7	1.9	2.4	1.4	2.1	2.7
STANISLAUS	9.2	5.8	14.5	13.0	2.7	11.9	7.5	4.7	6.1
SUTTER	7.8	6.0	8.8	8.6	5.6	2.7	0.0	2.7	2.6
TEHAMA	0.0	0.0	0.0	5.7	1.9	1.9	0.0	0.0	1.8
TRINITY	0.0	0.0	0.0	0.0	7.5	0.0	0.0	7.5	0.0
TULARE	13.8	6.9	18.0	21.8	7.9	11.8	5.1	2.8	2.5
TUOLUMNE	0.0	0.0	0.0	2.0	0.0	3.9	0.0	0.0	0.0
VENTURA	8.2	3.1	7.0	4.0	2.8	3.7	1.3	1.2	5.3
YOLO	2.8	2.1	4.1	2.7	1.4	2.0	2.6	2.6	0.6
YUBA	3.4	20.2	1.7	6.5	6.5	8.1	0.0	3.3	0.0

Table E-8a Reported Incidence of Shigellosis Type Unknown in California (1990-1998)

	Reported Cases by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	57	15	17	57	57	29	28		5
AMADOR	1		1			1			1
BERKELEY	2	6	6	5	1		4	3	1
BUTTE	9	17	20	14	7	4	4	6	2
CALAVERAS	1			1		1			
COLUSA	1		1					1	
CONTRA COSTA	37	72	5	14	23	18	5	12	18
DEL NORTE	2	9		3					
EL DORADO	1		2	2	3	2	5		1
FRESNO	13	19	17	8	16	23	3	4	24
GLENN		1		1					
HUMBOLDT	3	1	1	2		2	2	18	16
IMPERIAL	16	8	17	17	3	11	24	46	17
INYO		2		1		3			1
KERN	32	56	60	57	68	72	73	74	66
KINGS	1						3	2	2
LAKE	1	1						1	1
LASSEN			1					3	
LONG BEACH	9	5	1	8	3	4	4		3
LOS ANGELES	218	176	230	178	194	255	168	95	115
MADERA	5		1		1		9	9	9
MARIN	2	5	1	2	1	1	5	2	1
MENDOCINO			2	1		4	5	1	3
MERCED	25	16	18	14	23	19	8	5	6
MODOC		1					2		
MONTEREY	32	7	23	19	10	36	22	14	18
NAPA				1	2	3	1		2
NEVADA	1	2		1	1				
ORANGE	8	9	15	3	8	1		2	1
PASADENA	1	1	3			1	1	2	
PLACER						1	2		2
RIVERSIDE	38	49	51	21	34	65	20	33	35
SACRAMENTO	11	13	10	22	9	10	9	13	5
SAN BENITO	5	2			3	1	1		
SAN BERNARDINO	22	6	17	38	18	29	18	18	12
SAN DIEGO	52	45	48	55	46	46	55	60	48
SAN FRANCISCO	2	2	3	1		2	1	1	
SAN JOAQUIN	4	19	23	13	2	5			1
SAN LUIS OBISPO	1	2	4		1	1			
SAN MATEO	32	27	11	7	8	10	15	8	7
SANTA BARBARA		3	5	4	7	11	8	4	8
SANTA CLARA	57	53	48	49	45	55	41	55	61
SANTA CRUZ	5	3	10	9	7	16	9	21	7
SHASTA				4			1	1	2
SISKIYOU	4				6	1			
SOLANO	6	2	1	3	4	8	5	4	12
SONOMA	18	12	10	22	14	28	19	22	17
STANISLAUS	1								
SUTTER	1	2				1	1		
TEHAMA	1	2	2	2	2	1	1	1	
TULARE	7	7	9	11	9	7	23	19	26
TUOLUMNE	1		1	1	1	2			
VENTURA	18	14	15	23	22	18	11	11	10
YOLO		2	3	5	4	8	4	9	5
YUBA	9	17	4	2	3	1	1	1	1
Grand Total	773	711	717	701	666	817	621	581	572

Table E-8b Reported Incidence of Shigellosis Type Unknown in California (1990-1998)

	Disease Incidence/100,000 by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	4.9	1.3	1.4	4.7	4.6	2.3	2.2	0.0	0.4
AMADOR	3.3	0.0	3.2	0.0	0.0	3.1	0.0	0.0	3.0
BERKELEY	1.9	5.8	5.8	4.8	1.0	0.0	3.8	2.8	0.9
BUTTE	4.9	9.2	10.6	7.4	3.6	2.1	2.0	3.0	1.0
CALAVERAS	3.1	0.0	0.0	2.8	0.0	2.7	0.0	0.0	0.0
COLUSA	6.1	0.0	5.9	0.0	0.0	0.0	0.0	5.4	0.0
CONTRA COSTA	4.6	8.8	0.6	1.7	2.7	2.1	0.6	1.4	2.0
DEL NORTE	8.5	35.7	0.0	11.1	0.0	0.0	0.0	0.0	0.0
EL DORADO	0.8	0.0	1.5	1.5	2.1	1.4	3.5	0.0	0.7
FRESNO	1.9	2.8	2.4	1.1	2.2	3.1	0.4	0.5	3.1
GLENN	0.0	4.0	0.0	3.9	0.0	0.0	0.0	0.0	0.0
HUMBOLDT	2.5	0.8	0.8	1.6	0.0	1.6	1.6	14.3	12.7
IMPERIAL	14.6	7.0	14.3	13.4	2.3	8.1	17.2	32.6	11.9
INYO	0.0	10.9	0.0	5.4	0.0	16.3	0.0	0.0	5.5
KERN	5.9	10.0	10.4	9.6	11.3	11.7	11.8	11.8	10.4
KINGS	1.0	0.0	0.0	0.0	0.0	0.0	2.6	1.7	1.7
LAKE	2.0	1.9	0.0	0.0	0.0	0.0	0.0	1.8	1.8
LASSEN	0.0	0.0	3.6	0.0	0.0	0.0	0.0	8.7	0.0
LONG BEACH	2.1	1.1	0.2	1.8	0.7	0.9	0.9	0.0	0.7
LOS ANGELES	2.6	2.1	2.7	2.1	2.2	2.9	1.9	1.1	1.3
MADERA	5.7	0.0	1.0	0.0	1.0	0.0	8.3	8.0	7.9
MARIN	0.9	2.2	0.4	0.8	0.4	0.4	2.1	0.8	0.4
MENDOCINO	0.0	0.0	2.4	1.2	0.0	4.8	5.9	1.2	3.5
MERCED	14.0	8.7	9.6	7.3	11.7	9.6	4.0	2.5	3.0
MODOC	0.0	10.2	0.0	0.0	0.0	0.0	19.9	0.0	0.0
MONTEREY	9.0	1.9	6.3	5.1	2.7	10.0	6.1	3.8	4.7
NAPA	0.0	0.0	0.0	0.9	1.7	2.6	0.8	0.0	1.6
NEVADA	1.3	2.5	0.0	1.2	1.2	0.0	0.0	0.0	0.0
ORANGE	0.3	0.4	0.6	0.1	0.3	0.0	0.0	0.1	0.0
PASADENA	0.8	0.8	2.2	0.0	0.0	0.7	0.7	1.4	0.0
PLACER	0.0	0.0	0.0	0.0	0.0	0.5	1.0	0.0	0.9
RIVERSIDE	3.2	4.0	4.0	1.6	2.6	4.8	1.4	2.4	2.4
SACRAMENTO	1.1	1.2	0.9	2.0	0.8	0.9	0.8	1.1	0.4
SAN BENITO	13.6	5.4	0.0	0.0	7.4	2.4	2.3	0.0	0.0
SAN BERNARDINO	1.6	0.4	1.1	2.5	1.2	1.8	1.1	1.1	0.7
SAN DIEGO	2.1	1.8	1.9	2.1	1.7	1.7	2.1	2.2	1.7
SAN FRANCISCO	0.3	0.3	0.4	0.1	0.0	0.3	0.1	0.1	0.0
SAN JOAQUIN	0.8	3.9	4.6	2.6	0.4	1.0	0.0	0.0	0.2
SAN LUIS OBISPO	0.5	0.9	1.8	0.0	0.4	0.4	0.0	0.0	0.0
SAN MATEO	4.9	4.1	1.7	1.0	1.2	1.5	2.2	1.1	1.0
SANTA BARBARA	0.0	0.8	1.3	1.0	1.8	2.8	2.0	1.0	2.0
SANTA CLARA	3.8	3.5	3.1	3.1	2.8	3.4	2.5	3.3	3.6
SANTA CRUZ	2.2	1.3	4.3	3.8	2.9	6.7	3.7	8.6	2.8
SHASTA	0.0	0.0	0.0	2.5	0.0	0.0	0.6	0.6	1.2
SISKIYOU	9.2	0.0	0.0	0.0	13.5	2.2	0.0	0.0	0.0
SOLANO	1.8	0.6	0.3	0.8	1.1	2.2	1.3	1.1	3.1
SONOMA	4.6	3.0	2.5	5.4	3.4	6.7	4.5	5.1	3.9
STANISLAUS	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SUTTER	1.6	3.0	0.0	0.0	0.0	1.4	1.3	0.0	0.0
TEHAMA	2.0	4.0	3.9	3.8	3.8	1.9	1.8	1.8	0.0
TULARE	2.2	2.2	2.7	3.3	2.6	2.0	6.5	5.3	7.2
TUOLUMNE	2.1	0.0	2.0	2.0	1.9	3.9	0.0	0.0	0.0
VENTURA	2.7	2.1	2.2	3.3	3.1	2.5	1.5	1.5	1.4
YOLO	0.0	1.4	2.1	3.4	2.7	5.4	2.6	5.9	3.2
YUBA	15.5	28.6	6.6	3.3	4.9	1.6	1.6	1.6	1.6

Table E-9a Reported Incidence of Amoebiasis in California (1990-1998)

	Reported Cases by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	74	34	32	45	23	20	31	67	29
ALPINE						2			
AMADOR			1			1		2	
BERKELEY	13	9	5	9	2	3	5	9	3
BUTTE		1		1	1	3	1	2	7
CALAVERAS		1	1		1				
COLUSA	1			1					
CONTRA COSTA	12	13	6	14	16	10	9	11	7
DEL NORTE				1					
EL DORADO	2					1			
FRESNO	4	4	3	8	3	2	2	2	3
GLENN	2								
HUMBOLDT	1	1			1	1	2	2	
IMPERIAL		1	3	1	1	3	1		
INYO	1		1			1			
KERN	6	8	12	10	8	1	2	4	4
KINGS	1		3	4		1		1	
LAKE		1			1	1			
LASSEN								1	1
LONG BEACH	10	24	20	21	14	13	16	13	14
LOS ANGELES	446	361	250	306	220	186	204	173	167
MADERA	1	1		2		1			
MARIN	33	38	26	31	36	41	30	26	22
MARIPOSA				1		1	1		
MENDOCINO	2	1				2	1		
MERCED	3	10	20	8	11	10	2	3	3
MODOC				1					
MONO									1
MONTEREY	18	8	2	6	5		1	2	4
NAPA	5	3	4	1	5	4	1	3	6
NEVADA					1	1			1
ORANGE	110	81	123	93	50	48	36	41	26
PASADENA	5	8	4	3	1			2	
PLACER		4	2	1	2	2	1	2	
PLUMAS			1						
RIVERSIDE	15	18	14	9	7	6	15	7	12
SACRAMENTO	21	22	3	3	2	6	6	3	4
SAN BENITO		1	1	2				1	
SAN BERNARDINO	14	19	16	21	21	11	11	12	6
SAN DIEGO	26	21	37	37	49	62	62	82	27
SAN FRANCISCO	315	293	195	259	255	282	172	296	187
SAN JOAQUIN	22	41	34	18	7	5	4	6	13
SAN LUIS OBISPO	8	2	2	6	1	4	4	1	4
SAN MATEO	37	40	25	16	26	10	16	27	19
SANTA BARBARA	84	36	58	42	59	28	96	60	55
SANTA CLARA	238	132	111	94	90	96	52	44	47
SANTA CRUZ	13	10	11	3	12	5	1	4	6
SHASTA	3					1			
SISKIYOU		1							1
SOLANO	10	7	8	4	3	1	2		2
SONOMA	32	27	16	15	12	12	16	4	5
STANISLAUS	28	24	38	35	15	15	7	5	1
SUTTER	8	2	3	3	1	1		1	
TEHAMA					1		1		
TRINITY	3		1						
TULARE	7	29	35	33	23	21	6	10	3
TUOLUMNE	1	2	1						
VENTURA	10	3	6	7	4	6	1	2	4
YOLO	1	1	2	4		1	4	1	3
YUBA				3		2		1	1
Grand Total	1646	1343	1136	1182	990	934	822	933	698

Table E-9b Reported Incidence of Amoebiasis in California (1990-1998)

	Disease Incidence/100,000 by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	6.3	2.9	2.7	3.7	1.9	1.6	2.5	5.3	2.2
ALPINE	0.0	0.0	0.0	0.0	0.0	175.4	0.0	0.0	0.0
AMADOR	0.0	0.0	3.2	0.0	0.0	3.1	0.0	6.0	0.0
BERKELEY	12.7	8.7	4.8	8.6	1.9	2.9	4.8	8.5	2.8
BUTTE	0.0	0.5	0.0	0.5	0.5	1.5	0.5	1.0	3.5
CALAVERAS	0.0	3.0	2.9	0.0	2.8	0.0	0.0	0.0	0.0
COLUSA	6.1	0.0	0.0	5.8	0.0	0.0	0.0	0.0	0.0
CONTRA COSTA	1.5	1.6	0.7	1.7	1.9	1.2	1.0	1.2	0.8
DEL NORTE	0.0	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0
EL DORADO	1.6	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0
FRESNO	0.6	0.6	0.4	1.1	0.4	0.3	0.3	0.3	0.4
GLENN	8.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HUMBOLDT	0.8	0.8	0.0	0.0	0.8	0.8	1.6	1.6	0.0
IMPERIAL	0.0	0.9	2.5	0.8	0.8	2.2	0.7	0.0	0.0
INYO	5.5	0.0	5.5	0.0	0.0	5.4	0.0	0.0	0.0
KERN	1.1	1.4	2.1	1.7	1.3	0.2	0.3	0.6	0.6
KINGS	1.0	0.0	2.8	3.6	0.0	0.9	0.0	0.9	0.0
LAKE	0.0	1.9	0.0	0.0	1.8	1.8	0.0	0.0	0.0
LASSEN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	3.0
LONG BEACH	2.3	5.5	4.5	4.8	3.2	3.0	3.7	2.9	3.1
LOS ANGELES	5.4	4.3	2.9	3.5	2.5	2.1	2.3	1.9	1.9
MADERA	1.1	1.1	0.0	2.0	0.0	0.9	0.0	0.0	0.0
MARIN	14.3	16.4	11.1	13.1	15.2	17.2	12.5	10.8	9.0
MARIPOSA	0.0	0.0	0.0	6.4	0.0	6.3	6.3	0.0	0.0
MENDOCINO	2.5	1.2	0.0	0.0	0.0	2.4	1.2	0.0	0.0
MERCED	1.7	5.4	10.6	4.2	5.6	5.1	1.0	1.5	1.5
MODOC	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0
MONO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.5
MONTEREY	5.1	2.2	0.5	1.6	1.4	0.0	0.3	0.5	1.0
NAPA	4.5	2.7	3.5	0.9	4.3	3.4	0.8	2.5	4.9
NEVADA	0.0	0.0	0.0	0.0	1.2	1.2	0.0	0.0	1.1
ORANGE	4.6	3.3	4.9	3.7	1.9	1.8	1.4	1.5	1.0
PASADENA	3.8	6.0	3.0	2.2	0.7	0.0	0.0	1.4	0.0
PLACER	0.0	2.2	1.1	0.5	1.0	1.0	0.5	0.9	0.0
PLUMAS	0.0	0.0	4.9	0.0	0.0	0.0	0.0	0.0	0.0
RIVERSIDE	1.3	1.5	1.1	0.7	0.5	0.4	1.1	0.5	0.8
SACRAMENTO	2.0	2.1	0.3	0.3	0.2	0.5	0.5	0.3	0.3
SAN BENITO	0.0	2.7	2.6	5.1	0.0	0.0	0.0	2.2	0.0
SAN BERNARDINO	1.0	1.3	1.1	1.4	1.3	0.7	0.7	0.7	0.4
SAN DIEGO	1.0	0.8	1.4	1.4	1.9	2.3	2.3	3.0	1.0
SAN FRANCISCO	43.5	40.1	26.5	34.8	33.9	37.5	22.6	38.3	23.9
SAN JOAQUIN	4.6	8.4	6.8	3.5	1.4	1.0	0.8	1.1	2.4
SAN LUIS OBISPO	3.7	0.9	0.9	2.7	0.4	1.8	1.7	0.4	1.7
SAN MATEO	5.7	6.1	3.8	2.4	3.8	1.5	2.3	3.8	2.7
SANTA BARBARA	22.7	9.6	15.3	11.0	15.3	7.2	24.5	15.1	13.7
SANTA CLARA	15.9	8.7	7.2	6.0	5.7	6.0	3.2	2.7	2.8
SANTA CRUZ	5.7	4.3	4.7	1.3	5.0	2.1	0.4	1.6	2.4
SHASTA	2.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0
SISKIYOU	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	2.3
SOLANO	2.9	2.0	2.2	1.1	0.8	0.3	0.5	0.0	0.5
SONOMA	8.2	6.8	4.0	3.7	2.9	2.9	3.8	0.9	1.1
STANISLAUS	7.6	6.3	9.7	8.7	3.7	3.6	1.7	1.2	0.2
SUTTER	12.4	3.0	4.4	4.3	1.4	1.4	0.0	1.3	0.0
TEHAMA	0.0	0.0	0.0	0.0	1.9	0.0	1.8	0.0	0.0
TRINITY	23.0	0.0	7.6	0.0	0.0	0.0	0.0	0.0	0.0
TULARE	2.2	9.1	10.7	9.9	6.7	6.1	1.7	2.8	0.8
TUOLUMNE	2.1	4.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
VENTURA	1.5	0.4	0.9	1.0	0.6	0.8	0.1	0.3	0.5
YOLO	0.7	0.7	1.4	2.7	0.0	0.7	2.6	0.7	1.9
YUBA	0.0	0.0	0.0	4.9	0.0	3.2	0.0	1.6	1.6

Table E-10a Reported Incidence of Cryptosporidosis in California (1990-1998)

	Reported Cases by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA		1	2	1		3	8	8	29
AMADOR									1
BERKELEY	1	1	1	2	1		1	4	4
BUTTE					1				3
CONTRA COSTA	1	3	6	5	3	1	3	11	15
DEL NORTE			1						
EL DORADO	1								2
FRESNO		2	1	2	1	2	36	2	6
GLENN								1	
HUMBOLDT		1	2			2		2	1
IMPERIAL							2	1	
INYO									1
KERN		1		1	7	5	9	4	
LASSEN							2		2
LONG BEACH		5	10	18	17	24	10	4	3
LOS ANGELES	3	10	108	96	202	214	177	81	103
MADERA				1			2		
MARIN	2	4	4		2	2	3	10	9
MARIPOSA				1					
MENDOCINO					2	1			
MODOC								1	
MONTEREY	2					1	3	5	2
NAPA	1	1				1	1	2	2
NEVADA						1	1		5
ORANGE	15	15	18	20	8	28	9	13	21
PASADENA					4	1	2	1	1
PLACER									1
RIVERSIDE	1	2	8	4	9	12	9	1	9
SACRAMENTO	1		1		1	3	7	7	7
SAN BERNARDINO	11	1	5	15	14	12	11	4	4
SAN DIEGO	2	6	12	46	64	60	45	24	41
SAN FRANCISCO	116	144	85	138	118	125	84	66	27
SAN JOAQUIN		1	1	2	7	1		1	4
SAN LUIS OBISPO		1	1	1	1		2		
SAN MATEO	4	7	3	2	1	2	5	7	7
SANTA BARBARA						1	1	1	5
SANTA CLARA	2	2	7	3	7	5	16	20	14
SANTA CRUZ	2			2	2		1	4	4
SHASTA				1					2
SIERRA						1			1
SISKIYOU								1	
SOLANO	1	1	3	4	1	6	2	14	13
SONOMA		1			1	3	4	17	10
STANISLAUS					1		2	2	1
SUTTER							4	1	
TULARE					1				1
VENTURA			3	2	3	2	6	4	7
YOLO					1	2	1	3	4
YUBA							1	1	
Grand Total	166	210	282	367	480	521	470	328	372

Table E-10b Reported Incidence of Cryptosporidosis in California (1990-1998)

	Disease Incidence/100,000 by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	0.0	0.1	0.2	0.1	0.0	0.2	0.6	0.6	2.2
AMADOR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0
BERKELEY	1.0	1.0	1.0	1.9	1.0	0.0	1.0	3.8	3.7
BUTTE	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	1.5
CONTRA COSTA	0.1	0.4	0.7	0.6	0.4	0.1	0.3	1.2	1.7
DEL NORTE	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0
EL DORADO	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3
FRESNO	0.0	0.3	0.1	0.3	0.1	0.3	4.7	0.3	0.8
GLENN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0
HUMBOLDT	0.0	0.8	1.6	0.0	0.0	1.6	0.0	1.6	0.8
IMPERIAL	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.7	0.0
INYO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.5
KERN	0.0	0.2	0.0	0.2	1.2	0.8	1.5	0.6	0.0
LASSEN	0.0	0.0	0.0	0.0	0.0	0.0	6.5	0.0	5.9
LONG BEACH	0.0	1.1	2.3	4.1	3.9	5.5	2.3	0.9	0.7
LOS ANGELES	0.0	0.1	1.3	1.1	2.3	2.4	2.0	0.9	1.1
MADERA	0.0	0.0	0.0	1.0	0.0	0.0	1.8	0.0	0.0
MARIN	0.9	1.7	1.7	0.0	0.8	0.8	1.3	4.1	3.7
MARIPOSA	0.0	0.0	0.0	6.4	0.0	0.0	0.0	0.0	0.0
MENDOCINO	0.0	0.0	0.0	0.0	2.4	1.2	0.0	0.0	0.0
MODOC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.9	0.0
MONTEREY	0.6	0.0	0.0	0.0	0.0	0.3	0.8	1.4	0.5
NAPA	0.9	0.9	0.0	0.0	0.0	0.9	0.8	1.7	1.6
NEVADA	0.0	0.0	0.0	0.0	0.0	1.2	1.2	0.0	5.6
ORANGE	0.6	0.6	0.7	0.8	0.3	1.1	0.3	0.5	0.8
PASADENA	0.0	0.0	0.0	0.0	3.0	0.7	1.5	0.7	0.7
PLACER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
RIVERSIDE	0.1	0.2	0.6	0.3	0.7	0.9	0.7	0.1	0.6
SACRAMENTO	0.1	0.0	0.1	0.0	0.1	0.3	0.6	0.6	0.6
SAN BERNARDINO	0.8	0.1	0.3	1.0	0.9	0.8	0.7	0.2	0.2
SAN DIEGO	0.1	0.2	0.5	1.8	2.4	2.3	1.7	0.9	1.5
SAN FRANCISCO	16.0	19.7	11.6	18.5	15.7	16.6	11.1	8.5	3.4
SAN JOAQUIN	0.0	0.2	0.2	0.4	1.4	0.2	0.0	0.2	0.7
SAN LUIS OBISPO	0.0	0.5	0.5	0.4	0.4	0.0	0.9	0.0	0.0
SAN MATEO	0.6	1.1	0.5	0.3	0.1	0.3	0.7	1.0	1.0
SANTA BARBARA	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	1.2
SANTA CLARA	0.1	0.1	0.5	0.2	0.4	0.3	1.0	1.2	0.8
SANTA CRUZ	0.9	0.0	0.0	0.8	0.8	0.0	0.4	1.6	1.6
SHASTA	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	1.2
SIERRA	0.0	0.0	0.0	0.0	0.0	29.7	0.0	0.0	29.9
SISKIYOU	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0
SOLANO	0.3	0.3	0.8	1.1	0.3	1.6	0.5	3.7	3.4
SONOMA	0.0	0.3	0.0	0.0	0.2	0.7	0.9	4.0	2.3
STANISLAUS	0.0	0.0	0.0	0.0	0.2	0.0	0.5	0.5	0.2
SUTTER	0.0	0.0	0.0	0.0	0.0	0.0	5.4	1.3	0.0
TULARE	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3
VENTURA	0.0	0.0	0.4	0.3	0.4	0.3	0.8	0.6	1.0
YOLO	0.0	0.0	0.0	0.0	0.7	1.3	0.7	2.0	2.6
YUBA	0.0	0.0	0.0	0.0	0.0	0.0	1.6	1.6	0.0

Table E-11a Reported Incidence of Cryptosporidosis Type S in California (1990-1998)

	Reported Cases by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	2	2	1	2	1	2	3	2	1
BERKELEY					1				
BUTTE				1					
CALAVERAS							1		
CONTRA COSTA		1	2	1	1	1	3	1	1
FRESNO		1			1			5	2
IMPERIAL	1						1	1	
KERN		1	1			1			1
LONG BEACH	2	5	1	4	1	1	2		
LOS ANGELES	59	58	61	57	43	26	33	36	23
MARIN					2	1		1	
MENDOCINO		1						3	
MERCED				3		2			
MONTEREY	7	3	6	3	3	3			
NAPA				1	1	1			
ORANGE	27	38	24	25	19	14	13	21	15
PASADENA		1		2		1		1	
PLACER					1				
RIVERSIDE	2		10	5	7	4	2	3	3
SACRAMENTO				1		1			
SAN BENITO				1		1			
SAN BERNARDINO	2	5	4	3	7	2	2	1	3
SAN DIEGO	9	9	16	8	8	13	10	12	13
SAN FRANCISCO	1		2	3	4	2	3	4	
SAN JOAQUIN	2	2	3	2			2		
SAN LUIS OBISPO	1	1	1	1			1	3	
SAN MATEO	4	2		1		3		2	
SANTA BARBARA		2	4	1		4	1	1	1
SANTA CLARA	13	6	7	11	4	4	8	9	6
SANTA CRUZ	2		1	1	1	1	1		1
SHASTA								1	
SISKIYOU		1							
SONOMA	2	1	2	3	1		1	1	5
STANISLAUS	4		3	1	2		2	2	2
SUTTER					5	2		2	2
TEHAMA					1				
TULARE				2	1	1		1	1
TUOLUMNE								1	
VENTURA	4		1	1	3	2	2	5	1
YOLO		1					2		1
YUBA	1						1		
Grand Total	145	141	150	144	118	93	94	119	83

Table E-11b Reported Incidence of Cryptosporidosis Type S in California (1990-1998)

	Disease Incidence/100,000 by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	0.2	0.2	0.1	0.2	0.1	0.2	0.2	0.2	0.1
BERKELEY	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
BUTTE	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
CALAVERAS	0.0	0.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0
CONTRA COSTA	0.0	0.1	0.2	0.1	0.1	0.1	0.3	0.1	0.1
FRESNO	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.6	0.3
IMPERIAL	0.9	0.0	0.0	0.0	0.0	0.0	0.7	0.7	0.0
KERN	0.0	0.2	0.2	0.0	0.0	0.2	0.0	0.0	0.2
LONG BEACH	0.5	1.1	0.2	0.9	0.2	0.2	0.5	0.0	0.0
LOS ANGELES	0.7	0.7	0.7	0.7	0.5	0.3	0.4	0.4	0.3
MARIN	0.0	0.0	0.0	0.0	0.8	0.4	0.0	0.4	0.0
MENDOCINO	0.0	1.2	0.0	0.0	0.0	0.0	0.0	3.5	0.0
MERCED	0.0	0.0	0.0	1.6	0.0	1.0	0.0	0.0	0.0
MONTEREY	2.0	0.8	1.6	0.8	0.8	0.8	0.0	0.0	0.0
NAPA	0.0	0.0	0.0	0.9	0.9	0.9	0.0	0.0	0.0
ORANGE	1.1	1.6	1.0	1.0	0.7	0.5	0.5	0.8	0.5
PASADENA	0.0	0.8	0.0	1.5	0.0	0.7	0.0	0.7	0.0
PLACER	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0
RIVERSIDE	0.2	0.0	0.8	0.4	0.5	0.3	0.1	0.2	0.2
SACRAMENTO	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0
SAN BENITO	0.0	0.0	0.0	2.5	0.0	2.4	0.0	0.0	0.0
SAN BERNARDINO	0.1	0.3	0.3	0.2	0.4	0.1	0.1	0.1	0.2
SAN DIEGO	0.4	0.4	0.6	0.3	0.3	0.5	0.4	0.4	0.5
SAN FRANCISCO	0.1	0.0	0.3	0.4	0.5	0.3	0.4	0.5	0.0
SAN JOAQUIN	0.4	0.4	0.6	0.4	0.0	0.0	0.4	0.0	0.0
SAN LUIS OBISPO	0.5	0.5	0.5	0.4	0.0	0.0	0.4	1.3	0.0
SAN MATEO	0.6	0.3	0.0	0.1	0.0	0.4	0.0	0.3	0.0
SANTA BARBARA	0.0	0.5	1.1	0.3	0.0	1.0	0.3	0.3	0.2
SANTA CLARA	0.9	0.4	0.5	0.7	0.3	0.3	0.5	0.5	0.4
SANTA CRUZ	0.9	0.0	0.4	0.4	0.4	0.4	0.4	0.0	0.4
SHASTA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0
SISKIYOU	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SONOMA	0.5	0.3	0.5	0.7	0.2	0.0	0.2	0.2	1.1
STANISLAUS	1.1	0.0	0.8	0.2	0.5	0.0	0.5	0.5	0.5
SUTTER	0.0	0.0	0.0	0.0	7.0	2.7	0.0	2.7	2.6
TEHAMA	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0
TULARE	0.0	0.0	0.0	0.6	0.3	0.3	0.0	0.3	0.3
TUOLUMNE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0
VENTURA	0.6	0.0	0.1	0.1	0.4	0.3	0.3	0.7	0.1
YOLO	0.0	0.7	0.0	0.0	0.0	0.0	1.3	0.0	0.6
YUBA	1.7	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0

Table E-12a Reported Incidence of Giardiasis S in California (1990-1998)

	Reported Cases by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	301	217	305	239	149	153	152	270	
ALPINE			3			1			
AMADOR	4	7	11	4	14	9	8	4	8
BERKELEY	37	30	35	24	16	17	29	41	15
BUTTE	44	56	59	56	47	47	41	51	37
CALAVERAS	5	3	14	8	6	4	12	8	5
COLUSA	5	4	6	3	1	3	2	2	1
CONTRA COSTA	216	182	75	194	214	139	162	204	153
DEL NORTE	1	10	8	6	2	2	6	2	
EL DORADO	14	16	35	10	15	14	11	15	12
FRESNO	238	320	304	247	223	204	132	77	88
GLENN	4	6	14	5	3	5	5	4	1
HUMBOLDT	15	14	21	33	19	28	29	22	13
IMPERIAL	4	3	8	22	5	4	10	9	3
INYO	5	18	27	17	6	2		2	
KERN	83	102	153	117	73	65	93	78	82
KINGS	13	29	11	31	5	2	4	12	8
LAKE	18	21	21	26	12	15	29	2	2
LASSEN	2	3	5	2	5	2	5	13	5
LONG BEACH	107	89	125	89	89	64	85	73	63
LOS ANGELES	1808	1635	1667	1671	1177	924	979	804	724
MADERA	3	6	16	5	12	11	8	7	3
MARIN	108	155	213	141	138	137	75	104	98
MARIPOSA	2	3	3	3		1	2		2
MENDOCINO	22	21	12	19	15	44	31	34	23
MERCED	111	102	111	84	102	41	65	36	34
MODOC	2	2	6	7	2	3	1	2	2
MONO	2	6	1	7	2	1	1	2	3
MONTEREY	81	53	35	40	30	41	30	25	38
NAPA	39	34	108	72	48	64	32	32	41
NEVADA	43	28	48	17	25	12	33	26	15
ORANGE	666	472	668	674	302	406	359	321	272
PASADENA	47	58	51	39	27	16	28	27	20
PLACER	39	51	46	44	29	40	57	52	48
PLUMAS	3	36	54	20	8	6	4	8	8
RIVERSIDE	166	162	167	196	98	122	108	103	91
SACRAMENTO	241	329	267	198	95	62	63	78	106
SAN BENITO	6	8	11	10	2	2	6	15	7
SAN BERNARDINO	178	161	201	223	209	128	123	135	98
SAN DIEGO	317	311	497	736	695	573	507	455	455
SAN FRANCISCO	332	289	263	347	405	410	405	384	360
SAN JOAQUIN	295	266	297	196	249	195	178	114	99
SAN LUIS OBISPO	98	46	47	95	47	36	51	58	51
SAN MATEO	199	171	191	172	142	146	133	134	103
SANTA BARBARA	163	145	242	145	200	142	245	180	183
SANTA CLARA	651	545	556	616	554	511	452	369	307
SANTA CRUZ	50	37	110	29	39	45	34	35	34
SHASTA	19	21	24	27	31	14	4	9	8
SIERRA			4	4	1	2	1		2
SISKIYOU	11	15	15	8	14	3	3	16	4
SOLANO	73	42	58	67	62	66	52	46	65
SONOMA	122	107	157	136	108	124	131	70	67
STANISLAUS	144	134	121	117	92	91	68	50	28
SUTTER	28	19	22	19	26	27	21	14	11
TEHAMA	5	9	7	6	11	7	9	6	4
TRINITY	6	8	23	7	7	9	3	2	1
TULARE	39	41	103	66	67	89	59	34	44
TUOLUMNE	18	7	2	3	2	2	5	1	6
VENTURA	184	163	126	98	77	42	62	43	36
YOLO	29	47	44	43	25	33	50	33	25
YUBA	16	14	16	17	32	16	13	13	7
Grand Total	7498	6889	7850	7557	6111	5424	5306	4766	4029

Table E-12b Reported Incidence of Giardiasis S in California (1990-1998)

	Disease Incidence/100,000 by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	25.6	18.2	25.3	19.6	12.1	12.3	12.1	21.2	0.0
ALPINE	0.0	0.0	265.5	0.0	0.0	87.7	0.0	0.0	0.0
AMADOR	13.3	22.7	35.0	12.5	43.2	27.7	24.4	12.0	24.0
BERKELEY	36.0	29.0	33.6	23.0	15.3	16.3	27.7	38.6	13.9
BUTTE	24.2	30.3	31.4	29.4	24.4	24.1	20.9	25.8	18.6
CALAVERAS	15.6	9.1	40.7	22.6	16.6	10.9	32.5	21.6	13.1
COLUSA	30.7	24.1	35.5	17.4	5.7	16.9	11.1	10.9	5.4
CONTRA COSTA	26.9	22.3	9.0	23.0	25.0	16.1	18.6	23.0	16.9
DEL NORTE	4.3	39.7	30.2	22.2	7.3	7.2	21.8	7.2	0.0
EL DORADO	11.1	12.3	26.1	7.3	10.6	9.8	7.6	10.4	8.1
FRESNO	35.7	46.6	43.1	34.2	30.3	27.3	17.3	9.9	11.3
GLENN	16.1	23.8	54.6	19.3	11.5	19.0	18.8	14.9	3.7
HUMBOLDT	12.6	11.6	17.2	26.8	15.3	22.5	23.2	17.5	10.3
IMPERIAL	3.7	2.6	6.7	17.4	3.8	3.0	7.2	6.4	2.1
INYO	27.4	98.4	147.5	92.6	32.5	10.8	0.0	10.9	0.0
KERN	15.2	18.2	26.4	19.7	12.1	10.6	15.0	12.4	12.9
KINGS	12.8	27.9	10.3	28.3	4.5	1.8	3.5	10.3	6.6
LAKE	35.6	40.5	39.6	48.2	22.0	27.3	52.7	3.6	3.6
LASSEN	7.2	10.8	17.8	7.0	17.5	7.0	16.3	37.8	14.9
LONG BEACH	24.9	20.3	28.2	20.2	20.3	14.6	19.4	16.6	14.1
LOS ANGELES	21.8	19.4	19.6	19.4	13.5	10.6	11.1	9.0	8.0
MADERA	3.4	6.5	16.6	5.0	11.6	10.4	7.4	6.3	2.6
MARIN	46.9	66.8	90.9	59.7	58.2	57.5	31.4	43.1	40.1
MARIPOSA	14.0	20.3	19.8	19.3	0.0	6.3	12.6	0.0	12.5
MENDOCINO	27.4	25.7	14.6	22.9	17.9	52.4	36.7	39.8	26.7
MERCED	62.2	55.6	59.0	43.8	52.1	20.7	32.8	18.0	16.7
MODOC	20.7	20.5	60.8	70.2	19.9	29.9	10.0	19.7	20.1
MONO	20.1	59.7	10.0	68.3	19.0	9.4	9.5	19.0	28.4
MONTEREY	22.8	14.7	9.5	10.8	8.2	11.3	8.3	6.8	10.0
NAPA	35.2	30.3	95.1	62.4	41.2	54.6	27.0	26.6	33.6
NEVADA	54.8	34.8	58.4	20.3	29.4	14.0	38.0	29.6	16.8
ORANGE	27.6	19.3	26.8	26.6	11.8	15.6	13.6	12.0	9.9
PASADENA	35.7	43.8	38.2	28.9	19.9	11.7	20.4	19.5	14.3
PLACER	22.6	28.6	25.0	23.2	14.9	20.0	27.6	24.5	21.9
PLUMAS	15.2	181.4	266.7	97.3	38.8	29.3	19.6	39.3	39.1
RIVERSIDE	14.2	13.2	13.2	15.0	7.4	9.0	7.8	7.4	6.3
SACRAMENTO	23.1	30.9	24.6	18.0	8.6	5.6	5.6	6.8	9.2
SAN BENITO	16.4	21.4	28.8	25.4	4.9	4.8	13.8	33.3	14.9
SAN BERNARDINO	12.5	11.0	13.3	14.5	13.4	8.1	7.7	8.4	6.0
SAN DIEGO	12.7	12.2	19.2	28.2	26.3	21.6	18.9	16.7	16.3
SAN FRANCISCO	45.9	39.5	35.8	46.6	53.8	54.5	53.3	49.7	46.0
SAN JOAQUIN	61.4	54.3	59.4	38.6	48.5	37.5	33.7	21.2	18.1
SAN LUIS OBISPO	45.1	21.0	21.3	42.6	20.9	15.8	22.2	24.9	21.6
SAN MATEO	30.6	26.1	28.8	25.6	20.9	21.3	19.2	19.0	14.4
SANTA BARBARA	44.1	38.7	63.8	37.9	52.0	36.5	62.4	45.3	45.4
SANTA CLARA	43.5	36.0	36.2	39.5	35.0	32.0	27.9	22.3	18.2
SANTA CRUZ	21.8	16.0	47.1	12.3	16.4	18.8	14.0	14.3	13.7
SHASTA	12.9	13.9	15.5	17.1	19.5	8.7	2.5	5.5	4.9
SIERRA	0.0	0.0	121.2	120.5	29.9	59.3	29.6	0.0	59.9
SISKIYOU	25.3	34.3	34.2	18.1	31.4	6.7	6.8	36.2	9.0
SOLANO	21.5	12.0	16.2	18.4	16.8	17.8	14.0	12.3	17.0
SONOMA	31.4	27.1	39.2	33.4	26.2	29.8	31.0	16.3	15.3
STANISLAUS	38.9	35.1	30.9	29.2	22.6	22.1	16.3	11.9	6.5
SUTTER	43.5	28.7	32.3	27.1	36.3	37.0	28.3	18.6	14.4
TEHAMA	10.1	17.8	13.5	11.4	20.7	13.0	16.6	11.0	7.3
TRINITY	45.9	61.3	175.6	53.0	52.4	67.2	22.4	15.0	7.6
TULARE	12.5	12.8	31.4	19.7	19.7	25.7	16.8	9.6	12.2
TUOLUMNE	37.1	14.2	4.0	5.9	3.9	3.9	9.7	1.9	11.4
VENTURA	27.5	24.1	18.4	14.1	11.0	5.9	8.7	6.0	4.9
YOLO	20.5	32.8	30.3	29.3	16.9	22.1	33.0	21.5	16.1
YUBA	27.5	23.5	26.4	27.7	51.8	25.8	21.2	21.4	11.5

Table E-13a Reported Incidence of Hepatistis A in California (1990-1998)

	Reported Cases by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	130	135	115	91	96	97	137	157	92
ALPINE				1					
AMADOR	2		2	5	1		3	6	
BERKELEY	14	21	14	13	16	15	38	25	21
BUTTE	44	25	37	105	251	53	72	99	16
CALAVERAS	4	2	3	6	2	7	11		
COLUSA	5	2	4		13	3	6	4	1
CONTRA COSTA	114	75	67	90	78	78	105	81	58
DEL NORTE	2	48	5	46	46	52	4	5	4
EL DORADO	48	6	6	12	11	11	30	9	2
FRESNO	149	203	160	153	157	91	129	122	64
GLENN	13	3	2	1	29	2	13	6	
HUMBOLDT	59	22	13	59	401	219	68	22	1
IMPERIAL	26	30	49	22	45	46	60	33	23
INYO	1	5	1	6	26	10	1		
KERN	168	121	310	346	491	258	171	111	290
KINGS	39	38	64	13	5	13	12	22	14
LAKE	69	51	19	14	6	23	10	9	1
LASSEN	2			8	12	2	10	9	3
LONG BEACH	127	81	70	93	124	207	198	168	73
LOS ANGELES	1395	1182	1411	1094	1120	1120	1163	1753	892
MADERA	21	25	20	11	41	20	18	17	33
MARIN	15	13	13		12	34	40	32	13
MARIPOSA	2	1		5	5		1	1	6
MENDOCINO	23	35	8	30	15	35	14	7	9
MERCED	32	49	43	39	44	35	18	24	119
MODOC	1	3		8	1	5	5	1	
MONO	1	1	2	4	3	3		4	2
MONTEREY	66	66	41	34	56	60	42	64	53
NAPA	21	9	8	10	21	16	13	12	5
NEVADA	20	3	1	9	8	8	6	8	9
ORANGE	355	291	256	375	177	405	319	348	228
PASADENA	35	25	19	38	41	20	23	23	15
PLACER	79	20	47	15	22	16	48	35	17
PLUMAS	13		2	1	6	6	2	2	
RIVERSIDE	367	193	182	149	312	339	381	340	168
SACRAMENTO	285	137	144	309	122	215	678	428	197
SAN BENITO	2	3	5	7	4	6	7	7	12
SAN BERNARDINO	480	230	162	209	361	499	565	333	247
SAN DIEGO	773	622	337	490	668	479	642	534	446
SAN FRANCISCO	259	284	381	220	293	450	581	599	287
SAN JOAQUIN	83	50	86	297	162	198	76	133	61
SAN LUIS OBISPO	32	18	13	8	21	19	19	25	9
SAN MATEO	66	60	48	45	49	66	106	78	67
SANTA BARBARA	60	64	44	67	84	84	38	71	54
SANTA CLARA	222	153	176	157	154	167	121	185	158
SANTA CRUZ	58	30	24	27	39	45	39	73	29
SHASTA	13	20	18	8	109	563	121	16	11
SIERRA				4		8			
SISKIYOU	7	4	3	3	66	52	6	4	1
SOLANO	50	19	17	25	120	45	86	93	103
SONOMA	81	98	102	87	81	107	56	39	31
STANISLAUS	80	109	240	465	154	119	75	52	36
SUTTER	23	11	6	38	91	43	9	8	16
TEHAMA	3	1	4	4	51	37	30	2	4
TRINITY	1		8		8	14	3		
TULARE	125	208	120	99	75	72	90	55	56
TUOLUMNE	5	5	2	8	11	2	5	2	1
VENTURA	99	72	40	56	45	68	78	94	101
YOLO	34	11	17	20	37	26	27	22	34
YUBA	34	23	9	92	142	80	24	10	4
Grand Total	6414	5016	5000	5651	6641	6773	6653	6422	4197

Table E-13b Reported Incidence of Hepatistis A in California (1990-1998)

	Disease Incidence/100,000 by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	11.1	11.3	9.5	7.4	7.8	7.8	10.9	12.3	7.0
ALPINE	0.0	0.0	0.0	88.5	0.0	0.0	0.0	0.0	0.0
AMADOR	6.7	0.0	6.4	15.6	3.1	0.0	9.2	18.1	0.0
BERKELEY	13.6	20.3	13.4	12.5	15.3	14.4	36.3	23.5	19.4
BUTTE	24.2	13.5	19.7	55.2	130.4	27.2	36.7	50.1	8.0
CALAVERAS	12.5	6.0	8.7	17.0	5.5	19.1	29.8	0.0	0.0
COLUSA	30.7	12.0	23.7	0.0	74.3	16.9	33.2	21.7	5.4
CONTRA COSTA	14.2	9.2	8.1	10.7	9.1	9.0	12.0	9.1	6.4
DEL NORTE	8.5	190.5	18.9	170.4	167.6	188.4	14.5	17.9	14.2
EL DORADO	38.1	4.6	4.5	8.7	7.8	7.7	20.8	6.3	1.3
FRESNO	22.3	29.6	22.7	21.2	21.4	12.2	16.9	15.8	8.2
GLENN	52.4	11.9	7.8	3.9	111.1	7.6	48.8	22.4	0.0
HUMBOLDT	49.5	18.3	10.7	47.9	323.1	176.3	54.5	17.5	0.8
IMPERIAL	23.8	26.4	41.1	17.4	34.0	33.9	43.1	23.4	16.1
INYO	5.5	27.3	5.5	32.7	140.9	54.2	5.4	0.0	0.0
KERN	30.8	21.6	53.5	58.3	81.3	42.1	27.6	17.6	45.5
KINGS	38.4	36.5	59.9	11.9	4.5	11.4	10.4	18.9	11.6
LAKE	136.3	98.5	35.8	26.0	11.0	41.9	18.2	16.4	1.8
LASSEN	7.2	0.0	0.0	28.1	42.0	7.0	32.6	26.2	8.9
LONG BEACH	29.6	18.4	15.8	21.1	28.3	47.4	45.2	38.1	16.4
LOS ANGELES	16.8	14.0	16.6	12.7	12.9	12.8	13.2	19.7	9.9
MADERA	23.8	27.2	20.8	11.0	39.5	18.9	16.6	15.2	28.9
MARIN	6.5	5.6	5.6	0.0	5.1	14.3	16.7	13.3	5.3
MARIPOSA	14.0	6.8	0.0	32.2	31.6	0.0	6.3	6.3	37.5
MENDOCINO	28.6	42.9	9.7	36.1	17.9	41.7	16.6	8.2	10.5
MERCED	17.9	26.7	22.9	20.3	22.5	17.7	9.1	12.0	58.6
MODOC	10.3	30.7	0.0	80.2	10.0	49.8	49.8	9.9	0.0
MONO	10.0	10.0	19.9	39.0	28.4	28.3	0.0	38.1	19.0
MONTEREY	18.6	18.3	11.2	9.2	15.3	16.6	11.6	17.3	13.9
NAPA	19.0	8.0	7.0	8.7	18.0	13.7	11.0	10.0	4.1
NEVADA	25.5	3.7	1.2	10.8	9.4	9.3	6.9	9.1	10.1
ORANGE	14.7	11.9	10.3	14.8	6.9	15.6	12.1	13.0	8.3
PASADENA	26.6	18.9	14.2	28.1	30.3	14.7	16.8	16.6	10.7
PLACER	45.7	11.2	25.5	7.9	11.3	8.0	23.3	16.5	7.7
PLUMAS	65.9	0.0	9.9	4.9	29.1	29.3	9.8	9.8	0.0
RIVERSIDE	31.4	15.8	14.3	11.4	23.4	25.0	27.6	24.3	11.7
SACRAMENTO	27.4	12.9	13.3	28.1	11.0	19.3	60.3	37.6	17.0
SAN BENITO	5.5	8.0	13.1	17.8	9.9	14.4	16.1	15.5	25.6
SAN BERNARDINO	33.8	15.7	10.7	13.6	23.2	31.7	35.6	20.7	15.1
SAN DIEGO	30.9	24.5	13.0	18.7	25.3	18.0	23.9	19.6	16.0
SAN FRANCISCO	35.8	38.8	51.8	29.6	39.0	59.8	76.5	77.5	36.6
SAN JOAQUIN	17.3	10.2	17.2	58.6	31.6	38.1	14.4	24.7	11.2
SAN LUIS OBISPO	14.7	8.2	5.9	3.6	9.3	8.4	8.3	10.7	3.8
SAN MATEO	10.2	9.1	7.2	6.7	7.2	9.6	15.3	11.1	9.4
SANTA BARBARA	16.2	17.1	11.6	17.5	21.8	21.6	9.7	17.9	13.4
SANTA CLARA	14.8	10.1	11.5	10.1	9.7	10.5	7.5	11.2	9.4
SANTA CRUZ	25.2	13.0	10.3	11.5	16.4	18.8	16.1	29.7	11.6
SHASTA	8.8	13.2	11.6	5.1	68.5	351.2	75.0	9.8	6.7
SIERRA	0.0	0.0	0.0	120.5	0.0	237.4	0.0	0.0	0.0
SISKIYOU	16.1	9.2	6.8	6.8	148.1	116.5	13.5	9.1	2.3
SOLANO	14.7	5.4	4.7	6.8	32.5	12.2	23.1	24.8	27.0
SONOMA	20.9	24.9	25.4	21.3	19.6	25.7	13.3	9.1	7.1
STANISLAUS	21.6	28.5	61.2	116.1	37.8	28.9	18.0	12.3	8.4
SUTTER	35.7	16.6	8.8	54.2	126.9	58.9	12.1	10.6	20.9
TEHAMA	6.0	2.0	7.7	7.6	95.9	68.8	55.2	3.7	7.3
TRINITY	7.7	0.0	61.1	0.0	59.9	104.5	22.4	0.0	0.0
TULARE	40.1	65.1	36.6	29.6	22.0	20.8	25.6	15.5	15.6
TUOLUMNE	10.3	10.1	4.0	15.7	21.2	3.9	9.7	3.9	1.9
VENTURA	14.8	10.7	5.9	8.1	6.4	9.6	10.9	13.0	13.8
YOLO	24.1	7.7	11.7	13.6	25.1	17.4	17.8	14.3	21.9
YUBA	58.4	38.7	14.9	149.8	229.8	128.8	39.1	16.4	6.6

Table E-14a Reported Incidence of Viral Meningitis in California (1990-1998)

	Reported Cases by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	30	23	37	27	6	15	12	90	29
BERKELEY	5	1	6	5	2	4	2	12	5
BUTTE	9	10	5	11	2	3	6	15	8
CALAVERAS		1						8	1
COLUSA			1						
CONTRA COSTA	19	20	37	26	21	28	11	59	10
DEL NORTE		1	1						2
EL DORADO	1	1	3	2	5	5	10	15	10
FRESNO	47	57	103	137	89	40	68	89	128
GLENN	3	2	1	5	2		1	3	
HUMBOLDT	7	1		3	2	5	4	16	7
IMPERIAL	7	10	51	33	22	8	4	17	13
INYO			3						
KERN	78	72	78	115	79	54	46	40	53
KINGS	5	1	5	3			1	5	3
LAKE	2	1	2	2	2		2	1	4
LASSEN			1		1		2	1	2
LONG BEACH	31	37	86	69	18	22	35	30	87
LOS ANGELES	328	192	895	535	263	166	191	221	446
MADERA	1	1	11	4	6	4	3	6	10
MARIN	10	12	15	1	9	6	9	25	9
MARIPOSA			1	3				1	2
MENDOCINO	1		2	1		1	4	13	11
MERCED	5	3	3	10	2	3		4	8
MODOC	2			2					
MONO			2	1	2			2	
MONTEREY	25	17	27	12	6	9	6	14	11
NAPA	11	8	12	13	5	12	16	37	2
NEVADA	13	6	9	5	4	4	6	7	10
ORANGE	205	194	714	394	110	181	204	275	586
PASADENA	2	5	5	8	3	1	4	3	12
PLACER	6	4	14	12	9	12	8	53	20
PLUMAS				2			1	2	1
RIVERSIDE	67	72	269	126	63	62	49	83	224
SACRAMENTO	40	47	42	55	72	46	39	160	101
SAN BENITO	1		1			2	1	2	2
SAN BERNARDINO	88	63	131	156	62	48	54	62	171
SAN DIEGO	170	170	498	228	210	199	97	220	514
SAN FRANCISCO	12	7	23	12	1	4	5	4	7
SAN JOAQUIN	4	6	27	9	10	15	2	33	13
SAN LUIS OBISPO	5	3	21	23	17	20	13	35	50
SAN MATEO	10	17	12	13	10	9	3	7	9
SANTA BARBARA	7	4	47	24	12	13	13	25	42
SANTA CLARA	66	66	87	85	45	47	60	160	78
SANTA CRUZ	21	18	48	15	2	6	23	19	16
SHASTA	3	4	3	6	16	21	7	68	18
SIERRA						1			
SISKIYOU	1		1					1	
SOLANO	35	16	48	32	17	19	15	90	31
SONOMA	17	12	15	18	8	7	13	29	19
STANISLAUS	32	29	61	47	67	53	44	115	74
SUTTER	3	4	4	7	5	3	4	19	9
TEHAMA	3	1	2	5	1	1		5	2
TRINITY						1		2	
TULARE	36	53	57	52	54	33	17	45	34
TUOLUMNE		5	3	4	1				2
VENTURA	44	22	104	47	24	36	29	38	117
YOLO	2	1	8	4	1	2		5	7
YUBA	4	1	6	2	2	3	2	16	8
Grand Total	1525	1301	3648	2411	1370	1234	1146	2307	3038

Table E-14b Reported Incidence of Viral Meningitis in California (1990-1998)

	Disease Incidence/100,000 by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
ALAMEDA	2.6	1.9	3.1	2.2	0.5	1.2	1.0	7.1	2.2
BERKELEY	4.9	1.0	5.8	4.8	1.9	3.8	1.9	11.3	4.6
BUTTE	4.9	5.4	2.7	5.8	1.0	1.5	3.1	7.6	4.0
CALAVERAS	0.0	3.0	0.0	0.0	0.0	0.0	0.0	21.6	2.6
COLUSA	0.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0
CONTRA COSTA	2.4	2.5	4.5	3.1	2.5	3.2	1.3	6.7	1.1
DEL NORTE	0.0	4.0	3.8	0.0	0.0	0.0	0.0	0.0	7.1
EL DORADO	0.8	0.8	2.2	1.5	3.5	3.5	6.9	10.4	6.7
FRESNO	7.0	8.3	14.6	19.0	12.1	5.4	8.9	11.5	16.4
GLENN	12.1	7.9	3.9	19.3	7.7	0.0	3.8	11.2	0.0
HUMBOLDT	5.9	0.8	0.0	2.4	1.6	4.0	3.2	12.7	5.6
IMPERIAL	6.4	8.8	42.8	26.1	16.6	5.9	2.9	12.1	9.1
INYO	0.0	0.0	16.4	0.0	0.0	0.0	0.0	0.0	0.0
KERN	14.3	12.8	13.5	19.4	13.1	8.8	7.4	6.4	8.3
KINGS	4.9	1.0	4.7	2.7	0.0	0.0	0.9	4.3	2.5
LAKE	4.0	1.9	3.8	3.7	3.7	0.0	3.6	1.8	7.3
LASSEN	0.0	0.0	3.6	0.0	3.5	0.0	6.5	2.9	5.9
LONG BEACH	7.2	8.4	19.4	15.7	4.1	5.0	8.0	6.8	19.5
LOS ANGELES	4.0	2.3	10.5	6.2	3.0	1.9	2.2	2.5	5.0
MADERA	1.1	1.1	11.4	4.0	5.8	3.8	2.8	5.4	8.8
MARIN	4.3	5.2	6.4	0.4	3.8	2.5	3.8	10.4	3.7
MARIPOSA	0.0	0.0	6.6	19.3	0.0	0.0	0.0	6.3	12.5
MENDOCINO	1.2	0.0	2.4	1.2	0.0	1.2	4.7	15.2	12.8
MERCED	2.8	1.6	1.6	5.2	1.0	1.5	0.0	2.0	3.9
MODOC	20.7	0.0	0.0	20.1	0.0	0.0	0.0	0.0	0.0
MONO	0.0	0.0	19.9	9.8	19.0	0.0	0.0	19.0	0.0
MONTEREY	7.0	4.7	7.4	3.2	1.6	2.5	1.7	3.8	2.9
NAPA	9.9	7.1	10.6	11.3	4.3	10.2	13.5	30.8	1.6
NEVADA	16.6	7.5	10.9	6.0	4.7	4.7	6.9	8.0	11.2
ORANGE	8.5	7.9	28.7	15.6	4.3	7.0	7.7	10.3	21.4
PASADENA	1.5	3.8	3.7	5.9	2.2	0.7	2.9	2.2	8.6
PLACER	3.5	2.2	7.6	6.3	4.6	6.0	3.9	25.0	9.1
PLUMAS	0.0	0.0	0.0	9.7	0.0	0.0	4.9	9.8	4.9
RIVERSIDE	5.7	5.9	21.2	9.7	4.7	4.6	3.5	5.9	15.5
SACRAMENTO	3.8	4.4	3.9	5.0	6.5	4.1	3.5	14.0	8.7
SAN BENITO	2.7	0.0	2.6	0.0	0.0	4.8	2.3	4.4	4.3
SAN BERNARDINO	6.2	4.3	8.7	10.1	4.0	3.1	3.4	3.9	10.5
SAN DIEGO	6.8	6.7	19.3	8.7	8.0	7.5	3.6	8.1	18.4
SAN FRANCISCO	1.7	1.0	3.1	1.6	0.1	0.5	0.7	0.5	0.9
SAN JOAQUIN	0.8	1.2	5.4	1.8	1.9	2.9	0.4	6.1	2.4
SAN LUIS OBISPO	2.3	1.4	9.5	10.3	7.5	8.8	5.7	15.0	21.2
SAN MATEO	1.5	2.6	1.8	1.9	1.5	1.3	0.4	1.0	1.3
SANTA BARBARA	1.9	1.1	12.4	6.3	3.1	3.3	3.3	6.3	10.4
SANTA CLARA	4.4	4.4	5.7	5.4	2.8	2.9	3.7	9.7	4.6
SANTA CRUZ	9.1	7.8	20.5	6.4	0.8	2.5	9.5	7.7	6.4
SHASTA	2.0	2.6	1.9	3.8	10.1	13.1	4.3	41.8	11.0
SIERRA	0.0	0.0	0.0	0.0	0.0	29.7	0.0	0.0	0.0
SISKIYOU	2.3	0.0	2.3	0.0	0.0	0.0	0.0	2.3	0.0
SOLANO	10.3	4.6	13.4	8.8	4.6	5.1	4.0	24.0	8.1
SONOMA	4.4	3.0	3.7	4.4	1.9	1.7	3.1	6.8	4.4
STANISLAUS	8.6	7.6	15.6	11.7	16.5	12.9	10.6	27.3	17.3
SUTTER	4.7	6.0	5.9	10.0	7.0	4.1	5.4	25.2	11.8
TEHAMA	6.0	2.0	3.9	9.5	1.9	1.9	0.0	9.2	3.6
TRINITY	0.0	0.0	0.0	0.0	0.0	7.5	0.0	15.0	0.0
TULARE	11.5	16.6	17.4	15.5	15.8	9.5	4.8	12.6	9.4
TUOLUMNE	0.0	10.1	6.0	7.8	1.9	0.0	0.0	0.0	3.8
VENTURA	6.6	3.3	15.2	6.8	3.4	5.1	4.1	5.3	16.0
YOLO	1.4	0.7	5.5	2.7	0.7	1.3	0.0	3.3	4.5
YUBA	6.9	1.7	9.9	3.3	3.2	4.8	3.3	26.3	13.2

Table E-15a Reported Incidence of Toxoplasmosis in California (1990-1998)

	Reported Cases by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
BERKELEY						1			1
BUTTE									1
CONTRA COSTA									1
HUMBOLDT							1		
LAKE							1		
LONG BEACH	1			2		1	1	1	1
LOS ANGELES	30	13	7	49	12	39	27	22	14
MENDOCINO									1
MERCED									1
MONTEREY	1							1	1
ORANGE	1								
PASADENA			1				1	1	
RIVERSIDE	1	4	1		2				
SACRAMENTO	5								
SAN BERNARDINO	2				1				2
SAN DIEGO		2			2	1	1		
SAN FRANCISCO	148	1							
SAN LUIS OBISPO									1
SAN MATEO	3	1							
SHASTA									2
SOLANO								1	1
SONOMA				1					
Grand Total	192	21	9	52	17	42	32	27	27

Table E-15b Reported Incidence of Toxoplasmosis in California (1990-1998)

	Disease Incidence/100,000 by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
BERKELEY	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.9
BUTTE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
CONTRA COSTA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
HUMBOLDT	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0
LAKE	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0
LONG BEACH	0.2	0.0	0.0	0.5	0.0	0.2	0.2	0.2	0.2
LOS ANGELES	0.4	0.2	0.1	0.6	0.1	0.4	0.3	0.2	0.2
MENDOCINO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2
MERCED	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
MONTEREY	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3
ORANGE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PASADENA	0.0	0.0	0.7	0.0	0.0	0.0	0.7	0.7	0.0
RIVERSIDE	0.1	0.3	0.1	0.0	0.2	0.0	0.0	0.0	0.0
SACRAMENTO	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SAN BERNARDINO	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1
SAN DIEGO	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0
SAN FRANCISCO	20.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SAN LUIS OBISPO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
SAN MATEO	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SHASTA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2
SOLANO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3
SONOMA	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0

Table E-16a Reported Incidence of Taenia Tapeworm Infection in California (1990-1998)

	Reported Cases by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
BUTTE						1			
KERN								1	
LOS ANGELES	7	8	8	2	7	6		1	1
MONTEREY	1								
NAPA			1						
ORANGE	2	9	4			3	1	1	
PASADENA						1			
RIVERSIDE			1						
SAN BERNARDINO	1							1	
SAN DIEGO		1							
SAN FRANCISCO		1	2						
SANTA CLARA	1	27	2	3	2				
SONOMA	2								
STANISLAUS	2								
TULARE									1
Grand Total	16	46	18	5	9	11	1	4	2

Table E-16b Reported Incidence of Taenia Tapeworm Infection in California (1990-1998)

	Disease Incidence/100,000 by Year								
Local Health Department	1990	1991	1992	1993	1994	1995	1996	1997	1998
BUTTE	0.000	0.000	0.000	0.000	0.000	0.514	0.000	0.000	0.000
KERN	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.159	0.000
LOS ANGELES	0.084	0.095	0.094	0.023	0.080	0.069	0.000	0.011	0.011
MONTEREY	0.281	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NAPA	0.000	0.000	0.880	0.000	0.000	0.000	0.000	0.000	0.000
ORANGE	0.083	0.368	0.161	0.000	0.000	0.116	0.038	0.037	0.000
PASADENA	0.000	0.000	0.000	0.000	0.000	0.733	0.000	0.000	0.000
RIVERSIDE	0.000	0.000	0.079	0.000	0.000	0.000	0.000	0.000	0.000
SAN BERNARDINO	0.071	0.000	0.000	0.000	0.000	0.000	0.000	0.062	0.000
SAN DIEGO	0.000	0.039	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SAN FRANCISCO	0.000	0.137	0.272	0.000	0.000	0.000	0.000	0.000	0.000
SANTA CLARA	0.067	1.781	0.130	0.192	0.126	0.000	0.000	0.000	0.000
SONOMA	0.515	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STANISLAUS	0.540	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TULARE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.278

Appendix C. Mitigation Monitoring Program

Table 15-1.
Mitigation Monitoring Program

Mitigation Measures	Monitoring and Enforcement Action	Timing of Action	Implementation	Monitoring and Enforcement Responsibility
Land Productivity				
4-1: Provide Soil- and Site-Screening Information with the Pre-Application Report. The GO Pre-Application Report should be revised to require that WDR applicants provide sufficient soil and site information such that RWQCB staff can determine whether soils would be degraded and/or land productivity would be reduced as a result of biosolids application. In particular, providing the information is intended to ensure that 1) essential soil nutrients other than nitrogen are applied so that significant nutrient imbalances do not occur, 2) metals-related phytotoxicity does not occur, 3) metal- related forage toxicity or mineral deficiencies and other trace metals related problems do not occur on hay lands and pasture lands, ~~3)~~4) increases in salinity do not occur to the point that the yields of the crop(s) typically grown at the site is appreciably reduced, and ~~4)~~5) appreciable accelerated soil erosion does not occur.	The GO will be revised to include the development and use of a screening tool to identify sites where management of soil fertility, heavy metals ~~phototoxicity,~~ phytotoxicity and nutrient and heavy metals bioavilability and mobility may become a problem if biosolids are applied	Before adoption of GO	SWRCB	RWQCB

Mitigation Measures	Monitoring and Enforcement Action	Timing of Action	Implementation	Monitoring and Enforcement Responsibility
4-1. Continued The Pre-Application Report already requires sufficient information with which effects of potential nutrient imbalances, metals phytotoxicity, and excessive salinity can be analyzed. This information should be used by ~~the applicant,~~ a ~~qualified~~ certified soil scientist, civil engineer, agricultural engineer or a ~~qualified~~ certified agronomist to evaluate the above potential effects on land productivity. The soil scientist, civil engineer, agricultural engineer and/or agronomist should make recommendations in a letter report to accompany the Pre-Application report regarding the proper rate of biosolids applications, any soil management (e.g., supplemental fertilizers and pH adjustment), appropriate crop, and grazing practice recommendations, considering the nature of the application site soils and biosolids characterization data, and the need to preserve short-term and long-term land productivity. GO Pre-Application Report also should be amended to include the erosion hazard (derived from USDA soil survey reports[1])				

[1] Where a soils survey report is not available for a proposed application site, the applicant should have a qualified soil scientist determine the erosion hazard (using NRCS guidelines), unless the slope of the site is 3% or less. Sites with slopes of 3% or less will be considered to have a slight erosion hazard.

Mitigation Measures	Monitoring and Enforcement Action	Timing of Action	Implementation	Monitoring and Enforcement Responsibility
4-1. Continued of the proposed application site. As is currently done for the recognition of potential hydric (wetland) soils under Section 404 of the Clean Water Act, the soil screening tool could be developed based on existing U.S. Natural Resources Conservation Service (NRCS) soil survey information and a list of possible problem soil-series types. Alternatively, the screening criteria could be based on Soil Taxonomy, using, for example, the taxonomic Great Group and family-differentiating criteria such as particle size, reaction class, and mineralogy classes (e.g., Psamments or Aquents). Additionally, the Limitation to Land Application table hereafter should be added to the GO Pre-Application Report. Applicants or qualified soil scientists or agronomists should use the table to further determine whether soils could be degraded or land productivity reduced.				

Mitigation Measures	Monitoring and Enforcement Action	Timing of Action	Implementation	Monitoring and Enforcement Responsibility

4-1. Continued

Limitations to Land Application

Parameter	Slight	Moderate	Severe
Cation exchange capacity[a] (average milliequivalents per 100 g, 0-20 inches depth	>15	10-15	<10
pH[b] (average 0-20 inches depth)	>6.5	5.0 to 6.5	<5.0
Erosion hazard rating[c]	None to slight	Moderate	High to severe

[a] Cation exchange capacity limits based on professional judgment.
[b] pH limits based on U.S. Department of Agriculture (1993).
[c] Erosion hazard limits based on professional judgment.

Samplings of biosolids and soils should follow EPA/DHS procedures and protocols specified in the National Sewage Sludge Survey (U.S. EPA 1988).

Mitigation Measures	Monitoring and Enforcement Action	Timing of Action	Implementation	Monitoring and Enforcement Responsibility
4-1. Continued Provided that the applicant, a soil scientist, civil engineer, agricultural engineer or agronomist has provided written confirmation to the RWQCB that soils would not be degraded and/or land productivity would not be reduced as a result of nutrient imbalances, metals-related phytotoxicity, or adverse salinity effects, biosolids may be applied on any site with a "slight" limitation as defined in the table. At sites with a "moderate" limitation, biosolids may be applied only where the crop is not known to be particularly sensitive to metals and nutrient imbalances~~.~~ or is not known to be bioaccumulative of heavy metals. Sites with a "severe" limitation are excluded from eligibility under the GO and a site-specific waste discharge investigation and planning study should be conducted by a qualified soil scientist or agronomist to provide, in writing to the RWQCB, written confirmation that biosolids application would not cause soil degradation and would not reduce crop yield. The GO and the Pre-Application Report also should be amended to specify an absolute upper slope limit of 20% at sites in which the biosolids would not be immediately covered by sod or a sufficient mulch cover to control erosion.				

Mitigation Measures	Monitoring and Enforcement Action	Timing of Action	Implementation	Monitoring and Enforcement Responsibility
4-2: Extend Grazing Restriction Period to Allow for SOC Biodegradation. For grazing sites where biosolids applications are proposed, the GO should be revised to require that grazing of animals be deferred for at least 90 days after land application. The GO should also be revised to ~~prohibit grazing animals from using a site~~ require that grazing of animals be deferred for at least 60 days after application of biosolids in areas with average daily (daytime) air temperatures exceeding 50ºF. These measures will promote maximum biodegradation of SOCs and pathogens before grazing animals are exposed to the soil. Refer also to Mitigation Measure 4-1, which requires comprehensive testing and analysis of soils and biosolids by qualified professionals.	The GO will be revised to extend the grazing restriction period to allow for SOC biodegradation.	Before adoption of GO	SWRCB	RWQCB
4-3: Track and Identify Biosolids Application Sites. A program to identify and track applications of biosolids on agricultural lands should be established to mitigate the potential perception by produce buyers and consumers that crops have been contaminated or damaged by biosolids applications. The program should allow for public access to information.. The program should also identify previous biosolids incorporation sites and add them to the tracking system.	A program to track and identify biosolids application sites will be established	Following adoption of GO	SWRCB	RWQCB

Mitigation Measures	Monitoring and Enforcement Action	Timing of Action	Implementation	Monitoring and Enforcement Responsibility
	Public Health			
5-1: Review Manual of Good Practices. Although no significant public health risk is expected from direct human contact with biosolids, it is recommended that all individuals or agencies receiving land application permits under the GO review a manual of good practices that addresses measures to protect human health. The California Water Environment Association Manual of Good Practice—Agricultural Land Application of Biosolids is an example of such a manual (California Water Environment Association 1998).	Manual of Good Practices will be reviewed	Before land application	Discharger	SWRCB
5-2: Extend Grazing Restriction Period to Allow for Pathogen Reduction. For grazing sites where application of biosolids is proposed, the GO should be revised to require that grazing of animals be deferred for at least 90 days after application. The GO should also ~~prohibit grazing animals from using a site~~ require that grazing of animals be deferred for at least 60 days after application of biosolids in areas with average daily (daytime) air temperatures exceeding 50ºF. These measures will promote maximum degradation of pathogens (and SOCs) before grazing animals are exposed to the soil. See also Mitigation Measure 4-2.	The GO should be revised to state that the grazing of animals be deferred for at least 90 days following application and include grazing restrictions based on daily temperatures	Before adoption of the GO	SWRCB	RWQCB
5-3: Implement Good Management Practices. As part of good management practices, it is recommended that workers who are loading or working near sites where Class B biosolids are mixed or loaded or are applied by surface spreading wear respirators or masks to protect against inhalation of aerosols or fine particles derived from the biosolids being handled.	It is recommended that workers who are loading or are working near Class B biosolids wear masks or respirators	During land application operations	Applier	Applier

Mitigation Measures	Monitoring and Enforcement Action	Timing of Action	Implementation	Monitoring and Enforcement Responsibility
Land Use and Aesthetics				
~~**6-1: Require setbacks from areas defined as having a high potential for public exposure.** The GO will be modified to state that:~~ ~~(a) no application of Class B biosolids shall be permitted within an area defined in the GO as having a high potential for public exposure unless the biosolids are injected into the soil and~~ ~~(b) educational facilities; facilities designated for recreation activities other than hunting, fishing, or wildlife conservation; places of public assembly; hospitals; or similar sensitive receptors shall be included in the definition of "populated area" as used in conjunction with the designation "High Potential for Public Exposure Areas."~~	~~The GO will be modified to require setbacks from areas defined as having a high potential for public exposure (for Class B biosolids~~	~~Before adoption of GO~~	~~SWRCB~~	~~RWQCB~~
6-1: Require injection of biosolids in areas defined as having a high potential for public exposure for Class B biosolids. The GO will be modified to state that no application of Class B biosolids shall be permitted within an area defined in the GO as having a high potential for public exposure unless the biosolids are injected into the soil.	Class B biosolids will be injected at the application site if they are applied in areas defined as having a high potential for public exposure	During land application	Discharger	RWQCB
6-2: Require the Maintenance of Biosolids Transport Trucks after Biosolids Are Loaded in the Trucks. The GO will be modified to stipulate that dischargers ensure that any biosolids adhering to the outside of biosolids transport trucks and tires be removed before trucks leave the dischargers' sites. Implementation of this mitigation measure will prevent biosolids from being spilled in roadways.	The GO will be modified to require the maintenance of biosolids transport trucks	Before adoption of GO	SWRCB	RWQCB

Mitigation Measures	Monitoring and Enforcement Action	Timing of Action	Implementation	Monitoring and Enforcement Responsibility
Biological Resources				
7-1: Conduct a Site Assessment on Natural Terrestrial Habitat and Fallow Lands for Special-Status Plant and Wildlife Species. The NOI should be modified to include a section for the applicant to indicate whether the site where biosolids would be applied has been fallow for more than 1 year. RWQCB staff will evaluate each project to determine if the biosolids would be applied to natural terrestrial habitats or any lands that have been fallow for more than 1 year and that have not been continually disked. If RWQCB staff determines that natural terrestrial habitats or lands that have been fallow for more than 1 year are present on the project site, a site assessment must be conducted to determine whether there is potential for special-status species to occur and whether or not they could be affected by the application of biosolids~~.~~; this report must be forwarded to the appropriate regional office of the DFG and the Endangered Species Unit of the USFWS in Sacramento for review and approval of the mitigation strategy. If there are no special-status species present, RWQCB may continue with the project evaluation. If special-status species could be affected, the project would not be authorized under the GO unless the applicant submits a plan to mitigate for any significant impacts on special-status species, obtains the appropriate permits, and agrees to implement the mitigation.	The GO will be modified to include biological information in the NOI and site assessments will be conducted on natural terrestrial habitat and follow lands for special-status plant and wildlife species	Before issuance of Notice of Applicability	SWRCB Discharger	RWQCB

Mitigation Measures	Monitoring and Enforcement Action	Timing of Action	Implementation	Monitoring and Enforcement Responsibility
7-2: Conduct a Site Assessment on Natural Terrestrial Habitats for Biologically Unique or Sensitive Natural Communities. The NOI should be modified to include a section for the applicant to indicate whether the site where biosolids will be applied is an existing agricultural operation or whether it could contain biologically unique or sensitive natural communities. RWQCB staff will evaluate each project to determine whether the biosolids would be applied to natural terrestrial habitats. If RWQCB staff determines that natural terrestrial habitats are present on the project site, a site assessment must be conducted to determine whether biologically unique or sensitive natural communities occur and whether they could be disturbed by the application of biosolids~~.~~; this report must be forwarded to the appropriate regional office of the DFG and the Endangered Species Unit of the USFWS in Sacramento for review and approval of the mitigation strategy. If there are no biologically unique or sensitive natural communities present, RWQCB may continue with the project evaluation. If biologically unique or sensitive natural communities are present and more than 10% or 10 acres would be disturbed, whichever is less, the project would not be authorized under the GO unless the applicant submits a plan to mitigate for any significant impacts on biologically unique or sensitive natural communities and agrees to implement the mitigation.	The GO will be modified to include biological information on the NOI and a site assessment on natural terrestrial habitats for biologically unique or sensitive natural communities will be conducted	Before issuance of Notice of Applicability	SWRCB Discharger	RWQCB

Mitigation Measures	Monitoring and Enforcement Action	Timing of Action	Implementation	Monitoring and Enforcement Responsibility
	Fish			
8-1: Increase Setback from Enclosed Water Bodies If Pupfish Are Present. Proposed land applications in the habitat range of the pupfish should be reviewed for their proximity to enclosed water bodies that could be occupied by pupfish. If such water bodies are near the land application areas, setbacks of 500 feet should be required. There are several species of pupfish in southern California. Their current occupied habitat is confined to several small springs, Salt Creek and the Amargosa River in southern Inyo and northern San Bernardino counties in the vicinity of Death Valley National Monument, and San Felipe Creek and the Salton Sea in Imperial County. Exact locations of habitat can be found in Moyle et al. 1989.	NOI will be reviewed to determine if proposed land applications are within the habitat range of the pupfish. If pupfish are present, 500-foot setbacks from water bodies will be established	Before issuance of Notice of Applicability and during land application	RWQCB	RWQCB
	Air Quality			
~~**10-1: Properly Maintain Transport Vehicles in Good Operating Condition and Limit Truck Travel on Paved Roads to 4,800 VMT.** Biosolids application projects require the use of heavy-duty trucks to haul biosolids from wastewater treatment plants to application sites. To keep daily NO_x emissions at or under the NO_x significance threshold, trucks must be properly maintained and kept in good operating condition. This mitigation measure will reduce NO_x emissions by 5%, thus reducing emissions to 52.9 pounds per day (assuming 4,800 VMT per day), which is below the significance threshold. This mitigation measure will reduce NO_x emission impacts to a less-than-significant level for projects generating 4800 VMT per day or less.~~	~~Biosolid land application sites will be restricted to 60 acres to reduce NO_x emissions~~	~~Before issuance of Notice of Applicability~~	~~RWQCB~~	~~RWQCB~~

Mitigation Measures	Monitoring and Enforcement Action	Timing of Action	Implementation	Monitoring and Enforcement Responsibility
~~**10-2: Control Fugitive Dust from Unpaved Roads.** Delivery of biosolids often requires the use of unpaved roads that can generate substantial amounts of fugitive dust. Biosolids application projects requiring truck travel in excess of 67 VMT per day on unpaved roads would result in significant PM10 impacts. The following mitigation measures would keep daily PM10 emissions at or under the PM10 significance threshold and therefore reduce PM10 impacts to a less-than-significant level:~~ ~~g Limit truck travel on unpaved roads to 67 VMT per day.~~ ~~OR~~ ~~g Apply water or chemical stabilizers that have no secondary ecological effects to unpaved roads in sufficient quantities to prevent visible dust emissions and limit truck travel on unpaved roads to 134 VMT per day. Water and/or chemical stabilizers can reduce dust generation by 50% from uncontrolled levels. Travel on unpaved roads in excess of 134 VMT per day, even with the use of water or chemical stabilizers, will result in emissions exceeding the PM10 significance threshold.~~	~~Fugitive dust will be controlled on unpaved roads~~	~~During land application~~	~~Discharger~~	~~RWQCB~~

Mitigation Measures	Monitoring and Enforcement Action	Timing of Action	Implementation	Monitoring and Enforcement Responsibility
	Noise			
11-1: Avoid the Use of Haul Routes near Residential Land Uses. The project applicant and or transporter will avoid the use of haul routes near residential land uses to the extent possible. If the use of haul routes near residential land uses cannot be avoided, the project applicant and or transporter will limit project-related truck traffic to daylight hours ~~(8 a.m. to 6 p.m.)~~.	Haul routes near residential land uses will be avoided to the extent possible	During biosolids transport	Discharger	RWQCB
	Cultural Resources			
12-1: Conduct a Cultural Resources Investigation. A cultural resources investigation should be conducted before disturbance is permitted on land that has not been disturbed previously. The cultural resources investigation should include a records search for previously identified cultural resources and previously conducted cultural resources investigations of the project parcel and vicinity. This records search should include, at a minimum, contacting the appropriate information center of the California Historical Resources Information System, operated under the auspices of the California Office of Historic Preservation. In coordination with the information center or a qualified archaeologist, a determination can be made regarding whether previously identified cultural resources would be affected by the proposed project and if previously conducted investigations were performed to satisfy the requirements of CEQA. If not, a cultural resources survey may need to be conducted. The purpose of this investigation would be to identify resources before they are affected by a proposed project and avoid the impact. If the impact is unavoidable, mitigation should be determined on a case-by-case basis.	A cultural resources investigation will be conducted on undisturbed lands	Before issuance of Notice of Applicability	Discharger	RWQCB

Mitigation Measures	Monitoring and Enforcement Action	Timing of Action	Implementation	Monitoring and Enforcement Responsibility
12-2: Comply with State Laws regarding Disposition of Native American Burials, If Such Remains Are Found. If human remains of Native American origin are discovered during project activities, it is necessary to comply with state laws relating to the disposition of Native American burials, which are under the jurisdiction of the Native American Heritage Commission (Pub. Res. Code Section 5097). If human remains are discovered or recognized in any location other than a dedicated cemetery, excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains will stop until: g the county coroner has been informed of the discovery and has determined that no investigation of the cause of death is required; and g if the remains are of Native American origin, – the descendants of the deceased Native Americans have made a recommendation to the landowner or the person responsible for the excavation work, for means of treating or disposing of the human remains and any associated grave goods with appropriate dignity, as provided in Public Resources Code Section 5097.98, or – the Native American Heritage Commission is unable to identify a descendant or the descendant failed to make a recommendation within 24 hours after being notified by the commission.	State laws regarding disposition of Native American burials will be complied with	During land application	Discharger	RWQCB

Mitigation Measures	Monitoring and Enforcement Action	Timing of Action	Implementation	Monitoring and Enforcement Responsibility
12-2. Continued According to the California Health and Safety Code, six or more human burials at one location constitute a cemetery (Section 8100) and disturbance of Native American cemeteries is a felony (Section 7052). Section 7050.5 requires that construction or excavation be stopped in the vicinity of discovered human remains until the coroner can determine whether the remains are those of a Native American. If the remains are determined to be Native American, the coroner must contact the California Native American Heritage Commission.				
Cumulative Impacts				
13-1: Minimize Contribution to Groundwater Nitrate Contamination from Land Application of Biosolids Conducted under the GO. As a condition for the review of each individual NOI submitted for a proposed biosolids application project under the GO, the RWQCB engineer responsible for issuing the NOA would: g evaluate whether the proposed discharge would occur within an area designated as having existing nitrate contamination problems and g evaluate whether the proposed discharge would pose an imminent threat of contributing to or causing exceedances of water quality standards for nitrate.	RWQCB to review application and discharger to modify discharge activities or provide additional information on potential violation of water quality standards	Before issuance of NOA	RWQCB Discharger	RWQCB

Mitigation Measures	Monitoring and Enforcement Action	Timing of Action	Implementation	Monitoring and Enforcement Responsibility
13-1. Continued If the responsible engineer finds that either condition exists, the RWQCB would minimize the potential water quality impacts of the project by requiring the applicant to modify the proposed discharge activities or provide additional information to verify that the proposed discharge would not cause or contribute to violations of water quality standards. Verification that the proposed project would not cause or contribute to water quality degradation would require that sufficient information be submitted by a qualified civil engineer, agricultural engineer, or other professional hydrogeologist or water quality specialist such that the RWQCB engineer could make a finding that the proposed discharge would be in compliance with provisions of the GO. If the RWQCB finds that modifications to the proposed discharge are necessary for compliance with provisions of the GO, such modifications would consider, but would not be limited to, the following: g requirements for the discharger to use the services of a certified agronomist, crop advisor, or agricultural engineer to develop additional management practices related to: 1) determining the agronomic rate for biosolids application projects that includes all sources of nitrogen applied to the application site; 2) developing overall farm water, cropping, and fertility management practices; and 3) evaluating the potential for nitrate leaching or impairment of offsite groundwater use;				

Mitigation Measures	Monitoring and Enforcement Action	Timing of Action	Implementation	Monitoring and Enforcement Responsibility
13-1. Continued				
g requirements of the discharger to provide additional groundwater monitoring in areas where groundwater is found at depths greater than 25 feet or there exist other identified local hydrogeologic conditions that could make the groundwater susceptible to contamination;				
g requirements of the discharger to identify whether the proposed biosolids application site is within an area where Drinking Water Source Water Assessment and Protection (DWSWAP) Program setback requirements are implemented for municipal and domestic wells; and				
g requirements of the discharger to consider the unique local site and hydrogeologic conditions in the design of the project and/or other groundwater quality management or regulatory programs that are currently active in the area.				

Mitigation Measures	Monitoring and Enforcement Action	Timing of Action	Implementation	Monitoring and Enforcement Responsibility
13-2: Reduce Sources of Nitrate Contamination. The SWRCB would continue to identify causes of cumulative nitrate loading in nitrate sensitive groundwater areas and develop an effective strategy for reducing those sources. An effective strategy may include, but would not be limited to, the following: g Each RWQCB should implement existing groundwater pollution protection permit programs and policies to prevent or reduce nitrate contamination of groundwater. Such a program may include evaluating increased enforcement procedure, or modifying the permitting programs for other agricultural activities (e.g., confined animal feeding operations, dairies, poultry farms), industrial and municipal NPDES-permitted discharges of wastes and reclaimed water to land, and NPDES storm water management regulations. g Other local, state, and federal permitting authorities should evaluate, integrate, increase enforcement of, or modify their existing policies and procedures to reduce the cumulative contribution of nitrates to groundwater. Examples of other regulatory programs that should be evaluated and considered in areas that would have biosolids application include groundwater management programs, residential onsite septic tank system approval, municipal landfill management plans, agricultural cooperative extension programs, and forestry management programs.	Sources of nitrate contamination will be controlled	Ongoing	RWQCB	SWRCB

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

September 10, 1999

Mr. Todd Thompson
State Water Resources Control Board, Water Quality Division
901 P St.
Sacramento, CA 95814

Dear Mr. Thompson:

Thank you for providing the Draft EIR Covering General Waste Discharge Requirements for Biosolids Land Application for review. On behalf of the U.S. EPA Region 9's Clean Water Act Compliance Office, I am submitting the following comments.

The federal biosolids standards (40 CFR 503) were written with the expectation that they be supplemented as needed with management controls at the State/local level, and hopefully this General Order (GO) with the recommended mitigation measures will serve that purpose. It is important that all nine of the Regional Boards provide input on the implementation of the order and mitigation measures.

Comments:

Mitigation Measure 4.1: Provide Soil and Site-Screening Information with the Pre-Application Report:

The GO should be amended, as recommended, to require an evaluation of the data on salinity, nutrients, and pollutants. Salinity levels in California biosolids vary widely, and some biosolids may be of concern in some instances, depending on the crop and irrigation methods. 1-1

Neither 40 CFR 503 or the GO specify the frequency of monitoring for nitrogen or other micronutrients over the course of a project. Most appliers monitor nitrogen at the same frequency as is required in 40 CFR 503 for metals for the treatment plant in question. Some appliers have found that while metals levels do not vary greatly from month to month, organic and ammonium nitrogen levels may vary considerably. The DEIR should consider the frequency of monitoring for nitrogen that will be needed during the course of a project. This could be implemented by setting frequencies in the GO, or having RWQCBs specify frequencies on a case-by-case basis. 1-2

Mitigation Measure 4.2: Grazing Restrictions:

Many biosolids do not have detectable levels of any of the SOCs, and the 90 day restriction (as opposed to EPA's 30 day restriction) in this case may not be warrented in these cases. The Regional Board could review individual project data to decide when 90 day restrictions are needed. In the case of Class A biosolids, no grazing restrictions are necessary if the biosolids do not contain SOCs. 1-3

The Regional Boards should have discretion in deciding when SOC tests must be run. POTWs over 5 mgd (serving over 50,000 people) now run these tests at least annually; however smaller plants do not currently run these tests (which are fairly costly) and they may not be necessary in the case of very small, 100% domestic facilities, or for sites that will not be used for grazing. 1-4

Mitigation Measure 4.3: Track biosolids application sites:

A tracking system is also necessary in order to verify that harvesting restrictions are observed for the full 38 months, and to track cumulative metals loadings. We would be glad to work with the State/Regional Boards in developing this database. 1-5

Mitigation Measure 6.2: Maintenance of trucks:

This should measure should be incorporated, to ensure Class B biosolids are completely contained within trucks. 1-6

Mitigation Measure 7.1 and 7.2: Provide biological information:

The requirement to assess whether special-status species occur on sites which are fallow for more than a year would be advisable prior to the application of any fertilizer or soil amendment. However, this might also deter farmers from allowing fields to remain fallow every several years as a best management practice. The requirement should be constructed so as not to be unduly burdomsome for application of biosolids as opposed to other soil amendments. 1-7

While these measure does not specifically address endangered or threatened species, it should provide the information necessary to determine if there would be an impact to these species.

Mitigation Measure 10.1: Limit vehicle miles traveled to 4800 VMT

The mitigation measure, and the means by which Regional Boards would implement it, require substantial clarification. The impacts of limiting that traffic going to a particular site should be analyzed more fully, since in most cases this would result in additional overall VMT both within the Air Quality Management District (AQMD) in question, and within other AQMD's. 1-8

Treatment plants located in the South Coast Air Basin currently send more than 100 trucks per day distances of up to 400 miles per day (round trip), through the South Coast Air

Basin and into the San Joaquin, Southeast Desert , Salton Sea, and San Diego Air Basins. This results in very roughly 16,000 VMT within the South Coast Air Basin, plus roughly the same amount spread out among the other basins. Limiting VMT at individual sites in these receiving air basins would probably not alter the VMT within the South Coast Basin, since the South Coast plants would then switch to other sites within these receiving basins (using the same corridors along I-5, I-8, etc.), or switch to landfills, compost operations, or out-of-state sites also located along the same corridors in these receiving air basins. The implementation of VMT restrictions could result in a transfer of emissions, e.g. from the San Joaquin Air Basin to the Salton Sea Air Basin. 1-8 (cont)

The recommendation raises numerous questions in terms of implementation, such as:

- How would a Regional Board address two sites that are next to each other but operated by different appliers? For example, a POTW in the South Coast Air Basin sends 24 trucks per day to a site 200 miles away in the San Joaquin Air Basin, for very roughly 4,800 VMT in the San Joaquin Air Basin. Another POTW located a few miles from the first one in the South Coast Air Basin sends 24 trucks to an adjacent site run by another applier, for an additional 4,800 VMT. Would the Regional Board need to restrict the sites to 12 trucks each, or not allow the second site to operate? How would the Regional Board address this if the second site is not adjacent to the first site but 10 miles down the road from the first site? At 10 off-ramps further down the Interstate? 1-9

- If a composter in the San Joaquin Air Basin receives 24 trucks per day from POTWs in the South Coast Air Basin, plus additional truckloads of greenwaste, and trucks 36 loads per day of finished compost to a site also in the San Joaquin Air Basin where it is applied at > 20 tons/acre, will the Regional Board consider both the VMT from the POTWs to the compost operation and from the compost operation to the application site, or just from the compost operation to the site? 1-10

Sites located at the border of an AQMD would presumably be able to receive far more truckloads than sites located in the center of an AQMD, if the Regional Board only considers the VMT within the receiving AQMD. 1-11

It would be useful to assess the relative impact of rail plus truck travel (i.e. loading trailers onto railcars, transport to where they would be off-loaded back onto trucks). What would be the emissions resulting from transporting 40 truckloads of biosolids from the Los Angeles area 200 miles by rail plus about 20 VMT to a site in the San Joaquin Air District, v.s. trucking it the entire distance? 1-12

Mitigation Measure 11.1: Avoid haul routes near residential land uses:

Proposed haul routes should be reviewed as part of the pre-application review. Because application of biosolids requires more truck traffic to a site than if chemical fertilizers are used, optimum haul routes need to be established. 1-13

Mitigation Measure 13.1: Minimize Groundwater Nitrate Contamination:

These procedures should be incorporated in order to ensure that biosolids are applied at conservative rates in areas with groundwater contamination problems. Because the actual uptake of nitrogen during a growing season is dependent on numerous variables, a professional evaluation of the nitrogen loading rates should be made if there is the possibility of nitrates moving to groundwater. This level of evaluation is not necessary in areas where there is a considerable depth to useable groundwater sources. 1-14

Chapter 14: Alternatives:

The analysis of alternatives assumes up front that the Regional Boards will implement the General Order as adopted; therefore it is highly important to obtain their input at this point. 1-15

Under the land application ban alternative, there may be an increased use of waste-derived soil amendments which are not regulated at the Federal or State level. Manures are not subject to the same agronomic rate requirements. 1-16

Some editorial corrections:

Chapter 2, page 6, final paragraph: Define "exceptional quality" biosolids **to include one of the vector attraction reduction options 1 - 8 in 503.33.** 1-17

Executive Summary, page 2 and Chapter 1, Page 2: There is an erroneous statements that 40 CFR 503 applies to the generator but not the applier. The rule does set standards which the applier must comply with, subject to enforcement under Section 309 of the Clean Water Act. In reality, though, additional oversight is needed at the State/local level to ensure the standards are met. 1-18

Please call me at (415) 744-1909 with any questions on this.

Sincerely,

Lauren V. Fondahl

Lauren V. Fondahl
Biosolids Coordinator
Clean Water Act Compliance Office

Responses to Comments from U.S. Environmental Protection Agency - Region IX

1-1. The commenter's support of Mitigation Measure 4-1 is noted. The SWRCB will determine whether this mitigation measure is adopted.

1-2. The proposed GO requires nitrogen reporting annually. It is recognized that more frequent reporting may help to determine and track application rates and crop needs in areas with existing groundwater nitrate problems. However, SWRCB staff does not intend to overregulate the agricultural industry. RWQCB staff members have reviewed the proposed GO; none indicated that such a monitoring allowance is desired or deemed necessary. In cases where additional monitoring is deemed necessary, an individual, site-specific set of waste discharge requirements may be more appropriate. These decisions would be made at the RWQCB level.

1-3. The commenter stated that many biosolids do not have detectable SOCs and recommended that each RWQCB be given more discretionary authority to decide when the 90-day grazing restriction should be imposed.

The SWRCB staff acknowledges that when tested using commercial analytical techniques, biosolids, particularly those from rural, nonindustrial source areas (as opposed to urban-industrial areas), may not have detectable SOCs. However, many household uses of detergents and cleaning agents, cosmetics, medicines and pharmaceutical products, paints, paint products and pesticides can potentially introduce numerous SOCs into wastewater treatment plants. Many of these may also not be detected by standard commercial analytical tests. An RWQCB has little information on which to base a discretionary decision-making process. The SWRCB believes that potential SOCs in biosolids and their unknown impacts, combined with uncertain occurrence of potentially viable pathogens in biosolids warrants the prudent conservative approach in Mitigation Measure 4-2.

Also see Response to Comment 28-8.

1-4. The high cost of SOC testing is acknowledged. However, some SOCs were detected in more than 5% of sewage sludges in the National Sewage Sludge Survey, including some SOCs listed in the Safe Drinking Water and Toxic Enforcement Act. The National Academy of Sciences' peer review of the Part 503 regulations carefully evaluated pollutant selection and found that "while the probability that the compounds would affect human-consumed crops is very low . . . other pathways as defined in Part 503 should be re-evaluated." The monitoring requirement will allow generation of more California-specific data that may identify biosolids that need a special individual site-specific set of waste discharge requirements to address the nature of the material.

1-5. The importance of ensuring that all of the proposed GO's mandatory waiting periods are complied with prior to recission is acknowledged. Simply tracking, without enforcement authority, is not a feasible alternative. However, as addressed in the comment, site tracking is also an important mitigation measure for Class B biosolids land applications. Comment noted.

1-6. The commenter's support of Mitigation Measure 6-2 is noted.

1-7. The commenter stated that Mitigation Measures 7-1 and 7-2 could be burdensome for the biosolids land applier because both measures require the land applier to conduct biological surveys if the site remained fallow for more than 1 year. Because special-status species (including endangered species) could reenter areas if they have been fallow for long periods, Mitigation Measures 7-1 and 7-2 are required to ensure that biological resource impacts remain less than significant. Refer to Response to Comment 23-18 for additional information on Mitigation Measures 7-1 and 7-2.

Mitigation Measure 7-1 on page 7-12 of the draft EIR has been modified by adding the following text immediately after the word "species" in line four:

> ; this report must be forwarded to the appropriate regional office of the DFG and the Endangered Species Unit of the USFWS in Sacramento for review and approval of the mitigation strategy.

The same statement has been added to Mitigation Measure 7-2 on page 7-12 of the draft EIR, immediately following the word "habitats" in the last line of the mitigation.

1-8. See Master Response 5.

1-9. See Master Response 5.

1-10. See Master Response 5.

1-11. See Master Response 5.

1-12. See Master Response 5.

1-13. The commenter requested review of proposed haul routes. As stated in the proposed GO, a traffic plan will be submitted as part of the preapplication report. The traffic report shall, at the least, identify the proposed route and anticipated maximum vehicle weight for all vehicles handling biosolids.

1-14. The commenter's support of Mitigation Measure 13-1 is noted.

1-15. As the implementing agency, RWQCB input is critical to the proposed GO's success. Comment noted. Also see Response to Comment 1-2.

1-16. It is agreed that, under the Land Use Ban Alternative, people using biosolids may change to nonregulated sources of fertilizer, including animal manures, which could result in higher nitrate concentrations in soil and groundwater than would exist using biosolids regulated by the proposed GO.

1-17. To clarify the definition of "exceptional quality" biosolids, the last complete sentence on page 2-6 of the draft EIR is hereby revised to read:

> Biosolids are considered Class A Exceptional Quality (EQ) if they meet all of the pollutant concentration limits and vector attraction reduction options 1-8 in Part 503.88, as well as Class A pathogen reduction standards.

1-18. Comment noted. See Responses to Comments 14-3, 14-5, and 14-17.

STATE OF CALIFORNIA—THE RESOURCES AGENCY

GRAY DAVIS, Governor

DELTA PROTECTION COMMISSION
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June 29, 1999

Stan Martinson, Chief
Division of Water Quality
State Water Resources Control Board
901 P Street
Sacramento, CA 95814

DWQ Received
Division Chief's Office

JUL 2 1999

Subject: Draft Environmental Impact Report Covering General Waste Discharge Requirements for Biosolids Land Application

Dear Mr. Martinson:

Thank you for forwarding the above-named environmental document, dated June 28, 1999. The Commission itself has not had the opportunity to review the document, so these are staff comments only. They are, however, based on the Commission's adopted regional land use plan for the Primary Zone of the Delta and adopted regulations.

The proposed General Order includes several areas of the Sate within which biosolids application projects cannot be permitted under the proposed General Order. This includes the "jurisdictional Sacramento-San Joaquin River Delta" (page ES-12 and Appendix A, page 10). This proposed exclusion area is consistent with the Commission's regional plan and regulations which preclude disposal of sewage effluent and sewage sludge in the Delta Primary Zone (Title 14, Section 20030 and Utilities and Infrastructure Policy P-3) due to the uniqueness of the geography, soils, and hydrology of the Delta. 2-1

The General Order should not apply in the Legal Delta, or the Primary Zone of the Delta; the language in the proposed General Order should be retained.

Thank you for forwarding the environmental document to the Delta Protection Commission for review and comment.

Sincerely,

Margit Aramburu

Margit Aramburu
Executive Director

cc: Chairman Patrick N. McCarty

Responses to Comments from the Delta Protection Commission

2-1. The commenter agrees with the proposed GO's exclusion of biosolids land application from the Sacramento-San Joaquin River Delta. No response is required.

STATE OF CALIFORNIA—THE RESOURCES AGENCY

GRAY DAVIS, Governor

DEPARTMENT OF FISH AND GAME

SAN JOAQUIN VALLEY AND SOUTHERN SIERRA REGION
1234 East Shaw Avenue
Fresno, California 93710
(559) 243-4014

September 10, 1999

Mr. Todd Thompson
State Water Resources Control Board
Division of Water Quality
Post Office Box 944213
Sacramento, California 94244-2130

Dear Mr. Thompson:

Draft Environmental Impact Report (DEIR)
for General Waste Discharge Requirements
for Biosolids Land Applications

We have reviewed the DEIR referenced above. The subject of the DEIR is a proposed General Order (GO) for General Waste Discharge Requirements for the Discharge of Biosolids to Land for Use in Agricultural, Silvicultural, Horticultural and Land Reclamation Activities in California. Biosolids are defined as sewage sludge that has been treated, tested, and shown to be capable of being used beneficially as a soil amendment for agriculture, silviculture, horticulture and land reclamation. The GO would establish a notification and permit review process applicable to all persons and public entities intending to apply biosolids. The GO defines discharge prohibitions, discharge and application specifications, transportation and storage requirements, and general procedures and provisions to which all land appliers would be required to adhere. Our comments follow: 3-1

Of particular importance to the Department of Fish and Game's San Joaquin Valley Southern Sierra Region (Department) is the potential for the application of biosolids to result in the conversion of "vacant" agricultural lands that may contain native vegetation, vernal pools, and other wetlands and may support a variety of wildlife including listed, sensitive and otherwise protected species, to more intensive agricultural use. The Draft Environmental Impact Report (DEIR) does discuss this impact. As part of the biosolids discharge permit process, prospective biosolids dischargers must provide proof to the California Regional Water Quality Control Board (Regional Board) that the Department has received a copy of a Notice of Intent (NOI). Specific pre-application reports must include information on whether the site contains habitat, unique or sensitive communities, or sensitive status species. The pre-application

must also indicate whether it has been fallow for more than a year. Mitigation must be proposed as part of the pre-application.

It is unclear if and/or how the Regional Board will determine when the proposed mitigation will be deemed sufficient to mitigate for impacts. We typically recommend that prior to approval of a specific project (in this case application of biosolids), the project applicant should be able to show a cultivation history of the site back to 1985. If the project site was converted to intensive agriculture after 1985, then the applicant should be able to show the conversion was in compliance with State and Federal laws and regulations regarding wetlands and endangered species protection. Mitigation for loss of sensitive species or habitat should include some level of off-site habitat replacement. Should the Project have the potential to result in the "take" of a State- and or Federally-listed species, the discharger would need to obtain appropriate State and/or Federal "take" authorizations. Take of any fully-protected species is identified in Fish and Game Code Sections 3511, 4700, 5050 and 5515. 3-1 (cont)

We recommend that the final EIR and associated permitting actions include more specific treatment of habitat conversion impacts of biosolids application.

If you have any questions regarding these comments please contact Ms. Donna Daniels, Environmental Specialist III, at the address or telephone number provided on this letterhead.

Sincerely,

for W. E. Loudermilk
Regional Manager

cc: See Page Three

cc: California Regional Water
  Quality Control Board
Central Valley Region
3614 East Ashlan Avenue
Fresno, California 93726

United States Army
  Corps of Engineers
Central Valley Office
1325 J Street
Sacramento, California 95814-2922

United States Fish and
  Wildlife Service
3310 El Camino, Suite 130
Sacramento, California 95821

Responses to Comments from the California Department of Fish and Game

3-1. This comment addresses the adequacy of the mitigation measures proposed for biological resources. The commenter states that the SWRCB should request cultivation history back to 1985 from the applicator for the site where biosolids are to be applied. This request has been considered; however, no changes to the mitigation measures have been made in response to this comment. Generally, land application of biosolids will occur on sites where agricultural operations are ongoing. In those cases where applications are submitted for the land application of biosolids and the proposed site has been fallow for more than 1 year, biological reports, as stated in Mitigation Measures 7-1 and 7-2, would be prepared and submitted to the RWQCB with the notice of intent (NOI). These reports also will be provided to DFG. Measures will be included in the reports to avoid, reduce, or compensate for biological impacts, if necessary. DFG will be able to forward concerns to the RWQCB if it finds that proposed mitigation measures are not adequate to fully protect sensitive species or habitat.

Also see Response to Comment 1-7.

The commenter also expresses concern for the land application of biosolids to affect wetlands. The proposed GO specifically states that biosolids may not be applied within 100 feet of surface waters, including wetlands, creeks, ponds, lakes, underground aqueducts, and marshes. Furthermore, because the draft EIR is a programmatic EIR, the level of detail provided in the mitigation measures is appropriate.

DEPARTMENT OF HEALTH SERVICES
Food and Drug Branch
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SACRAMENTO, CA 94234-7320
(916) 445-2263
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September 10, 1999

State Water Resources Control Board, Division of Water Quality
Attention: Mr. Todd Thompson, Associate Water Resources Control Engineer
P.O. Box 944213
Sacramento, CA 94244-2130

Re: Written Comments on "Draft Environmental Impact Report (DEIR) for General Waste Discharge Requirements for Biosolids Land Application"

The California Department of Health Services submits the following comments to assist the State Water Resources Control Board (SWRCB) in the development of the Environmental Impact Report for General Discharge Requirements for Biosolids Land Application.

General Comments:

1. We understand that the DEIR exclusively addresses the use of biosolids (municipal waste), and that waste from farm operations is outside the scope of developing this DEIR. However, from the viewpoint of public health, the final use of biosolids regardless of whether it comes from the municipality or from the farm may be the same agricultural field. And the field is the source of the problem, not whether the waste came from a municipality or from a farm. Since a large proportion of what is considered in this DEIR applies to farm waste as much as it does to municipal waste, we suggest that, if possible, SWRCB consider including waste from farm operations in the DEIR. (As you are aware, the U.S. Environmental Protection Agency and the U.S. Department of Agriculture have proposed waste management regulations for discharge of waste from large farm operations). 4-1

2. We think that the comparison of human disease incidence between high biosolids application counties with low biosolids application counties was improper, and may have led to an inaccurate conclusion in the DEIR with regard to the public health risk from use of biosolids. 4-2 As clearly described in the DEIR, the pattern of use of biosolids has changed dramatically over the last few years. Any comparison to health data would have to account for this. In addition and most importantly, the hypothesis that living in higher use counties conveys a higher public health risk implies that consumption of agricultural products, water, or for that matter air, (i.e.: exposure) is also higher risk in those counties; an unrealistic assumption. We believe that human disease incidence data is not a good way to assess the true risk from use of biosolids. 4-3

3. Human disease incidence surveillance systems are by definition a posteriori, that is, the person has already become sick. A good case control study that identifies exposure factors, together with new molecular typing technology might be able to traceback a specific outbreak of disease to a common source at a given field or even to the contents of the biosolids applied to a given field if we have the source data on record. After a few years we could also correlate monitoring data with ground water quality data. This is why it would be good to have continuous monitoring data available. The proposed 3-year period seems reasonable. 4-4

Specific Comments:

(1) DEIR, Chapter 5, Page 5-21:

Under the heading "Food Safety", the DEIR listed several federal laws that apply to the quality and safety of foods: Federal Food, Drug and Cosmetic Act (21 U.S.C. 301), Unavoidable Contaminants in Food and Food Packaging Material (21 CFR 109), Food labeling and Processing (21 CFR 100-199), and Good manufacturing Practices (21 CFR 110), etc. The list, however, did not include state laws which adopt the federal regulations and contain additional requirements for the safety of foods. We suggest that two state laws be added to the list: the California Health and Safety Code, Division 104, Part 5 (Sherman Food, Drug, and Cosmetic Law) and the California Uniform Retail Food Facilities Law (CURFFL; Health and Safety Code Sections 27500, et seq.). 4-5

The DEIR list of federal laws includes the "Model Food Code" as one of applicable food safety-related regulations. The Model Food Code is not a regulation, but a federal recommendation for adoption by states. California does not adopt the entire Model Food Code. CURFFL is substantially equivalent to it, and contains most of its food safety-related features. We suggest that the "Model Food Code" be deleted from the list and be replaced by CURFFL. 4-6

(2) DEIR, Appendix A (Draft Text of the General Order), Page 22, Item 17:

The draft text of the General Order, Item 17 states that "The discharger shall report any noncompliance which may endanger human health or the environment. Any such information shall be provided orally to the RWQCB's executive office within 24 hours from the time the discharger become aware of the circumstances. . . .Also, the discharger shall notify the Office of Emergency Services (1-800-852-7550) and the local health department as soon as practical but within 24 hours after the incident." DHS's Food and Drug Branch (FDB) is responsible for the safety of food products harvested from cropland in California including those harvested from land to which biosolids have been applied. Thus, it is essential for FDB to receive the information of non-compliance which may endanger human health as quickly as possible, assess the safety of the resultant food products, and take appropriate action. We suggest that the last sentence of the Item 17 be changed to read ". . . Also, the discharger shall notify the Office of Emergency Services (1-800-852-7550), <u>the State Department of Health Services'</u> 4-7

Food and Drug Branch (916-445-2263), and the local health department as soon as practical but within 24 hours after the incident." 4-7 (cont)

(3) DEIR, Chapter 5, Page 5-1

In the first paragraph, we suggest that the second sentence be changed to read "Pathogens (or pathogenic organisms) are disease-causing organisms, including certain bacteria, parasites, and viruses." 4-8

(4) DEIR, Chapter 5, Page 5-3

In the first paragraph, the term "emerging pathogens" must be defined as this term is used inconsistently throughout the document. Many pathogens are considered to be emerging pathogens including *E. coli* O157:H7 and *Cyclospora* which have caused several outbreaks in California. This paragraph seems to limit the definition of emerging pathogens only to new, formerly unidentified organisms which is the rare situation. The current definition of emerging pathogens is "New, reemerging or drug-resistant infections whose incidence in humans has increased within the past two decades or whose incidence threatens to increase in the near future" (Emerging Infections: Microbial Threats to Health in the United States. Institute of Medicine, 1992). Please make appropriate changes to reflect the broader, commonly known definition of an emerging pathogen. 4-9

At the bottom of the first paragraph please add to the examples for importation of diseases into California, "(for example, by travelers or by importation of contaminated food or animals)." 4-10

(5) DEIR, Chapter 5, Page 5-4

Please make to following changes to the second paragraph: 4-11
"Tables 5-1 through 5-4 list...host organisms, the infective dose, and provides..."

"The infective dose for some Salmonella serotypes and other pathogenic...organisms can multiply in high numbers..." The infective dose for *Salmonella* sp. varies by serotype and host factors.

(6) DEIR, Chapter 5, Table 5-1

Please correct the number of types of *Salmonella* on the left column to read "*Salmonella* (≥2000 types)." 4-12

(7) DEIR, Chapter 5, Table 5-3

Please add *Cyclospora* to the list of human pathogens. 4-13

(8) DEIR, Chapter 5, Page 5-5, Emerging pathogens of concern

This entire paragraph is misleading because it implies that the cause of many disease outbreaks is a new or unidentified pathogen. In the majority of outbreaks a single or small list of organisms is suspected as a cause. It must be emphasized that the reason why there is no confirmation of the pathogen causing the outbreak is due to 1) the patient not seeking medical attention, 2) no laboratory diagnostic tests (including stool cultures and examination) being performed, and 3) either late or non-reporting of illnesses hindering the investigation of individual cases or outbreaks. While the majority of outbreaks are due to bacterial causes, limitations on our diagnostic capabilities may also hinder our ability to confirm a diagnosis. This section needs to be expanded to discuss these limitations of the data. In addition, please expand this section to include the numerous sporadic cases and not limit the section to outbreaks only. As mentioned previously, please expand the definition of "emerging pathogens" to include a broader number of diseases currently considered to be emerging or re-emerging. 4-14

The term "unknown origin" should be replaced with either an "unknown cause" or "unknown source" depending upon whether the causative agent or the source of infection is being referred to. 4-15

(9) DEIR, Chapter 5, Page 5-6

The second paragraph references table 5-5 and attempts to compare the number of reported illness to the quantities of applied biosolids. This comparison is very misleading and inappropriate since there are many other factors involved such as population, demographic, and geographic effects. It is impossible to determine the causality or association of disease and quantity of biosolids application by just crudely comparing the numbers. In addition, all of the disease data listed in the table are inaccurate. 4-16

In the third paragraph, please omit "voluntarily" in the sentence regarding disease reporting. Please recalculate all of the disease numbers (throughout the document) and tables to reflect the most current reported numbers of diseases for tables 5-6 through 5-8 and appendix E tables E-1 through E-16. All of the number of reported diseases appears to be grossly underestimated. The actual numbers of reported cases compared to those listed in the tables appears to be at least six times higher. This difference will greatly affect the conclusions and comparisons drawn based upon the inaccurate data. 4-17

Please change "worm" to "helminthes" in the last sentence of the fourth paragraph. 4-18

(10) DEIR, Chapter 5, Tables 5-6 through 5-8

Please contact the Department of Health Services, Surveillance and Statistics Section for the numbers of reported diseases. The numbers presented in these tables are grossly underestimated and do not come close to the actual numbers of disease reports. We are greatly concerned that interpretations of erroneous data will lead to inaccurate conclusions. Population 4-19 data for each county as well as presentation of crude rates of diseases by county (number of cases per 100,000 population) will allow for better comparison of disease incidence between counties. 4-19 (cont)

(11) DEIR, Chapter 5, Page 5-14

In the fourth paragraph, please make the following changes:
"...transmission of disease has been documented in California as it related to biosolids management although the potential exists." 4-20

(12) DEIR, Appendix E, Page E-1, Part I. Diseases of Interest

Please omit "voluntarily" in the last paragraph. Please expand to describe how diseases are reported and the problem of under-reporting in California. It has been estimated that only a very small percentage of actually cases are reported to the health department. By focusing only on the numbers of reported cases, the true incidence of disease will be underestimated and this will greatly affect any conclusions drawn. 4-21

(13) DEIR, Appendix E, Page E-1, Bacterial Diseases

Please expand the name of "*E. coli* 0157" to "*E. coli* O157:H7." Please note that it is the letter "o" before the 157 and not a zero. Please make this change throughout the document. In the first sentence, please replace "guts" with "intestinal tracts." 4-22

(14) DEIR, Appendix E, Page E-5

Please add "reptiles" to the list of *Salmonella* animal reservoirs since other reptiles besides turtles and tortoises can be a reservoir for *Salmonella*. 4-23

For the third paragraph, please provide a corresponding range of the rates of salmonellosis since a range is given for the number of estimated cases. Please revise the numbers of salmonellosis in California based upon the current numbers of reported cases. 4-24

At the end of the fourth paragraph, please convert the *S. typhi* morbidity rate to number of cases per 100,000 population which is a standard format of presenting disease incidence. 4-25

(15) DEIR, Appendix E, Page E-11, Ameobiasis

Correct spelling of "amoebiasis" to amebiasis. Please elaborate that none of the cases have been definitively associated with biosolids however, most cases are not investigated to the extent as to make a definitive association. For amebiasis cases in addition to campylobacteriosis, giardiasis, salmonellosis (other than typhoid fever), and shigellosis, only summary counts of cases are reported to DHS and a thorough investigation by the local health department into each case of these diseases is not always conducted. 4-26

(16) DEIR, Appendix E, Page E-23, Roundworms

Please change the last sentence to read "This disease occasionally occurs and is not a reportable disease in California." 4-27

(17) DEIR, Appendix E, Page E-27, Pathogens of concern

Please include the definition of emerging pathogens in comment (2). Please expand tables E-17 through E-19 to include a comprehensive list of organisms currently considered to be emerging pathogens. 4-28

Hopefully, the information provided is helpful to you. If you have questions, please call me or Dr. Chang-Rae Lee at 916-445-2263.

Sincerely,

James M. Waddell

James M. Waddell, Acting Chief
Food Safety Section
Food and Drug Branch

Responses to Comments from the California Department of Health Services

4-1. The similarities between biosolids and animal manures/waste in terms of pathogens is acknowledged. However, the two potentially beneficial materials are different enough in composition to be addressed separately. As mentioned, the U.S. Department of Agriculture and the U.S. Environmental Protection Agency (EPA) are developing management options for animal manures/waste. That approach will most likely be specifically oriented toward the federal program and the type of waste, focusing on different potential environmental impacts.

4-2. Human disease incidence data were reported to indicate the relative degree of human disease to areas of biosolids use. This information was not used to draw conclusions regarding the health risk associated with biosolids use. Also see Response to Comment 4-16.

4-3. The assumption that there was a greater risk associated with increased biosolids use was not made, nor was a hypothesis to this effect made in the comparisons. Human disease incidence data were used only to determine whether there was any association between counties where biosolids were applied and any greater number of disease cases identified through the current reporting system. A revised set of disease case records and the calculated incidence per 100,000 population by county are presented in Appendix B of this final EIR, a revised version of Appendix E from the draft EIR.

4-4. Comment noted. The comment supports development of a study to evaluate human disease incidence utilizing the monitoring data collected by the provisions required under the proposed GO for land application. The provisions of the proposed GO should provide site-specific information that could be used in any future studies. No studies are proposed or recommended by SWRCB staff at this time.

4-5. The following items are added to the list of regulations in Chapter 5, page 5-22:

California Health and Safety Code, Division 104, Part 5 (Sherman Food, Drug and Cosmetic Law)

California Uniform Retail Food Facilities Law (CURFFL; Health and Safety Code Sections 27500 et seq.)

4-6. The following item is deleted from the list of regulations in Chapter 5, page 5-22:

~~Model Food Code (42 U.S.C. 243 and 311 and 31 U.S.C. 686 authorities)~~

4-7. By contacting the Office of Emergency Services, it was believed that all necessary agencies would receive notification. However, the text of the proposed GO, as found in Provision No. 17 of Appendix A, now reads as follows:

> Also, the discharger shall notify the Office of Emergency Services . . . the State Department of Health Services Food and Drug Branch (916/445-2263), . . .

4-8. In Chapter 5, page 5-1, the second sentence of the first paragraph has been changed as follows:

> Pathogens (or pathogenic organisms) are disease-causing organisms, including certain bacteria, parasites, and viruses.

4-9. In Chapter 5, page 5-3, in the second paragraph, the second sentence, "Emerging pathogens are briefly described . . . (there have been no reported disease outbreaks)" has been replaced with the following:

> Emerging pathogens are organisms responsible for new, reemerging, or drug-resistant infections whose incidence in humans has increased within the past two decades or whose incidence threatens to increase in the near future. Included are such pathogens as *E. coli* O157:h7 and *Cyclospora*, which have caused several outbreaks in California.

4-10. Also on page 5-3 in the second paragraph, the following has been added to the second-to-last sentence:

> (for example, by travelers or by importation of contaminated food or animals).

4-11. The first full paragraph on page 5-4, starting with the 12th line, has been changed to read as follows:

> Tables 5-1 through 5-4 list the specific disease organisms, diseases they cause, host organisms, and the ~~infection~~ infective dose....

With the sentence beginning on line 17, make the following changes:

> The infective dose for some ~~salmonellae~~ salmonella serotypes and other pathogenic . . . organisms can ~~increase~~ multiply in high numbers. . . The infective dose for *Salmonella* sp. varies by serotype and host factors.

4-12. In Table 5-1, the number of types of salmonella in left column has been changed to (≥2,000 types) from (1700 types).

Also in Table 5-1, "infectious" has been changed to "infective" in the heading for the last table column.

4-13. The following information has been added to Table 5-3, at the end of the list of human pathogens:

Cyclospora cayetanesis	Cyclosporiasis (severe Diarrhea)	None known

4-14. On page 5-5, under "Emerging Pathogens of Concern", the entire paragraph has been replaced as follows:

> In most outbreaks of unknown cause or unknown source, a single or small list of organisms is normally suspected. If the causative agent is not identified or confirmed, it is because (1) the patient not seeking medical attention, (2) no laboratory diagnostic tests (including stool cultures and examination) are performed, and (3) either late or nonreporting of illnesses occurs that hinders the investigation of individual cases or outbreaks. Although most outbreaks are attributable to bacterial causes, limitations on our present diagnostic capabilities may also hinder a confirmatory diagnosis. New techniques using genetic markers and electron microscopy have improved laboratory capabilities to detect and identify pathogens, particularly viruses. There continue to be numerous sporadic cases of diseases (particularly gastroenteritis) of unknown cause or unknown source that arise and may be associated with a number of agents or sources. A literature review of disease outbreaks on a worldwide basis was performed to determine some of the emerging pathogens and their modes of transmission. The results of this search are summarized in Appendix E. The results indicated that the reported cases are normally associated with poor sanitation, poor food preparation and handling practices, or drinking contaminated water. Information on emerging pathogens of concern (bacteria, parasitic microsporidians, viruses, and bovine spongiform encephalophathy) is presented in Appendix E. These are in addition to those pathogens such as *E. coli* O157:h7 and Cyclospora that which have caused several outbreaks in California.

4-15. See changes made as noted in Response to Comment 4-14.

4-16. The comparison of biosolids land application amounts and acreages with the incidence of disease and reported number of cases was presented to determine the relative magnitudes of biosolids use and relate this to disease incidence in counties where land application is greatest. The Department of Health Services' (DOHS's) comments are noted; revisions to the text and tables have been made to reflect those comments.

It is clear that many factors are involved in disease rates, such as population, demographic, and geographic effects. However, given the nature of the comments received, reporting of outbreaks is of interest, particularly in those counties where the use of biosolids is most intense. It is hoped that this information will be helpful to those interested in any particular health-related concerns. It can be used to review trends in reported disease, and the relative magnitude of various illnesses. It is again noteworthy that no evidence has come to light during preparation of this EIR that indicates land application of biosolids can be related to any reported disease case in California.

The disease statistics database has been revisited and revised to reflect the corrected number of reported cases. The requested revisions have been made to Tables 5-6 through 5-8 and Tables E-1 through E-16; and these have been replaced by Tables 5-6a though 5-8a. These tables are provided at the end of the Response to Comments. In addition, new tables numbered 5-6b though 5-8b and Tables E-1b through E-16b have been added to reflect incidence rates per 100,000 people based on population in each county. The time frame for the diseases has been reported for the period 1990 through 1998 where data is available. Note that the reported disease cases are "provisional" for the years 1996 through 1998 according to the DOHS. This means that minor revisions of the reported number of cases are still occurring.

See attached revisions to Tables 5-6 through 5-8, which contain updated and corrected disease statistics summaries ranked by number of cases for the state totals and alphabetically by county for the incidence rates. These tables are labeled 5-6a through 5-8a for the number of cases and 5-6b through 5-8b for the incidence rates.

See Appendix B (formerly DEIR Appendix E) for revised text and tables of the Public Health Technical Appendix that provide detailed year-by-year statistics for disease case numbers and incidence rates based on population.

Revisions to the text starting on paragraph 3 of page 5-6 and ending with paragraph 2 on page 5-7 are as follows:

> Data on the diseases of interest (those listed in Tables 5-1 through 5-4) were obtained from the ~~DHS~~ Department of Health Services (DOHS) (descriptions of the diseases of interest are provided in Appendix E). These data consisted of records on reportable diseases that are ~~voluntarily~~ provided by local county and city health departments (Starr pers. comm.). The diseases for which data were obtained are those with causative agents that could be derived from biosolids; therefore, certain diseases that were rare, not reported, or not related to biosolids were not included (AIDS, fungal diseases, and nonspecific gastroenteritis). The ~~DHS~~ DOHS information consisted of 46,159 records representing 300,818 cases of disease and covering the period from ~~1991~~ 1990 though 1998 for some diseases and ~~1993~~ 1992 to 1998 for Enterotoxic *E. coli* O157:h7 ~~others of more recent origin/or reporting requirements~~. The information was sorted by county, year, and disease (and broken down by pathogenic organisms) and is presented in Tables E-1a and E-1b through E-16

a and E-16b in Appendix E for the number of cases and the incidence rate per 100,000 people by county and summarized on a statewide basis by year in Tables 5-6a and 5-6b. The summary data show that the number of cases of a particular disease and incidence rates ~~varies~~ vary from year to year as conditions favor its occurrence in a particular population.

The incidence of diseases presented on a statewide basis in Table 5-6a are shown by county for the past ~~6 to 8~~ 6-9 years (depending upon when the reporting was started for a particular disease) in Tables 5-7a and 5-7b and 5-8a and 5-8b. Also shown next to each county name (in parentheses) is the county's ranking in the state from the highest (1) to the lowest in terms of the amount of biosolids applied on land in that county in 1998. ~~Table~~ Tables 5-7a and 5-7b ~~contains~~ contain a summary of the bacterial and viral diseases. ~~Table~~ Tables 5-8a and 5-8b ~~summarizes~~ summarize the data on parasitic protozoan and ~~worm~~ helminth diseases that are reported.

As noted in ~~Tables~~ Table 5-5 ~~7 and 5-8~~, the Central Valley counties of Kern, Merced, and Kings ranked first, second, and third in terms of the amount of biosolids that were land applied. The amounts applied ~~(see Table 5-5)~~ were 32%,13%, and 13%, respectively, of the statewide total, or about 58% of the statewide total that was land applied. ~~These three counties had no reported cases of salmonellosis or shigellosis, the two most prevalent bacterial diseases, in 6 years.~~

The comparison of the number of reported outbreaks of acute infectious disease and the listing of counties where biosolids reuse occurs showed no apparent association between the highest biosolids use and any unusual illness outbreaks or patterns. Furthermore~~, no incidents of acute or chronic disease associated with the use or handling of biosolids were found through examination of these data,~~ discussions with public health officials and a ~~, or~~ review of available literature and discussions with other experts in the field revealed no reported disease problems associated with biosolids land application operations. Again, the types of diseases that might occur are not those that would normally be reported unless it was a severe case involving a visit to a doctor or hospital.

4-17. The third paragraph of page 5-6, third sentence is revised by striking out the word "voluntarily". See Response to Comment 4-16 for information on the revised and expanded presentation of disease data.

4-18. In the last sentence of the fourth paragraph on page 5-6,"worm" has been changed to "helminthes".

4-19. See Response to Comment 4-16.

4-20. On page 5-14, in the fourth paragraph, the following changes have been made:

> No reported cases of airborne transmission of disease ~~were identified~~ have been documented in California as it related to biosolids management although the potential exists.

4-21. In Appendix E of the draft EIR, page E-1, Part 1, Diseases of Interest, the last sentence of the paragraph is modified as follows:

> The information on disease incidence reflects the data collected by the existing statewide ~~voluntary~~ public health reporting system, in which local health departments (two city and all county health departments) participate. Disease data are reported only for those whose illness results in a visit to a physician or local clinic or hospital and thus represent only a small percentage of the actual cases of illness that may occur. The true incidence of disease from pathogens causing gastroenteritis and other general symptoms normally treated with over-the-counter drugs will be underestimated and thus greatly affect any conclusions drawn from the disease incidence data reported herein.

For this change and many others, see the revised Appendix E, included as Appendix B of this final EIR.

4-22. Change the name "*E. coli* 0157" to "*E. coli* O157:H7" in the heading on page E-1 of the draft EIR, in all subsequent text notations, and in Table E-1.

In the first sentence of the third paragraph of page E-1, replace "guts" with "intestinal tracts".

For this change and many others, see the revised Appendix E, included as Appendix B of this final EIR.

4-23. Change the first sentence at the top of page E-5 to read as follows:

> ...poultry, swine, cattle, rodents, dogs, cats, ~~turtles~~ and ~~tortoises~~ reptiles.

For this change and many others, see the revised Appendix E, included as Appendix B of this final EIR

4-24. Regarding Appendix E, page E-5, see the revised Appendix E, included as Appendix B of this final EIR.

4-25. Regarding Appendix E, page E-5, see the revised Appendix E, included as Appendix B of this final EIR.

4-26. In Appendix E, page E-11, change the spelling of “Amoebiasis” to “Amebiasis”.

For this change and many others, see the revised Appendix E, included as Appendix B of this final EIR

4-27. For the requested clarification to and additional changes to Appendix E, page E-23, Roundworms, see the revised Appendix E, included as Appendix B of this final EIR.

4-28. The definition of emerging pathogens in Appendix E, page E-27, Pathogens of Concern, was provided and Tables E-17 through E-19 were expanded to include additional organisms considered emerging pathogens.

For the requested clarification and additional changes, see the revised Appendix E, included as Appendix B of this final EIR.

Air Pollution Control District
Antelope Valley

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Fax (805) 723-3450

Charles L. Fryxell, Air Pollution Control Officer

July 12, 1999

Todd Thompson
State Water Resources Control Board, Water Quality Division
P.O. Box 944213
Sacramento, CA 94244-2130

Re: **General Waste Discharge Requirements for Biosolids Land Application Draft EIR**

Dear Mr. Thompson:

The Antelope Valley Air Pollution Control District (AVAPCD) has reviewed the General Waste Discharge Requirements for Biosolids Land Application Statewide Program Draft Environmental Impact Report (EIR). The AVAPCD recommends that the following comment be addressed in the final EIR:

- The General Order discharge prohibitions as reiterated in the executive summary include a requirement that:

  > "No application or incorporation into the soil is permitted when wind may reasonably be expected to cause airborne particulates to drift from the site."

  The air quality impacts section specifies the following requirement as a minimizing factor: 5-1

  > "The release of any visible airborne particulates from the application site during biosolids application or subsequent to spreading onto the soil will be prohibited."

  Both prohibitions should be included in the General Order, with some additional language that defines how they will be enforced. AVAPCD suggests specifying a wind gust threshold for application and incorporation, based on the moisture content of the material. AVAPCD also suggests specifying a moisture content minimum that would apply during application and for a number of days after in order to minimize visible particulate release.

Thank you for the opportunity to comment on the General Waste Discharge Requirements for Biosolids Land Application Draft EIR. If you have any questions regarding this letter, please contact Alan De Salvio, Air Quality Engineer, at (760) 245-1661, extension 6122.

Sincerely,

Eldon Heaston
Deputy Air Pollution Control Officer

Biosolids DEIR.doc

Responses to Comments from Antelope Valley Air Pollution Control District

5-1. See Master Response 9.

Tuolumne County
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Sonora, California 95370

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BOARD OF SUPERVISORS
COUNTY OF TUOLUMNE

Edna M. Bowcutt
Clerk of the Board of Supervisors

Linda R. Rojas
Assistant Clerk

Larry A. Rotelli, *First District*
Mark V. Thornton, *Fourth District*
Don Ratzlaff, *Second District*
Laurie Sylwester, *Third District*
Richard H. Pland, *Fifth District*

August 17, 1999

Todd Thompson
Associate Water Resources Engineer
Division of Water Quality
State Water Resources Control Board
P.O. Box 944213
Sacramento, CA 94244-2130

RE: **Draft EIR for general waste discharge requirements for biosolids land application**

Dear Mr. Thompson:

On behalf of the Tuolumne County Board of Supervisors, Solid Waste Committee, thank you for the opportunity to respond to the above.

We recommend that the final EIR address the following:

1. Analyze the necessary funds and staffing needed to adequately administer this program. 6-1

As you are aware, biosolids are used as a soil amendment in over 75% of counties. We are pleased to see your agency propose a protective statewide biosolids management program to address escalating proposals for land application reuse of biosolids. We support the use of land application of biosolids only when it can be done in a manner that does not pose any significant threat to public health, water quality and the long term sustainability of agricultural land. Your agency's proposed program will only be acceptable on the provision that funds and staffing resources are allocated to adequately administer the program.

Sincerely,

Laurie Sylwester

Laurie Sylwester, Supervisor Dist. 3
Solid Waste Committee Chairperson

LS:dmm

cc: Don Ratzlaff, Supervisor Dist
Walt Kruse, Director Division of Environmental Health
Jerry Benincasa, Director
Department of Agricultural/Weights & Measures/Air Pollution

file:diana\eir

Responses to Comments from Tuolumne County Board of Supervisors

6-1. See Master Response 1.

Tuolumne County
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BOARD OF SUPERVISORS
COUNTY OF TUOLUMNE

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August 17, 1999

Todd Thompson
Associate Water Resources Engineer
Division of Water Quality
State Water Resources Control Board
P.O. Box 944213
Sacramento, CA 94244-2130

RE: <u>Draft EIR for general waste discharge requirements for biosolids land application</u>

Dear Mr. Thompson:

On behalf of the Tuolumne County Board of Supervisors, Solid Waste Committee, thank you for the opportunity to respond to the above.

We recommend that the final EIR address the following:

1. Analyze the necessary funds and staffing needed to adequately administer this program. 6-1

As you are aware, biosolids are used as a soil amendment in over 75% of counties. We are pleased to see your agency propose a protective statewide biosolids management program to address escalating proposals for land application reuse of biosolids. We support the use of land application of biosolids only when it can be done in a manner that does not pose any significant threat to public health, water quality and the long term sustainability of agricultural land. Your agency's proposed program will only be acceptable on the provision that funds and staffing resources are allocated to adequately administer the program.

Sincerely,

Laurie Sylwester

Laurie Sylwester, Supervisor Dist. 3
Solid Waste Committee Chairperson

LS:dmm

cc: Don Ratzlaff, Supervisor Dist
Walt Kruse, Director Division of Environmental Health
Jerry Benincasa, Director
Department of Agricultural/Weights & Measures/Air Pollution

file:diana\eir

PALMDALE WATER DISTRICT
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August 19, 1999

State Water Resources Control Board
ATTN: Mr. Todd Thompson,
Associate Water Resources Control Engineer
901 P Street
P. O. Box 944213
Sacramento, CA 94244-2130

RE: COMMENTS ON DRAFT E.I.R. COVERING GENERAL WASTE DISCHARGE REQUIREMENTS FOR BIOSOLIDS LAND APPLICATION DATED JUNE 28, 1999

Dear Mr. Thompson:

The District's review of the subject draft E.I.R. found that many concerns raised in our November 30, 1998 letter were either not addressed or not included in the proposed General Order (GO). However, some concerns are reflected in the proposed project and the Modified GO Alternative.

Major concerns that remain to be addressed are:

1) It is not clear what the application and annual fees will be. The fees must be sufficient to fund the administration and monitoring of land application operations by the Regional Boards. This should include a site inspection prior to issuance of a Notice of Applicability. 7-1

2) The draft requirements do not include criteria or methods of establishing the agronomic rate or nitrogen carry-over. These are needed to accurately apply biosolids. This must be provided in the final requirements to make them universal and enforceable. 7-2

3) Record searches and field inspections should be required to locate all active, inactive, and abandoned wells at the proposed land application site and adjacent properties. 7-3

The District would like to see these three items included in the GO or the Modified GO Alternative. A grave concern is the statement made on Page ES-16 acknowledging the lack of staffing and funds to adequately monitor and enforce biosolids regulations. State level administrative or legislative changes are needed to ensure any regulatory program fulfills its intent. 7-4

The District also supports adopting the Modified GO Alternative, including the above listed changes. As stated, it is the environmentally superior alternative and is a reasonable approach *if* it is enforced. 7-5

Please let me know if you have any questions.

Very truly yours,

Dennis D. LaMoreaux

DENNIS D. LaMOREAUX,
General Manager

DDL/dtd

cc: Board of Directors

Responses to Comments from Palmdale Water District

7-1. A site inspection prior to issuing any waste discharge requirement is advisable and should be paid for by the discharger. The fee system is intended to cover even individually issued waste discharge requirements, including pre-inspections. Pursuing general waste discharge requirements is a more streamlined process and therefore is more cost effective. Also see Master Response 1.

7-2. Comment noted. For the agronomic rate calculation to be determined correctly, the soil carry-over of nitrogen must be included. As pointed out, the Monitoring and Reporting Program in the proposed GO did not have a location to report this information. But the draft text of the GO in Appendix A's Monitoring and Reporting Program now includes reporting locations for residual soil nitrogen in both the Pre-Application Report and the Annual Report.

7-3. The Notice of Intent and the Pre-Application Report require that wells be identified on a USGS 7.5 Minute map or similar map. The extent of the search on the part of the landowner and generator, who are the principal entities responsible for compliance, has not been specified. However, the discharger is also required to notify local water districts, and the county health and planning departments. Such notifications may also assist in identifying such wells.

7-4. Comment noted and discussed in responses to comments 7-1, 7-2 and 7-3, and Master Response 1.

7-5. The commenter identifies the Modified GO Alternative, with the revisions recommended in comments 7-1 through 7-4, as the district's preferred alternative.

JAMESTOWN SANITARY DISTRICT
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August 29, 1999

Todd Thompson, Associate engineer
State Water Resources Control Board
Division of Water Quality
P.O. Box 944213
Sacramento, CA 94244-2130

Subject: Draft EIR Covering General Waste Discharge Requirements for Biosolids Land Application

Dear Mr. Thompson,

Attached, please find the District's Comments on the Draft EIR.

Sincerely,

Ron Boyd-Snee
Operations Manager

Enclosures

1. Executive Summary: The Executive Summary states that the purpose of the EIR is to comply with a Superior Court decision. The summary would also lead the reader to understand that a State wide program was required as result of that court order. It is our understanding that the Superior Court allowed application of Class A Biosolids to continue indefinitely. Further, Water Code Section 13274 allowed either the State Board or regional Boards to adopt a General Order for Biosolids land application. If this is the case, a no action alternative, for projects receiving approval in the form of an EQ Waiver for the Regional Water Quality Control Boards CVR. should be included. 8-1

b. The Summary also states that one of the objectives create a cost effective program and to streamline the permitting process. Neither of these provisions were included in the court decision or Water Code Section. We commented on future costs to POTW'S in our previous correspondence, however, cost efficiency was excluded as a consideration in this, an environmental document. All costs considerations and efficiencies should be considered on an equal basis or not considered at all. 8-2

c. The objective of a State wide program may not be achievable or practical. California is diverse in climate, topography and culture. A "one size fits all" runs counter current to this diverse land. Further, Counties are able to regulate or even ban biosolids applications. It would appear that the main objective of the GO is to accommodate those generators which cannot land apply within their own jurisdictions and must export to other areas. It has been our experience that the real public issue is the import of waste from other communities. Adoption of the GO would only serve to increase apprehension in areas thought suitable for biosolids imports. 8-3

2. The Draft GO

a. The drafted GO contains language regarding public concern over the bulk application of Class A biosolids. It is important to point out that there is no way to qualify this statement. This statement appeared in the draft GO prior to the public meetings held throughout the state. This statement is a result of a political special interest group being allowed to add unsubstantiated claims to the draft GO. 8-4

It is our experience that those person(s) concerned about biosolids application do not differentiate between class A or B biosolids. **The statement regarding public concern over class A biosolids should be eliminated from consideration unless and until that concern reaches the State Board by the public through the CEQA process.** There is no single political special interest group that is authorized to speak on behalf of the citizens of California.

The draft GO equates <u>regulation</u> with <u>oversight.</u> This is a serious mistake. If the public is concerned about oversight, then the solution would be to provide that assurance of sufficient oversight. Restrictive regulation, in of itself, does not meet the expectation of increased oversight. The DEIR also fails to recognize that this concern with oversight was addressed in the National Research Council's report <u>Use of Reclaimed Water and Sludge in Crop Production.</u> That report recommends that oversight be accomplished on a local level, and we concur. We have encouraged the County to form a citizen's oversight committee staffed as necessary with representatives from the agricultural commissioner's office, environmental health and planning departments. 8-5

AFFECT ON PUBLIC WORKS PROJECTS

Our biosolids reuse project is a public works project. The project was developed to both satisfy the District's Waste Discharge Requirements and provide long term solution for residuals management. This phase is only one element in an over all plan to relocate the District's Wastewater Plant within the next several years to this site. The project complied with CEQA and was permitted by the Regional Water Quality Control Board on a site specific basis. It is not our intent to question the State Board's authority to further regulate biosolids, but rather to call attention to the issue of existing public works projects which would be affected. Absent evidence of a risk to public, public works projects should be allowed to continue. The State Board should not allow special interest groups to condition public works projects after the fact and once they have complied with all applicable laws and have adequate permitting. To revisit a public works project and impose additional restrictions years later (absent a risk to the public) would undermine the ability of any project, public or private, to continue. 8-6

AFFECT ON AGRICULTURE

Further regulation may hamper the State's agriculture. As was mentioned in the Draft EIR, little or no silvaculture utilizing biosolids exists in California. However, also noted was the existence of biosolids projects in the Pacific Northwest. Our project is a pilot project which would demonstrate the effective use of biosolids in silvaculture in California at lower elevations. Potentially, California could enter the same markets as the Pacific Northwest for poplar wood. The proposed GO would eliminate our demonstration project and we are unaware of any similar project within the State. Due to the sizable investment of capital, this project and its potential market, may never be realized as the risk of ever changing regulation would deter investment. 8-7

Hybrid Poplars and other high nutrient adsorbing crops would actually reduce the amount of land needed for biosolids application. As stated earlier, these trees can utilize up to 380 lbs of N/ac/yr or five times the amount utilized by dry land pasture.

Additionally, Hybrid Poplar trees are used for soil remediation using a process termed "phyto-remediation". Studies are also being conducted to determine the carbon sequestration capabilities of Hybrid Poplar which could be significant in addressing the issue green house gas. All of the district's work in these areas are funded through biosolids application with the return of the investment to be made by sale of product. 8-8

GENERAL COMMENTS:

It is unclear how the proposed action would affect existing projects. If enacted as proposed and applied to the Jamestown project, it is most likely the project would be abandoned. Existing residences are well with the 500 ft set back requirements. To avoid the General Order, the district could apply at 10 tons per acre or less. This would equate to approximately 30 lbs of nitrogen per acre per year (N/ac/yr) while a mature Hybrid Poplar tree's uptake 380 lbs (N/ac/yr). Additionally, more ground would be needed under the GO each year in order to satisfy both the District's need and regulatory requirements. 8-9

The proposed GO is far too conservative relative to set back requirements for wells and residences especially for EQ Class A biosolids. Application of biosolids at agronomic rates is an ample safeguard for protection of ground water. Existing regulations are ample to safeguard nearby residences from nuisances. 8-10

Although we understand the requirement for a GO (Water Code Section 13274) we question the wisdom of "one size fits all". Perhaps the State Board should influence the legislature to allow permitting either by General Order or specific WDR whichever is better suited to the individual project. Many of the public's concerns regarding biosolids land application can be addressed through site and crop selection, and project management. 8-11

Individual Counties which have or will ban or effectively ban biosolids reuse on land should be made responsible for the resulting impacts to other areas. 8-12

Responses to Comments from the Jamestown Sanitary District

8-1. The No-Project Alternative in the draft EIR is based on the assumption that land application would continue to be regulated in its current form by the RWQCBs through individual waste discharge requirements or exemptions. This analysis, therefore, includes a continuation of EQ waivers and individual WDRs issued by the RWQCBs as allowed under existing regulations. A new or separate alternative is not needed to assess the effects of this no-action situation.

8-2. The referenced portion of the draft EIR is on pages 2-8 through 2-10. This section describes the SWRCB's program objectives, which include providing a streamlined permitting process for the regulated community. The EIR contains the program's environmental effects; a complete economic evaluation has not been undertaken in this document because it is not considered a CEQA issue.

8-3. A program EIR is not a "one size fits all" document. Rather, it is intended to provide a broad environmental analysis of a large program (in this case, the proposed GO). An individual project (in this case, a specific application request) would be reviewed by the RWQCB with jurisdiction over the application site. If the project meets all of the proposed GO's requirements, the RWQCB could approve the project using the program EIR as CEQA compliance. A project that does not meet those requirements or presents exceptional circumstances may be required to apply for an individual permit and undergo additional environmental review.

The commenter also states that adopting the proposed GO would increase apprehension of biosolids land application. We disagree; the proposed GO is designed so that the land application of biosolids can occur in a conservative manner, whether using local biosolids or biosolids from outside the area.

8-4. This portion of the proposed GO has been re-evaluated and changed. The text of the proposed GO, as found in Finding No. 2 of Appendix A, now reads:

> However, ~~public acceptance to~~ it is believed that large scale uses ~~has indicated the need for~~ require oversight at this time, regardless of the actual threat to water quality ~~while done~~ when applied at agronomic rates and using best management practices. ~~The perception~~ Accordingly, this General Order can be applied to such sites to ensure that biosolids are being properly used~~of~~ and not an activity of unregulated dumping ~~necessitates that t~~. This ~~regulatory~~ tool may be used to regulate material that is land applied . . .

This accurately describes and conveys the concern regarding Class A EQ biosolids.

8-5. Nothing in this action pre-empts local authority on this issue. Proactive efforts by communities to address this issue can only support or supplement adequate oversight. This is not a process that forces communities to use or cease using biosolids where the existing applications are performed in a manner that protects water quality and the environment. It is acknowledged that regulation and oversight are not equals. But the proposed GO process involves regulatory oversight which includes inspections, monitoring, and interaction with regulatory staff. Hence, the proposed process involves both regulation and oversight.

8-6. See Master Response 2.

8-7. Experimental projects, in most cases, will not comply with all conditions of the proposed GO and must be addressed on a site-specific basis through the application for waste discharge requirements process or as a formal waiver. Such projects are not "typical" land application operations and are therefore unlikely to fall within the scope of the proposed GO. Nothing in the process would exclude individual experimental projects from being permitted using individual waste discharge requirements.

8-8. See Response to Comment 8-7.

8-9. The proposed GO has been modified to include a footnote allowing for a lesser setback if not opposed by the adjacent landowners within 500 feet of the operation, and approval of the Executive Officer. Also see Master Response 2.

8-10. The setbacks for wells allow for lesser distances provided that adequate conditions are met. See Response to Comment 8-9 regarding offsite residences.

8-11. The proposed GO's intent is to provide a consistent statewide framework for approval of biosolids application projects. The nine RWQCBs retain decision-making approval over projects in their jurisdictions regarding their ability to be approved under the proposed GO or the need to undergo additional review and analysis, possibly including specific waste discharge requirements.

8-12. Comment noted. It is the responsibility of the public and the involved government entities to fully evaluate the effects of local bans on biosolids application.

Wastewater Treatment

SRCSD

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California
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Website: www.srcsd.com

September 7, 1999

Mr. Todd Thompson
State Water Resources Control Board
Division of Water Quality
P.O. Box 944213
Sacramento, CA 94244-2130

Dear Mr. Thompson:

Subject: **Comments on Draft EIR for General Waste Discharge Requirements for Biosolids Land Application**

Thank you for the opportunity to comment on the subject document. The Sacramento Regional County Sanitation District (District) provides wastewater conveyance and treatment services to approximately 1.2 million customers in the metropolitan Sacramento Area. The Sacramento Regional Wastewater Treatment Plant currently produces approximately 25,000 dry tons of biosolids annually. The District has managed a portion of these biosolids in the past by land application to farm fields in Sacramento, Solano, and Alameda counties.

The SWRCB is to be commended for its efforts to develop a General Order for biosolids land application. Development of the General Order will, in the long run, prove to be beneficial for the wastewater industry as it grapples with the issues and concerns associated with biosolids management.

Mitigation measures 10-1 and 10-2 are a particular concern. Imposition of VMT limits associated with the biosolids beneficial use sites could actually increase overall air emissions if agencies are forced to haul biosolids to more-remote sites after the VMT limits for closer sites have been used. In addition, the VMT limits could result in increased biosolids disposal in landfills, which AB 939 clearly maintains is not in the public's overall best interest. Therefore, the SWRCB should consider overriding mitigation measures 10-1 and 10-2 as a matter of public policy. 9-1

Several other minor comments are provided on the attached table. Please feel free to call me at (916) 875-9205 if you have any questions.

Sincerely,

Craig Lekven
Biosolids Program Manager

attachment

Printed on Recycled Paper

Sacramento Regional County Sanitation District

Comments on Draft Environmental Impact Report

Location	Comment	
Table 5-1	Units of measure need to be defined in the table.	9-2
Table 5-4	Units of measure need to be defined in the table.	9-3
Page 5-38, Horticultural Use, 1st paragraph, 3rd sentence	The District understands that the GO would only be used to regulate Class A, exceptional quality biosolids when application is at high rates (greater than 10 dry tons/acre-yr or 20 dry tons/ac-yr, depending on the quantity of biosolids in the mixture). The nutrient requirements for horticultural projects would be similar to agricultural crops. Given the typical nitrogen concentrations found in biosolids, it appears most horticultural projects would not be required to apply for coverage under the GO, unless biosolids are to be applied at very high rates. Therefore, the statement "use of Class A biosolids for larger scale landscaping projects would be subject to the GO" is not necessarily true.	9-4
Page 6-3, Agriculture, 4th and 6th sentences	Please change wording from "biosolids disposal sites" to "biosolids recycling sites" or "biosolids beneficial use sites". Industry terminology is to use the term "disposal" only when biosolids are landfilled or otherwise not being put to beneficial use. Biosolids are used for beneficial purposes at agricultural sites, not disposed.	9-5
Page 10-5, Methods, 3rd paragraph, 1st sentence.	The District understands that the GO requirement to cover stored biosolids between October 1 and April 30 is to prevent precipitation from contacting biosolids and washing them away. While the cover may provide some odor control, it is not required during the warm weather months, when biological activity in the biosolids will be highest. The District recommends deleting the last part of the sentence.	9-6
Table 15-1, Mitigation Measure 4-1, Monitoring and Enforcement Action	Change "phototoxicity" to "phytotoxicity".	9-7

Responses to Comments from the Sacramento Regional County Sanitation District

9-1. See Master Response 5.

9-2. The units of measure for the column headed Density of Biosolids should be (no/gm dry wt) as shown in Tables 5-2 and 5-3. The units of measure for the column headed Survival Time should be Days as shown in Tables 5-2 and 5-3. The units of measure for the column headed Infectious Dose should be Numbers of Organisms and should be included in Tables 5-1, 5-2, 5-3 and 5-4.

9-3 See response 9-2 for units of measure that were omitted in draft EIR Table 5-4.

9-4. The commenter requested that language in the public health analysis regarding horticultural activities be modified. The third sentence of the first paragraph on page 5-38 of the draft EIR is hereby revised as follows:

> Use of Class A biosolids for larger scale landscaping projects would be subject to the proposed GO if the material were applied at high rates.

9-5. The fourth and sixth sentences on page 6-3 of the draft EIR are hereby revised as follows:

> Types of crops commonly grown on agricultural biosolids ~~disposal~~ land application sites are row crops that are not typically used for human or dairy animal consumption . . . The visual impact of such sites is limited, and because they are located away from urban centers and major highways, most people are unaware of their status as biosolids ~~disposal~~ land application sites.

9-6. The proposed GO has been modified to require that any biosolids stored for more than 24 hours at the application site must be covered. This action will provide odor control, dust control, and runoff protection throughout the year.

9-7. Table 15-1, Mitigation Measure 4-1 (under the Monitoring and Enforcement Action column) of the draft EIR is hereby revised such that “phototoxicity” is changed to “Phytotoxicity.”

ANTELOPE ACRES
TOWN COUNCIL
8812 West E-8
Antelope Acres, California 93536

September 8, 1999

Todd Thompson
Water Resources Control Board
Sacramento, CA 94244-2130

Dear Mr. Thompson:

The Draft EIR states that the G.O. Program objective is to provide flexible framework for biosolid land application based on sound science. This sound science tells you to exclude whole areas whose water will become contaminated. We fail to understand why only some areas will have their water quality threatened, but others apparently will not. 10-1

There are so many restrictions on Class B applications that it would be dangerous for humans (workers) to enter the areas. 10-2

Sound science indicates a reduction in agriculture; money will be made in accepting sludge, not in any ensuing crops. 10-3

Your sound science notes there can be no assurances bacteria will not breed and migrate off site. 10-4

The residents of Antelope Acres, considering all the scientic evidence, reject land application of sludge. It is unconscionable for a government agency to allow certain sacrifice areas, putting citizens' health at risk. Certainly sewage disposal is an important problem that need addressing. But there are better ways than land application that need to be studied as our thinking is hopefully moving toward the new millenium. 10-5

At least, the Antelope Valley must be added to the specific excluded areas. Excessive winds already bring in dust and air pollution; the relatively pristine aquifer provides our water. The Valley is targeted for massive home and estate growth. 10-6

ANTELOPE ACRES
TOWN COUNCIL
8812 West E-8
Antelope Acres, California 93536

The Town Council did not receive a copy of the Draft EIR, though we were assured of receiving a copy. Therefore, we are behind on study and subsequent comments. We request that you please make sure that the Council is on your mailing list. Biosolids are a major issue in our community. 10-7

In closing, I would like to reiterate that your own sound science dictates that you consider alternative recommendations to land application. We look forward to working with you on this issue. 10-8

Sincerely

Virginia Stout

Virginia M. Stout
Antelope Acres Town Council
661-9484359

Responses to Comments from the Antelope Acres Town Council

10-1. The draft EIR analyzed water quality impacts of implementing the proposed GO and recommended measures to mitigate significant impacts that could result from cumulative water quality impacts. Contrary to the commenter's opinion, the EIR did not determine that implementation of the proposed GO would result in water contamination. Additionally, exclusion areas were identified as places where the proposed GO did not apply. Land application may still occur in these locations but would be subject to individual waste discharge requirements. These exclusion areas were based on the Basin Plans for each of the RWQCB regions and existing state law.

10-2. The provisions of the proposed GO are sufficient to protect public health and the environment if the biosolids meet minimum quality requirements. The proposed mitigation measures identified in Chapter 5 (Measures 5-1 and 5-2) are intended to provide additional means of reducing grazing animals' risks of exposure to Class B biosolids. Human exposure is best controlled through the management practices related to storage, loading, spreading and incorporation into the soil, and posting of the areas to let people know that they need to practice good sanitation (hand washing, proper handling of dirty clothing and soil-laden shoes or boots in fields where material has recently been applied).

10-3. The commenter is expressing an opinion about the economic value of biosolids land application. No response is necessary.

10-4. The EPA Part 503 regulations addressed the issue of bacterial survival and regrowth. Bacteria and viruses can survive for a few days to several months depending on the environmental conditions (See Tables 5-1 and 5-2 of the draft EIR).

Regarding the regrowth of bacteria, it should be noted that the bacteria of concern are not spore formers so they are easily destroyed by adverse conditions found in the ambient environment. On the other hand, they are facultative (able to grow in the presence or absence of oxygen) and grow readily over a temperature range of about 10E to 40EC, if nutrients are available and competitors and predators are few. The ability to regrow is a particular disadvantage in instances where processing kills most predators and competitors. If nutrients are available when the stress (such as elevated temperature) is removed, very rapid bacteria regrowth can occur in the right conditions. These conditions are seldom found in the ambient environment.

Fecal indicators can still be used as conservative markers of bacteria regrowth. Because the initial densities of fecal indicators are much higher than pathogen densities, the fecal indicators survive adverse conditions better than pathogens do. Processing may eliminate pathogenic bacteria most of the time but nearly always leaves fecal indicators. These can regrow and indicate pathogenic bacteria when in fact none are present. Thus, fecal indicators may be too conservative in some cases. When this situation is likely, a relatively hardy pathogenic bacterial species such as *Salmonella sp.* may be an indicator of pathogenic bacterial contamination. Yanko (1988) used a combination of these two approaches to assure product quality at a composting site. He set a coliform standard (19 MPN/g) before a compost batch could be released to a customer. If the compost could not be brought down to this level, the pile was tested for salmonellae and released if results were negative.

Overall, regrowth is not a concern and not a significant impact considering the site access restrictions, crop restrictions and buffer zones required by the proposed GO. No additional mitigation is needed under normal conditions found at land application sites.

10-5. This comment states that the residents of Antelope Valley are opposed to the land application of biosolids. The commenter's opinion regarding the citizen's being exposed to health risks is noted. The draft EIR indicates that citizens will not be exposed to significant health risks because of the precautionary measures that have been included in the proposed GO.

10-6. The exclusion areas designated in the proposed GO and identified on page 2-16 of the draft EIR are unique or valuable public resources, jurisdictional waters or preserves, or state-designated management areas. The exclusion areas were based on sensitive locations in each RWQCB's Basin Plan or in existing state law. The proposed GO contains specific requirements to protect the public from hazards related to movement of biosolids via air and water. Also see Response to Comment 10-1.

10-7. The Antelope Acres Town Council has been added to the distribution list.

10-8. Chapter 14 of the draft EIR identifies and evaluates several alternatives to the proposed GO, including the Land Application Ban Alternative. The environmental review process provides opportunities for members of the public to comment and to add or suggest revisions to alternatives before a decision is reached on the proposed project.

IMPERIAL IRRIGATION DISTRICT

OPERATING HEADQUARTERS • P. O. BOX 937 • IMPERIAL, CALIFORNIA 92251

September 8, 1999

Mr. Todd Thompson
Associate Water Resources Control Engineer
State Water Resource Control Board, Division of Water Quality
P.O. Box 944213
Sacramento, CA 94244-2130
(916) 657-2388 FAX

Dear Mr. Thompson:

Subject: *Statewide Program Draft Environmental Impact Report (DEIR) Covering General Waste Discharge Requirements for Biosolids Land Application*

Thank you for the opportunity to comment on the executive summary for the *Statewide Program Draft Environmental Impact Report Covering General Waste Discharge Requirements for Biosolids Land Application* (Biosolid ES), a statewide program. The Biosolid ES evaluates the environmental impacts of the California State Water Resources Control Board's adoption and implementation of a General Order (GO) that would allow the issuance of general waste discharge requirements for land application of biosolids. 11-1

The Imperial Irrigation District (District), as the regional supplier of raw water for the Imperial Valley, has a real interest in the development of a General Order (GO) for these discharges as well as all issues related to biosolid management in agricultural and rural environments. The District maintains approximately 1,451 miles of surface drains to collect agricultural tailwater, operational discharge, and subsurface tile drainage flows, and as such is particularly concerned with the impacts that biosolid application may have on its drain water quality. District comments are as follows:

On page ES-2, first paragraph, next to the last sentence, a clearer definition of "biosolids" needs to be included. Simply stating that it is "commonly referred to as sewage sludge" is not a sufficient definition. 11-2

On page ES-7, Relationship of the GO to Part 503 Regulations section, second bullet, why are there no conditions for Class A Biosolids such as runoff restrictions? 11-3

On page ES-9, bullet number 8, the 30-day restriction on surface water runoff, the structures through which the surface water exits the site must be in good condition so that no site erosion occurs. 11-4

On page ES-10, last paragraph, second sentence, for the District's satisfaction, the spill response plan will need to discuss the potential of transport trucks ending up in our canals due to accidents. 11-5

On page ES-16, second and third paragraphs, Section 15131 of the CEQA Guidelines states that while economic or social effects of a project shall not be treated as significant, the information may be included in an EIR. The EIR "may trace a chain of cause and effect from a proposed decision on a project through anticipated economic or social changes resulting from the project to physical changes caused in turn by the economic or social changes." 11-6

On page ES-17, first paragraph, if the body of research on the health risks of land application of biosolids is not conclusive and "the potential for these risks will continue to be studied," then the application of biosolids should not be allowed until more research provides answers. 11-7

For Table ES-1, page 1 of 7, please change the following in the Soils, Hydrology, and Water Quality section: (a) for the "Potential degradation of surface water from nutrients in biosolids" impact, change the level of significance before mitigation from "less than significant" to potentially significant and add "monitoring needed" as a mitigation measure; (b) for the "Potential degradation of groundwater from nutrients" impact, change the level of significance before mitigation from "less than significant" to potentially significant and add "monitoring needed" as a mitigation measure; (c) for the "Potential degradation of surface water and groundwater from trace elements in biosolids" impact, change the level of significance before mitigation from "less than significant" to potentially significant and add "monitoring needed" as a mitigation measure; and (d) for the "Potential degradation of surface water and groundwater from synthetic organic compounds in biosolids" impact, change the level of significance before mitigation from "less than significant" to potentially significant and add "monitoring needed" as a mitigation measure. 11-8

For Table ES-1, page 2 of 7, please change the following in the Land Productivity section, for the "Changes in amount of synthetic organic compounds in soils and resulting effects on agricultural productivity" impact, change the level of significance before mitigation from "less than significant" to potentially significant. 11-9

For Table ES-1, page 3 and 4 of 7, please change the following in the Public Health section: (a) for the "Potential for increased incidence of disease resulting from direct contact with pathogenic organisms at biosolids land application sites" impact, change the level of significance before mitigation from "less than significant" to potentially significant; (b) for the "Potential for increased incidence of disease resulting from direct human contact with pathogenic organisms in irrigation runoff from biosolids land application sites" impact, change the level of significance before mitigation from "less than significant" to potentially significant and add "monitoring needed" as a mitigation measure; (c) for the "Potential for increased incidence of chronic human disease resulting from ingestion of biosolids-derived metals in crops grown on land application sites or animals fed with crops grown on land application sites" impact, change the level of significance before mitigation from "less than significant" to potentially significant and add "monitoring needed" as a mitigation measure; (d) for the "Potential for increased risk of of 11-10 chronic disease resulting from ingestion of biosolids-derived organic compounds in food, soils, animals, dairy products, or wildlife" impact, change the level of significance before mitigation from "less than significant" to potentially significant and add "monitoring needed" as a mitigation measure; (e) for the "Potential for increased incidence of disease resulting from ingestion of groundwater contaminated by biosolids-derived pollutants or pathogens" impact, change the level of significance before mitigation from "less than significant" to potentially significant and add "monitoring needed" as a mitigation measure; (f) for the "Potential for increased incidence of acute or chronic disease resulting from human exposure to aerosols and wind-blown particulates from biosolids stockpiling, composting, or land application" impact, change the level of significance before mitigation from "less than significant" to potentially significant and add "monitoring needed" as a mitigation measure; and (g) for the "Potential for increased risks of disease resulting from contact with biosolids spilled during transport from point of generation to application site" impact, change the level of significance before mitigation from "less than significant" to potentially significant and add "monitoring needed" as a mitigation measure. 11-10 (cont)

For Table ES-1, page 6 of 7, please change the following in the Air Quality section, for the "Biosolids drift associated with wind-blown biosolids" impact, change the level of significance before mitigation from "less than significant" to potentially significant. 11-11

For Table ES-1, page 6 of 7, please change the following in the Noise section, for the "Exposure of noise-sensitive land uses to noise from the land application of biosolids" impact, change the level of significance before mitigation from "less than significant" to potentially significant and under mitigation measure add "Avoid areas near residential and school lands". 11-12

For Table ES-1, page 7 of 7, please change the following in the Cumulative Impacts section, for the "Cumulative deterioration of roadways" impact, change the level of significance before mitigation from "less than significant" to "potentially significant" and under mitigation measure add "Avoid roads not built for industrial truck traffic". 11-13

Previously, the District has provided comments regarding biosolids land application on agricultural fields to the Imperial County Planning Department for incorporation into conditional use permits. These comments have included the following: 11-14

1. District notification of biosolids use (location and date) prior to application.

2. Tailwater structures should be completely grade boarded up and wrapped with plastic prior to the biosolids application process. This is a precaution against storm water runoff carrying materials off the field. The tailwater structures may be returned to their normal condition once the biosolids have been completely incorporated into the soil.

3. At least one sediment reduction Best Management Practice (BMP) should be incorporated into an irrigation management plan by the biosolids user.

4. Agricultural runoff (tailwater) and subsurface tilewater from sites accepting biosolids should be monitored for the metal concentrations as listed and for the presence of pathogens (as indicated by Fecal Coliform) during the first irrigation event after biosolid incorporation. Metal concentrations monitored should include arsenic, boron, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc. If there is no evidence that biosolids are contributing pollutants to the District drainage system, this monitoring may be lessened or discontinued. 11-14 (cont)

The District also is supportive of "buffer zones" that restrict biosolid application with minimum setbacks from various locations (property lines, residences, downstream domestic water users, wells, roadways, water supplies, schools, hospitals, etc.) This is of even greater concern to the District as it begins implementing new rules to comply with changes in the federal and state Safe Drinking Water Acts. 11-15

Again, thank you for the opportunity to review the *Notice of Preparation of a Statewide Program Environmental Impact Report for General Waste Discharge Requirements for Biosolids Land Application.* This is an issue that is of great concern to the Imperial Irrigation District, and we look forward to providing input on future documents pertaining to this EIR process. Please include the Imperial Irrigation District's Resources Management Section on all future mailings. Please contact me at (760) 339-9446 if you have any questions regarding these comments. 11-16

Sincerely,

Vickie Doyle

Vickie Doyle
Water Resources Assistant Engineer
Resources Management Section

Responses to Comments from the Imperial Irrigation District

11-1. This comment states that the District has an interest in the development of the proposed GO. No response is necessary.

11-2. The commenter requested a clearer definition of biosolids in the EIR. The first paragraph on draft EIR page ES-2 is hereby revised to include the following final sentence:

> Biosolids is defined as sewage sludge that has been treated and tested and shown to be capable of being beneficially and legally used as a soil amendment for agriculture, silviculture, horticulture, and land reclamation activities as specified under 40 CFR Part 503.

11-3. Under the Part 503 regulations, runoff issues are not addressed. However, Class A material is subject to the entire GO, except for those requirements specifically mentioned for Class B biosolids. Within the proposed GO, Prohibition No. 7 prohibits runoff from irrigation for 30 days after the application unless the site includes a filter strip of unmowed grass or similar vegetation. The more specific requirements in Discharge Specification No. 7 are included for Class B because the characteristics of that material require more precautionary measures. Accordingly, Class A does have runoff restrictions specified in the proposed GO.

11-4. Comment noted. The text for page E-9 of the draft EIR will have a bullet added and read as follows:

> # structures conveying tailwater shall be designed and maintained to minimize any field erosion;

The text of the proposed GO, as found in Discharge Specification No. 7 of Appendix A, is added to read as follows:

> Structures conveying tailwater shall be designed and maintained to minimize any field erosion.

11-5. Comment noted. Spill Response Plans should certainly include procedures to address accidental discharges to surface water bodies or discharges to conveyance structures that lead to surface water bodies or serve as a drinking water source. The details of a spill response plan, however, will not be in the requirements of the proposed GO. Rather, the industry will be required to develop such plans.

11-6. The commenter has correctly cited CEQA guidelines regarding the need to address economic issues in an EIR. SWRCB staff believes the potential for physical change in the environment as a result of economic effects of the proposed GO is speculative. Therefore, while the EIR recognizes the controversy that exists regarding potential economic effects of the proposed GO, resultant environmental effects are not identified.

11-7. The commenter indicates that land application of biosolids should not be allowed until further research on health risks is completed. While it is true that there is not a large body of research relating specifically to biosolids and the potential to transmit certain high-profile diseases, there is sufficient information relating to disease transmission from wastewater disposal and other human activity to conclude that the risk of transmitting these diseases from land application of biosolids is small. The conservative approach being used in the proposed GO regarding human exposure to biosolids at and near land application sites is considered fully protective of human health. As additional research is conducted regarding pathogens in biosolids, SWRCB staff will continue to track and respond to any significant changes in the risks associated with land application.

11-8. The SWRCB staff respectfully disagrees with the commenter's request for changing CEQA impact significance levels of surface and groundwater quality impacts from "less than significant" to "potentially significant." Refer to Master Response 13 for a description of how potential water quality impacts to surface and groundwater resources were evaluated and why the identified impacts were considered less than significant.

11-9. The commenter recommends that in Chapter 4, Land Productivity, under the heading "Changes in Amount of Synthetic Organic Compounds in Soils and Resulting Effects on Agricultural Productivity"(Table ES-1), the impacts be considered "potentially significant" (the draft EIR indicates the impact as "less than significant").

The draft EIR concluded that effects on agricultural productivity caused by changes in synthetic organic compounds in soils would not significantly impact the environment. The SWRCB staff believes that there is adequate scientific and specific project data to support this conclusion. This information has been addressed in the EIR. Therefore, no change to Table ES-1 regarding this impact is required.

11-10. Comment noted. The impact conclusions remain valid based on the information and analysis contained in the draft EIR; no changes were made based on the comment.

11-11. The commenter requests that the significance determination for the following impact, "Biosolids drift associated with wind-blown biosolids," be changed from "less than significant" to "potentially significant." This change has not been made because the analysis concluded that land application of biosolids, in accordance with the proposed GO, would not result in a significant impact. Additionally, since the publication of the draft EIR, the proposed GO has been further refined to require the incorporation of biosolids (where tillage will occur) within 24 hours in arid areas and within 48 hours in non-arid areas. The proposed GO also now prohibits the application of biosolids with a moisture content of less than 50 percent. These changes to the proposed GO do not alter the significance conclusions presented in the EIR; however, refinement of the proposed GO will further reduce the potential for soil containing biosolids to be blown off application sites.

11-12. The noise analysis in the draft EIR states that "the primary land uses in the potential application areas would be rural residential and/or agricultural operations" (page 11-1). Because the application of biosolids on agricultural land would emit noise levels similar to those of existing agricultural equipment in those areas, even near residences and schools, this impact was found to be less than significant. The same restrictions that apply to agricultural operations near residences and schools would correspondingly limit land application of biosolids in those agricultural areas. No change in the text of the draft EIR is required.

11-13. The number of vehicles that would use roadways to deliver biosolids is a small percentage of the overall volume of vehicles on these roads. In addition, Sections 35550-35559 of the California Vehicle Code identify weight and load limitations for trucks on state highways (see page 9-2 of the draft EIR). These limitations would also apply to county roadways if no limitations were specified by the county. Biosolids transport trucks would be required to meet these state requirements. Therefore, no additional mitigation is required.

11-14. The issues discussed in this comment are addressed as discussed below:

1. Provision No. 3 requires notification of the local water district.

2. The text of the proposed GO, as found in Discharge Specification No. 7 of Appendix A, is added to read as follows:

> Tail water structures shall be boarded and wrapped with plastic prior to any biosolids application, but removed after biosolids incorporation into the soil.

3. SWRCB staff agrees that irrigation BMPs are important. In fact, a vegetative filter strip is already required for discharges within 30 days of the biosolids application in Prohibition No. 7. But, it is possible that material will be spread where it is intended for dry land farming. In such cases, irrigation BMPs would not be applicable. The proposed GO also requires that tillage practices be used that minimize erosion from wind and water. As such, erosion issues are addressed in the proposed GO, but in a way that they are applied site-specifically and therefore relate to all sites.

4. There is no technical justification for requiring tailwater and tilewater monitoring by individual farmers solely because they use biosolids for a fertilizer or soil amendment. It is acknowledged that such monitoring would add to the knowledge base regarding this material, as well as the knowledge base on the water quality impacts from fertilizer use as a whole. However, the economic cost of requiring individual farmers to monitor their tailwater and tilewater solely because of the use of biosolids is not warranted.

11-15. The commenter expresses support for “buffer zones.” The comment is noted and no response is required.

11-16. The Imperial Irrigation District’s Resource Management Section has been added to the distribution list.

University of California
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County of Kern

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September 8, 1999

Todd Thompson
Associate Water Resources Control Engineer
Division of Water Quality
State Water Resources Control Board
PO Box 944213
Sacramento CA 94244-2130

Dear Mr. Thompson:

I am Ralph L. Phillips and have worked for the University of California as a farm advisor in Kern County since 1980. My academic training includes a Ph.D. in Ruminant Nutrition from Oregon State University, a M.S. in Toxicology and a B.S. in Animal Science from Utah State University. I worked on an Oregon State University Experiment Station for six years before moving to California, where I conducted research involving selenium and molybdenum metabolism in beef cattle and sheep.

While in California, I have conducted 10 years of research on selenium and molybdenum in the environment and their impact on the nutritive value of alfalfa hay and range forages for beef cattle and sheep. I cooperated with Dr. Roland D. Meyer, a soil fertility-plant nutrition specialist at the University of California, Davis. Dr. Meyer provided the expertise in the soil and plant area of the study and I provided the expertise in the area of forage nutrition and beef cattle requirements. 12-1

For the past three years, I have been cooperating with Dr. Edward Atwill, an environmental animal health researcher with the University of California School of Veterinary Medicine.

After reading the Draft Environmental Impact Report for Biosolids Land Application, I would like to respond to two areas of the report. The first area is Chapter 4, Land Productivity, Pages 4-11.

In ruminant nutrition, there is a copper - molybdenum - sulfur interaction that can have a big economic impact on the livestock industry under certain conditions. Cameron and Goss (1948) and Parker (1952) demonstrated that a high level of molybdenum in alfalfa hay was causing serious health problems for beef cattle grazing forages or consuming alfalfa hay grown on the valley floor. 12-2 Parker noted that the severe cases were associated with alkaline clay soils. Since this early work, science has found that molybdenum is antagonist toward copper. Also, it has been shown that alfalfa and other legumes accumulate higher levels of molybdenum than other plant families. To further complement the situation, sulfur concentrations can influence the molybdenum and copper complex.

As a rule of thumb, feed with three or more parts per million molybdenum are considered a health

risk. However, evaluating the health risk of forages to cattle is very complicated when interpreting the three way interaction between copper, molybdenum and sulfur. Also, the ratio of copper to molybdenum must be considered. A 2:1 ratio of copper to molybdenum is considered safe to feed unless there is excess sulfur, then there is a potential of animal health problems.

Parker's work showed that less than three percent of alfalfa samples taken in 1950, contained less than three parts per million, about 45 percent contained 3:1-10:0 parts per million molybdenum, about 50 percent contained 10:1-20:0 parts per million, and about two percent contained 20:1-50:0 parts per million molybdenum.

In 1985, Phillips and Meyer (1993) took alfalfa samples from the same areas of Kern County that Parker had sampled and found that about 45 percent of the alfalfa contained less than three parts per million molybdenum. The remaining 55 percent contained 3:01-10:0 parts per million molybdenum.

Also, they ranked the alfalfa samples as to potential nutritional problems for ruminant animals. Based on the molybdenum and copper concentrations and their ratios, they showed that over 20 percent of the samples would probably cause nutritional problems in cattle and sheep if their diets were not supplemented with copper. Another 24 plus percent of the samples had a potential problem if animals did not receive a copper supplement. 12-2 (cont)

This work demonstrates that progress has been made over the past 35 years in improving the nutritional value of alfalfa hay regarding concentrations of molybdenum. However, no work has been done in Kern County to address the sulfur levels in relation to molybdenum and copper. Phillips and Meyer (1993) evaluated potential problems related to copper and molybdenum interaction, but did not evaluate the concentration of sulfur in the interaction of the three minerals. However, their data does show there is a potential for nutritional problems in about 50% of the hay sampled if it were fed to cattle not receiving a copper supplement.

Phillips and Meyer (1993), showed there was not a geographic pattern for the distribution of copper, molybdenum or sulfur. This creates an expense for livestock producers. They must have forages tested for minerals, supplement for minerals or accept reduced livestock performance because of the mineral imbalance.

The addition of biosolids to Kern County soils has a good chance of reversing the 35 year trend of lower molybdenum concentrations in alfalfa hay grown in Kern County.

Dr. Meyer, in his personal comments, stated that adding very small amounts of molybdenum increased the levels in alfalfa hay.

Most of the federal EPA's report on safety of biosolids does not address molybdenum in western U.S. soils. It would be wise to talk to people like Dr. Meyers, who have done considerable work in this area and understands the soil-plant-animal relationship before this EIR is approved. 12-2 (cont)

The second point of concern regarding the Draft Biosolids EIR is on Page 5-14: "Transport of bacteria, viruses and other pathogens by air or by aerial vector such as insects and birds has been hypothesized." Work done in Kern County by Dr. Edward Atwill and Ralph L. Phillips, would indicate that feral hogs, coyotes, squirrels, rats and cattle, could be vectors for *Cryptosporidium parvum* and *Giardia duodenalis* and should be added to the list of potential vectors of waterborne protozoan.(Table 1).

LEVELS OF INFECTION

	C. parvum	*G. duodenalis*
Cattle (Atwill, et.al. 1999)		
One year or older	0.6%	7%
Calves less than one year	6%	37%
Trail and Pack Horses (Johnson, et.al., 1997)	0	0
Feral Hogs		
Less than eight months (Atwill, et.al., 1997)	11%	6%
More than nine months	3%	8%
*Coyotes	22%	43%
*Squirrels	16%	16%
*Rats	5%	21%

*Unpublished data

12-3

Atwill's work has not studied the link between wildlife and humans or the link between biosolids and wildlife, but clearly demonstrated that certain mammalian wildlife species can carry the same pathogens found in humans and biosolids.

Kinde (1996) studied the movement of *Salmonella enteritidis*, in the environment. He demonstrated the movement of *S. entiritidis* from the sewage effluent to rodents along the banks of the effluent stream. He later isolated the same organism from eggs from a chicken ranch in the area. He is convinced that he has shown a link from the sewage industry to the human food chain. His peered reviewed articles on the topic would support his beliefs.

Kinde's and Atwill's work would push the transport of microorganisms by vectors away from hypothesis and much closer to reality. 12-3 (cont)

The EIR for biosolids land application needs a deeper review of the current and past research in the areas discussed in this letter. The EIR is not complete enough to ensure public safety at this time.

References

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Sincerely,

Ralph L Phillips

Ralph L. Phillips, Ph.D.
Range/Natural Resources and Livestock Advisor
Kern and Tulare Counties

RLP:cr
cc: Bernard C. Barmann

Responses to Comments from the Kern County - University of California Cooperative Extension

12-1. This comment is in regards to the commenter's qualifications. No response is necessary.

12-2. The commenter raises concern that addition of biosolids containing molybdenum (Mo) can cause molybdenum toxicity (molybdenosis) in grazing animals fed from hay containing elevated levels of Mo. As noted in the detailed and informative letter, and its accompanying references, this is a concern in large parts of Kern County where native soils contain elevated concentrations of Mo. Consequently, feed grown on these soils also can contain Mo levels that are potentially harmful to animal health. Biosolid additions, where the biosolids contain appreciable levels of Mo, could increase the problem. The commenter also provides information and references that molybdenum toxicity and nutrition is a complex issue, and is related to levels of copper and sulfur in the soil and forage crops, which interact to influence the mineral nutrition of animals. The commenter does not believe that the Part 503 regulations adequately addressed this concern. Since the cumulative loading rates for soils in the proposed GO for Mo is largely based on the Part 503 regulations, the commenter concluded that this issue needs further analysis and discussion in the EIR.

Molybedenum toxicity was briefly discussed in Chapters 3 and 4 of the draft EIR; however, it was concluded on page 4-12 that "the combination of circumstances that could lead to grazing animal toxicity following biosolids applications with elevated levels of trace metals . . . were remote." The information in the commenter's letter has become part of the final EIR and adds greatly to the understanding and discussion of this issue. How remote the chance of grazing animal health impact would be, particularly when viewed from a statewide perspective, is a subjective determination. The SWRCB staff agrees with this comment; it appears to be a potential threat in Kern County in areas of high native Mo, where elevated Mo biosolids (but nevertheless below ceiling limits) were to be applied to these lands. Similarly it was acknowledged in the draft EIR that biosolids containing selenium (Se) in elevated levels but below ceiling limits, could also potentially cause toxicity problems in soils high in native Se, such as that on the west side of the San Joaquin Valley.

But, these acknowledgments do not significantly change the draft EIR's findings and mitigation recommendations, as potential grazing animal toxicity was determined to be a potentially significant impact. Please note that the Pre-Application Report (Appendix A) requires that native soils be tested for a range of elements that are potentially toxic or essential to the mineral nutrition of plants and grazing animals. Testing of biosolids for this same suite of elements, including Mo and Se, is also required. Mitigation Measure 4-1 requires that waste discharge requirements applicants provide information on soils that allows RWQCB staff to consider, in a comprehensive fashion, the nutrients and mineral elements applied to a biosolids application site, considering native soil conditions and crops.

The Part 503 regulations only specifically require consideration of nitrogen from an agronomic perspective. SWRCB staff believes that implementing this mitigation measure, specifically in cases where regulators and applicators are alerted to the potential Mo problem in Kern County (as they are), will also be effective in precluding the type of animal mineral toxicity and mineral deficiency problems that might otherwise occur. The continued involvement and assistance of UC Cooperative Extension, which was acknowledged in the draft EIR section, will also be essential to management of grazing lands and grazing animals to avoid the type of potential toxicity and mineral deficiency or imbalance problems identified.

Mitigation Measure 4-1, which requires comprehensive testing of soils and biosolids and analysis of potential fertility (and toxicity) problems, is not specifically referred to under the impact heading “Changes in Grazing-Land Productivity.” Therefore, the following text is added to the end of Mitigation Measure 4-2 on page 4-12 of the draft EIR:

> Refer also to Mitigation Measure 4-1, which requires comprehensive testing and analysis of soils and biosolids by qualified professionals.

Additionally, to strengthen this mitigation measure and its applicability to the grazing land productivity issue, the first paragraph of Mitigation Measure 4-1 on page 4-5 is revised as follows:

> The GO Pre-Application report......2) metals related phytotoxicity does not occur, 3) metals related forage toxicity or mineral deficiencies and other trace metals related problems do not occur on hay lands and pasture lands, 4) increases in salinity............

As presented in the draft EIR, Mitigation Measure 4-1 was written such that the applicant, an agronomist, or a soil scientist are all able to make the determination as to whether biosolids applications will impact soil and grazing land productivity (see page 4-5, third paragraph). Some of the issues regarding metals bioavailability and mobility and nutrient and metal interactions in different soil environments and for different crops, and regarding animal nutrition may be beyond the capabilities and experience of many applicators. Accordingly, the third paragraph of Mitigation Measure 4-1 is revised as follows to eliminate the “applicant” from those qualified to perform the analysis, unless of course the applicant is also a qualified soil scientist or agronomist:

> This information should be used by a certified soil scientist~~,~~ or a certified agronomist to evaluate the above potential effects on land productivity. The soil scientist and/or agronomist should make recommendations in a letter report to accompany the Pre-Application report regarding the proper rate of biosolids

applications, any soil management (such as supplemental fertilizers and pH adjustment), appropriate crop, and grazing practice recommendations, considering the nature of the application site soils and biosolids characterization data, and the need to preserve short term and long term land productivity.

Also see Response to Comment 26-32.

12-3. Comment is regarding the statement made on page 5-14 of the draft EIR, where it is stated that "Transport of bacteria, viruses and other pathogens by air or by aerial vector such as insects and birds has been hypothesized." The Commenter provided information on recent research showing that feral hogs, coyotes, squirrels, rats and cattle could be vectors of *Cryptosporidium parvum* and *Giardia duodenalis* and should be added to the list of potential vectors of waterborne protozoans.

Table 5-3, column 3, entitled Nonhuman Reservoir is amended to include the following vectors for the human pathogens Cryptosporidium: feral hogs, coyotes, squirrels and rats ; and *Giardia* spp.: cattle, feral hogs, coyotes, squirrels and rats.

Addition of this information makes no change in the previous conclusions regarding impacts to public health nor a change in any proposed mitigation measures.

The unpublished research work cited does not link these two pathogenic protozoans with wildlife exposure to biosolids or provide any linkage between these wildlife species and human exposure to the organisms or their feces. However, the commenter notes the work of Kinde (1996) cited in the draft EIR on page E-5 about the link between a salmonella outbreak among chickens and wastewater effluents in a nearby stream that might have been transmitted by rodents.

The commenter notes that "The EIR is not complete enough to ensure public safety at this time" and indicates a desire to have "a deeper review of the current and past research in the areas discussed in this letter."

The reader is referred to Appendix E of the draft EIR (see Appendix B of this final EIR) for the requested discussions of pathogens and public health concerns, which was intended to go into more detail and expand on the information presented in draft EIR Chapter 5.

LAS VIRGENES MUNICIPAL WATER DISTRICT
EST. 1958

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MEMBER AGENCY OF THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

September 8th, 1999

Mr. Todd Thompson
Associate Water Resources Control Engineer
Division of Water Quality
State Water Resources Control Board
P.O. Box 944213
Sacramento, California 94244-2130

Subject: **Comments Regarding DEIR; Covering General Waste Discharge Requirements for Biosolids Land Application**

Dear Mr. Thompson:

Unfortunately we could not attend the public workshops regarding this document. However, we have several very important topics we would like to comment on regarding the State Water Resources Control Board's DEIR Covering General Waste Discharge Requirements for Biosolids Land Application.

In the mid-1970's Las Virgenes Municipal Water District together with the Triunfo Sanitation District teamed up with the EPA and SWRCB to construct a rather unique land application program for handling solids disposal within the Santa Monica Mountains Zone. Recognizing the ecological importance and sensitivity of this location, a program was developed to handle the treatment, storage and beneficial reuse of the biosolids generated within the same area of origin. In 1979, the Los Angeles RWQCB granted WDR Order No. 79-107 (attached) for a sub-surface biosolids injection project. This Order included stringent storm diversion and runoff control measures that acheived conformance goals of the Los Angeles Basin Water Quality Control Plan. A full-scale operation of a 91-acre facility (the Rancho Las Virgenes Farm) began in 1982. This project included most of the monitoring and tracking elements required by this DEIR. Our history of operating this project has provided us with a thorough understanding of land application and beneficial reuse of biosolids. This DEIR has several components that would have very significant impacts on our to ability operate this successful project. 13-1

The General Order (GO) lists the entire Santa Monica Mountains Zone as an exclusion area (page ES-12). The reasoning for this exclusion is to avoid the "potential impacts on protected fishes located in these areas....southern steelhead in Malibu Creek" (page 8-2). Our Rancho Las Virgenes Farm is located in the central section of this "Zone." Our RWQCB discharge permits require us to monitor a wide spectrum of analytes in the surfacre waters and groundwater long Malibu Creek. Many years of monitoring results show no impact to the concentration of nutrients, pathogens or metals due to our sub-surface injection activities. A general exclusion of our sucessful operation is not appropriate. 13-2 (cont)

Initially the injection rate into these fields was restricted by a 30 dry tons per acre maximum, however this has been dramatically reduced to conform with crop uptake limits defined by the 503 regulations. Furthermore, the biosolids injected into our Farm are mainly of a domestic sewage origin. Metals concentrations are very low, and have always been well below the 503 Exceptional Quality or Ceiling Concentrations. Likewise our soil concentrations for these metals are also very low. Even after 17 years of injection, the soil is still less than one tenth the concentration allowed by the DEIR.

Our current operating practice makes our farm site a sustainable area for land application for many years. Our history of operation and monitoring demostrates that the soil is a reservoir and should have a maximum allowable concentration level, but should also have a potential removal consideration through crop uptake. This is particularly true for dedicated field areas that are used with an integrated approach to utilize crops and land application together as a beneficial means of biosolids handling. When considering the long-term needs for biosolids handling, the concepts of application, removal or uptake, and remaining residual must be handled in concert. 13-3

However Chapter 2 (page 2-14) of the DEIR is written to include not only a ceiling concentration for metals but also a cumulative lifetime metals loading limit. This loading limit is based on the background soil levels and the concentration applied over time. There is no consideration for what is removed by crops. We believe this is the wrong approach. 13-4

EPA and State grant funds were provided under the Clean Water Act to cover almost 90% of the cost of purchasing the land for the Farm and the cost of construction of the storage and injection facilities. The exclusions and cumulative loading rates of this DEIR would eliminate the option of sub-surface injection at our Rancho Las Virgenes Farm. Thus, it would create very significant economic burden by way of stranded investment, and the need to look for more costly alternative disposal options. 13-5

The 503 regulations, and the growth of the communities in Las Virgenes Municipal Water District and Triunfo Sanitation District caused us to look for additional means of handling biosolids. In 1993 we began making compost using anaerobic digestion and a fully-contained, in-vessel composting system. This Composting Facility sited behind the Farm. The Farm property serves two purposes; first it serves as a buffer zone between the Composting Facility, and the heavily traveled road and encroaching residential areas. But more importantly it provides us an operational alternative for handling biosolids. Again, elimination of the Farm would introduce a variety of additional negative impacts. 13-6

We endorse the monitoring requirements stated in the GO as an appropriate means of environmental protection, and can meet them with existing operations and monitoring pracitices. We also support the continued use of Class B biosolids for the land application process. 13-7

In conclusion, we feel the statewide approach to handling the control of land application works for vast areas that are far away from the site of generation, but it is not applicable in all circumstances. It serves as a general guideline, however specific requirements for each unique situation can ensure long-term use, and protection of ecologically sensitive areas. The DEIR needs to specify that agencies currently using land application on dedicated areas are excluded from the proposed new provisions. 13-8

Please feel free to call me if you have questions.

Very truly yours,

James E. Colbaugh
General Manager

JEC:jg

STATE OF CALIFORNIA—RESOURCES AGENCY

Exhibit J

cc Tim
orig. [illegible]

EDMUND G. BROWN JR., G

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
LOS ANGELES REGION
SOUTH BROADWAY, SUITE 4027
LOS ANGELES, CALIFORNIA 90012
(213) 620-4460

Full scale Rancho Las Virg
non-NPDES permit
order 79-107

JUN 2 7 1979

Las Virgenes Municipal Water District
4232 Las Virgenes Road
Calabasas, California 91302

Attn: Mr. H. W. Stokes, General Manager - Chief Engineer

Re: Waste Discharge Requirements - Sludge Application at Rancho Las Virgenes (File 78-26)

Gentlemen:

Reference is made to our letter dated May 8, 1979, which transmitted a draft of tentative requirements for sludge application at Rancho Las Virgenes.

Pursuant to Section 13263 of the California Water Code, this California Regional Water Quality Control Board, at a public meeting held on June 25, 1979, reviewed these tentative requirements, considered all factors in the case, and adopted Order No. 79-107 (copy attached) relative to this discharge.

Also attached is a copy of specifications for technical reports to be submitted by you.

Please reference all technical and monitoring reports to our Compliance File No. 6430.

We are enclosing a copy of the Department of Health Services comments for your consideration.

Very truly yours,

Raymond M. Hertel

RAYMOND M. HERTEL
Executive Officer

cc: See attached mailing list

Enclosures

cc: State Water Resources Control Board
Legal Division, Attn: H. M. Schueller
State Water Resources Control Board
Division of Water Quality, Attn: Farouk Ismail
Department of Fish and Game, Region 5
Department of Health Services, Sanitary Engineering Section
Attn: Bill MacPherson
Department of Health, Waste Management Section
Attn: Earl Margitan
Department of Water Resources
Department of Health (Sacramento)
Attn: Mike Kiado
Los Angeles County Department of Health Services
Attn: Ed Schulenburg
Los Angeles County Flood Control District
Los Angeles County Engineer - Facilities, Sanitation Division
Ventura Regional County Sanitation District
Attn: John Lambie
Boyle Engineers
Black & Veatch
Monte Nido Valley Property Owners Association
Attn: Joan Kay
South Coast Air Quality Management District
Environmental Protection Agency, Region IX
Santa Monica Mountains Comprehensive Planning Commission
Los Angeles County Regional Planning Commission
Las Virgenes Enterprise

State of California
Resources Agency
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, LOS ANGELES REGI

ORDER NO. 79-107

WASTE DISCHARGE REQUIREMENTS
FOR
LAS VIRGENES MUNICIPAL WATER DISTRICT
(Rancho Las Virgenes)
(File 78-26)

The California Regional Water Quality Control Board, Los Angeles Region, finds:

1. Las Virgenes Municipal Water District (LVMWD) operates the Tapia Water Reclamation Facility at 731 Malibu Canyon Road, Calabasas, California.

2. On August 28, 1978, this Regional Water Quality Control Board adopted Order No. 78-98 prescribing waste discharge requirements for LVMWD to operate a sludge farm test model as a portion of their proposed full-scale sludge farming project at a site located near the intersection of Mulholland Highway and Las Virgenes Canyon Road, Calabasas. The overall purpose of the study model was to inject sludge in controlled and monitored small test plots to obtain site-specific data, to train the District's personnel, and to provide a site management tool for establishing field operating procedures to be used in the full-scale system. The test model has been in operation for about six months.

3. In a letter dated April 20, 1979, LVMWD has requested this Regional Board to adopt waste discharge requirements for the proposed full-scale operation. Information and site-specific data resulting from operation of the test model were also submitted as required. The 120-acre farm site will be known as Rancho Las Virgenes.

4. Aerobically digested sewage sludge will be pumped from Tapia Plant to Rancho Las Virgenes via a 6-inch, cement-lined ductile iron force main. The pipe will run parallel to the existing reclaimed water line crossing Malibu Creek at one point. The force main will terminate at two 700,000-gallon steel sludge storage tanks at Rancho Las Virgenes. The two tanks combined will provide 27 days of storage capacity at the beginning of the design period and 18 days at the end of the design period.

   In addition, 4 days of emergency sludge storage capacity at design flows will be available at the Tapia Plant.

5. The storage tanks at Rancho Las Virgenes will be covered and equipped with forced ventilation and air scrubbing equipment to eliminate any odors that could be generated from long-term sludge storage. Contents of the storage tanks will be continuously circulated by pumping to prevent buildup of a scum layer. Storage tank overflows and drains will be piped directly into a sewer in Las Virgenes Road so that sludge can be returned to the Tapia Plant for reprocessing should any emergency arise. To provide 100 percent standby capacity for the sludge piping system from Tapia to Rancho Las Virgenes as well as for the sludge injection process, sludge dewatering facilities will be constructed at Tapia. During the wet season, or under any emergency conditions or equipment malfunctions, the sludge can be dewatered at Tapia and hauled to a legal disposal site as necessary.

6. Rancho Las Virgenes will have approximately 87 net acres available for sludge injection. The Rancho will be divided into 16 plots for sludge injection. Sludge will be injected about six inches below the ground surface, using a tractor and specially designed plow. After sludge has been applied to a plot, the soil will be tilled and crops will be planted. After the crops are harvested, the injection process will be repeated.

7. During the first year of operation the resulting sludge loading rate will be approximately 18 tons of dry solids per acre per year. During that design year of operation when the Tapia influent flow reaches 8 mgd, the resulting loading rate will be approximately 27 tons of dry solids per acre per year.

8. Groundwater monitoring and extraction wells will be constructed upstream and downstream of the injection area.

9. The entire site will be fenced to restrict public access.

10. A forage or cereal grain crop will be planted on each plot. The selection of a specific crop for each plot will be based on suitability for the area and adaptability to the sludge farming operation.

11. Reclaimed water from the Tapia Plant will be used to spray irrigate the crops. Water will be applied to meet the crops' requirements and will be measured as will the seasonal rainfalls.

12. Las Virgenes Municipal Water District discharges reclaimed wastewater on land under Order No. 74-381, adopted by this Board on November 18, 1974.

13. The sludge application site is located in Section 7, T1S, R17W, S.B.B.&M., within the Malibu Creek Hydrologic Subarea. Groundwaters in this subarea are beneficially used for limited agricultural water supply. There are no known water wells in the proximity of this site.

14. Surface drainage from the site would flow to Las Virgenes Creek which is tributary to Malibu Creek. Beneficial uses of Malibu Creek are: water contact recreation, non-contact water recreation, warm freshwater habitat, cold freshwater habitat, wildlife habitat, fish migration, and fish spawning. Surface runoff will be diverted around the sludge application areas.

15. The Board adopted a Water Quality Control Plan for Los Angeles River Basin (4B Basin Plan) on March 10, 1975. The Plan contains water quality objectives for the groundwater in Malibu Creek Hydrologic Subarea and Malibu Creek. The requirements contained in this Order as they are met will be in conformance with the goals of the Water Quality Control Plan.

16. An Environmental Impact Report (EIR) has been prepared for the Las Virgenes-Triunfo-Malibu-Topanga Areawide Facilities Plan in accordance with the California Environmental Quality Act. The EIR states that the disposal of solids to a sludge farm could cause localized odor and could cause a health hazard if runoff were to occur into the Malibu Creek System. The proposed installation of leachate control facilities would be able to intercept any leachate that may occur. Odors would be mitigated by proper storage and subsurface injection of sludge into the soil. The requirements established for this discharge will assure that there are no adverse water quality impacts upon the environment.

The Board has notified the discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for this discharge and has provided them with an opportunity to submit their written views and recommendations.

The Board in a public meeting heard and considered all comments pertaining to the discharge and to the tentative requirements.

IT IS HEREBY ORDERED, that Las Virgenes Municipal Water District, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, shall comply with the following:

A. Requirements for Discharge of Sewage Sludge

1. Sewage sludge discharged to land shall be limited to digested sewage sludge generated at the Tapia Plant only.
2. Sewage sludge shall be discharged only at the proposed site and only on land owned or controlled by the discharger.
3. Sludge shall be discharged only by injection below the surface of the soil, as proposed.
4. Erosion of deposited materials by surface flow shall be prevented.
5. No sludge injection area shall be closer than 100 feet to any water well, stream channel, ditch or other watercourse.
6. The discharger shall remove any wastes which are discharged at this site in violation of these requirements.
7. Sludge shall not be applied onto lands within 100 feet of any low-pressure water line from which domestic water is derived.
8. Storm runoff, except rain falling naturally on the site, shall be diverted around the operation, storage, and land application areas.
9. The injected sludge shall not be permitted to escape as surface flow from areas of application or to enter creeks, drainage ditches or watercourses.
10. The injected sludge shall not be permitted to pond, surface, or flow across the land application areas.
11. The application rate of sludge on each plot shall not exceed 30 dry tons per acre per year.
12. Reclaimed water shall be applied in quantities to meet the irrigation need of the crops only.
13. Storm diversion facilities and other safeguards such as groundwater monitoring system shall be constructed prior to sludge injection activities.

B. General Requirements

1. Neither the handling nor application of sludge shall cause pollution or nuisance.

2. The disposal of sludge shall not result in problems due to breeding of mosquitoes, gnats, midges, or other pests.

3. The disposal of sludge shall not impart tastes, odors, color, foaming, or other objectionable characteristics in receiving waters.

4. Odors of waste origin shall not cause a nuisance.

C. Provisions

Plans + Design Report to RWQCB — REQUA —

1. Prior to initiation of any full-scale injection operation, the discharger shall submit the 100 percent facility design report, including runoff and leachate control facilities and groundwater monitoring wells to this Board for the Executive Officer's review and approval.

2. A copy of these waste discharge specifications shall be maintained at the discharger's headquarters so as to be available at all times to operating personnel.

3. In the event of any change in name, ownership, or control of these waste disposal facilities, the discharger shall notify this Board of such change and shall notify the succeeding owner or operator of the existence of this Order by letter, copy of which shall be forwarded to the Board.

4. In accordance with Section 13267 of the California Water Code the discharger shall furnish, under penalty of perjury, technical reports on self monitoring work performed according to the detailed specifications contained in any Monitoring and Reporting Programs as directed by the Executive Officer, which specifications are subject to periodic revisions as may be warranted.

5. In accordance with Section 13260 of the California Water Code, the discharger shall file a report of any material change or proposed change in the character or location of the discharge.

6. The discharger shall notify this Board immediately by telephone of any adverse condition resulting from these waste discharges or from operations producing these waste discharges, such notifications to be affirmed in writing.

7. These requirements do not exempt the operator of this waste disposal facility from compliance with any other laws, regulations, or ordinances which may be applicable; they do not legalize this waste disposal facility, and they leave unaffected any further restraint on the disposal of wastes at this site which may be contained in other statutes or required by other agencies.

8. In accordance with Section 13263 of the Water Code, these requirements are subject to periodic review and revision by this Regional Board.

9. All wastes which do not meet each of the foregoing requirements shall be held in impervious containers, and if transferred elsewhere the final discharge shall be at a legal point of disposal, and in accordance with provisions of Division 7.5 of the Water Code. For the purpose of this requirement, a legal point of disposal is defined as one for which waste discharge requirements have been established by a California Regional Water Quality Control Board, and which is in full compliance thence.

I, Raymond M. Hertel, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Los Angeles Region, on June 25, 1979.

RMHertel

RAYMOND M. HERTEL, Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION
MONITORING AND REPORTING PROGRAM NO. 6430
FOR
LAS VIRGENES MUNICIPAL WATER DISTRICT
(Rancho Las Virgenes)
(File No. 78-26)

The discharger shall implement this monitoring program at the commencement of discharge. Monitoring reports shall be submitted to this Board monthly by the first day of the second following month, beginning with the month subsequent to the commencement of discharge.

GROUNDWATER MONITORING

The discharger shall establish suitable and accessible water well(s) down-gradient from the site used as a receiving water monitoring station. In addition to the above, at least one control well shall be established upstream from the site. The selected wells are subject to the approval of the Executive Officer as required in Provision No. C1.

The following shall constitute the groundwater monitoring program:

Parameter	Units	Frequency
Water elevation	feet (above sea level)	monthly
Total dissolved solids	mg/l	quarterly
Chloride	mg/l	quarterly
Sulfate	mg/l	quarterly
pH	pH units	quarterly
Nitrate nitrogen	mg/l	quarterly
Total nitrogen	mg/l	quarterly
Chemical oxygen demand	mg/l	quarterly
Lead	mg/l	quarterly
Cadmium	mg/l	quarterly
Total chromium	mg/l	quarterly
Copper	mg/l	semiannually
Nickel	mg/l	semiannually
Zinc	mg/l	quarterly
Color	----	quarterly

Set number of wells to be monitored as one at head of Central Canyon as control and two more downstream of North & Central Canyons 3 wells total.

Quarterly composite sludge samples shall be collected and analyzed fo the following parameters:

Parameters	Units
Total solids content	%
Volatile solids content	%
pH	pH unit
Total dissolved solids	mg/l
Ammonia nitrogen	mg/kg
Total nitrogen	mg/kg
Zinc	mg/kg
Cadmium	mg/kg
Copper	mg/kg
Total chromium	mg/kg
Lead	mg/kg
Nickel	mg/kg
PCB	mg/kg (annually)

Crop Analysis

The plant uptake of cadmium and zinc in plant tissues for each crop shall also be determined after crop harvesting.

Soil Analysis

A soil sampling grid shall be established for this site and the sampl points shall be located where representative soil samples can be obta Composite soil samples shall be collected from active plots and analy annually for the following parameters:

Parameter	Units
pH	pH unit
Cation exchange capacity	(me/100g)
Zinc	mg/kg
Cadmium	mg/kg
PCB	mg/kg
Copper	mg/kg
Lead	mg/kg
Nickel	mg/kg
Total chromium	mg/kg
Total nitrogen	mg/kg

Site Observation

Sludge injection areas shall be inspected on weekly basis for observation of sludge runoff or ponding. The results of these observations shall be reported to the Board during the reporting period.

set up an observation form similiar to Malibu Creek's observa to be submitted monthly

Each monitoring report must affirm in writing that:

All analyses were conducted at a laboratory certified for such analyses by the State Department of Health and in accordance with current EPA guideline procedures or as specified in the Monitoring Program.

For any analysis for which no procedure is specified in the EPA guidelines or in this Monitoring Program, the constituent or paramete analyzed and the method or procedure used must be specified in the report.

Reporting

Each report shall contain the following information with respect to the reporting period:

1. Volume of sludge disposed of during each day and the total volume disposed of during the reporting period and the percent of solid content in injected sludge. we nee of sludge
2. Sludge application rate during the reporting period, in dry tons per year.
3. The analytical results of sampling programs, as required.
4. A scaled map showing the areas of the site where the above wastes were applied during the reporting period, including the quantity (gallons per acre per day) applied per each area. we need 8½ map showing
5. A certification that all wastes deposited were in compliance with the Board's requirements and that no wastes were deposited outside of the boundaries of the site, as specified in the Board's requirements.
6. Quantities of reclaimed irrigation water applied on the plots during the reporting period, in inches per month. meters for each plot
7. Site observation report.

As this monitoring program continues, the results may indicate after two-year period that certain parameters need not to be monitored and they could be dropped. The Staff will then revise this monitoring program as appropriate.

GENERAL PROVISIONS FOR SAMPLING AND ANALYSIS

All sampling, sample preservation, and analyses shall be performed in accordance with the latest edition of "Guidelines Establishing Test Procedures for Analysis of Pollutants", promulgated by the United States Environmental Protection Agency.

All chemical analyses shall be conducted at a laboratory certified for such analyses by the State Department of Health Services.

The discharger shall calibrate and perform maintenance procedures on all monitoring instruments and equipment to insure accuracy of measurements, or shall insure that both activities will be conducted.

A grab sample is defined as an individual sample collected in fewer than 15 minutes.

GENERAL PROVISIONS FOR REPORTING

For every item where the requirements are not met, the discharger shall submit a statement of the actions undertaken or proposed which will bring the discharge into full compliance with requirements at the earliest time and submit a timetable for correction.

The discharger shall maintain all sampling and analytical results, including strip charts; date, exact place, and time of sampling; date analyses were performed; analyst's name; analytical techniques used; and results of all analyses. Such records shall be retained for a minimum of three years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge or when requested by the Board.

In reporting the monitoring data, the discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized to demonstrate compliance with waste discharge requirements.

Each report shall contain the following completed declaration:

"I declare under penalty of perjury that the foregoing is true and correct.

Executed on the ________ day of ____________ at ________________.

______________________ (Signature)

______________________ (Title)"

Ordered by R M Hertel
Executive Officer

JUN 2 5 1979
Date

Responses to Comments from the Las Virgenes Municipal Water District

13-1. The Santa Monica Mountains Zone is a designated exclusion area in the proposed GO. Therefore, the GO would not be applicable to biosolids application projects in that location, but individual waste discharge requirements may be required as deemed necessary by the RWQCB. See Master Response 2 for more information about how the proposed GO would affect existing programs.

13-2. The subject operation will not be permitted under the proposed GO. The Santa Monica Mountain Zone is exempt from the proposed GO because it is designated as an area requiring special consideration in the Public Resources Code. However, the subject operation should not be viewed as prohibited solely because it is in an area that is excluded from coverage by the proposed GO. The proposed GO excluded the Santa Monica Mountain Zone and other similar areas because it is believed that the necessary special consideration could not be adequately addressed. Individual waste discharge requirements, however, may be needed for these projects. Also see Response to Comment 8-6.

13-3. The commenter writes about the already-operating land application program in the Santa Monica Mountains Zone. SWRCB staff recognizes that a well-managed reuse operation can extend the useful life of an individual site. It is also acknowledged that a long-term soil management plan should consider application rates, uptake by plants, and soil residuals. The proposed GO is a program-level regulation and, as such, deals with application rates and initial soil concentrations. The small amounts of uptake or removal are not considered at this program level.

13-4. The commenter criticizes the method for calculating the cumulative loading rate, as it only considers metals that are native to soils or are imported with biosolids. It fails to consider any metals that may be removed from a site by crop harvest.

This is a potentially valid criticism of one aspect of the Part 503 regulations. Because the proposed GO adopts these, the commenter is critical of the cumulative loading limits of the proposed GO. The analysis also does not consider the potentially small fraction removed as surface runoff, or with percolating groundwater, or possible additions with fertilizer salts or manure. Failure to consider these low-level losses makes the soil cumulative loading estimates more conservative with respect to actual metals accumulation following long-term biosolids application. As a practical matter, it is likely that only a relatively small portion of the total metals load applied to a land area is actually removed by the harvested portions of the crop, or with the soil-water system in most agricultural soils; a large proportion of the metals will remain bound to soil particles and will not be very mobile in the soil environment for potential uptake by plants or loss in the hydrologic cycle.

Obtaining valid data for the portion of the metals load removed by the crop (or with water discharge) would be difficult and potentially costly to determine, as the crop would need to be statistically sampled and accurate records on yield obtained and reported. The crop may be more variable in terms of metals composition than the well-mixed biosolids. Additions from fertilizers and losses in surface water runoff and through any groundwater discharge would also have to be tracked and recorded if a comprehensive analysis is to be made.

Cumulative loading calculations that consider all input, residual and export pathways would be much more complex than is proposed in the proposed GO or in the Part 503 regulations, and would approach completion of a sophisticated mass balance analysis. This would make the regulatory system more difficult to standardize and track results, and evaluate, and much less user-friendly.

For the proposed GO to factor in metals removal by crops and other input and output sources, the entire risk assessment completed by the EPA would have to be revised and redone by the State and a new cumulative loading approach would have to be developed. SWRCB staff feels the present approach provides an additional conservative safeguard to the issue of the presence of metals in biosolids amended soils.

13-5. See Response to Comment 13-2.

13-6. Implementation of the proposed GO would not preclude the Las Virgenes Municipal Water District from applying for an individual permit. See Responses to Comments 8-6 and 13-2, and Master Response 2.

13-7. The commenter supports the proposed GO's monitoring requirements and the continued use of Class B biosolids. No response is necessary.

13-8. Comment noted. The text of the proposed GO, as found in Finding No. 1 of Appendix A, is amended to read as follows:

> This General Order . . . discharges, <u>but may not be appropriate for all sites using biosolids due to particular site specific conditions or locations. Such sites are not precluded from being issued individual waste discharger requirements.</u>

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September 8, 1999

State Water Resources Control Board
Division of Water Quality
P. O. Box 944213
Sacramento, CA 94244-2130

Attention: Todd Thompson

RE: COMMENTS-DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE GENERAL WASTE DISCHARGE REQUIREMENTS FOR BIOSOLIDS LAND APPLICATION

The City of Los Angeles, Bureau of Sanitation appreciates the opportunity to comment on the Draft Environmental Impact Report (DEIR) for the general waste discharge requirements for biosolids land application. The City fully supports your agency's efforts to develop a General Order (GO) for biosolids land application .

The City commends the State Water Resources Control Board (SWRCB) for its efforts in developing a DEIR that will continue the land application of biosolids while addressing potential impacts to public health and the environment. The use of the U.S. EPA regulations (40 CFR Part 503) demonstrates that the SWRCB is committed to developing a DEIR based on sound science. 14-1

I am enclosing with this letter a table of specific comments that apply to sections of the DEIR. I have listed below several general comments related to the entire document.

The DEIR and the GO should incorporate U. S. EPA's recently completed phase one 14-2 amendments (64 FR 42552) to the Part 503 regulations. The terminology used throughout the DEIR and the GO should be consistent, such as the use of the terms applier and discharger. The DEIR and the GO should be consistent with the metals that are regulated under the Part 503, such as chromium and molybdenum. 14-3

If you have any questions, please call me at the number listed above or Diane Gilbert of my staff at (310) 648-5248.

Sincerely,

Raymond J. Kearney
Division Manager

RJK:dxg

Enclosures

c: V. Varsh
J. Wilson

SWRCB DEIR
City of Los Angeles comments
September 8, 1999
Page 1

Notes: Comments show deletions of text with ~~strikeout~~ and additions to the text in *italics:*

SWRCB DEIR—— June 28, 1999					
#	PG	SECTION	¶	COMMENT	
1	ES-6	General Order Program Objectives	1	The GO is based on compliance with section 13274 of the California Water Code, which requires the issuance of WDRs for projects that may affect the waters of the state. How does this section of the Water Code affect the renewal of existing biosolids sites permitted under specific WDRs? Will the existing sites be unaffected by the GO, or have to comply with the GO and if so what will be the established time frame for compliance?	14-4
2	ES-6	Applicability	2	The term applier and discharger appear to be interchangeable. The word discharger is used throughout the GO but not defined in the findings section of the GO, where the word applier is defined. In the pre-application report, the term applier is used. Please define discharger in the GO and use it throughout the document and remove applier from the findings section or use applier throughout the document.	14-5
3	ES-6	Applicability	3	A permitted site under a single NOI cannot be more than 2000 acres and the sites must be within a 20-mile radius. What is the basis for limiting the acreage of a single site? Some landowners may have a site larger that 2000 acres. How would the site be divided and what guidelines would the landowner use to determine and develop an NOI for the sites larger than 2000 acres but in the same location?	14-6
4	ES-6	Applicability	3	The GO does not preempt or supersede the authority of local agencies. This statement should be removed from the DEIR and the GO. The GO should require local authorities to provide peer reviewed scientific evidence before allowing them to prohibit, restrict, or control biosolids use beyond the provisions of the GO. Only where health and safety concerns related to specific conditions within a local jurisdiction can be proven should they be permitted to prohibit or further restrict the use of biosolids.	14-7
5	ES-7	Requirements of the GO to part 503 regulations	3	What is the scientific basis for regulating ten metals when the U. S. EPA only regulates nine metals under the Part 503 regulations? The DEIR and GO should be consistent with the Part 503 rule. If chromium is being regulated, what is the scientific basis for the limit as set forth in the GO?	14-8
6	ES-10	Storage and Transportation	1	The definition of storage in this section is different from the definition in the GO. This section defines storage as more than 7 consecutive days whereas the GO defines it as more than 48 hours. Storage should be for more than 7 consecutive days.	14-9
7	2-8	Comply with California Water Code and Judicial Code	1	See comment 1	
8	2-10	Applicability	2	See comment 2	
9	2-10	Applicability	3	See comment 3	
10	2-10	Applicability	3	See comment 4	
11	2-12	Requirements of the GO to part 503 regulations	3	See comment 5	
12	2-14	Storage and Transportation	1	See comment 6	

SWRCB DEIR
City of Los Angeles comments
September 8, 1999
Page 2

SWRCB DEIR—— June 28, 1999					
#	PG	SECTION	¶	COMMENT	
13		Table 2-4		Delete chromium from the table. It is not regulated by the Part 503 regulations. It was removed from the Part 503 regulations in October 1995 (64 FR 54764).	14-10
14	—	Table 2-5		Remove molybdenum from the cumulative loading table. The limits for molybdenum were stayed from the Part 503 rule in February 1994 pending further EPA evaluation. What is the scientific basis for selecting the limits?	14-11
15	10-6	Thresholds of Significance	2	This paragraph identifies air districts where biosolids are applied in the greatest volume. When determining the impact for generation of NOx and PM10 and limiting vehicle miles traveled (VMT) per day to 4800, was this number determined for a particular air districts, per site in a particular air district or total of all trucks for all agencies or per agency that transport biosolids in a particular air district?	14-12
16	10-7	Mitigation Measure 10-1	1	Limiting vehicle travel to 4800 vehicle miles traveled (VMT) per day for biosolids trucks would increase vehicle emissions for the City of Los Angeles by 67 percent. The City's biosolids vehicles currently travel 9,000 VMT per day. To comply with this requirement the City of Los Angeles would have to divert one-half of it biosolids to a landfill in Arizona. Doing this would increase travel to 15, 000 VMT per day and vehicle emissions by 67 percent. Landfilling of biosolids would also impact California's AB 939mandate to decrease by fifty percent the amount of material being landfilled by year the 2000. This impact should be re-evaluated to determine if limiting truck travel to 4800 VMT per day is actually reducing emissions or creating more emissions and creating other environmental impacts.	14-13
17	10-8	Mitigation Measure 10-2	1	Does this mitigation measure apply to biosolids spreaders and other equipment used on the sites? The equipment will create dust. The mitigation only addressed truck travel but the impact statement included biosolids spreaders. What about the impact of emissions from other farming vehicles?	14-14

Appendix A: Draft Text of General Order—— June 28, 1999					
#	Pg.	SECTION	¶	COMMENT	
18	1	Findings	1b	All Exceptional Quality (EQ) biosolids-derived mixtures consisting of more than or equal to 50 percent biosolids (dry weight) applied at more than 10 dry tons per acre per year *for use as a soil amendment* to continuous fields.... This phase is missing from 1b and included in 1c.	14-15
19	2	Findings	3d	See comment 2	
20	5	Findings	3ag	Short-term storage: Biosolids storage sites used as a temporary holding facility for less than *or equal* to 7 days. The definition of long-term storage facility in 3t is more than 7 days, so short-term storage should include 7 days.	14-16
21	9	Findings	15	This General Order shall primarily apply to the ~~landowner~~ *discharger or applier* of the sites using biosolids.... The executive summary stated that the GO applies to the discharger and this section states the landowner. Delete the word landowner and replace with discharger or applier. (See comment 2)	14-17
22	10	Findings	16	See comment 3	
23	10	Findings	17	See comment 4	
24	13	Prohibitions	A4	Are municipalities exempt from the Safe Water Drinking Water and Toxic Enforcement Act. How does this act apply to municipalities who generate biosolids?	14-18
25	14	Prohibitions	A12	See comment 13	
26	15	Discharge Specifications	B4	The statement including background soil metals and metal additions from biosolids was included in this specification. Peer reviewed data and analysis performed during the risk assessment for the Part 503 regulations took into account background soil median metals concentration throughout the United States. What scientific data does the SWRCB have to support this statement?	14-19
27	15	Discharge Specifications	B4	See comment 14	
28	16	Discharge Specifications	B7b 1(c)	Animals are grazed for at least 30 days. Based upon the mitigation measures 4-2 and 5-2 this timeframe will be changed to 90 days with some conditions for 60 days if temperature requirements are met. What is the scientific basis for changing the grazing times. Comments in Chapter 4 and 5 support the risk assessment provided in the Part 503 that indicates there is little potential for pathogens to be transmitted to animals if grazed on sites applied with biosolids. See amendments to Part 503 (64 FR 42552) regarding intentional grazing versus unintentional grazing.	14-20
29	17	Discharge Specifications	B8	The setbacks determined in this section should be consistent with other regulatory limits and the CWEA Manual of Good Practice for the Agriculture Land Application of Biosolids.	14-21
30	18	Biosolids Storage and Transportation Specifications	1	See comment 6	
31	20	Provisions	D7	The discharger shall be responsible for informing all biosolids transporters and growers using the site of the conditions contained in this general order. Who does grower in this statement refer to? A definition for grower should be included in the findings section.	14-22

Appendix A: Draft Text of General Order —— June 28, 1999					
#	Pg.	SECTION	¶	COMMENT	
32	22	Provisions	D17	The statement that the discharger should notify the Office of Emergency Services if there is any noncompliance which may endanger human health or the environment should not be the responsibility of the discharger. The discharger is not qualified to make that type of assessment. The Regional Board should advise the discharger that human health or the environment may be endangered and inform the discharger to notify the Office of Emergency Services or the Regional Board makes the notifications.	14-23

Pre-Application Report — June 28, 1999				
#	Pg.	SECTION	¶	COMMENT
33		Pre-Application Report	1	Site location/~~Applier~~ *Discharger* This section should be changed to be consistent with the GO terminology or the GO should be changed to use Applier as defined in the finding section.
34		Pre-Application Report	1	The work Applier in the table should be changed to Discharger or Applier should be used throughout the GO.
35		Pre-Application Report	3	See comment 13 and 14
36		Annual Reporting	3	See comment 13 and 14
37		Annual Reporting	4	See comment 13 and 14

14-24

14-25

14-1. The commenter supports the analytical approach used in the draft EIR. No response is necessary.

14-2. The SWRCB is following EPA's process of amending the Part 503 regulations, but these changes are not being automatically incorporated into the proposed GO. Many of the EPA proposed changes are in a review stage and have not been adopted as final rules. SWRCB staff will incorporate changes as they are deemed necessary to protect water quality and public health.

14-3. Since the proposed GO is potentially applicable to several different entities, the titles of groups of people is important and should be used in a concise and consistent manner. Discharger refers to the entity issued and required to comply with the proposed GO. As such, the discharger could be any entity listed on the GO's Notice of Applicability, but in all cases will include the landowner and the generator. See Master Response 4 regarding metals limits.

14-4. See Master Response 2.

14-5. In all cases, the landowner and the generator will be the discharger, sometimes in conjunction with other entities. All aspects of compliance remain with the discharger, including activities usually associated with the applier. As such, use of the term "discharger" may appear confusing. Also see Response to Comment 14-3.

14-6. See Master Response 3.

14-7. Such actions (pre-empting of local ordinances) is beyond the authority of the SWRCB. Accordingly, the subject language is accurate and shall remain in the proposed GO. Also see Response to Comment 23-4.

14-8. See Master Response 4.

14-9. Short-term storage is defined in the proposed GO as less than 7 days; long-term storage is defined as holding biosolids on site for more than 7 days. Staging is defined in the proposed GO as less than 48 hours. Holding biosolids on site can create nuisances and impact the aesthetic value of the surrounding environment. The text of the proposed GO, as found in Finding No. 3(aj). of Appendix A, is amended to read as follows:

> Biosolids storage sites used as a temporary holding facility for less than or equal to ~~7~~ seven days.

The text on page ES-10, last paragraph, third sentence of the draft EIR is revised as follows:

> The proposed GO defines short-term...for ~~more than~~ longer than 48 hours but less than . . .

14-10. See Master Response 4.

14-11. See Master Response 4.

14-12. See Master Response 5.

14-13. See Master Response 5.

14-14. See Master Response 5.

14-15. Comment noted. The text of the proposed GO, as found in Finding No. 1(b). of Appendix A, is amended to read:

> All Exceptional . . . 10 dry tons per acre per year for use as a soil amendment to continuous fields . . .

14-16. Comment noted. The text of the proposed GO, as found in Finding No. 3(aj). of Appendix A, is amended to read:

> Biosolids storage sites used as a temporary holding facility for less than or equal to ~~7~~ seven days.

14-17. The primary entity permitted under this proposed GO will be the landowner and the generator. The landowner is the primary entity responsible for operations allowed on properties and the condition of the properties. The generator is also primarily responsible as the entity required to comply with federal regulations.

14-18. The Safe Drinking Water and Toxic Enforcement Act applies to any entity that discharges into a source of drinking water any chemicals known to the State to cause cancer or reproductive toxicity. It applies with or without being specified in the proposed GO. As such, the proposed GO only brings attention to that law.

14-19. Incorporating soil background is consistent with the risk assessment. On page 117 of "A Guide to the Biosolids Risk Assessment for the EPA Part 503 Rule," the EPA identifies the "Risk Assessment Acceptable Soil Concentration" for pollutants in biosolids. California has unique geology and therefore has unique soils. For example, some soils in the Salinas Valley contain higher-than-average cadmium levels. Also, soils in the Central San Joaquin Valley contain molybdenum. As such, the proposed GO attempts to equate these inequities to account for California conditions. Use of background soils concentrations is discussed in more detail in the proposed GO. Specific requirements addressing background soils is explicitly stated. See Discharge Specification No. 5 in the proposed GO (Appendix A).

14-20. See Master Response 7 and Master Response 8.

14-21. See Master Response 3.

14-22. The text of the proposed GO, as found in Finding No. 3 of Appendix A, is amended to add the definition of "grower" as follows:

> o. Grower: Person or entity primarily responsible for planting, maintaining and harvesting or allowing the use of crops and/or range land for domestic animal or human use.

14-23. In conjunction with the proposed GO, the discharger, by obtaining the requirements, is made aware of the potential adverse health effects when using biosolids in a manner which is not compatible with the General Order. Although not every violation may constitute an eminent threat to human health, the discharger can make a determination that such is the case if it is believed necessary to ensure compliance with this requirement. SWRCB staff believes that the discharger should immediately notify the State Office of Emergency Services if a significant health threat has been created.

14-24. The Pre-Application Report has been modified to include a separate location to report the Applier, if applicable.

14-25. See Response to Comment 7-3.

RESOURCE MANAGEMENT AGENCY

county of ventura

Environmental Health Division
Donald W. Koepp
Director

September 8, 1999

Todd Thompson
Division of Water Quality
State Water Resources Control Board
901 P Street
Sacramento, CA 95814

DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR) - GENERAL WASTE DISCHARGE REQUIREMENTS FOR BIOSOLIDS LAND APPLICATION

The Environmental Health Division, as Local Enforcement Agency, reviewed the subject DEIR, and provides the following comments:

- Appendix E, page E-27 states that "...current green waste composting regulations require a setback of at least 300 feet...unless a variance is granted from the local enforcement agency." Also, Chapter 5 (Public Health), page 5-14 states that "...setbacks...have been placed on [compost projects]...by the California Integrated Waste Management Board."

  The 300-foot setback standard referenced in Appendix E was formerly found in Title 14, California Code of Regulations (CCR), Section 17859. Section 17859 was amended by the California Integrated Waste Management Board in approximately 1995, and the 300-foot setback standard was removed at that time. Currently, Title 14 CCR does not provide prescriptive setback standards applicable to composting activities. 15-1

- Chapter 5 (Public Health) and Appendix E discuss potential public health risk associated with compost bioaerosol(s), with particular emphasis upon Aspergillus fumigatus in Appendix E. The California Department of Health Services (DHS), Environmental Health Investigations Branch, recently released a report on compost bioaerosols entitled "Bioaerosols and Green-Waste Composting in California," dated June 1999. 15-2

To insure that the DEIR contains the most up-to-date information, and to insure that the DEIR is consistent with information provided by DHS on this issue, the compost bioaerosol information presented in the DEIR should be reviewed for consistency with the DHS report, and amended as necessary to achieve consistency. 15-2 (cont)

If you have any questions, please call Darrell Siegrist at 805/654-5038.

Terrence Gilday

TERRENCE O. GILDAY, MANAGER
SOLID WASTE SECTION
ENVIRONMENTAL HEALTH DIVISION

TOG/sg/gilday/bioslcom.doc

c: Melinda Talent, Land Use Section, EHD
Darrell Siegrist, EHD/LEA

Responses to Comments from the Ventura County Resources Management Agency

15-1. This comment refers to Appendix E of the draft EIR, page E-27, regarding setback requirements which have been amended for composting facilities. Page E-27, paragraph 2 is amended as follows:

> The California Integrated Waste Management Board's current green waste composting regulations ~~require a setback of at least 300 feet of the facility's active compost materials areas from any residence, school, or hospital, excluding onsite residences, unless a variance is granted from the local enforcement agency.~~ included in Title 14 of the CCR does not provide prescriptive setback standards applicable to composting activities. A Local Enforcement Agency can establish requirements for any new facility that can mitigate potential impacts to public health based on the local conditions including such factors as ~~More stringent requirements can be applied where there are~~ sensitive receptors; high winds; or other factors related to health risks, such as the health status of the community potentially affected.

Addition of this information does not change the previous conclusions regarding impacts to public health or change any proposed mitigation measures.

15-2. The June 1999 report was obtained and reviewed. The report entitled "Bioaerosols and Green-Waste Composting in California" reviewed what is known about aerosols from composting operations. The focus was on green waste and did not address biosolids in particular, but noted the importance of considering the feedstock materials being composted. The report confirmed the draft EIR's findings that there did not appear to be an increased risk to healthy populations from exposure to Aspergillus fumigatus from composting operations. It did indicate that workers needed to be protected and that studies are needed to assess the impacts of bioaerosols on communities downwind from composting sites.

EAST BAY MUNICIPAL UTILITY DISTRICT

DAVID R. WILLIAMS
DIRECTOR OF WASTEWATER

September 9, 1999

State Water Resources Control Board
Division of Water Quality
P. O. Box 944213
Sacramento, CA 94244-2130

Attention: Todd Thompson

SUBJECT: Comments On The Draft Environment Impact Report For The General Waste Discharge Requirements For Biosolids Land Application (DEIR-GWDRFBLA) Including The General Order (GO)

The East Bay Municipal Utility District (EBMUD), serving 1.2 million people in the Oakland area, appreciates the opportunity to comment on the Draft Environmental Impact Report (DEIR) for the general waste discharge requirements for biosolids land application. EBMUD supports your agency's efforts to develop a General Order (GO) for biosolids land application.

EBMUD commends the State Water Resources Control Board (SWRCB) for it efforts in developing a DEIR that will continue the land application of biosolids while addressing impacts to public health and the environment. The use of the U.S. EPA regulations 40 CFR part 503 demonstrates that the SWRCB is basically committed to developing an EIR based on sound science.

Since 1983, EBMUD has fostered the reuse of biosolids in a beneficial manner. Initially, EBMUD operated an EPA award-winning biosolids compost operation that recycled over 200,000 tons of biosolids as a very successful compost product. In 1995, EBMUD began agricultural land application of biosolids that has resulted in 100% beneficial reuse of biosolids.

EBMUD's general comments are included below. Specific comments of a technical nature that apply to sections of the GO are listed in Attachment A.

Increased Costs

EBMUD is concerned that the overall effect of the GWDRFBLA, as drafted, will be to increase land application costs to the point where landfill disposal may be more attractive than beneficial reuse; this is a counterproductive result from our viewpoint.

16-1

Costs will be increased by the increased level of testing, the continual payment of fees even if a field is left fallow, imposition of requirements beyond the 40CFR503 requirements, multiple Notices of Intent (NOI) for plots of land in excess of 2000 contiguous acres, no releases of

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particulates from a site during application or incorporation of biosolids, special site assessments, and extended grazing restrictions. Individually, any one measure may seem less than significant and relatively inexpensive to adopt, but collectively, all of the measures mentioned will add up to drive land application costs to the point where landfill disposal will likely be more economically feasible. Land application costs are already beginning to exceed landfilling costs in the State of California, and our own current contract procurement for biosolids handling includes the option for landfill disposal due to known/expected cost increases in land application of biosolids. 16-1 (cont)

The SWRCB should review every requirement against the measure of whether or not it is necessary to protect public health and the environment, to avoid fueling the current trend of spiraling land application costs in the State. Alameda County, the county in which EBMUD operates, is already basically surrounded by counties that ban or restrict the land application of biosolids at the local level. More restrictive regulation at the state level could work to force EBMUD to landfill, rather than reuse, biosolids. 16-2

Manual of Good Practice

Many public and private expert practicioners have worked hard to prepare *the California Water Environment Association Manual of Good Practice* for land application of biosolids. This document includes plans and standardized forms that could be used in the management and administration of the general WDR program. Mitigation measure 5-1 recommends the review of the manual, which we support. 16-3

Consistency of Terms

The term applier and discharger appear to be interchangeable. The word discharger is used throughout the DEIR but not defined in the finding section of the GO. In the finding section, the word applier is defined. In the pre-application report, the term applier is used. We suggest that one term be defined and used throughout the document. 16-4

Metals

The scientific basis for regulating ten metals is unclear, since the U. S. EPA currently regulates eight metals under the part 503 regulations. The scientific bases for the limits as set forth in the GO for chromium and molybdenum need to be demonstrated before these two additional metals are regulated. 16-5

The copper and lead ceiling concentration limits have been reduced in the GO, also without establishing scientific bases for the reduction. 16-6

Since the SWRCB is committed to developing a DEIR based on sound science, then there must be a valid scientific basis for more stringent metal requirements. 16-7

The U. S. EPA has completed phase one amendments of round one for the 40CFR503 regulations. SWRCB should incorporate the necessary changes to the part 503 regulations into the DEIR. 16-8

The DEIR states that ten metals are being regulated instead of eight metals as per the 40CFR503 regulations. Chromium is not regulated by the U. S. EPA as being a pollutant that affects biosolids land application. The limits for chromium were deleted from the 40CFR503 rule in October 1995 in Federal Register volume 60 number 206. The limits for molybdenum have been deleted from the part 40CFR503 rule pending EPA considerations. SWRCB should delete molybdenum limits from the cumulative loading requirements or provide a scientific analysis for using the limits stated in the DEIR. 16-9

The Draft Environmental Impact Report

The SWRCB has done a fine job preparing this draft program EIR. Nine environmental and public health issues were considered and no impacts were identified which could not be avoided or mitigated. Forty-nine potential impacts were considered and 28 were found to be less-than-significant, 14 potentially significant, and 10 significant. These findings are consistent with the work done at the federal level in the preparation of 40CFR503.

EBMUD strongly supports the SWRCB in their effort to prepare a statewide, unified approach to regulation of the land application of biosolids, including streamlined permit review with CEQA documentation. Most of the mitigation measures proposed in the draft EIR appear to be generally reasonable. Most significant and potentially significant impacts are mitigated by use of a comprehensive pre-application report, which we support. 16-10

However, the mitigation measures to control fugitive dust from unpaved roads and the extended grazing restriction periods do not seem reasonable or substantiated, and will cause operational costs to increase, perhaps significantly. 16-11

To the extent that agricultural biosolids land application sites are near residential areas, recreational areas, schools, hospitals, recreational and public assembly areas, controlling fugitive dust may be appropriate, but to require this measure for all biosolids land application sites seems inappropriate and unnecessary. Other farming operations in California are not subject to this type of restriction, and therefore, why should farming operations using biosolids be "singled out"? This mitigation measure should be qualified only to actual instances where residential areas, recreational areas, schools, hospitals, recreational and public assembly areas are in close proximity. 16-12

Extended grazing restriction periods will reduce the time that a rancher can productively use land, which may have significant economic impact on ranching operations, thereby reducing ranching interest in using biosolids for crop production. The effect would be the reduction of available land for biosolids land application, which will indirectly increase costs. This mitigation measure appears to be based on one study done by the Cornell Waste Management Institute in 1997. The SWRCB acknowledges that the combination of circumstances that could 16-13

lead to toxicity in grazing animals in California is only remotely possible. This mitigation measure should therefore be relaxed until more data related to the issue is considered. In addition, the SWRCB should lend more weight to the positive effects that biosolids have on the quality of feed produced along with other beneficial factors, and weigh those factors against the unlikely, rare effect of reduced grazing animal health. 16-13 (cont)

In Closing

The SWRCB is to be commended for its work on the Biosolids Land Application EIR. Hopefully, biosolids land application on a large scale will remain a viable way to recycle valuable nutrients back to the land from whence it came. EBMUD would like to see more emphasis in the EIR on the positive aspects of using biosolids and is pleased to see that the commercial sale of bagged biosolids products for small scale uses in horticulture will not be governed by the GO. 16-14

Sincerely,

for DRW

DAVID R. WILLIAMS
Director of Wastewater

DRW:HWL:cih

Attachment

W:\Planning\Biosolids\DEIR-comments.doc

Attachment A

Comments on

GENERAL WASTE DISCHARGE REQUIREMENTS FOR THE DISCHARGE OF BIOSOLIDS TO LAND FOR USE AS A SOIL AMENDMENT IN AGRICULTURAL, SILVICULTURAL, HORTICULTURAL, AND LAND RECLAMATION ACTIVITIES

OTHERWISE KNOWN AS THE GENERAL ORDER (GO) 6/99 DRAFT

Comment #	Section	¶	Comment	
1	Findings	1.a	Modify to exclude all EQ biosolids that can be classified as a "Fertilizing Material" per 3.I. This type material would be used for fertilizing properties rather than soil amending properties, and is otherwise regulated.	16-15
2	Findings	1.b	All Exceptional Quality (EQ) biosolids-derived mixtures consisting of more than or equal to 50 percent biosolids (dry weight) applied at more than 10 dry tons per acre per year *for use as a soil amendment* to continuous fields…. This phase is missing from 1b and included in 1c.	16-16
3	Findings	1.c	Modify to exclude all EQ biosolids-derived products consisting of 20 percent or less biosolids (dry weight) from the GO. This exclusion would work to foster the preparation of commercial type products. The GO should prescribe some methodology to be used to measure the biosolids dry weight component.	16-17
4	Findings	3.n	The definition of "High Potential for Public Exposure Areas" seems ambiguous. The definition should describe the type of land frequented by the public, such as a park or a camping area. Distance may not correlate with extent of public use.	16-18
5	Findings	3.q	The definition of "Low Potential for Public Exposure Areas" seems ambiguous. The definition should describe the type of land not frequented by the public, such as a farm. Distance may not correlate with extent of public nonuse.	16-19
6	Findings	3.t	The length of time allocated to "Long-term Storage" seems particularly short! EQ biosolids derived materials, like compost, can be stored for lengthy periods of time without detriment to the environment.	16-20
			The definition of "long-term" should be modified to pertain to pure semi-solid biosolids, such as digested dewatered cake, liquid sludge, etc., and exclude compost type materials. Paragraph 20 would also need to be modified, such that a separate WDR is not required for compost type materials.	16-21
7	Findings	10	The use of fecal coliform, and not salmonella, to determine Class A pathogen level has been included in the GO. 40CFR503 allows for fecal coliform or salmonella. Class A status must be determined at the time of usage (pg. ES-7) The salmonella test should be allowed in the GO, as does 40CFR503, or use a log reduction measure. Most fecal coliforms are not pathogens. Fecal coliform are ubiquitious in the environment, and could regrow in a biosolids material that was Class A at a production facility. Fecal coliforms are only indicators. A 1000 MPN fecal coliform indicates about a 6 or 7 log Reduction, which is very difficult to maintain since fecal coliform are everywhere in nature. A 4 or 5 log reduction would indicate a 99.99+% reduction in coliform which is more reasonable.	16-22
8	Findings	15	The GO should be primarily directed to the "applier" of biosolids who physically places the biosolids on the land, rather than the landowner. A landowner may be absent or not directly manage the day-to-day operations of a farm or other type land application site. The applier should be required to get certificates of compliance from other involved parties.	16-23
9	Findings	16	What is the basis for the maximum size of 2000 net acres per NOI? Land application operations can involve parcels sizes much larger than 2000 contiguous net acres. This appears to be merely a way to generate fees. The effect of this provision will be to increase costs unnecessarily. The size of the project should be the actual size of the contiguous net acres available, rather than an arbitrary number of acres.	16-24
10	Findings	16	Filing fees apply annually until the project is terminated.	↓16-25

Comment #	Section	¶	Comment	
			whether or not the land is actually used for land application. The provision should be made that fees are due in any year in which biosolids are applied. This would reduce costs for land application operations during fallow years.	16-25 (cont)
11	Prohibitions	12	Chromium has been added to the metal pollutants concentration limits. What is the scientific basis? The chromium ceiling concentration limit was originally in the Part 503 regulations but was remanded by the court because data does not support the regulation of chromium. Delete chromium from the list.	16-26
12	Prohibitions	12	What is the basis for lowering the ceiling concentrations for copper from 4300 mg/kg to 2500 mg/kg, and for lead from 840 mg/kg to 350 mg/kg? This GO is based on 40CFR503, a risk based scientifically derived rule. This concentration change seems subjective, and without basis.	16-27
13	Prohibitions	14	The GO calls for no visible airborne particulates leaving the application site during biosolids application or incorporation, whether they are biosolids or native soil. This is probably impossible to realistically achieve, and as such would preclude the application of biosolids to the land, or cause very high costs. Just driving on access roads or positioning application equipment would cause some degree of particulate matter to enter the air. There would be few if any no-wind days to land apply. This section should be modified to say that biosolids application would not be allowed when winds exceeded some realistic wind speed.	16-28
14	Discharge Specifications	1	See comment 6 above.	16-29
15	Discharge Specifications	4	Biosolids with concentrations less that 40CFR503 Table 3 are not subject to tracking under the federal law. This GO is based on 40CFR503, a risk based scientifically derived rule. This tracking requirement seems subjective, and therefore without basis. Delete the tracking requirement for high quality biosolids.	16-30
16	Discharge Specifications	4	The statement including background soil metals and metal additions from biosolids was included in this specification. Peer reviewed data and analysis performed during the risk assessment for the part 503 regulations took into account background soil metals and found that the soils throughout the United States was of the same medium and that there was not need to address the background soil metals. What scientific data does the SWRCB have to support this statement?	16-31
17	Discharge Specifications	4	40CFR503 excludes the metal molybdenum, pending further review. This GO should be consistent with that exclusion. Delete molybdenum from the GO.	16-32
18	Biosolids Storage and Transportation Specifications	1,3 6, etc	This section appears to be written to pertain to liquid and semi-liquid biosolids cake materials. However, a biosolids product like compost would be severely impacted by this section unless modified. A typical scenario would be the purchase of compost by a vendor from a generator for the sale into the home horticultural market for use as a soil conditioner. The product would be picked up and transported to the vendor by truck in 25 cubic yard lots. The compost would be placed on the ground at the vendors site for sale to customers in small amounts of 1 to 5 cubic yards, and may remain at the site until sold out in 2 weeks, at which time another load of compost would be acquired by the vendor. This type use is excluded from the GO, but this exclusion should be reinforced in the introductory paragraph here.	16-33
19	Pre-Application Report	3	Chromium and Molybdenum should be removed from the list. See comments 10 and 15 above.	16-34
20	Pre-Application Report	3	One of the key parameters governing the application of biosolids to the land is available nitrogen, both existing in the soil as well as in the biosolids. This is the nitrogen that plants can actually use to grow, and includes the ammonium, nitrate, nitrite ions. Biosolids have the important and valuable beneficial property of containing nitrogen, as well as other nutrients, in organic form that can be slowly released into the soil through mineralization. The Constituent Concentration table should list the available nitrogen for biosolids and soil, which can be easily determined in the laboratory. Otherwise, how can	16-35

Comment #	Section	¶	Comment	
			the proposed nitrogen loading be determined as indicated in paragraph 4, Application Area Information or in paragraph 2, Application Information under Annual Reporting? There are mineralization rate formulas, starting with total nitrogen, that could be used, but there are so many site specific and biosolids specific factors to consider, so that accuracy becomes an issue.	16-35 (cont)
21	Pre-Application Report	3	How many samples are required for testing biosolids and soil? This type testing is a major expense, especially methods SW 846 and EPA Method 8270, so the GO should indicate the minimum number of samples required. Why not require a site monitoring plan?	16-36
22	Pre-Application Report	4	The units used for Proposed Nitrogen Loading and Crop Nitrogen Usage should match. For example, if plant available nitrogen is listed as pounds per acre, then crop usage should be shown as pounds per acre, or vice versa. This would reduce the need for RWQCB staff to make further calculations.	16-37
23	Annual Reporting	1	How many samples need to be collected? The implication is that only one sample per year per well is sufficient.	16-38
24	Annual Reporting	3	Chromium and Molybdenum should be removed from the list. See comments 10 and 15 above.	16-39
25	Annual Reporting	4	Chromium and Molybdenum should be removed from the list. See comments 10 and 15 above	16-40
26	General Reporting	1	Annual reports are required by January 15 of the following year. This is not enough time to collect all the required information, and prepare and submit the report. At the same time information is being collected to submit annual reports to the EPA under 40CFR503, which are due February 19 of the following year. The annual report to the State should coincide with the report to the EPA and be due on February 19 of each year.	16-41
27	General Reporting	6	A standard reporting format would assist all parties in the reporting, review and use of the data. This would also be helpful if electronic reporting becomes available in the future.	16-42

Responses to Comments from the East Bay Municipal Utility District

16-1. Land application costs will likely increase as an overall result of the proposed GO. However, SWRCB staff is taking a sustainable approach to land application through its proposed GO and believes that the additional conditions and requirements beyond the Part 503 regulations are needed for sustainability. See Response to Comment 8-2.

16-2. The commenter requests that the SWRCB review every GO requirement and mitigation measure in the EIR to determine if the requirement is necessary and if the requirements/mitigation measures would make the land application of biosolids cost prohibitive. The proposed GO and the mitigation measures were designed to protect the environment and human health. Additionally, the mitigation measures were designed to be feasible, in compliance with CEQA. Although some of these measures may incrementally add to the cost of land application, they are deemed necessary to adequately protect the state's water quality and public health.

16-3. The opinion of the commenter regarding support for Mitigation Measure 5-1 is noted.

16-4. See Response to Comment 14-3.

16-5. See Master Response 4.

16-6. See Master Response 4.

16-7. See Response to Comment 16-5 and Master Response 4.

16-8. See Response to Comment 14-2.

16-9. See Master Response 4.

16-10. Comment noted. This comment summarizes the number of impacts presented in the EIR and states that EBMUD supports the SWRCB in its effort to prepare a comprehensive statewide EIR.

16-11. See Master Responses 5, 7, and 8.

16-12. See Responses to Comments 16-18 and 16-19, and Master Responses 9 and 11 .

16-13. This comment also pertains to the proposed mitigation measure to extend the grazing period to 60-90 days, and explains that the extended period may have adverse economic impacts on some biosolids users or make biosolid less competitive than other grazing land soil amendments. It indirectly recognizes a possible unknown impact on grazing animals and states that the mitigation measure should be relaxed until more is known on this issue. It also states that more should be said of the biosolids' benefits to land productivity and feed quality; this should be balanced against the remote possibility of grazing animal impacts discussed in the draft EIR.

The benefits of biosolids additions to soil fertility and land productivity were addressed on page 4-4 of the draft EIR. But the National Academy of Sciences indicated in its 1996 report on wastewater and sludge use on agricultural crops that the 30-day grazing waiting period following biosolids application should be further researched, indicating a substantial scientific uncertainty regarding this issue.

According to the project description, nearly all land-applied biosolids are cultivated or disced into the soil within 48 hours of application. Depending on the time of year, final cultivation and pasture seeding might occur within days to several weeks after incorporation, with grass/forb germination 2 to 3 weeks or more thereafter. Developing a good erosion-controlling pasture grass cover, and plants with a root system strong enough to withstand grazing pressure, may require another 30-60 days or more, again depending on time of year, rainfall, and temperature conditions. Common practice in California and a best management practice for pasture development and resource protection is to wait at least 60 days after biosolids application and pasture seeding before grazing. The recommended mitigation measure cannot, therefore, be considered an economic disadvantage to those who incorporate biosolids into the soil, as nearly all applicators would practice these measures. In the absence of fully understood scientific facts and with scientific uncertainty, such as the situation here, and where severe economic hardship is not caused by a mitigation measure, it is generally best to be prudent and conservative.

Also see Master Responses 7 and 8.

16-14. The commenter's opinion commending SWRCB staff for its work on the EIR is noted. Additionally, the commenter expressed that the EIR should place a greater emphasis on the positive aspects of using biosolids. State CEQA Guidelines Section 15126.2 states that an EIR shall identify and focus on the significant environmental effects of the proposed project. It further states that a lead agency should normally limit its examination to changes in the existing physical conditions in the affected area at the time the notice of preparation is published (if one is published). Therefore, the EIR analysis only identified the physical changes to the environment that could result from the land application of biosolids and did not compare the use of biosolids as a soil amendment to other soil amendments.

16-15. The proposed GO is only regulating EQ biosolids where the application rate is at higher rates. These rates are established from communications with industry representatives. Regulation of this material is intended to protect California's resources from applications of biosolids at high-end loading rates. Excessive applications of biosolids and waste disposal converge where applications exceed the agronomic rate and go beyond what is useful for the typical agricultural operation Also, at higher application rates, metal accumulations are a larger issue for exceptional quality material.

16-16. See Response to Comment 14-15.

16-17. The potential for accumulation of metals and organic contaminants from sewage sludge-derived compost or other sewage sludge-derived mixtures at sites where higher loading rates are used poses a threat to water quality and California's resources. Accordingly, such applications will not be exempted from coverage under the proposed GO.

16-18. See Master Response 11.

16-19. See Master Response 11.

16-20. SWRCB staff believes that biosolids should not be transferred to the field and held for long periods. Adverse environmental conditions, including water quality degradation and adverse air quality, may arise if biosolids are stored on the surface for extended periods without incorporation into the soil.

16-21. Onsite storage of compost and exceptional quality biosolids can have the same types of environmental impacts as material that is not exceptional quality. The storage restrictions have not been changed.

16-22. See Master Response 6.

16-23. See Response to Comment 14-3.

16-24. See Master Response 10.

16-25. Sites with active waste discharge requirements require tracking and oversight regardless of whether the land is fallow. Should a landowner not expect to use biosolids every year, they have the ability to terminate the requirements, provided that they have complied with the applicable waiting periods.

16-26. See Master Response 4.

16-27. See Master Response 4.

16-28. The requirements in the GO have been revised to address the same issue but in a manner that makes compliance easier to evaluate and takes further steps to minimize air quality impacts. The approach requires that biosolids applied to fields designated for tilling have at least 50% moisture and be incorporated into the soil within 24 to 48 hours. To place these requirements in the proposed GO, it has been modified in two locations. The text of the proposed GO, as found in Prohibition No. 14 of Appendix A, now reads:

> The application of biosolids containing a moisture content of less than 50% is prohibited. ~~Any visible airborne particulate leaving the application site during biosolids applications or during incorporation of biosolids at the permitted site is prohibited.~~

The text of the proposed GO, as found in Discharge Specification No. 6 of Appendix A, now reads:

> If biosolids are ~~incorporated into the ground,~~ applied to a site where the soil will be tilled, biosolids shall be incorporated within 24 hours after application in arid areas and within 48 hours in non-arid areas. ~~t~~Tillage practices shall be used which minimize the erosion of soils from the application site by wind, storm water, or irrigation water.

This approach is similar to one taken by the CWEA Manual of Good Practice. Specifying a particular wind speed poses problems for evaluating site microclimates and measuring those wind speeds (e.g., height of measurement, location, time of day). Also see Master Response 9.

16-29. See Response to Comment 16-20.

16-30. The SWRCB staff believes that it is important to track the cumulative loading of metals to soils in California, even if they are applied in concentrations below the levels identified in Table 3 of the Part 503 regulations. The risk assessments conducted by EPA are still valid, but the cumulative loading tracking is a safeguard against loss of soil productivity and “dumping” of biosolids in one area over an extended time.

16-31. See Response to Comment 14-19.

16-32. See Master Response 4.

16-33. The proposed GO is not applicable to vendors of biosolids, only biosolids applied at the point of use.

16-34. See Master Response 4.

16-35. The Pre-Application Report and the Annual Report have been revised to include reporting of residual soil nitrogen.

16-36. The number of soils tests required should be representative, but would vary with size of the site and the different number of soil types. Such decisions should be made on a case-by-case basis by RWQCB staff. Soil samples are required to be reported only once. The Pre-Application Report has been modified to exclude soil testing using methods 8270 and SW 846.

16-37. Comment noted. The units for nitrogen applications now use consistent units.

16-38. One sampling result from the groundwater monitoring system is required.

16-39. See Master Response 4.

16-40. See Master Response 4.

16-41. Annual Reports are due on January 15 for all State waste discharge requirements. This is standard operating practice and allows for logging with all other reports throughout the state system. However, Annual Reports have been changed to cover the period between December 1 and November 30.

16-42. Comment noted. Electronic reporting is being developed by some of the RWQCBs and the SWRCB.

Planning Department

COUNTY OF IMPERIAL

Jurg Heuberger, AICP - Director

September 9, 1999

Todd Thompson
State Water Res. Control Board
901 "P" Street
Sacramento, CA 95814

SUBJECT: Draft Statewide Program EIR for Biosolids Land Application

Dear Mr. Thompson:

The Planning/Building Department received a copy of the proposed *"Draft Statewide Program EIR Covering General Waste Discharge Requirements for Biosolids Land Application" (DEIR)* on June 29, 1999, for review. This is the first opportunity for the Planning/Building Department to comment on this project. The document's *"Notice of Preparation" (NOP)* was sent to two (2) agencies in Imperial County, Environmental Health and the County Agricultural Commissioner, but was not sent to this Department. 17-1

The Planning/Building Department has over the years been involved in reviewing a number of proposals to apply sewage sludge or "biosolids" in Imperial County. As the "lead agency" for the environmental review of all applications made in the unincorporated areas of the County excluding Government and native Indian lands, there are numerous concerns which have been raised over the years regarding the application of biosolids on agricultural lands. Though this DEIR addresses many of these issues and attempts to eliminate them, Imperial County still is gravely concerned with the application of "human waste" on any cultivated crop. The following are our concerns related to this DEIR. 17-2

On pages ES-16 &17, of the Executive Summary, the DEIR discusses "***Public Perception and Acceptance***". The very ideal of using "human waste" as soil amendment for agricultural crops, which is meant for human consumption "will" undoubtedly be perceive with negative connotations. This perception will not only be associated with those farmer who use "human waste", but, with the entire area (countywide, statewide). If you agree with the previous statements, then those farmers who use "human waste" on their agricultural crops that are intended, in anyway, for human consumption, will jeopardize the entire agricultural industry in Imperial County, which will 17-3

planning@icoe.k12.ca.us

undoubtedly affect the agricultural industry at the state level. If the public perceive that Imperial County's agricultural crops are being grown in "human waste", in comparison to other areas that ***do not*** use "human waste" as soil amendment, we are at an extreme disadvantage in the agricultural market. Furthermore, the force behind Imperial County's economy is driven by fragile agriculture resources and the many agricultural related good/services which rely on it, which if "human waste" is utilized, our economy will be severely damaged, maybe permanently by this "public perception". 17-3 (cont)

Also, the DEIR mentions that this public perception could be change through education and research. However, Imperial County contends that the time that the public will accept of agriculture product grown in "human waste", is ***years*** in the future, if this sort of practice is ever accepted at all. Imperial County realizes the potential of "Biosolids Land Application" in some areas, however, we are not willing to risk our future by gambling with "human waste" land application on agricultural products.

The DEIR, Chapter 2, Program Description, "Local Programs—County Ordinances", Page 2-8, states the following:

> "...Of the 58 counties in California, 16 currently have ordinances that related directly to land application of biosolids...These local ordinances are important because they restrict the areas within the State that can currently accommodate land application of biosolids, and <u>they supercede the controls of the proposed GO where they are more restrictive..."</u> (emphasis added). 17-4

The County Board of Supervisors has adopted an Ordinance in which any "Land application of sludge or similar "waste" material to agricultural land..." in the A-2 (General Agriculture) and A-3 (Heavy Agricultural) zones must first be approved through the County's Conditional Use Permit process.

The agricultural fields in Imperial County are generally surrounded by irrigation canals and drains and are therefore exposed to drift and windblown biosolids materials. There are at least 4,000 people in the rural areas of the County that currently use irrigation canal water for domestic use and contamination is an ever-present problem. The Imperial Irrigation District is currently attempting to get these rural users to comply with the Environmental Protection Agency's requirements for treating the water or other methods to protect the residents from possible contamination and the resultant health effects. The application of human waste will only complicate this issue and possibly result in the demise of this vital water delivery system. 17-5

Imperial County currently has over 500,000 acres of cultivated farm land. Based on the DEIR, the California State Water Resource Control Board states that both "funds and staffing will be needed to adequately administer this additional regulatory program (ES-16). How does the DEIR or CSWRCB plan on enforcing this very detailed program, which as proposed is going to require an army of technicuely trained (biology, chemistry, farm/ag management, engineering, etc.) individuals, in Imperial County, let alone the entire State of California's vast agricultural resources? An Environmental Impact Report, mitigations, mitigation monitoring program and even the General Order are all well and good but without adequate enforcement it does not prevent abuses or contaminations such as the waste not being processed to the right level prior to application, run-off, excess application, failure to adhere to the time period for harvesting and crop protection between applications, excess toxins and heavy metals, etc. 17-6

In Chapter 4, page 4-14, the DEIR discussed the effect on ***Agricultural Lands Caused by Public Concerns about Crop Contamination from Biosolids Application.*** Here, at Imperial County, ***we*** believe that "no" human waste should be used as soil amendment for agricultural products that are directly or indirectly intended for human consumption. Furthermore, we believe that if "human waste" is used at all, it should be that of a "Class A EQ" and used for silvicultural and horticultural purposes, rather than for agriculture. Biosolids or "human waste" should ***never*** be use for agricultural products that is intended for human consumption. 17-7

We were unable to respond to the NOP due to the lack of notice and will review the Final Statewide Program EIR and the comments the State Water Resources Control Board receives when it is finalized.

We appreciate the opportunity to review and comment on the draft document.

Sincerely,

JURG HEUBERGER, AICP
Planning Director

cc: Board of Supervisors
Richard Inman, CAO
George Poppic, County Counsel
Darrell Gardner, Planning Div. Manager
SWRCB Correspondence File
10.105

JH/sm/ToddBioS

Responses to Comments from the Imperial County Planning Department

17-1. The commenter notes that the NOP was sent to two county agencies, Environmental Health and the County Agricultural Commissioner; however, the Planning/Building Department did not receive a copy. SWRCB staff targeted each county's environmental health and agricultural commission offices as the locations likely to have the greatest interest in land application of biosolids. However, it is also noted that the Planning/Building Department did provide comments on the NOP.

17-2. The commenter expresses concerns about the overall application of biosolids on cultivated crops. No response is necessary.

17-3. Comment noted. Negative perception issues do exist with the use of biosolids as a fertilizer and soil amendment. The SWRCB will consider this, along with technical information in this EIR, as it makes a decision on the proposed GO.

17-4. Please see Response to Comment 14-7.

17-5. The commenter's opinions about possible biosolid contamination of irrigation canal water are noted. Setbacks established in the GO are one of the effective practices required by the GO to protect such waters. Additionally, the proposed GO has been revised to include provisions that require the incorporation of biosolids on fields that will be tilled within 24 hours in arid areas and 48-hours within non-arid areas. A prohibition has also been added to the proposed GO which states that biosolids containing a moisture content of less than 50 percent shall not be applied under the proposed GO. Because of the measures that were already included in the proposed GO and the measures that were added since the public review of the draft EIR, irrigation canals and drains should not be exposed to excessive amounts of windblown biosolids.

17-6. See Master Response 1 for information on SWRCB funding, staffing and enforcement of the GO.

17-7. The commenter's opinions about the use of biosolids for agricultural products are noted. No response is necessary.

CHARLES MOSLEY
Engineer - Manager

VALLEJO SANITATION AND FLOOD CONTROL DISTRICT

450 RYDER STREET
VALLEJO, CALIFORNIA 94590
AREA CODE 707
TELEPHONE: 644-8949

September 9, 1999

State of California Water Resources Control Board
Division of Water Quality
P.O. Box 944213
Sacramento, CA 94244-2130

Attention: Mr. Todd Thompson,

Subject: Draft Environmental Impact Report (DEIR) For General Waste Discharge Requirements For Biosolids

Vallejo Sanitation and Flood Control District has several concerns with the proposed General Order (GO) for Waste Discharge Requirements for the Discharge of Biosolids to Land for Use in Agricultural, Silvicultural, Horticultural and Land Reclamation Activities in California. Since 1977, the District has responsibly applied biosolids. As the attached article explains, this has benefited not only the District but the private sector farmer as well. We are concerned about the possible adverse impacts of the GO on this long standing relationship. 18-1

Background:

Vallejo Sanitation is a Special District in Solano County that was created by act of the State Legislature in 1952 for the express purpose of treating and transporting sanitary sewage as well as storm water. As a part of its operation, the District has land applied lime stabilized biosolids for the past 22 years. All biosolids have been applied to District owned property called Tubbs Island which includes approximately 1,500 tillable acres immediately adjacent to the North San Pablo Bay in Sonoma County. 18-2

Prior to the EPA issuing the regulations for sewage sludge (40 CFR503) the District's biosolids spreading activities were regulated through the San Francisco Bay Regional Water Quality Control Board. Under the direction of the Regional Board the District was required to implement a comprehensive monitoring program to test the soils, ground water, drainage water, receiving waters, and crops grown on the island. During the 15 years that the monitoring program was in place, no negative effects were ever indicated on the property. Instead it was determined that the application of biosolids had improved the conditions on the island.

In recognition of its efforts to promote environmentally acceptable utilization of sewage sludge, the District received the EPA Award for the best example of a lime stabilized land application operation in the nation in 1990. The Tubbs Island project continues to be an example of utilizing a valuable by-product that would otherwise go unused if deposited at a sanitary landfill. 18-2 (cont)

Issues Surround the Proposed GO

Generally speaking, the District agrees with the GO intent of improving the handling and management of biosolids, however, the manner in which the GO approaches this objective concerns the District. The following are the District's concerns:

We question the need for a regional enforcement framework since the District's project is already locally regulated and must conform to the EPA 503 regulations. Established through extensive risk-based evaluations, the EPA sewage sludge regulations clearly cover all issues related to safety for the general public. Adherence to these regulations establishes the greatest margin of safety possible, thereby promoting self implementation. 18-3

The GO contains a provision requiring that annual fees be assessed for each application site. Public agencies are currently having difficult times with additional fees as the public is becoming more and more resistant to fee increases. Additional fees represent an unreasonable burden to the District's constituency, especially when we already have a layer of enforcement at the Federal level performing to the same function that this GO is purporting to do. 18-4

Leak proof vehicles for transporting biosolids do not need to be covered. The rational for covering certain types of vehicles has been to provide safety for the surrounding drivers from damage that could be caused by rocks, etc., dewatered biosolids are generally not dry enough to blow off a vehicle. Furthermore, the California Vehicle Code already establishes requirements for materials transportation. 18-5

Biosolids can not always be spread within 7 days of storage. Biosolids generated by the District may be stored on Tubbs Island for up to eleven months as our site is a one crop operation, all solids are applied once a year between the months of August through October, the crop is planted, grown, and harvested between the months of November through August. Considering this type of operation, which is not unique to the District, there is absolutely no way to spread biosolids within 7 days of storage. Furthermore, spreading biosolids as proposed in the GO represents extremely poor management practices by mandating the application of biosolids during wet weather when the potential for nutrient laden runoff is at its greatest. 18-6

Each year the District stores approximately 30,000 cubic yards of lime stabilized biosolids in an impermeable storage pad 1,200 feet by 300 feet. Rain water is removed immediately from the storage area by a pump which directs it to a nearby field. Removing the water as soon as it accumulates ensures that nutrients and potential pollutants are not leached from the biosolids. This method has been proven to be efficient and there are no adverse impacts associated with it. The requirement to cover an area the size of our current storage pad would be an expensive and unnecessary undertaking with no real benefit. 18-7

Monitoring at sites where the depth to groundwater is less than 25 feet is unreasonable. The calculations employed to determine biosolids application rates are designed to provide plant available nutrients for production of a single crop, taking residual nutrients into account. Studies indicate that this approach is rather conservative since actual nutrient uptake may be much greater, suggesting that when properly applied biosolids will not result in the introduction of nutrients to groundwater. Over 15 years of groundwater testing at the District's application site supports this conclusion. 18-8

The District appreciates the opportunity to comment on the proposed GO and looks forward to working with your agency to develop reasonable guidelines that will satisfy the fundamental requirements established by CEQA. Please feel free to contact Daniel Tafolla, Environmental Services Director if you have any questions of comments related to this letter.

VALLEJO SANITATION AND FLOOD CONTROL DISTRICT

Charles Mosley

CHARLES MOSLEY
Engineer-Manager

att: Tubbs Island article
mailing list

Mailing List

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Ms. Helen Thomson
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CWPCA
BULLETIN
WINTER 1991

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IN THIS ISSUE:

Vallejo's Tu
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wins U.S. E
Sludge Use
Award

EPA's Sludge Award Goes to Vallejo Sanitation

by Ronald Matheson, Plant Superintendent

Vallejo's Tubbs Island Sludge Project

The Vallejo Sanitation and Flood Control District recently received the first place award for large treatment plants in the operating projects category of the EPA's 1990 National Sludge Use awards program. The District was formed in 1952 to operate and maintain the sanitary and storm water systems for the City of Vallejo and parts of Solano County.

Treatment Facility

The sewage treatment facility has a dry weather design flow of 12.5 mgd, wet weather flow of 30 and is currently under construction to increase wet weather capacity to 60 mgd.

The District now processes 12 mgd. The liquid stream consists of bar screens, grit removal, sedimentation, trickling filters followed by short term aeration (trickling filter/solids contact system) and clarification.

The raw sludge and waste activated sludge is blended in a gravity thickener where the pH is elevated to 12 by the addition of lime slurry in order to stabilize the sludge. The District currently uses two types of lime slurry for this purpose; waste lime slurry generated from acetylene production, and slaked lime produced by dissolving quicklime. Using slaked lime for this process costs $100 per dry ton plus the cost associated with the high maintenance of lime slakers. The District prefers to use the waste lime slurry as the primary source of lime because the cost is approximately $50 per dry ton, and at the same time, a resource that would otherwise have to be disposed of as a hazardous waste is being recovered. The waste lime slurry is obtained from several acetylene production plants on a contract basis.

The thickened sludge is dewatered using vacuum filters and ferric chloride as a conditioning chemical. Approximately 30,000 cubic yards per year are produced and utilized in the District's sludge application project.

Tubbs Island Project

The sludge application project began in 1977 as a pilot project using a 400 acre test field on a farm in Sonoma County called Tubbs Island. The sludge applied was lime stabilized sludge generated from the secondary treatment process which, at that time, consisted of a physical-chemical process using lime, carbon dioxide, carbon adsorption and filtration.

The land application project was developed in cooperation with the Regional Water Quality Control Board, San Francisco Bay Region and Sonoma County. The RWQCB and the Sonoma County Solid Waste Board worked with the District in the early stages to develop the criteria for monitoring the project, as there was not a lot of background information available at that time.

Over the next few years, an increasing amount of land was utilized as we gained experience with application rates and monitoring changes in soil quality. Because of the success of the pilot project, the Board of Trustees viewed the project as an opportunity to secure a long-term solution to the District's sludge disposal concerns. The decision was made to purchase the entire lower Tubbs Island property in 1982 for $1.6 million.

The current estimated life of Tubbs Island i: approximately 140 years based on cad mium loading limitations that are cur rently in effect. This project is the larges: of its kind in California.

Tubbs Island is composed of 1850 acre: located between Highway 37 and the edg of the North Bay of San Francisco Bay anc is bordered on the west by a U.S. Fish anc Wildlife Services nature conservatory. O the 1850 acres, 1500 are tillable with th balance being composed of roads, levee and drainage ditches.

This project was a particularly goo match from an agronomic point of view a the pH of the soil ranged from 3.5 to 4. prior to sludge application. The applica tion of the sludge has increased the pH o the soil from 6.5 to 7.5. This change ha allowed the tenant farmer to shift the cro: of oat hay, kanota oats and silage to a hig revenue crop of wheat. Currently, whea is grown on half of the island.

We have also seen the benefit of th application of the sludge from reports b the local mosquito abatement district tha indicate they are able to maintain a viabi population of mosquito fish for control i: the ditches. Prior to the project, the fis would not survive in the low pH enviror ment.

VSFCD staff perform all sampling c test wells, ditches, soil, and crops to a: sess the fate of heavy metals. They als determine the proper spreading rate c the sludge based on available nitrogen i: the sludge vs. the ability of the crop t utilize the nitrogen. The goal is to slight underload the crop so there is less like hood that we will experience runoff

Continued Page 5

Vallejo staff performs all sampling to determine spreading rate.

President's Message
Continued from Page 4

Board's evaluation and direction. We now have new budget forms and a budget review process so that various services will be placed on pay-as-you-go basis rather than as a deficit subsidy. We should all be appreciative of the efforts and potential created by the dynamic-duo team of Mike and Linda in meeting their short-term goals and beginning the foundation for the long term.

BULLETIN

One of our goals was to review the existing *BULLETIN* for changes in format and the use of sub-editors for our various committees and training source updates. This was begun with the October issue and is being further updated in this and future issues. What do you think of the new printing format and the vivid use of colors to spark and delight your visual senses? We have encouraged Linda and her staff to use their poetic license and expression to bring forth an enjoyable and informative *BULLETIN* for your use and reference. They have accepted the challenge and I believe are justifying the professionalism of this publication. I know they would welcome your comments, both positive and negative, so don't hesitate to let them know what you think.

Public Relations

By this time, we should be getting out to each section an agenda for establishing one local meeting per year devoted to public relations and/or public education. Your Southern and Northern Regional Chairs, John Morris and Warren Tellefson, will be following this up with a draft of a PR Manual for section use. John has already placed into the works a modification for our Pasadena Annual Conference to encourage public interest and the media. These are new waters for us, but thanks to John Morris and Bob Barletta (your Pasadena conference chairs) and their intuitive concepts for a presentation "a-la-mode," we are looking forward to a challenging format.

Education & Training

The draft of the math workbook is now ready for Board review and the preview given me by Don Proctor dispels the prior concept that mathematics instruction is usually dry and ho hum. Don has a talent for bringing things down to earth and supplying just enough humor and folklore to keep us learning.

A video tape is also now available as an introduction to mathematics which was prepared by your VCP Committee and has been reviewed and blessed by Tom Welch. Thanks and pats on the back to Tom and his volunteers.

In this issue, you shall also find the availability of various study courses. we hope to bring you periodic updates so that your horizons for advancement remain unlimited.

And, if this isn't enough, let me remind you that the new revisions for the study manuals in the VCP disciplines of Collection System, Mechanical Technologist, Industrial Waste Inspector, Electrical/Instrumentation and Laboratory are now all available through our CWPCA office.

Constitution and Bylaws

This month your Board will receive and authorize the final printing of our Association's revised Constitution & By-laws. This detailed and very thorough update was spearheaded by Mike Hogan and Ron Young to whom we all owe a debt of gratitude. This chore had previously been put on the back burner, not because it wasn't important, but rather for the lack of someone to bite the bullet and do it. Our new Constitution & Bylaws will have to be approved by the membership at our next scheduled business luncheon meeting during the Annual Conference in Pasadena, before they will become effective.

Training Conference

Our Northern and Southern Regional Training Conferences continue to get more technical and noteworthy programs and better attendance each year. This year's Northern Regional Conference at San Jose and the Southern Regional Conference at Palm Springs were no exception, breaking all prior records.

Our thanks to the Santa Clara Section's Gary Lee and his entire ensemble for orchestrating a terrific and memorable training and location session. And, the same to the CORBS' Ken Boyd and his volunteers for a record breaking and successful event in everybody's hometown—Palm Springs.

Operations Challenge

And, last but not least, our support and congratulations to our California teams who participated in the WPCF Operations Challenge at their annual conference in Washington, DC, this past October. We have indeed established a record for being "king of the mountain" for the past two years in this competition in which EBMUD has reigned as "numero uno." This year, we again walked away with honors in which the Bashers took the "silver" and another California team, "The Raging Reclaimers" from Irvine Ranch Water District, locked onto the "bronze." A commendable showing was also made by the "Hyperion Torpedoes" from Los Angeles. The competition is really getting quite keen with 34 teams from all over the USA showing the stuff of which they are made. We are proud of our teams and just wait until next year!

Your CWPCA membership was well represented at the WPCF conference which boasted a record 13,000 registrants. It is rewarding to see a good number of our Directors and members actively participating in Federation committees and functions. There is no doubt that California is not only the largest member association with its 3500 WPCF members, but we are also influential and well respected within the WPCF, due to our united and progressive attitudes.

George Ohara, Jim Brisco and yours truly are looking forward to sharing the honor of being at your respective installations and let's remember to meet for the "Pasadena Rose" in April 91. Till next time...Ciao.

EPA Sludge Award Goes to Vallejo Sanitation
Continued from Page 8

nitrogen into the waterways.

Summary of Project Benefits:

1. Annually, the District uses approximately 1.5 million gallons of potentially hazardous waste and 30,000 cubic yards of sludge in a manner that is useful to the environment rather than taking up valuable space in shrinking landfills.

2. The project saves the District rate payers between $600,000 and $800,000 per year at 1990 landfill rates. Prior to purchasing the property, the District paid $2 per cubic yard for the privilege of spreading the sludge.

3. The District receives a revenue from the sale of crops that in 1990 exceeded $114,000.

4. The project has complied with all Federal, state and local regulations since its inception. The project was featured in the new WPCF Manual of Practice "Beneficial Use of Waste Solids." The project was also featured as a demonstration project at the WPCF conference in San Francisco in October 1989 as an example of beneficial use of sludge.

Responses to Comments from the Vallejo Sanitation and Flood Control District

18-1. The commenter's concern regarding the effects of the proposed GO and the agency's land application program are noted.

18-2. This comment provides information on the District's biosolids land application program. No response is required.

18-3. The commenter's opinion regarding the need for regional enforcement of biosolids land application (since the commenter's project is already locally regulated and must conform to EPA's Part 503 regulations) is noted. Land application of biosolids is regulated by Part 503 regulations. However, in California, no single state agency regulates the land application of biosolids. On September 12, 1997 the Superior Court judge ordered the SWRCB to prepare a statewide EIR for land application of biosolids. Please also refer to Response to Comment 18-4.

This proposed GO is not intended to regulate every biosolids application site in the state. The need for a waste discharge requirement is assessed on a case-by-case basis and determined by the RWQCBs. Undoubtably, some sites will be permitted using the GO waste discharge requirements. Others will continue with site-specific waste discharge requirements or will be regulated by the local enforcement authority without a state waste discharge requirement being issued.

While Part 503 regulations address many factors necessary for human, plant and animal health, it does not necessarily address all issues. Unaddressed matters include transportation, storage, wind, animal feed grazing, and nuisance issues. Also see Master Response 2.

18-4. The level of regulation afforded by the proposed GO goes beyond what is occurring at the federal level. Although Part 503 regulations is the baseline for the proposed GO, the State is taking a more cautious approach to ensure that adequate protection of its resources will be achieved. Such steps require that the State be able to fund oversight activities and ensure compliance. The costs of those activities should be borne by the land application proponents, not by the entire population of California. Annual fees serve that purpose.

18-5. Section 13274 of the California Water Code requires the SWRCB or RWQCB, in issuing general waste discharge requirements, to "include provisions to mitigate significant environmental impacts, potential soil erosion, odors, the degradation of surface water quality or fish or wildlife habitat, the accidental release of hazardous substances, and any potential hazard to the public health or safety." Biosolids blowing from vehicles during transportation may adversely affect the public's health. As such, it is within the scope of this project.

18-6. The proposed GO does not require that the discharger apply biosolids continuously or in wet weather. The order requires that biosolids not be stored at application sites for more than 7 days, unless the discharger has been issued separate general waste discharge requirements or a waiver for the storage operation. It is understood that, in most cases, biosolids require storage at some location. However, to avoid nuisance conditions, that location should not be the application site unless the above requirements are met.

18-7. Covering short-term storage facilities does more than halt leaching of nutrients from biosolids designated for use, although it does minimize runoff from piles and any potential leaching. Because covering the piles also minimizes dust, covers are now required for biosolids piles placed onsite for more than 24 hours, to address air quality issues. The text of the proposed GO, as found in Biosolids Storage and Transportation Specifications No. 6 of Appendix A, has been added to read:

Biosolids placed onsite for more than 24 hours shall be covered.

18-8. Degradation of groundwater at sites in compliance with the proposed GO is not anticipated. However, groundwater in close proximity to the ground surface does have a higher chance of being affected than sites without such conditions. For that reason, groundwater monitoring is required for sites where biosolids operations are proposed for multiple applications (see Master Response 15). Such monitoring is intended to ensure application of biosolids at the agronomic rate.

CITY OF WATSONVILLE

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FAX TRANSMITTAL

DATE: 9/9/99

TO: TODD THOMPSON
S.W.R.C.B.

FROM: BOB GEYER - 831-728-6149

NUMBERS OF PAGES INCLUDING COVER: 3

COMMENTS:

CITY OF WATSONVILLE

"Opportunity through diversity; unity through cooperation"

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September 1, 1999

Todd Thompson
Associate Water Resource Control Engineer
Division of Water Quality
State Water Resources Control Board
P.O. Box 944213
Sacramento, CA 94244-2130

Dear Mr. Thompson,

On behalf of the City of Watsonville we would like to submit the following comments on the draft EIR for General Waste Discharge Requirements for Biosolids Land Application. Overall, the EIR seems thorough and fair. However, the City opposes excluding the California Coastal Zone from the EIR (p. 2-16). Many of the agencies financing this project (including the City of Watsonville) are located within or very near the Coastal Zone, and can expect to have potential land application projects in this area.

Over the past 7 years the City of Watsonville has very successfully land applied biosolids on erosion control projects within the Coastal Zone thereby beneficially reusing it's biosolids. As one of the financial contributors funding this EIR, the City understood that the EIR would cover the *entire* State. By not including the Coastal Zone, a significant portion of our local farmland has been excluded, and the possibilities for future projects limited. 19-1

The City acknowledges that additional regulatory constraints exist within the Coastal Zone, and that the General Order may not address all issues of concern. If, however, the EIR was to include the Coastal Zone, individual agencies wishing to land apply biosolids in the Coastal Zone would have a basic environmental review to work from, and the additional permitting requirements could be significantly reduced.

[illegible]

Please consider including the Coastal Zone in this EIR. It would allow many agencies in the State additional opportunities for beneficial reuse of biosolids through land application, and would be a more equitable use of the study funds. 19-1 (cont)

Sincerely,

Bob Geyer

David Koch
Director of Public Works and Utilities

Responses to Comments from the City of Watsonville, City Utilities Customer Service Division

19-1. The California Coastal Zone has been excluded because of the additional regulatory constraints and other special considerations associated with it. The EIR still affords environmental review work that is beneficial for sites not applicable to the proposed GO by identifying potential impacts and mitigation. These issues can be used in subsequent environmental documentation for sites within the excluded areas.

805 942 5069
SEP-10-1999 11:07 FROM SUPERVISOR ANTONOVICH AV TO 19166572388 P.01

SUPERVISOR MICHAEL D. ANTONOVICH
ANTELOPE VALLEY FIELD OFFICE
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(661) 942-5069 fax

DATE: 9-10-99 NUMBER OF PAGES: 2 (including cover sheet)
TO: Todd Thompson
FROM: Kim
SUBJECT:

COMMENTS

Please consider our request.

T.Y.
Kim

805 942 5069
SEP-10-1999 11:07 FROM SUPERVISOR ANTONOVICH AV TO 19166572388 P.02

Board of Supervisors County of Los Angeles

MICHAEL D. ANTONOVICH
SUPERVISOR FIFTH DISTRICT

September 10, 1999

Mr. Todd Thompson
Associate Water Resource Control Engineer
State Water Resources Control Board
Division of Water Quality
901 P Street
Sacramento, CA 95814

Dear Mr. Thompson:

I have just learned that the Regional Board circulated a draft environmental impact report relating to the use of sludge as soil amendment for areas within the Lahonten region. Apparently, my office was not notified of the availability of the document nor were we invited to participate in the public meetings held last month in the Antelope Valley. 20-1

This is a very important issue and I would like to request a copy of the document and a 30-day extension of time to review the document so that I can submit comments and suggestions. Quite frankly, given the controversy that exists on this issue and the active role I have taken in seeing the issue addressed, I was surprised that I was not included on the notification list.

Thank you for your consideration of this request, and I look forward to your response.

Sincerely,

Mike Antonovich

MICHAEL D. ANTONOVICH
Supervisor, Fifth District

MDA:sh

ROOM 869 KENNETH HAHN HALL OF ADMINISTRATION, 500 WEST TEMPLE STREET, LOS ANGELES, CALIFORNIA 900
TELEPHONE (213) 974-5555 • (213) 974-1010 (FAX)

TOTAL P.02

Responses to Comments from Los Angeles County Board of Supervisors (Antelope Valley)

20-1. A copy of the draft EIR was forwarded to the Los Angeles County Board of Supervisors office. We regret that this copy was not forwarded to you or that you were not informed of its receipt. Due to the court-imposed deadline for completing the EIR on the proposed GO and the fact that the public review period was nearly 72 days, an extension is not appropriate.

DIRECTORS
George Biagi, Jr.
Rudy Mussi
Alfred R. Zuckerman

COUNSEL
Dante John Nomellini
Thomas M. Zuckerman

CENTRAL DELTA WATER AGENCY

235 East Weber Avenue • P. O. Box 1461 • Stockton, CA 95201
Phone 209/465-5883

September 10, 1999

<u>Via Facsimile # (916) 657-2388</u>
<u>and Regular U.S. Mail</u>

Todd Thompson
Associate Water Resources Control Engineer
State Water Resources Control Board
Division of Water Quality
P.O. Box 944213
Sacramento, CA 94244-2130

Re: Comments on the Statewide Program Draft Environmental Impact Report (DEIR) for General Waste Discharge Requirements for Biosolids Land Application.

Thank you for the opportunity to comment on the above matter. In addition to concerns about adverse impacts on the environment and public in general, the Central Delta Water Agency (CDWA) is particularly concerned about the impacts from the land application of biosolids on ground and surface waters which naturally flow into or eventually are discharged into the Sacramento/San Joaquin Delta. 21-1

With regard to the land application of biosolids, the CDWA has not suggested a total prohibition of land application, but rather, has advocated significantly more restrictive use than what the US EPA's 503 regulations currently allow. (U.S. Code of Federal Regulations, Title 40, Part 503). Given the conceded lack of an adequate scientific understanding of the full potential impacts from land application on public health and the environment, together with substantial scientific evidence demonstrating the clear potential for adverse impacts, the CDWA has been advocating and continues to advocate the prohibition of the land application of biosolids to areas that unreasonably and unnecessarily jeopardize the public and the environment. 21-2

Based on a review of the available scientific evidence, it is clear that the scientific uncertainty with regard to the potential risks of land application of biosolids is considerable to say the least. Given this tremendous gap in our current scientific understanding of the 21-3

environmental fate of the thousands of potential contaminants and pathogens present in biosolids, it is difficult to comprehend how one could conclude that the most environmentally superior alternative for disposal of biosolids is to scatter them all over the state, much less on our state's limited and scarce prime farmland. No where in the EIR does the EIR make the case that disposal on prime farmland is a necessity. Instead, the EIR proceeds on the premise that biosolids will be applied on the state's most productive lands and attempts to analyze the potential impacts from such applications. The purpose of the EIR is "to provide public agencies and the public in general with detailed information about the effect which a proposed project is likely to have on the environment; to list ways in which the significant effects of such a project might be minimized; and to indicate alternatives to such a project." (Public Resources Code section 21061). For the following reasons, the EIR has thus far failed to fulfill its fundamental purposes. 21-3 (cont)

I. The SWRCB's Directive:

At the outset it is important to note that in the SWRCB's Decision 96-08, whereby the SWRCB mandated that the Central Valley Regional Water Quality Control Board could not approve its general waste discharge requirements for the land application of biosolids without first preparing an EIR (which decision ultimately led to the preparation of the current EIR), the SWRCB stated:

> "The RWQCB should also give special consideration to the unique nature of the lands in the Sacramento-San Joaquin Delta, areas within floodplains, and areas with very high ground water in its CEQA document." 21-4

While the present EIR has excluded the statutory legal Delta (as defined in Water Code Section 12220) from coverage under the General Order (GO), the GO allows the application of biosolids to lands immediately adjacent to and surrounding the legal Delta, as well as on lands within the watershed of the legal Delta. Application of biosolids on such lands will, in addition to other impacts, potentially impact ground and/or surface waters which naturally flow into or eventually are discharged into the legal Delta. As will be discussed more fully below, despite the SWRCB's directive, the EIR has failed to give adequate, much less "special," consideration to the unique nature of the lands in the Delta, to areas within floodplains and to areas with very high ground water.

II. The EIR Has Failed to Thoroughly Document, Acknowledge and <u>Take Into Consideration</u> the Shortcomings of Our Current Understanding of the Full Risks Associated with the Land Application of Biosolids.

The EIR has failed to thoroughly document, acknowledge and take into consideration the shortcomings of our current understanding of the full short-term and long-term risks associated with the land application of biosolids. The considerable uncertainty associated with the environmental and public health impacts associated with the thousands of contaminants and pathogens present in biosolids <u>must be properly factored into the decision</u> 21-5 making when designating areas that are suitable for land application and when specifying the conditions under which biosolids may be applied to those areas. While the EIR identifies some of the shortcomings in our current understanding of the risks associated with the land application of biosolids, the EIR fails to provide additional "safety buffers" or "uncertainty buffers" to protect the environment and the public from the extensive gaps in our scientific knowledge in this area.

As an example of the unavoidable uncertainty associated with the impacts from pathogens in biosolids, the authors of the study, "Hazards from Pathogenic Microorganisms in Land-Disposed Sewage Sludge," explain the following:

21-5 (cont)

> "It should be recognized that the list of pathogens is not constant. As advances in analytical techniques and changes in society have occurred, new pathogens are recognized and the significance of well-known ones changes. Microorganisms are subject to mutation and evolution, allowing for adaptation to changes in their environment. In addition, many pathogens are viable but nonculturable by current techniques [cite], and actual concentrations in sludge are probably underestimated. Thus, no assessment of the risks associated with the land application of sewage sludge can ever be considered to be complete when dealing with microorganisms. As new agents are discovered and a greater understanding of their ecology is developed, we must be willing to reevaluate previous assumptions." (See Attachment "A" to prior comments on NOP dated 12/1/98, pg. 58).

A. **The EPA's 503 Regulations Do Not Adequately Protect the Public and the Environment from Potentially Significant Adverse Impacts.**

At the outset, it is important to further note that while the EPA has promulgated regulations dealing with the land application of biosolids on a national scale, a review of the scientific literature and the 503 regulations themselves demonstrates that the 503 regulations fail in numerous respects to adequately protect the public and the environment from potentially significant adverse impacts. The numerous gaps and shortcomings of the EPA's minimum, national standards must therefore be filled and accounted for by the respective lead agencies for proposed biosolid applications. The numerous gaps and shortcomings of the EPA's 503 regulations leave the clear potential for significant adverse impacts on the environment. 21-6

1. **Scientific Evaluation and Criticism of the 503 Regs.**

An example of a recent scientific evaluation and criticism of the 503 regulations is the Cornell Waste Management Institute's report entitled, "The Case for Caution. Recommendations for the Land Application of Sewage Sludges and An Appraisal of the US EPA's Part 503 Sludge Rules." (See Attachment "B" to prior comments on NOP dated 12/1/98). In the summary of that report, the authors state: 21-7

> "Current US federal regulations governing the land application of sewage sludges do not appear adequately protective of human health, agricultural productivity or ecological health. The risk assessment conducted by United States Environmental Protection Agency (USEPA) contains many gaps and non-conservative assumptions in establishing contaminant levels which are far less protective than those of many other nations. . . . The potential for widespread use of sludge on agricultural and residential land, the persistence of many of the pollutants which may remain in soils for a very long time, and the difficulty of remediation call for a more cautious approach. In addition, reassessment of standards based on ecotoxicological impacts will need to be undertaken shortly when the US EPA-sponsored study being performed by Oak Ridge National Laboratory is completed." (Id. pg. 1).

21-7 (cont)

The report continues:

> "Additional testing of sludges is recommended. Caution is advised in application to pasture and forage . . . . Further investigation is needed to assess risks to ground and surface water and to establish standards for additional contaminants." (Id.).

Additional statements regarding the inadequacies of the 503 regs are set forth in Attachment "C" to prior comments on NOP dated 12/1/98, a letter from the Citizens' Environmental Coalition, dated April 1996, entitled, "Sewage Sludge in Agriculture: Cause for Concern."

2. **The EPA's Acknowledgment of the Inadequacies of its 503 Regs.**

The EPA itself acknowledges the limits and shortcomings of its 503 regulations. The EPA explains:

> "The Agency recognizes that today's rule may not regulate all pollutants in sewage sludge that may be present in concentrations that may adversely affect public health and the environment." (Federal Register, Vol. 58, No. 32, pg. 9253).
>
> "Today's rule establishes standards for those pollutants and sludge use or disposal methods for which the Agency had sufficient information to establish protective numerical limits, management practices, and other requirements." (Id.). 21-8
>
> "The scope of the part 503 standards is necessarily constrained by the adequacy of information on sewage sludge pollutants and means of use or disposal. However, rather than wait for more complete information in order to promulgate all-inclusive regulations, the Agency is promulgating standards for those pollutants and use or disposal practices for which sufficient information exists." (Id., pg. 9252).
>
> "EPA deferred consideration of pollutants for which EPA lacked human health criteria or sufficient data. . . . [For example,] [w]hen EPA initiated [their] pollutant assessments in 1984, the Agency did not include dioxin as a pollutant evaluated for this rule. At that time, EPA lacked the data required to assess numerical limitations for dioxin in sewage sludge. In addition, adequate data were not available on the levels of dioxin or its pervasiveness in sewage sludge." (Id. pg. 9264).

Thus, with regard to dioxin, the EPA further explains:

"Dioxins, which may be present in sewage sludge, are not regulated not because they are believed safe but because at the time EPA initially screened pollutants for regulation it lacked data to evaluate dioxins for regulation." (Id. pg. 9384).

21-8 (cont)

Some of the other pollutants which were similarly deferred not because they posed little risk to the public and the environment, but, sadly, because the EPA lacked sufficient data to determine the extent of the risk they posed are listed in Table III-3 on page 9265 of the Federal Register Vol. 58, No. 32. (Note that this list is not exhaustive, see Id. pg. 9384).

III. Ground and Surface Water Impacts.

Given the considerable effort and expense our public wastewater treatment facilities undergo to concentrate and extract the potentially harmful contaminants and pathogens from the wastewater such that the wastewater effluent can be safely returned to the waterways, it should be obvious that adequate steps should be taken to ensure that these contaminants and pathogens which can not be directly applied to our waterways are not indirectly applied to our waterways as a result of biosolid applications to areas which create an unreasonable and unnecessary risk of contamination of our state's surface and ground waters.

With regard to potential ground and surface water contamination, the CDWA believes the available scientific evidence demonstrates that the staging, storage and bulk application of biosolids should be prohibited in the following areas: 21-9

(1) Any area onto land having less than 60 feet of depth to groundwater.
(2) Any area for which the elevation is not at least three feet above the 100 year flood plain elevation.
(3) Any area protected from flooding by levees.
(4) Any area within the inundation zone of any dam or dam failure.
(5) Any area within 850 feet from any water well.
(6) Any area within 850 feet from surface waters, including creeks, ponds and marshes, water supply ditches and canals, and drainage ditches and canals which discharge into surface waters.

As will be discussed more fully below, the CDWA believes there is substantial evidence to support a fair argument that the land application of biosolids in any of these areas may result in potentially substantial adverse impacts on the environment.

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A. Groundwater Impacts:

1. The Available Scientific Evidence Justifies the Imposition of an Adequate Vertical Buffer.

The GO fails to adequately protect the groundwater from potentially significant contamination. While the EIR acknowledges that shallow groundwater is one of the major risk factors with regard to the leaching of contaminants to groundwater (e.g., EIR pg. 3-36), the EIR fails to designate a minimum vertical buffer from the land application site to the underlying groundwater which will minimize or reduce the GO's adverse impacts on groundwater. 21-10 The CDWA believes the available scientific evidence demonstrates that the land application of biosolids to areas with less than 60 feet to groundwater unnecessarily and unreasonably subjects the groundwater to potentially significant contamination. The risk of groundwater contamination is unnecessary since there is ample land throughout the state with greater that 60 feet to groundwater upon which biosolids could be applied. Moreover, as will be discussed more fully below, the risk is unreasonable since the available scientific evidence demonstrates that viruses have traveled at least 60 feet to groundwater and that other pathogens and pollutants may potentially travel such distances via "preferential flow" routes. 21-11

The need for an adequate vertical buffer is readily apparent from a review of the available scientific evidence. While the CDWA presented evidence of the "preferential flow" phenomenon in its comments on the Notice of Preparation (dated December 1, 1998), the EIR has apparently overlooked and failed to consider this information. 21-12 This evidence is obviously relevant and as such must be adequately discussed and taken into consideration in the EIR.

With regard to the leaching of metals, the Cornell Waste Management Institute (CWMI), explains:

"The generally-held belief that metals in sludges cannot readily leach has been called into question by recent data. Working with undisturbed soil columns rather than the repacked soil columns used in previous experiments, the potential for leaching of metals has been demonstrated. In undisturbed soils, channels created by worms and roots and other processes ('macropores') provide for rapid downward water movement that can limit the adsorption or chemical interactions between the percolate and the soil (Camobreco, et al., 1996). 21-13 Transport appears to be governed by this fast and far-reaching preferential flow and by the relatively non-reactive forms of some of the metals, i.e., as soluble and/or colloidal complexes which is enhanced by the organic matter in sludges (Richards, et al., 1998). Most sludge research to date has overlooked this phenomenon." (Case for Caution 1999 Revision, pg. 23). (Emphasis added).

The CWMI goes on to add:

"High pH (such as in alkaline-stabilized sludge products) can actually increase leaching since the solubility of some organically-complexed metals is high under such conditions. Examination of field research data collected over the years by many researchers shows that typically up to half of some metals applied in sludges appear to be 'missing' from the soil and may have leached (Baveye, et al., 1999). Transport of a range of metals in percolating water has been directly observed at a field site where sludge was applied more than a decade earlier (Richards, et al., 1998). Concentrations of Cd, Ni, and Zn exceeded drinking water standards in leachate collected from lysimeters immediately below soils receiving sludge 20 years after a large quantity of sludge had been applied to agricultural soils (Richards, et al., 1998). Calculations of impacts on groundwater indicate the potential for violation of drinking water standards in the vicinity of sludge application sites." (Id.).

Other statements regarding leaching include the following:

With regard to the leaching of metals to groundwater, please see Attachment "H" to prior comments on NOP dated 12/1/98 for the recent study entitled "Movement of Heavy Metals Through Undisturbed and Homogenized Soil Columns" which indicates:

"[P]revious laboratory metal leaching studies performed on homogenous soils might have greatly underestimated metal mobility in the field and that preferential flow [e.g., flow through cracks, worms holes and macropores, etc.], both alone and in combination with organic-facilitated transport can accelerate metal leaching through soils." (Id. at pg. 740). 21-13 (cont)

Moreover, as the recent study entitled, "Mobility and Solubility of Toxic Metals and Nutrients in Soil Fifteen Years After Sludge Application," explains:

"[T]he supposition that metals have not migrated substantially downward in soils is usually based on the lack of a marked increase of total or readily extractable metals in the subsoil immediately below the sludge/soil layer. It should be recognized that bypass flow through structural cracks, root channels, wormholes, and other highly conductive paths and the presence of fairly nonadsorptive soluble complexed forms of metal can create conditions conducive to significant metal leaching without markedly increasing the *average* metal concentration in the subsoil (Sidle and Kardos 1977; Camobreco et al. 1996). (Emphasis added). (See Attachment "I" to prior comments on NOP dated 12/1/98, pg. 488).

Moreover the study additionally explains:

"Researchers have further noted that lab-determined distribution coefficients, Kd, for metal adsorption in sludge-amended soils tend to grossly overestimate

metal retention in the field situation (Persicani 1995; Sidle et al. 1977)." (Emphasis added). (Id. pg. 489). 21-13 (cont)

To the extent the EIR concludes that the available scientific evidence does not support the need for a minimum vertical buffer to groundwater, the EIR should indicate whether the scientific studies it relies on to make that determination have overlooked the preferential flow phenomenon. 21-14 In the end the SWRCB will have to support its findings with regard to the environmental impacts from the GO with substantial evidence. As the CEQA Guidelines explain, "[E]vidence which is clearly erroneous or inaccurate . . . does not constitute substantial evidence." (Guidelines section 15384). As is self-evident, sludge experiments which overlook the preferential flow phenomenon are inaccurate and erroneous and, as a result, underestimate the potential leaching of pathogens and pollutants to the groundwater. 21-15

From the abovementioned evidence summarized by the Cornell WMI, it is clear that the available scientific evidence demonstrates that an adequate vertical buffer is needed to protect against the migration of pollutants and pathogens. While there is no guarantee that 60 foot buffer recommended by the CDWA will prevent significant contamination of groundwater given the potential "preferential flow paths" which pathogens and other contaminants can travel, 60 feet would appear reasonable based on existing information. This minimum depth could be increased or decreased in the future as scientists gain a better understanding of preferential flow and other factors which affect the vertical migration of pathogens and contaminants. 21-16 As the Cornell WMI further explains:

"Further investigation is needed to ascertain if there is a significant concern for both metals and pathogens in groundwater, as viral pathogens could migrate by preferential flow as well." pg 23. There is need for field data regarding the movement of pathogens, particularly where groundwater is found at shallow depths and soils are conducive to preferential flow. Few viruses have been studied in regard to sludges and unfortunately unlike viruses behave differently (Dubovi, 1997). No monitoring is currently required for viruses in sludges or sludge products." (Case for Caution, pgs. 28-29). 21-17

Additionally and importantly, the authors of ["Movement of Heavy Metals Through Undisturbed and Homogenized Soil Columns", supra] further indicate:

"The literature shows that metals movement through soil is still not well understood. The roles of preferential flow paths and soluble organic matter are especially unclear." (Id. at pg. 742).

Rather than subject the state's groundwater to potentially significant contamination, the GO should provide at least a 60 foot vertical buffer to minimize such contamination since (1) the available scientific evidence demonstrates that viruses have traveled at least 60 feet to groundwater, (2) migration of contaminants and pathogens via preferential flow has been widely overlooked, (3) preferential flow can provide for "rapid downward movement" that 21-18 can lead to significant leaching of contaminants and pathogens, and (4) since there has been no demonstration that there is a scarcity of available land for land application which has at least a 60 foot buffer to groundwater. (The CDWA hereby renews its request that the EIR survey the potential land available for land application of biosolids and make a finding whether there is adequate land with 60 feet or greater to groundwater to accommodate the projected increase in biosolids over the next fifteen years--i.e., the EIR's impact analysis time frame). 21-18 (cont)

As stated above, the available scientific evidence indicates that viruses have migrated downward through the soil up to 60 feet. In the study entitled, "Hazards from Pathogenic Microorganisms in Land-Disposed Sewage Sludge," it states: 21-19

> "In contrast [to studies using viruses that are highly adsorbed in soil] Gerba and Bitton (1984) reported that coxsackie B3 virus was able to migrate 18.3 m when sewage effluent was applied to land used for artificial groundwater recharge. Downward migration from sludge-amended soils using viruses that adsorb poorly to soil like group B coxsackie has not been studied. . . . Only a limited number of virus groups have been studied to date." (See Attachment "A" to prior comments on NOP dated 12/1/98, pg. 76).

Despite the fact that this study used sewage effluent that was applied to land used for artificial groundwater recharge, a 60 foot buffer nevertheless appears to represent a reasonable buffer given our current lack of an adequate scientific understanding of the vertical migration of pathogens and contaminants. Since the preferential flow phenomenon has been widely overlooked and since only a limited number of virus groups have been studied (apparently none of the viruses which adsorb poorly to soil like group B coxsackie have yet been studied) 60 feet may not be as conservative as it may first appear. Nonetheless, the CDWA believes 60 feet would provide a reasonable level of protection until the scientific community has an opportunity to further investigate the preferential flow phenomenon with regard to both pathogens and other pollutants in biosolids. As was stated above, the minimum vertical buffer could be increased or decreased in the future in response to future scientific research. 21-20

In the event the preparers of the EIR continue to maintain that no minimum vertical buffer is scientifically justified, the EIR (and ultimately the SWRCB) must base that finding on substantial evidence. Before dismissing (and hopefully not ignoring) the results in the abovementioned coxsackie B3 study, the EIR should thoroughly address the following questions, among others: 21-21

- -- The extent coxsackie B3 can be present in Class A and Class B biosolids. 21-22
  - -- Must consider all of the abovementioned shortcomings with the 503 regs, not the least of which are the inadequacies of the pathogen reduction methods, the potential for pathogen regrowth after treatment, and the accidental or negligent application of biosolids that have not met the Class A or Class B standards. 21-23

- -- Extent to which other viruses with similar characteristics as coxsackie B3 (e.g., viruses that absorb poorly to soil) are present in Class A and Class B biosolids. 21-24
- -- Whether viruses and other contaminants which we know very little about and/or which we are not scientifically able to detect or study can move through soil similarly or more easily than coxsackie B3. 21-25
  - -- "Downward migration from sludge-amended soils using viruses that adsorb poorly to soil like group B coxsackie has not been studied. . . . Only a limited number of virus groups have been studied to date." (See Attachment "A" to prior comments on NOP dated 12/1/98, pg. 76).
    - -- To date, have viruses like group B coxsackie been studied?
    - -- To date, what virus groups have been studied?
    - -- Did these studies take into consideration the preferential flow phenomenon?
  - -- "The literature shows that metals movement through soil is still not well understood. The roles of preferential flow paths and soluble organic matter are especially unclear." (See Attachment "H" to prior comments on NOP dated 12/1/98, pg. 742).
- -- Whether biosolids will be applied to lands which due to their soil makeup and/or the presence of preferential flow paths are similarly capable of transferring viruses (and other contaminants) 60 feet below the surface. 21-26
- -- The extent to which irrigation, the intentional leaching of salts and other minerals from the soils, flooding (and the resulting pooling of water), and rainfall, or a combination of these situations can similarly drive viruses and other contaminants 60 feet or more below the surface. 21-27

2. **The Proposed GO's (and the Modified GO's) Groundwater Protection Provisions are Inadequate.**

Prohibitions No. 3 of the General Order states: 21-28

> "The discharge shall not cause or threaten to cause pollution, as defined in Section 13050 of the California Water Code."

In spite of the EIR's recognition that shallow groundwater is a major risk factor contributing to the leaching of contaminants to groundwater (e.g., EIR pg. 3-36), the EIR fails to propose (and the GO fails to specify) a minimum depth to groundwater. While it is difficult to comprehend given the available scientific evidence described above, the GO apparently allows biosolids to be applied on any land that is not "water-saturated." (GO, Prohibition A-15). While the term "water-saturated" is apparently not defined, it would appear that land with groundwater twelve (12) inches below the surface, for example, would not constitute water-saturated land. (Note: The GO should define water-saturated). It thus appears that the GO would potentially allow the land application of biosolids to lands where the groundwater is extremely close to the surface. As has been explained in detail above, the CDWA believes this is unacceptable and unreasonably and unnecessarily subjects the 21-28 (cont) groundwater to potentially significant contamination.

In lieu of designating a minimum vertical buffer to protect the groundwater, the EIR preparers apparently believe that provision #5 of the proposed "Pre-Application Report" is sufficient to protect the groundwater. As will be discussed more fully below, provision #5, entitled, "Ground Water Monitoring," is wholly inadequate to protect the groundwater from contamination from pollutants and pathogens.

The so-called ground water monitoring program would <u>potentially</u> (not automatically) apply to "biosolids' application operations where minimum depth to useable ground water is less than 25 feet." (Note: The GO should define "minimum depth . . . is less than 25 feet"-- 21-29 e.g., does it refer to the highest water level in the last year, in the last 10 years?). This program "at a minimum, consists of three monitoring wells (one upgradient, two downgradient) for each application area is required . . . ." The deficiencies in this program are numerous. First, the monitoring program only applies when biosolids are applied "more than twice within a five-year period at any particular location." Unfortunately, the EIR lacks substantial evidence to support the finding that less than two biosolid applications in five years will not have a significant impact on groundwater. What if the depth to groundwater was less than 60 feet? Less than 25 feet? Less than 1 foot? Presumably it does not matter. The EIR simply lacks accurate scientific and factual information to support this exemption.

Second, the monitoring program may be entirely waived by the Executive Officer "if it is determined that the benefit of such monitoring is not commensurate to the level of protection." The EIR fails to indicate what scientific evidence the Executive Officer will rely on to make such a determination. Unfortunately, the EIR has avoided a thorough evaluation 21-30 of what depth to groundwater is necessary to adequately protect the groundwater. As such, the EIR does not provide the requisite analysis from which the Executive Officer could determine (1) what level of protection the groundwater monitoring will provide, or (2) the extent of the benefit afforded by that protection. Moreover, it is improper for the EIR to defer the analysis of the projects potential impacts on groundwater to the Executive Officer. The EIR's fundamental role is to investigate and analyze the potential impacts of the proposed GO. Allowing the Executive Officer to independently asses the level of protection afforded to a particular site by the monitoring program would violate CEQA. If the EIR 21-31 fails to address the potential impacts of the GO on groundwater across the entire range of potential site conditions throughout the state, then the EIR should be converted into a "program" or "master" EIR which would then be followed up with supplemental CEQA documents for each particular site.

Third, the EIR claims that "In areas with shallow groundwater, monitoring is required that would result in early detection if leaching of substantial quantities of pollutants were 21-32 occurring."3-35. As was described above, monitoring is not required if biosolids are applied

2 or less times in five years and if the Executive Officer decides it is not necessary. Thus in either of these situations, early detection will not occur. Moreover, even when monitoring is 21-32 required, it does not require testing of metals, organic compounds, or pathogens. Thus early (cont) detection of leaching of metals, organic compounds, and pathogens will not occur.

Finally, while the CDWA believes biosolids should not be applied to lands with less than 60 feet to groundwater, to the extent the EIR relies on groundwater monitoring in addition to or in lieu of providing an adequate vertical buffer, the monitoring must test for metals, organic compounds and pathogens. Moreover, to the extent the EIR relies on groundwater monitoring in lieu of setting a minimum depth to groundwater, the EIR must present factual, scientific evidence supporting its conclusion that its groundwater monitoring program will "result in early detection if leaching of substantial quantities of pollutants were occurring." For example, the EIR should discuss, among other issues: (1) under what circumstances the minimum 3 wells will be sufficient, i.e., for what size site is 3 wells 21-33 adequate, a 5 acre site? A 2,000 acre site?; (2) whether one sample once a year is sufficient; (3) whether other wells in the vicinity of the site will create a depression which will affect the flow of contaminants away from the designated monitoring wells; (4) whether the typical tests for pathogens--e.g., the fecal coliform test--will sufficiently detect the presence of the entire range of pathogens that may have leached from the application site (E.g., the EIR should take into consideration the fact that "negative coliform tests do not provide assurance that water is free of Giardia cysts . . ." EIR, pg. E-14), (5) the extent to which subsurface farm drains (if present), such as "tile drains" will drawn the leached pathogens and contaminants away from the monitoring wells and into surface waters, etc.

In general, the EIR should consult scientists who specialize in groundwater monitoring and obtain their professional advice on what form of testing protocol is necessary to "early detect" leaching of all of the various contaminants and pathogens present in the biosolids. For example, precisely what constituents should be tested, how often should they be tested, how deep in the saturated zone should the samples be taken, how many samples should be taken during each sampling event, how many wells should be monitored, where 21-34 should the wells be placed--i.e., in the middle of the application site, along the perimeter of the site etc.--how many years after the last application of biosolids should the wells continue to be tested, etc.? The scientists should then provide their professional opinion as to how much protection such monitoring will provide.

B. **Horizontal Migration:**

With regard to the horizontal migration of pathogens, the scientific evidence demonstrates that "once [pathogens are] in groundwater, they may travel significant distances from the site." (See Attachment "A" to prior comments on NOP dated 12/1/98, pg. 84). The CDWA believes the available scientific evidence demonstrates that the land application 21-35 of biosolids should be prohibited to any area within 850 feet from any water well; surface waters, including creeks, ponds and marshes, water supply ditches and canals; and drainage ditches and canals which discharge into surface waters. For example, viruses have been detected in groundwater 820 feet from the application site:

" . . . Koerner et al. (1979) detected viruses in samples collected at a depth of 55 feet and 820 feet away from a rapid infiltration site in New Jersey." (See Attachment "J" to prior comments on NOP dated 12/1/98, pg. A-2).

With regard to the potential for horizontal movement of viruses to distances of 820 feet as reported by Koerner, et al., similar concerns and questions as stated above with respect to the studies regarding the 60 foot vertical movement must be addressed in order to accurately assess the significance of the study.

The EIR unfortunately lacks scientific information regarding the factors which contribute to the horizontal and vertical movement of pathogens and contaminants once they reach the saturated zone (i.e., the groundwater aquifer). The EIR should solicit scientific information regarding these various factors and investigate and discuss the following issues, among others: How far and how quickly will the various contaminants and pathogens travel vertically and horizontally in the saturated zone? What factors influence their movement? Will they concentrate near the top of the water table (will some of the pollutants and pathogens float? If so which ones?) Or, rather, will they continually drive downward as a result of gravitational forces? 21-35 (cont)

It is clear that all of these factors are essential in order to adequately designate setback distances from nearby wells and surface water sources (where the groundwater could accrete to the surface waters, etc.). As mentioned below in the comments under the heading "Discharge Specification #8," the EIR must thoroughly present the factual, scientific basis for each of the proposed setback distances. While there is no guarantee that the 850 foot horizontal buffer recommended by the CDWA will prevent significant contamination of groundwater, 850 feet would appear reasonable based on existing information. This minimum buffer could be increased or decreased in the future as scientists gain a better understanding of the factors which influence the horizontal migration of pathogens and contaminants in the groundwater. 21-36

The EIR should also bear in mind the extremely low infection dose for many pathogens:

"Significant numbers of pathogens exist in sludge even after stabilization and treatment. If these pathogens can remain viable for extended periods of time, groundwater sources beneath sludge disposal and land application sites may become contaminated. Pathogens may not be significantly inactivated or removed by transport through the vadose zone. Once in groundwater, they may travel significant distances from the site. For viruses and parasites, the infectious dose is low, 1-50 organisms (Gerba 1986). If the concentration of either of these pathogens exceeds 10^{-3}/mL of groundwater, there could be a significant risk of infection on an annual and lifetime basis (Gerba and Rose 1990)." (See Attachment "A" to prior comments on NOP dated 12/1/98 Hazards, pg. 85). 21-37

C. Impacts from Flooding:

The EIR has failed to adequately investigate, analyze and discuss the potential impacts on surface and ground water quality from the application of biosolids to areas subject to flooding. The CDWA believes the land application of biosolids in an area subject to flooding may result in potentially substantial adverse impacts on the environment. To mitigate these potential impacts, the CDWA believes the available scientific evidence demonstrates that the land application of biosolids should not be applied to (1) any area for which the elevation is not at least three feet above the 100 year flood plain elevation, (2) any area protected from flooding by levees, and (3) any area within the inundation zone of any dam or dam failure. 21-38

1. The EPA Failed to Analyze the Potential Impacts From the Flooding of Land Application Sites.

The US EPA's 503 regs not only suffer from the extremely limited number of pollutants which were evaluated and regulated--merely nine out of the thousands of potential pollutants commonly found in biosolids--but, in addition, the 503 regs wholly lack any meaningful analysis of the impacts from any pollutants or pathogens from the flooding of land application sites. The EIR should therefore conduct this much needed analysis in order to adequately assess the potential impacts from the flooding of biosolid application sites.

In the EPA's discussion accompanying the 503 regs, the EPA explains: "The proposed general requirement that was deleted from the final regulation concerns restricting the flow of a base flood, reducing the temporary storage capacity of a floodplain, <u>or posing a hazard to human health, wildlife, or land or water resources because of sewage sludge in the runoff from the base flood</u>." (Federal Register, Vol. 58, No. 32, pg. 9330). (Emphasis added). 21-39

With regard to the potential impacts from the run-off of pollutants from flooded land, the EPA states the following reasons for dismissing (and ignoring) the concerns from floodwater runoff:

(1) "[T]he probability that sewage sludge will be land applied to a 100 year floodplain is low . . . .", and
(2) "[P]ollutant limits in the land application subpart are designed to protect run-off of pollutants into surface waters (i.e., the surface water pathway was evaluated during the land application exposure assessment)" (Id. pg. 9330).

There are numerous gaps and shortcomings associated with the EPA's "assessment" of the potential impacts from flooding, not the least of which is the EPA's unwarranted and inaccurate assumption that "the probability that sewage sludge will be land applied to a 100 year floodplain is low." This assumption, however, nevertheless helps explain the 503 regs's clear deficiency of any meaningful analysis of the impacts from the flooding of biosolid application sites.

A review of the 503 regulations demonstrates that the EPA has failed to give any attention to the peculiar impacts typically associated with flooding. For example, the EPA has failed to consider the following impacts, to name a few:

(1) The nature and extent biosolid pollutants and pathogens will enter the waterways as a result of erosion of the soil typically associated with flooding. (See Attachment "D" to prior comments on NOP dated 12/1/98).

(2) The extent to which biosolid pollutants and pathogens will be absorbed or re-suspended in the floodwaters as the floodwaters pass over the sites or collect or "back-up" onto the sites before they eventually drain into the nearby surface waters or other low lying areas; 21-40

(3) The effect pooled or "backed-up" floodwaters will have on the downward migration of pollutants and pathogens into the underlying groundwaters; and

(4) The impacts of floodwaters on the temporary or permanent stockpiles of sludge awaiting land application.

Moreover, the mentioned "surface water pathway" evaluation not only failed to consider any of the abovementioned concerns, but, additionally, suffers from numerous other limitations, including the following:

(1) This pathway evaluation, as well as the other EPA pathway evaluations, only looked at nine of the potentially thousands of toxic pollutants commonly found in biosolids;

(2) This pathway, as well as the other EPA pathway evaluations, entirely failed to analyze the potential impacts from the spread of pathogens[1]; and 21-41

(3) As the Cornell University Waste Management Institute explains, "The US EPA risk assessment [regarding surface water quality impacts] used unrealistic assumptions regarding dilution of contaminants [e.g., the EPA assumed only 0.24% of the model watershed receives sludge, thus failing to properly assess the impacts on smaller bodies of water]." (See Attachment "B" to prior comments on NOP dated 12/1/98 pg. 27-28).

Moreover, with regard to the significance of the amount of biosolid contaminants which may enter the surface waters the EIR should consider the following: 21-42
In the City of Modesto's <u>Draft EIR For the Land Application of Class A Exceptional Quality Biosolids</u>, the City of Modesto states the following based on a personal

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[1] "The [EPA] Administrator concluded that it is not feasible, based on current information and the state of analytical capability, to develop numerical limitations for pathogens, vector attraction reduction, and Total Hydrocarbons at this time using the type of exposure assessment employed to develop numerical limitation for other pollutants. (Fed. Regis. Vol. 58, No. 32, pg. 9322). (See also, Id. at pg. 9324, "The pathogen requirements in the part 503 regs are not based on the results of an exposure assessment. Instead, the requirements are performance standards based on the demonstrated ability of treatment processes to reduce pathogens in the sewage sludge.").

communication with Kenneth Landau, a supervisor of the Central Valley Regional Water Quality Control Board ("Regional Board"):

> "If significant quantities of biosolids are discharged into a surface water body, the quality of the surface water could be degraded by: 21-42 (cont)
> [1] decreases in dissolved oxygen caused by oxygen demanding substances in the wastes;
> [2] increased levels of bacteria and other pathogens;
> [3] increases in nutrients (e.g., NO3),
> [4] turbidity and color impacts, and
> [5] sedimentation on the bed of the water body."
> (See Attachment "E" to prior comments on NOP dated 12/1/98, pg. VI-96).

The Regional Board's Basin Plan further explains:

> "Toxicity can be associated with many discharge activities [including the land application of biosolids]. Its effects may be first expressed as acute or chronic reductions in the number of organisms in receiving waters. <u>Minute amounts</u> of toxic materials may also impair beneficial uses from accumulation in tissues or sediments." (Regional Board's 1994 Water Quality Control Plan, pg. IV-2.00). (Emphasis added). (See Attachment "F" to prior comments on NOP dated 12/1/98). 21-43

Thus, for the foregoing reasons, the EIR should thoroughly investigate, document, discuss and analyze the extent to which flooding may transport contaminants and pathogens into ground and surface waters, and the resulting environmental and public health impacts associated with the transport of these contaminants and pathogens. Thus far, the EIR has entirely failed to conduct this analysis. 21-44

D. Surface Water Impacts:

The EIR has failed to adequately address the potential impacts from the land application of biosolids on surface waters from storm water runoff, and irrigation return flows (both surface and subsurface) to surface waters.

Similar to the discussion and analysis stated above with regard to surface and groundwater impacts resulting from the flooding of land application sites, the EIR should thoroughly investigate, document, discuss and analyze the following: 21-45

(1) The nature and extent <u>each of the particular</u> biosolid pollutants and pathogens will enter surface waters as a result of storm water runoff, and irrigation drainage return flows to the surface waters.

(a) This discussion and analysis would necessarily include an examination of the extent to which <u>each of the particular</u> biosolid pollutants and pathogens will be absorbed or re-suspended in storm or irrigation waters as the waters pass over the sites (including the temporary stockpiles of biosolids) or drain from the sites into the nearby surface waters.

(b) This discussion and analysis would likewise necessarily include an examination of the extent to which the storm or irrigation water leaches each of the particular biosolid pollutants and pathogens (from biosolid application areas and the temporary stockpiles of biosolids) into the underlying groundwater and subsequently transports these contaminants into the nearby surface waters via subsurface accretions to the surface waterways. 21-45 (cont)

(2) Once the magnitude of the potential loading of each of the particular biosolid pollutants and pathogens to the surface waters is adequately determined, the EIR should thoroughly investigate, document, discuss and analyze the potential adverse impacts this loading will have on the full range of organisms which live in, feed from, drink from, and/or recreate in the affected surface waters.

For this discussion as well as all others, the EIR should fully set forth the methodology it employs to determine the extent of contaminant loading to the surface waters and the impact of this loading.

Please see the comments below under the heading "Discharge Specification #8" for a discussion of what the EIR should disclose regarding the adequacy of the proposed setback distances from surface waters. The buffer distance from agricultural drains which ultimately discharge into surface waters is especially critical since these drains will very likely pick up contaminants and pathogens which are leached through the soil and/or which are picked up by the excess irrigation water, i.e., the tail water. 21-46

An example of one of the surface water contamination issues is the extent to which floodwaters, storm runoff and irrigation runoff from the proposed sites will impact the trihalomethane formation potential of our waterways. As the California Water Plan 1994 Update explains:

> "In its journey to the sea, water dissolves organic compounds present in the soil as a result of plant decay. This organic material includes humic and fulvic acids, and other organic compounds. High levels of these compounds can be present in drainage from wooded or heavily vegetated areas and from soils high in organic content, such as the peat soils which are present in parts of the Delta and other places in CA [and such as the soils on biosolid application sites]. . . . Trihalomethanes are a class of synthetic organic chemicals produced in drinking water when chlorine, used as a disinfectant, comes into contact with naturally occurring organic material dissolved in the water." (CA Water Plan 1994 Update, Bulletin 160-93, Vol. 1, pg. 111-112). (See Attachment "G" to prior comments on NOP dated 12/1/98). 21-47

In the recent Delta Wetlands' hearings before the State Water Resources Control Board (SWRCB) there was considerable testimony regarding the effects and impacts of organics present in runoff from land which enters the Delta. Moreover, the Delta is a partial 21-48

or total source of drinking water for approximately two-thirds of the state (Water Education Foundation, 1994). Since the land application of biosolids is being touted for its ability to provide a large supply of organics to the land, the proposed project has the potential to substantially exacerbate the amount of trihalomethanes in our drinking supplies. The EIR should adequately investigate, document, discuss and analyze the potential impacts from floodwaters, storm runoff, and irrigation return flows draining from the proposed applications sites on the trihalomethane formation potential of the receiving surface or ground waters. 21-48 (cont)

Another example of one of the surface water contamination issues which the EIR should thoroughly investigated is the extent to which floodwaters, storm runoff and irrigation runoff from potential biosolid application sites throughout the watershed of the San Francisco Bay will cumulatively contribute to the mercury, copper, dioxin, and other contaminant problems in the Bay. As the recent article, entitled, "Fever Breaks on Mercury," explains:

> "[The] EPA has suddenly cracked down on discharges to water bodies officially listed as 'impaired' under the Clean Water Act due to the presence of mercury, copper, dioxin and other contaminants. Both the North and South Bays are officially 'impaired.'" (See Attachment "AA" to these comments). 21-49

The EIR should analyze the cumulative impacts from the potential widespread disposal of biosolids authorized under the GO containing these and other contaminants on the already "impaired" North and South Bays. Our wastewater treatment plants have spent considerable resources extracting and concentrating these contaminants from the wastewater; does it make sense to then turn around and scatter these contaminants throughout the watershed of the Bay-Delta, especially in light of the already "impaired" waterways?

IV. Environmental Impacts from Pathogens.

The EIR has failed to adequately investigate, document, discuss and analyze the potential for the numerous pathogens present in both Class A and Class B biosolids to enter the ground and surface waters, the air, or the land in the vicinity of the application sites. 21-50

It should be noted that, as explained above, the EPA did not conduct an exposure assessment with regard to pathogens. As the EPA explained:

> "The [EPA] Administrator concluded that it is not feasible, based on current information and the state of analytical capability, to develop numerical limitations for pathogens, vector attraction reduction, and Total Hydrocarbons at this time using the type of exposure assessment employed to develop numerical limitation for other pollutants. (Fed. Regis. Vol. 58, No. 32, pg. 9322). (See also, Id. at pg. 9324, "The pathogen requirements in the part 503 regs are not based on the results of an exposure assessment. Instead, the requirements are performance standards based on 21-51

the demonstrated ability of treatment processes to reduce pathogens in the sewage sludge.").

Thus, the potential impacts on the public and the environment from the disposal of pathogens via the land application of biosolids have simply not been analyzed or considered by the EPA, and therefore should be adequately evaluated in the EIR. 21-51 (cont)

To make matters worse, the evidence demonstrates that the pathogens present in biosolids have the potential to regrow after the biosolids leave the treatment plant. "The EPA concluded that significant regrowth of Salmonella sp. bacteria was possible if the sludge was not injected into the soil within 8-hours after it leaves the treatment works (FR 58-p. 9353)." (See Attachment "K" to prior comments on NOP dated 12/1/98, pg. 2). The EIR should thoroughly investigate, document, discuss and analyze the extent to which pathogens will regrow after the biosolids leave the treatment plants and/or after the biosolids are tested for compliance with the Class A and B standards. The EIR should then thoroughly investigate, document, discuss and analyze the potential environmental impacts from such regrowth. 21-52

Other scientific evidence regarding the potential regrowth of pathogens, which the EIR should adequately investigate and take into consideration, include the following:

> "A major reason for enteric bacterial die-off outside of the host intestinal tract is probably their inability to lower their metabolic requirements to a lower nutrient availability (Klein and Casida 1967). Mallman and Litsky (1951) felt that the organic content of sludge enhanced bacterial survival. The survival of fecal coliforms is greatly extended in organic soils over that observed in mineral soils (Tate 1978), and the regrowth of S. typhimurium and E. coli has been observed in buried feces (Temple et al. 1980)." (See Attachment "A" to prior comments on NOP dated 12/1/98, pg. 77). (Emphasis added). 21-53

> "Salmonella can multiply vigorously in sterilized sludge or slurry, but under natural conditions growth is limited or strongly inhibited by the activity of microflora (Findlay 1973)." (Id.).

> "Bacteria, unlike either viruses or parasites, can actually increase in numbers during treatment under certain conditions. Regrowth in composts that were not fully stabilized has been documented (Soares, et al., 1995). Thus a compost could have met processing requirements and standards for E. coli or Salmonella (US EPA requires testing for one or the other for Class A), but could subsequently have significant bacterial levels if regrowth occurs after testing." (Case for Caution 1999 Revision, p. 29).

The EIR should also bear in mind and take into consideration our current inability to effectively detect pathogens: 21-54

> "Currently, methods to determine the risk of disease from pathogens in land-disposed sludge are inadequate because the sensitivity of pathogen detection is poor. The application of recombinant DNA technology (gene probes and polymerase chain reaction) to environmental samples may provide increased sensitivity for detecting specific pathogens in land-disposed sludge and greatly improved risk assessment models for our exposure to these sources of pathogens." (See Attachment "A" to prior comments on NOP dated 12/1/98, pg. 85). 21-54 (cont)

With regard to cattle grazing on biosolid amended land, it should be noted that the available scientific evidence demonstrates that the risks from cattle grazing on biosolid sites to the health of the cattle and to the health of humans who consume the cattle may be unacceptably and unreasonably high. Please see Attachment "L" to prior comments on NOP dated 12/1/98, entitled, "Parasitic Hazard with Sewage Sludge Applied to Land." That report made the following findings:

> "A modification of the FAUST technique allowed a highly regular recovery of Taenia saginata eggs from sewage sludge, as well as their quantification. Despite the low viability (8%) noted, the viable T. saginata egg level remains high (20 -10^6) and offers a serious risk for cattle even after a 3-week "no-grazing" period." (Pg. 1420, title summary). (Emphasis added). 21-55

The report further states:

> "[W]e must stress the danger of spreading 20,280,000 viable T. saginata eggs over 1 ha of grazing or pasture land, even with a 'no-grazing' interval of 3 weeks, as fixed by the recommendations of the European Economic Community dated 12 June 1986 (to be implemented in 1989). This 3-week delay is a precautionary measure than can by no means stop all hazards of parasitic disease for cattle or humans." (Id. pg. 1421).

V. **Air Quality Impacts.**

The CDWA believes there is substantial evidence to support a fair argument that the proposed biosolid application will have a potentially substantial adverse impact on air quality in the vicinity of the application site. In a recent study, "Occurrence of Airborne Bacteria and Pathogen Indicators during Land Application of Sewage Sludge," the study concluded,

> "It is clear . . . that physical agitation of sludge material could result in the generation of a large number of diverse bacterial populations in the immediate vicinity, raising questions of possible sludge-handling worker exposure." (See Attachment "M" to prior comments on NOP dated 12/1/98, pg. 299.) 21-56

For the purposes of this study, the "immediate vicinity" was 48 to 99 feet from the application sites. (Id. pg. 297).

The EIR should thoroughly investigate, document, discuss and analyze the potential impacts on the public, including the local residents and workers, and the environment from airborne pathogens and toxic airborne pollutants (via wind erosion, physical sludge agitation, or otherwise). Again, the factual, scientific evidence supporting the GO's proposed setback distances must be fully explained and disclosed in the EIR. 21-56 (cont)

VI. The EIR Should Thoroughly Address the Potential Impacts from Land Application on Agricultural Land.

The CDWA believes there is substantial evidence to support a fair argument that the land application of biosolids will have a potentially substantial adverse impact on the productivity of the land upon which the biosolids will be applied. As the recent study entitled, "Mobility and Solubility of Toxic Metals and Nutrients in Soil Fifteen Years After Sludge Application," explains, biosolid applications not only have short term impacts on the productivity of the soil, but long term impacts as well. For example, on pg. 498-499 of the study, the authors explain:

> "Some trace metals, particularly Cd and Zn, remain highly plant-available in the sludge-treated soil after 15 years. Young maize plants grown in containers of soil from the S1 site accumulated in excess of 500 mg Zn kg-1 and 50 mg Cd kg-1 despite the near-neutral pH of the soil. Maize showed significant growth reduction, and tomato showed severe chlorosis and marked growth reduction accompanied by lower measured Mn concentrations in the plant tissues, symptoms attributable to antagonism from the excess Cu and Zn in the soil (McBride 1995). . . . It is clear that severe effects on plant growth and quality continue to exist more than 15 years after sludge application." (See Attachment "I" to prior comments on NOP dated 12/1/98). 21-57

The EIR should thoroughly investigate, document, discuss and analyze the potential impacts from the proposed application of biosolids on the short term and long term productivity of the land upon which biosolids will be applied.

VII. Site-Specific Environmental Analysis is Required.

The CDWA believes site-specific environmental review is necessary in order to properly minimize or avoid significant adverse impacts on the environment. The EIR should clearly set forth the background conditions--e.g., soil type, soil pH, depth to groundwater, existing levels of contaminants and pathogens in the soil, amount of rainfall, climate etc.--from which it bases its findings and conclusions that significant impacts will or will not occur. To the extent subsequent projects deviate from these conditions, their analysis will not be covered by the analysis in the EIR and thus will require future 21-58

environmental review. 21-58 (cont)

VIII. Alternative Analysis.

A. Other Reasonable Alternatives.

The EIR should adequately discuss and analyze the following alternatives and analyze whether there would be adequate land throughout the state under these alternatives: 21-59

1. Prohibiting the application of biosolids to those areas mentioned above (under the **Ground and Surface Water Impacts** heading) which may have a potentially significant adverse impact on ground and surface water quality.
   a. Analyze whether there would be adequate land throughout the state under this alternative.
2. Prohibiting the application of biosolids to lands used to grow food or used for grazing, thereby limiting application to reclamation sites or to fiber (i.e., cotton), or cover crops.
   a. Analyze whether there would be adequate land throughout the state under this alternative.
3. Prohibiting the application of biosolids to lands used to grow fresh fruits and vegetables.
   a. Analyze whether there would be adequate land throughout the state under this alternative.
4. Segregating food processing waste from other waste.
   a. The EIR should compare and contrast the pollutant concentrations in food processing sludge with those of other sludges to determine if food processing sludge would be less harmful to the environment if land applied.

IX. Other Notable CWMI Recommendations That Should be Incorporated into the GO: (Quotes are from the CWMI's Case for Caution 1999 revision):

A. "In addition to testing of receiving soils, monitoring for a number of currently unregulated contaminants should be required and test results provided to potential users to enable them to compare among different sludges. Tests should include synthetic organic chemicals (including dioxins and furans), antimony, beryllium, boron, chromium, and silver. If animals will be grazing or if forage is grown, copper, fluoride, iron, molybdenum and selenium should be monitored and dietary metal ratios considered." (pg. 31). 21-60

B. "Review existing data on use and disposal of radionuclides and assess potential exposures and require monitoring of sludges for radioactivity." (pg. 34). 21-61

C. "Test shallow water supply wells that are near and downgradient of field where sludges have been applied for metals and pathogens." (pg. 33). (Emphasis added). 21-62

D. "Avoid application on steep slopes, on saturated soils where runoff is excessive, or on shallow or extremely well-drained (coarse) soils where percolation to goundwater may be rapid." (pg. 33). 21-63

E. "Consider expanding pathogen testing to include both fecal coliform and salmonella and require non-detection of salmonella for Class A sludge." (pg. 34). 21-64

F. "Consider measures to apply equal controls to sludge products imported from out of state." (pg. 34).
   1. To what extent will this be allowed? I think the EIR says somewhere that concentrations of CA biosolids tend to be low, or something like that. 21-65

G. "Consider stringent criteria for allowing surface application of Class B sludges based on strict necessity and an assessment of ecological and animal health impacts." (pg. 35). 21-66

X. **Specific Comments on the General Order:**

A. **Finding #s 1(b) and 1(c):**

The exemptions from the GO set forth in Findings 1(b) and 1© should not be allowed. 21-67a Thus far, the EIR has failed to provide factual, scientific evidence to justify the exemptions. The EIR must provide a thorough explanation why these biosolids will not leach 21-67b contaminants and pathogens via preferential routes and why each of the setbacks and other protections in the GO (including setbacks protecting vernal pools and pulpfish) are not scientifically justified. Moreover, the EIR should thoroughly explain what process and procedure an applicant will go through when land applying this exempted biosolids. Will 21-67c there be a process? Will there be any protections? Can the applicant literally apply it anywhere, on any crop, with no setbacks whatsoever?

Please see pathogen section above which discusses regrowth of bacteria in Class A sludges.

As the Cornell Waste Management Institute (CWMI) explains:

"Parasites such as Helminth ova are relatively resistant to inactivation when present as cysts. In Class B sludges they could be present in significant numbers and they have 21-68 been documented to survive for many years in soils (Bowman, 1997)." (Case for Caution 1999 revision, p. 29).

The EIR should examine the extent parasites (that are "relatively resistant to inactivation") are present in Class A sludges, and particularly in the Class A EQ sludges which are exempted from the GO's protections.

The CWMI continues:

"Little is known about the presence and viability of Cryptosporidium and Giardia in sludges. High levels of cysts of Giardia have been detected in sludges, but they may be inactivated (non-infective). More research is needed to assess the risks posed by these protozoa (Straub, et al., 1993). (Case for Caution 1999 revision, p. 29).

The EIR should examine the extent these protozoa are present in Class A sludges, and 21-68 (cont) particularly in the Class A EQ sludges which are exempted from the GO's protections. To the extent the EIR can not say for certain whether these protozoa are present in Class A EQ sludges which are exempted from the GO, then these sludges should <u>not</u> be exempted. The GO's protections should apply in order to safeguard against this gap (as well as countless others) in the current scientific understanding of the risks associated with the land application of biosolids.

B. **Finding #10:**

The GO should require testing for <u>both</u> salmonella and fecal coliform, not just for fecal coliform. The National Research Council recommended the following:

"Until a more sensitive method for the detection of salmonella in sludge is developed, the present test should be used for support documentation, but not be substituted for the fecal coliform test in evaluating sludge as Class A." (Executive Summary, p. 3-- at least on my copy from the Internet). 21-69

The CWMI similarly recommends testing for <u>both</u>:

"Consider expanding pathogen testing to include both fecal coliform and salmonella and require non-detection of salmonella for Class A sludge." (Case for Caution 1999 revision, pg. 34).

The GO should additionally require "non-detection of salmonella for Class A sludge."

C. **Finding # 11:**

If the GO will not regulate the generator, then the EIR should thoroughly explain who, if anyone, will regulate the generator. Will the EPA regulate the generator? If so, how many staff members will the EPA assign to monitor the various generators throughout the state? How often will these staff members independently verify the quality statements made by the generators? How often will these staff members conduct on-site investigations 21-70 to determine whether or not the pathogen and vector attraction reduction requirements are properly being met?

As the CWMI explains:

"Enforcement (or the lack thereof) of rules and practices such as use of agricultural best management practices is a significant issue. The concern is magnified as both federal and state budget cuts force a reduction in environmental staff. US EPA has said that they view the 503 regulations as largely 'self-implementing.'" (Case for Caution 1999 revision, p. 29). 21-70 (cont)

D. **Finding #12:**

This GO should not be approved unless and until the Regional Boards can demonstrate that they have sufficient funds and staff to adequately monitor and enforce the GO. If necessary, the annual and application fees should be sufficient to cover the expected costs of the necessary regulatory oversight for that project. 21-71

E. **Finding # 19:**

This finding states that the biosolids under this order are non-hazardous decomposable wastes. How is this determination made? What testing procedure is required to demonstrate that the biosolids are "non-hazardous decomposable wastes." Precisely what pollutants are tested for? Who performs the test? Is it independently verified? How often is the test performed? Is the frequency of testing adequate to fairly represent the quality of biosolids at any given time? I.e., Do the various treatment plants experience seasonal or other fluctuations which would alter the constituents of the biosolids? If so, are these fluctuations adequately accounted for? 21-72

The EIR should thoroughly document the procedure necessary to support the determination that a particular batch of biosolids are "non-hazardous decomposable wastes."

F. **Finding # 22:**

It appears that the phrase "Mitigated Environmental Impact Report" should omit the word "Mitigated" since EIRs are not typically denominated as "Mitigated" or "Un-mitigated." 21-73

G. **Prohibition A(3):**

As discussed elsewhere in these comments, the groundwater monitoring is severely deficient and ultimately incapable of monitoring whether "the discharge will cause or threaten to cause pollution." In addition, the GO completely lacks any surface water monitoring to detect for pollution. Without adequate monitoring, the SWRCB, the regional water boards, the public and the environment will have no means to enforce this prohibition. As such, the GO should investigate and discuss the type of monitoring of nearby ground and surface waters which would allow meaningful enforcement of this prohibition. 21-74

H. **Prohibition A(4):**

The EIR should thoroughly explain how this prohibition is enforced. How will the regulators and the public know if the discharge of biosolids will result in "the application of any material that results in a violation of the Safe Drinking Water and Toxic Enforcement Act." How often, if ever, will the biosolids be tested for the multitude of contaminants designated in this act? Who will perform the test, the generator, the discharger, an 21-75

independent party? Please thoroughly explain the compliance and enforcement of this prohibition. 21-75 (cont)

I. **Prohibition A(7):**

The EIR should thoroughly present the factual, scientific basis (1) for determining that the retention of irrigation runoff for 30 days will adequately protect nearby surface waters from contamination (in the absence of a 33 foot vegetation buffer)--why 30 days? Cattle are not allowed to graze for 90 days? Etc.; and (2) for determining that a 33 foot vegetation buffer is adequate in the event there is no retention of irrigation runoff. Precisely what were the various assumptions used in that determination, i.e., how dense is the vegetation, how steep is the slope, are biosolids incorporated into the soil, etc.?

As the court in Santiago County Water Dist. v. County of Orange, (1981) 118 Cal.App.3d 818, 831, explained: 21-76

> "The EIR must contain facts and analysis, not just the agency's bare conclusions of a public agency. An agency's opinion concerning matters within its expertise is of obvious value but the public and decision-makers, for whom the EIR is prepared, should also have before them the basis for that opinion so as to enable them to make an independent, reasoned, judgment."

As such, the EIR must present the facts and analysis it used to arrive at the above retention period and buffer zone.

J. **Prohibition # 11:**

The EIR should thoroughly explain how this prohibition is enforced. How will the regulators and the public know if the discharge of biosolids will result in "the application of 'hazardous waste'? How often, if ever, will the biosolids be tested for the multitude of contaminants designated as hazardous wastes? Who will perform the test, the generator, the discharger, an independent party? Will the test results be available to the public? What assurance is there that each particular truckload of biosolids will not contain any hazardous wastes? Please thoroughly explain the compliance and enforcement of this prohibition. 21-77

In addition please explain the meaning and significance of the following statements on page 5-21 of the EIR:

> "Biosolids that meet the 503 requirements are not subject to hazardous waste regulations because the maximum concentration levels (ceiling levels) are below the levels that would result in the material being classified as a hazardous waste. Section 14505 of the CA Food and Agricultural Code classifies soil amendments derived from municipal sewage sludge as fertilizing material which is exempt from hazardous waste regulations." 21-78

The explanation, among other things, should specifically indicate which hazardous waste laws or regulations, if any, biosolids are allegedly exempt from? 21-78 (cont)

K. **Prohibition # 13:**
The GO should specifically define what is meant by "water-saturated", "frozen ground", and "periods of precipitation that induces run-off from the permitted site"? For example, how close to the surface must the groundwater be in order for the land to be classified as "water-saturated," a few feet, a few inches? 21-79

L. **Prohibition # 15:**
The GO should specifically define what constitutes "areas where biosolids are subject to erosion or washout offsite." Do these areas include: (1) Any area for which the elevation is not at least three feet above the 100 year flood plain elevation, (2) Any area protected from flooding by levees, and (3) Any area within the inundation zone of any dam or dam failure. 21-80

M. **Discharge Specification # 1:**
The GO should adopt the recommendations stated in Finding #10 above. 21-81

N. **Discharge Specification #7(a):**
Prohibition #7 suggests that all biosolids, Class A and B, must meet this requirement, not just Class B. Please explain. The CDWA believes that no types of biosolids should be exempt from this requirement. Again, the EIR should address the concerns expressed in prohibition #7 above. 21-82

O. **Discharge Specification #8**
The EIR should thoroughly present the factual, scientific basis for each of these setback distances. As mentioned above: 21-83

> "The EIR must contain facts and analysis, not just the agency's bare conclusions of a public agency. An agency's opinion concerning matters within its expertise is of obvious value but the public and decision-makers, for whom the EIR is prepared, should also have before them the basis for that opinion so as to enable them to make an independent, reasoned, judgment." (Santiago, supra).

Presumably these setback distances where not "arbitrarily and capriciously" drawn out of thin air, thus the EIR should present to the public the precise basis for these distances. What were the factors that were taken into consideration for setting each of these distances and how did the GO arrive at the specific distance. To the extent these distances where based on "best professional judgment," the EIR should fully disclose precisely what that professional judgment was based upon.

The CDWA objects to the provisions allowing the Executive Officer to reduce the setback distances from domestic and non-domestic water supply wells. If a discharger can demonstrate that lesser distances may be required, then the EIR should fully discuss the 21-84

conditions which would justify a lesser distance. Again, the scientific basis for these setback distances, and the justifications for any reductions, must be fully disclosed to the public and the decision-makers. It is inappropriate for the EIR to avoid a scientific discussion of the conditions, if any, under which the setback could be reduced. Moreover, there has been no demonstration that the Executive Officer is sufficiently qualified to make the determination that "the ground water, geologic, topographic and well construction conditions at the specific site are adequate to protect the public health of individuals using the supply well" or to protect groundwater. The EIR is supposed to gather the requisite information from the scientific community and from the public in order to make that determination. The Executive Officer should not and can not be expected to make that complex determination. 21-84 (cont)

P. **Biosolids Storage and Transportation Specification #7:**
The EIR should more specifically describe how the biosolids' storage facilities will be "designed, maintained, and operated to minimize the generation of leachate and the effects of erosion." As it stands, the public and the decision-makers do not have any information upon which to assess the adequacy of the groundwater and surface water protections from these facilities. What will be the depth to groundwater? How porous will the soil be underneath the facility? Will there be an impermeable liner underneath the facility? Etc. If the EIR preparers elect to avoid analyzing the potential impacts form the storage facilities, then future CEQA review of such facilities should be expressly required in the GO. If the current EIR intends to cover the proposed storage facilities, then the EIR should thoroughly describe the features of the storage facilities and thoroughly discuss the factual, scientific information supporting the EIR's findings regarding the potential impacts from the facilities. 21-85

Q. **Provisions (Section D) in General:**

The landowner, the tenant or other operator of the property, the generator of the biosolids or septage which in the case of sewage sludge would be the owner of the publicly operated treatment works, the transporter of the biosolids and the applicator of the biosolids should be required to sign the application and pre-application reports and also agree to be responsible for any resulting contamination and pollution and any required cleanup of the land and water. The limited testing and monitoring makes the process dependent upon the integrity of those involved. Without responsibility for cleanup, the generator and transporter lack incentive to police their own operations. 21-86

R. **Provision # 18 :**
The monitoring records should be maintained longer than three years from the date of the sample. The regional boards should archive the monitoring records and preserve them as long as possible in order to assess both the short term and long term impacts of the project. At the very least the discharger should be required to keep the records for the entire life of the particular project. 21-87

S. **The Preapplication Report:**

1. **The Map:**
The map must show both current and abandoned wells and mine shafts, and any other potential routes to groundwater. 21-88

2. **Constituent Concentrations:**

The GO needs to ensure that each and every truckload of biosolids (1) meets the constituent concentrations set forth in the preapplication report, (2) does not contain "hazardous waste" as required in prohibition #11, and (3) does not violate the Safe Drinking Water and Toxic Enforcement Act as required in prohibition #4. Thus, far the EIR has not demonstrated how this will be achieved. The EIR should thoroughly describe the procedures which will ensure that each and every truckload will meet these requirements. How often will the biosolids be tested? With regard to pathogens, and the potential for regrowth, how soon before application will each load be tested? If every load is not tested immediately prior to application, then the EIR must fully explain how the public and the environment can be assured that the frequency of testing which will occur is representative of each particular load of biosolids coming from the batch that was tested. To what extent are there seasonal or other fluctuations in the constituents in biosolids which will not be reflected by the particular sample which was tested? How representative are the samples that are drawn from large piles or lagoons of sludge? How many samples will be drawn? Who will draw the samples, an independent party? How are temporary breakdowns or shutdowns in treatment plants accounted for? 21-89

Moreover, the dischargers should be required to record and report the source of each truckload of biosolids so that the final disposition of biosolids from the treatment plants can be accounted for and to facilitate remediation in the event there is concern about a particular treatment plant's biosolids. 21-90

Moreover, the GO should require at least annual testing of the soil for concentrations for metals, pathogens and other pollutants in order to monitor the quality of the soil and the buildup of pathogens and contaminants. 21-91

Additionally, the GO should require frequent testing and monitoring of the nearby surface waters for metals, pathogens and other pollutants in order monitor the potential transport of contaminants to surface waters. 21-92

XI. **Potential Typos:**

A. On pg. ES-7, please verify that the last sentence in the 3rd paragraph is intended to say "Category 'b' complexity rating." 21-93

B. Please check the following: Page 5-29, Mitigation Measure 5-2; page 4-12 mitigation measure 4-2; and again on page 3 and 5 of table 15-1. These statements are difficult to reconcile. Please explain the meaning and significance of the 90 day grazing period and the 60 day "using" period? 21-94

C. On page 5-34, last paragraph, it states that the GO "contains sufficient provisions to prevent such occurrences [including] minimum depth to groundwater . . . ." While the GO clearly should designate a minimum depth to groundwater, the GO fails to do so. 21-95

D. On page 3-19, the EIR apparently omits the "lack of data" as one of the EPA's major reasons for not setting regulations for organic compounds. For example, with regard to dioxin, the EPA explained: 21-96

> "Dioxins, which may be present in sewage sludge, are not regulated not because they are believed safe but because at the time EPA initially screened pollutants for regulation it lacked data to evaluate dioxins for regulation." (Federal Register, Vol. 58, No. 32, pg. 9384).

E. Page 14 of table 15-1 should say "less" than 25 feet (not "greater"), right? 21-97

XII. **Conclusion.**

For the foregoing reasons, the EIR has failed to fulfill its fundamental purposes. In particular, the EIR has failed (1) to provide public agencies and the public in general with detailed information about the effect which a proposed project is likely to have on the environment; (2) to adequately discuss ways in which the significant effects of such a project might be minimized; and (3) to adequately analyze alternatives to the proposed project. The CDWA respectfully requests the lead agency to provide a "detail[ed] good faith, reasoned analysis in response" to the above comments and to those of other commenting parties as required by CEQA Guidelines section 15088(b). 21-98

If you should have any further questions regarding our concerns please do not hesitate to contact us.

Very truly yours,

Dante John Nomellini, Jr.
Co-counsel for the
Central Delta Water Agency

DJR:djr
Enclosure

... DISCOVERED AT KESTERSON yield further evidence that the presence of toxics in the environment can screw around with the wildlife, according to a June 17 article in the *Sacramento Bee*. Monitoring conducted by CH2M Hill found that 29 of 87 mice and voles at the former Kesterson National Wildlife Refuge — once a collection point for selenium and pesticide-laced agricultural drainage from the San Joaquin Valley — had both male and female sex organs. Researchers will now try to home in on the culprit — possibly the locally high levels of selenium, possibly something else — as well as to determine if this is a Kesterson-unique phenomena. Gruesome deformities and deaths in waterfowl eggs and embryos linked to selenium led to the closure of Kesterson back in 1986. Contact: gsantalo@ch2m.com

DREDGED MATERIAL DUMPING IN THE BAY will decrease by 75% over the next 50 years under a regional dredging and disposal strategy signed by five government agencies on July 16. This record of decision is the product of ten years of collaborative effort on the part of regional government, shippers and environmentalists to break out of the mudlock of the 1980s, when concerns about the ecological impacts of the then Bay-centered-disposal program blocked efforts to expand local shipping. The new plan is to divvy up the dredge spoils in a more balanced manner, with only 20% going back into the Bay, 40% going out to an ocean disposal site, and the remainder going to wetland restoration, levee repair and landfill cover projects. Contact: (415)744-2201

WHERE DIOXINS COME FROM depends on whom you ask, according a June 24 article in the *Contra Costa Times*. U.S. EPA, for example, says only 9% of this man-made carcinogenic chemical comes from cars, trucks, buses and other mobile sources, as well as wood burning stoves, whereas the local air district puts the figure at 66% and the regional water quality board at 84%. Similar disparities appear in estimates of industry's share. Scientists say it's time to stop the finger-pointing and focus instead on which sources are the most controllable.

A BAY AREA MASTER PLAN FOR WATER RECYCLING released this July by 13 local and regional agencies suggests that cost-effective use of recycled water could reach 125,000 acre feet by the year 2010 and grow to up to 500,000 acre feet by 2040. Planners zeroed in on the least costly means of connecting potential users of recycled water with the treatment plants that produce the supply, with a goal of offsetting water shortages projected for dry years. The Master Plan also identifies 18 potential wetland sites and 13 streams where recycled water could be used to swell the quantity, and sweeten the quality, of the water. Contact: www.recyclewater.com

AN ORDINANCE REQUIRING MID-OCEAN BALLAST WATER EXCHANGE for vessels calling at the Port of Oakland was passed by the Board of Port Commissioners this June and went into effect August 1. The ordinance aims to protect the Bay from further invasions of non-native marine life via ballast water from foreign ports. Contact: (510)272-1179

YOUR INDEPENDENT SOURCE FOR BAY-DELTA NEWS & V

ESTUARY

SEP - 7 1999

Fever Breaks on Mercury

Shoes that light up, greeting cards that play music, orange paint and crematoria... These are just a few of the surprising items harboring mercury — a heavy metal very much at large in the Bay-Delta environment and fast accumulating in the food chain. Efforts to thwart this contamination are heating up, as government and stakeholders up and down the Estuary wrangle over objectives, science and regulations.

"It's nasty stuff," says Phil Bobel of the Palo Alto Water Quality Plant. "It's a water pollution problem that people respond to more strongly because of the human contact hazards."

Mercury as a deadly pollutant made its most dramatic appearance back in the 1960s in Minamata, Japan, where enough got into the local food chain that it actually poisoned the populace and caused frightful birth defects and symptoms like those of MS. More recently, mercury has been found in Bay fish at levels high enough to lead the state to issue health warnings for consumers.

Where is it coming from? Not only is it hidden in household items like lap top switches and thermometers, but also in our dental fillings and wrinkle creams. Regulators guesstimate that over 1,700 kilograms per year enter the Bay watershed (see table p.6). One big chunk comes sewage, urban runoff and atmospheric fallout from furnaces, crematoria and cement manufacturing. Another chunk flows downstream from decommissioned mines in the watershed while a third chunk lurks in Bay bottom deposits of old hydraulic mining debris (miners used mercury to extract gold and silver from their ores).

Scientists say at least 400 million cubic meters of this debris ended up in San Pablo Bay. According to bathymetric models crafted by the U.S. Geological Survey's [illegible] Jaffe and Richard Smith, underwater erc[illegible] is fast exposing about 100 square kilom[illegible] of the debris up to five meters thick. "W[illegible] talking hundreds of tons of mercury at [illegible] near the surface of the Bay floor and in contact with the ecosystem," says Jaffe.

Most of this was introduced into the environment as what's called elemental mercury, one of four kinds absorbed into [illegible] ecosystem in differing degrees. Elementa[illegible] and reactive divalent mercury (Hg^{2+}) bo[illegible] convert into the most dangerous and "bioavailable" form, known as methyl mercury, at a faster rate than cinnabar — mercury sulfide in mine runoff. What kin[illegible] environments and conditions promote mercury methylation are questions scienti[illegible] now wish to explore. But one thing they [illegible] know is that bacteria in marshes along rive[illegible] and bayshores spur methylation.

"With some pollution problems the bes[illegible] thing to do is let natural processes remov[illegible] but not in this case," says Jaffe. "Mercury [illegible] moving target."

With the marsh-ringed, debris-strewn shallows of the North Bay such a potential breeding ground for the bad stuff, it's no wonder that environmentalists have been raising Cain about mercury in local sewage discharges. To date, BayKeeper has appea[illegible] four North Bay discharge permits, both on mercury and other contaminant issues.

The latest of these permit wars flared th[illegible] May, when the S.F. Regional Water Quality Control Board re-issued Novato's NPDES permit but temporarily increased the amount of dissolved mercury the treatmen[illegible] plant is allowed to discharge from 0.03 to 0.052 parts per billion. The Board then gav[illegible] Novato seven years to comply with a tougher 0.025 final limit.

Reasons for allowing the increase, according to the Board, were that the old limit was based on since invalidated state

continued page .

Attachment "AA"

MERCURY CONTINUED

objectives rather than on the region's current Basin Plan, and that within the next five years the Board would have a new improved regulatory approach to plug into the equation.

In the meantime, the limits currently in the permit include a new mass mercury limit based on prior performance. Keeping a growing bedroom community to existing performance and giving them a monthly cap is a disturbing idea to many dischargers. "It's a new concept, and one that has our industry very worried, because if you set the mass limit low enough, it's a growth control, which should be the purview of regional land use planning not water quality regulation," says Novato's Tom Selfridge. "We can live with the mass limit in our permit, but we don't like the precedent."

Environmentalists, meanwhile, don't think the North Bay permits go far enough and have accused the Board of backsliding from tougher limits and allowing potential increases in the area's mercury load. "The old myth is that mercury is just a historic legacy of Gold Rush days, and that there's nothing we can do about," says Mike Belliveau of Just Economics for Environmental Health. "But having so much in the system already means we have to crack down harder on what's ongoing. We're long past due to get rid of mercury containing products, especially where alternatives already exist for them."

Palo Alto's sewage plant has proved this can be done. Last year it invited its community to turn in their old mercury thermometers for a coupon good for a digital fever detector. The plant's Phil Bobel says that while the actual reductions in load may be small — only 1,000 thermometers turned in within 18 months — the public awareness value has been great. "It's a way to communicate with the public about something they can understand, and give them something they can do. People come in actually excited to be turning in their thermometer." (Ironically, the recycled thermometers are made into new ones.)

Palo Alto has also asked hospitals and labs to come up with strategies to find substitute equipment for pressure-sensing and other devices containing the offending metal, and found them eager to try. Breaking one mercury thermometer in the wrong place can mean a $500-$1000 hazardous waste clean up, he says. Palo Alto has also conducted a thorough review of sources of mercury to the wastewater entering its treatment plant, and also discovered that the unregulated smoke produced by crematoria may contribute on the order of 100 pounds of mercury per year (via the volatilization of dental fillings). Contemplating possible control strategies — since there's no real technology yet to filter out mercury "smoke" — boggles the mind, if not the soul.

But a certain amount of soul searching may be required if traditionally at-odds dischargers, environmentalists and regulators are to come to agreement on a regional strategy for reducing mercury. To this end, the S.F. Regional Board began work to set a total maximum daily acceptable mercury load (TMDL) for the entire region last year, which is scheduled to complete by 2004. The Central Valley Regional Board is on a similar TMDL track.

"The TMDL is the answer to everyone's questions," says the S.F. Board's Shin Roei Lee. "When it's done, everyone will get their fair share of the waste load."

"The Novato permit continues our trend over the past year of reissuing permits that focus less on compliance with a 'number' and more on ensuring that dischargers take the responsibility to reduce loadings of critical constituents to the maximum extent possible," adds another Board staffer, Bruce Wolfe. "We want them to quit operating in a vacuum and work with other dischargers to coordinate monitoring, and with us to develop an understanding of what their discharge means in their watershed."

Such an understanding should come from the newly-formed, 50-member, stakeholder-based Mercury Watershed Council launched by

continued page 6

BURNING

SUMMER NO VACATION FOR SMELT

Nature, California's relentless thirst and human error conspired to make the early summer of 1999 a particularly deadly one for Delta smelt, creating a textbook example of the hazards facing efforts to protect wildlife and simultaneously supply water to farms and cities.

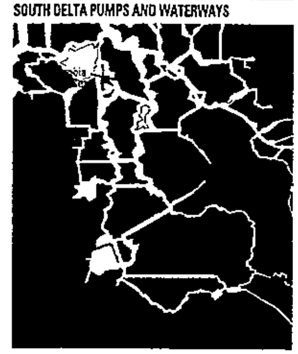
Cal Fish & Game scientists are reviewing their data, trying to find out why so many of the threatened fish lingered for so long within reach of the state and federal pumps in May, June and July, leading to high entrainment levels and a month-long slowdown at the pumps that had water officials and farmers biting their nails and environmentalists calling for a complete shutdown.

According to Fish & Game's Heather McIntire, there have been large takes at the pumps before, although they usually occurred in dry years, when the smelt's spawning habitat in fresh water areas of the Estuary is limited to the Delta and upstream areas. "They may have stayed because the Delta water was cooler than normal this year, or their preferred food was more abundant here," she says.

The pumps hit the take limit in late May, leading U.S. Fish & Wildlife to restrict pumping to less than 3,500 cfs (from the usual 6,000 to 8,000 cfs). As a result of the cutbacks San Luis Reservoir, where heavy spring flows would normally have been stockpiled during this period, had to be drawn down to supply San Joaquin Valley farmers and Silicon Valley industries, raising the specter of water shortages later this summer. And despite the cutbacks, "more than six times the legal allowable take was entrained at the facilities in May and June, and twice the legal take in July," says McIntire.

In late June, as calls from water users grew increasingly frantic, "the smelt began moving away in the right direction," says U.S. Fish & Wildlife's Pat Foulk, and the agency granted permission to ramp up pumping. But a clean getaway for the little fish was not in the cards: three weeks later wildlife agencies discovered that a temporary barrier at Grant Line, required by permit to remain open while Delta smelt salvage is high, had been inadvertently closed. With the barrier closed, explains McIntire "the hydrodynamics of the south Delta reverse direction and pull fish toward the pumps from Turner and Columbia cuts." McIntire says the specific impact of the barrier closure is unknown, as is the overall effect of the summer's events on the total smelt population. Contact Heather McIntire (209)948-7087 CH

SOUTH DELTA PUMPS AND WATERWAYS



MERCURY CONTINUED

the Regional Board this March, if everyone stays at the table. The Council's job is to advise on the TMDL proposal, to study options for trading loads among dischargers, and to explore the realities of "virtual elimination" of mercury from the system. To date, the Council has produced a slim ream of research — most notably a list of mercury sources and pollution prevention methods, and a survey of how trading programs work in other states.

"It makes sense for everyone to work on sources they can do something about, using the low-hanging fruit principal — namely, do the things that are easiest and most inexpensive first," says Palo Alto's Bobel.

Many dischargers think that more treatment, where the mercury reduced may measure in the nanograms, is much less cost-effective than reducing the pounds and pounds coming out of the mines, or the tons lying on the Bay bottom. Public education, meanwhile, remains an important option but one whose impacts in terms of mercury reduction are hard to quantify.

Measuring gains and losses could be equally tough in the arena of runoff pouring into our rivers and bays from cities and towns. "If a lot the mercury we're seeing is from urban stormwater, then municipalities are going to have to get aggressive about finding sources," says veteran stormwater manager and consultant Roger James. "But what if the biggest sources turn out to be global, third world aerial emissions? Should reducing that ultimately become the responsibility of the discharger, since its coming out of their pipe?"

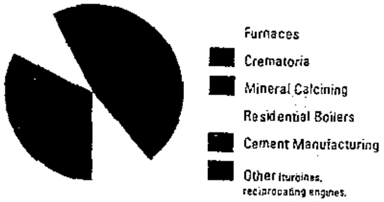
Some of these issues may be resolved via a proposed banking system that would give mercury credits and debits to dischargers who've exhausted their own local ability to reduce mercury but might be able to pay for reductions elsewhere. To this end, the Council is trying to develop a mass load trading system to complement the TMDL. Key issues for any such program are who can participate, how big will the trading area be (can Bay dischargers trade with Central Valley ones?), when does it kick in (after discharge levels exceed permit requirements? Or only when all local reduction efforts are exhausted?), how to measure gains, and how to make sure ecological impacts aren't just shifted elsewhere.

"If North Bay dischargers buy credits to clean up Cache Creek, it provides no benefit for the immediate Napa River environment, and for those Latino farmworkers fishing in the river," says Mike Belliveau. Yolo County's Cache Creek is a known mercury hot spot in the Delta watershed.

How have other states dealt with pollutant trading questions? Council intern Katy Chamberlain recently investigated ten existing programs in Colorado, Florida, North Carolina and the Great Lakes. Most were focused on nutrients rather than toxics, and very few have been established long enough to evaluate their effectiveness. But Chamberlain did glean some wisdom. According to a memo she wrote to the Council: "The truly successful programs are not only clearly outlined and strictly regulated by the government, but also have a baseline from which emissions must not increase. If a discharger's emissions are over loadings allocated by their NPDES permits, the discharger may buy credits generated through the regulatory agency *before* the transfer of credit. This reduction in pollutant loadings before the trade is integral to successful trading, otherwise load reductions can be uncertain. To prevent hot spots and high concentrations, trading must only be performed within smaller watersheds."

Despite all the data collected, lists made, and policy drafted, the Board's Lila Tang says "no one is shaking hands and hugging yet." Things could get more painful soon, if similar conflict-ridden efforts to build South Bay consensus on copper and nickel reduction strategies are any indication.

SOURCES OF AIR EMISSIONS OF MERCURY IN THE SAN FRANCISCO BAY REGION



The following sources also contribute, but quantities are unknown: paint use, abandoned mines, contaminated soils and geothermal power.

MERCURY LOADS TO SAN FRANCISCO BAY

Bay sediment deposited	410 kg/yr
Bay sediment eroded	190 kg/yr
Local stream input	2.5 - 8 kg/yr
(to) Ocean dissolved	60 kg/yr
(to) Ocean particles	430 kg/yr
POTWs	10.7 kg/yr
Industrial	20 kg/yr
Mudflats & wetlands	18 kg/yr
Urban non-point runoff	470 kg/yr
Direct atmospheric deposition	3-8 kg/yr
Net influx from watershed	175-208 kg/yr

Source: San Francisco Regional Water Quality Control Board, 1998

Part of the problem for would-be consensus builders is the current regulatory vacuum on mercury. "Regulations are behind the times on mercury, partly because it's an arena that's so litigious. It's easy for dischargers to retard the regulatory process," says U.S. Fish & Wildlife's Steve Schwarzbach, whose agency recently issued a biological opinion on the proposed California Toxics Rule.

The rule — to be released in draft form by U.S. EPA this fall — will apply everywhere there aren't already regional numbers in place (the Central Valley, for example), and become a default when local objectives are challenged. But the rule's 50 parts per trillion mercury criteria is "orders of magnitude" off the 2 ppt Schwarzbach would like to see to protect fish and wildlife from reproductive and health effects.

"The mercury objective should be the guiding light, the regulatory end point, which says this is where we need to be," he says. "If you've got the wrong destination from the start, it doesn't help."

No statewide numbers are in place either — California's water quality standards were remanded by a lawsuit in 1994 and never reinstated. Exacerbating this regulatory vacuum, meanwhile, are pending changes in how the feds want mercury levels measured and risks assessed.

Amid all this regulatory uncertainty, however, are two signs of movement on mercury. First, EPA has suddenly cracked down on discharges to water bodies officially listed as "impaired" under the Clean Water Act due to the presence of mercury, copper, dioxin and other contaminants. Both the North and South Bays are officially "impaired."

continued page 7

/yr

PLACES TO GO & THINGS TO DO

WORKSHOPS & SEMINARS

SEPT TUES 14 THRU THUR 16
PESTICIDE SYMPOSIUM
Topic: The chemistry and fate of modern pesticides
Sponsor: University of Kansas
Location: Lawrence, Kansas
(785)864-4790

SEPT THUR 23
S.F. BAY DECISIONMAKERS CONFERENCE
Topic: Does the environmental regulatory process serve the public interest?
8:00 AM — 5:00 PM
Sponsor: Bay Planning Coalition
Location: San Francisco
(415)397-2293

SEPT THUR 23 THRU SAT 25
SOCIETY FOR ECOLOGICAL RESTORATION 11TH ANNUAL CONFERENCE
Topic: Reweaving the World
Sponsors: SER, CALFED, National Park Service, more.
Location: San Francisco
(608)262-9547
www.ser.org/ser99.htm

SEPT SAT 25 THRU THUR 30
INTERNATIONAL ESTUARINE RESEARCH FEDERATION CONFERENCE
Sponsor: Estuarine Research Federation
Location: New Orleans
(504)280-7395

OCT FRI 8
WATER SUPPLY AND FISH IN THE SACRAMENTO-SAN JOAQUIN DELTA
Topic: One-day short course presenting the latest information on Delta resource issues and solutions.
8:00 AM — 4:30 PM
Sponsor: U.C. Extension
Location: Berkeley
Cost: $295
(510) 642-4111

OCT WED 20
WATER ISSUES BRIEFING
Topic: Bay-Delta and Beyond
Sponsor: ACWA
Location: Oakland
(916) 441-4545

NOV TUES 2
WATER RIGHTS, WATER WRONGS FORUM
Topic: Rethinking California's water rights system and laws.
All Day
Sponsor: S.F. Estuary Project
State Building, 1515 Clay Street, Oakland
(510)622-2465

MEETINGS & HEARINGS

AUG TUES & THURS 18 THRU SEPT 22
CALFED BAY-DELTA PROGRAM
Topic: Hearings on CALFED draft plan.
6:00 — 9:00 PM
Location: Various
(800) 900-3587

SEPT WED 15 & OCT 22
FRIENDS OF SAUSAL CREEK
Topic: New action plan
7:00 — 9:00 PM
Sponsor: Aquatic Outreach Institute
Location: Dimond Library, Oakland
(510) 231-9556

HANDS ON

SEPT SUN 12
CALIFORNIA ENVIRONMENTAL FAIR
Topic: Water quality, river and fishery restoration, endangered species and habitat preservation, agricultural land protection.
Noon — 5:00 PM
Sponsor: Oakland Museum
Location: Oakland
(888)625-6873

SEPT SATURDAYS 25 & OCT 2
KIDS IN CREEKS
Topic: Interdisciplinary creek exploration and restoration program for educators
9:00 AM — 4:30 PM
Sponsor: Aquatic Outreach Institute
Location: Sunol Regional Wilderness
(510)231-9507

OCT SAT & SUN 2 THRU 3
COSUMNES RIVER PRESERVE WEEKEND
Topic: Results of Point Reyes Bird Observatory's five-year monitoring project.
Sponsor: Point Reyes Bird Observatory
Location: Cosumnes River Preserve
(415)868-1221, ext 780

OCT SATURDAYS 16 23 & NOV 6 13
CREEKS, WETLANDS AND WATERSHEDS CONFERENCE
Topics: A series of 12 field trips on topics ranging from water quality and aquatic insect monitoring to nature-based art.
Sponsor: Aquatic Outreach Institute
Location: Various
(510)231-5778

MERCURY CONTINUED

For years, deepwater dischar[...] as Tosco have enjoyed what's c[...] "dilution credit" which allows t[...] assume a certain amount of dil[...] problem contaminants at the e[...] pipe by the receiving waters. Fo[...] organizations like BayKeeper ha[...] challenging such credits.

As of now, EPA is sending ou[...] warning letters that such dilutio[...] will soon no longer be given for [...] and other offenders. This isn't ne[...] just proper implementation of e[...] law, says EPA's Terry Oda. "If the [...] body itself is already exceeding [...] we can't give them a credit for d[...] flies in the face of the whole Cle[...] Act concept of not contributing [...] impairment," he says. "We won't [...] them right between the eyes, we [...] they need time to come into com[...] In the interim they can still opera[...] current conditions but in the en[...] have to meet either the metal cri[...] TMDLs without the dilution credi[...]

The second new regulatory mo[...] mercury came this July, when the [...] Board amended stormwater disch[...] permits for Contra Costa and San [...] counties to improve mercury cont[...] mandate more pollution preventi[...] "Stormwater permits usually only [...] BMPs (best management practice[...] for the first time these permits sa[...] counties have to monitor and asse[...] mercury loadings," says the Board [...] Roei Lee "It's putting stormwater p[...] a point source category."

BayKeeper doesn't think the pe[...] far enough, however, and is appe[...] them for, among other things, the [...] to control increases in mercury di[...] from new developments.

Another source that may need t[...] moved into the point source cate[...] the mines upstream, where Bay fin[...] have long pointed when it comes [...] mercury. Preliminary results of som[...] science confirm the importance of [...] mines, and reveal likely hot spots upstream of the Delta.

The three-year U.C. Davis study investigating Delta tracts flooded inadvertently by storm events over past 75 years to determine if methy[...] mercury distribution and bioaccum[...] varied with watershed source, salini[...] time since flooding, vegetation and [...] factors.

continued bac[...]

MERCURY CONTINUED

"We were afraid we'd end up with a dull project, and find mercury concentrations uniform everywhere in the Delta," says co-author Dareli Slotton. "But the news is we found real low spots and real high spots, and the most dramatic high spots so far correlate with Cosumnes River and Yolo Bypass inflows."

It's ironic that one of the Estuary's last remaining wild and undammed rivers, the Cosumnes, should have some of the highest mercury concentrations for the very same reason (dams trap and contain mercury-laced sediments), says Slotton. The Cosumnes' small flows and gentle gradient also play a role is encouraging the mercury to hang around, he adds. The Yolo Bypass, meanwhile, conveys flows from that known mercury bad guy: Cache Creek.

One surprise, says Slotton, was to find higher levels of mercury upstream of the city of Stockton than below it on the San Joaquin River: "We thought we'd see a signal from the city, especially with all its organic matter (sewage) and low oxygen level problems. All these factors should contribute to mercury methylation, but go figure. It looks like more is coming from the mines upstream on the Merced and Stanislaus than from the city."

The study's authors conclude that regions demonstrating enhanced bioavailability may not be the most desirable locations for large-scale wetland restoration (too bad the Cosumnes is the Miss America of the restoration universe). Further research on upstream mercury sources and methylation is planned courtesy of a $3.8 million CALFED grant, part of the biggest mercury research project undertaken nationwide since similar projects in the Great Lakes and Everglades.

The conclusions of the U.C. Davis study are echoed by Jaffe's and Smith's mapping of North Bay mining debris, spots planners should be beware of when restoring wetlands or dredging. Either activity could increase the ecosystem's exposure to mercury and mercury methylation. "If you flood dry soils to make a wetland, we know that there's an instant pulse of methyl mercury that can last up to a decade," says the Geological Survey's Sam Luoma.

So with mercury in our air, water and land, with little regulatory guidance in place, and with only fledgling science at our fingertips, there seem to be more questions than answers available to those trying to purge our small estuarine universe of this slippery silver poison.

"Science may not give us all the answers and our environmental community won't wait," says the Board's Lila Tang. "So our strategy's going to have to be based on our best judgment, and the work of our stakeholder Council. Luckily mercury has a lot of potential in the pollution prevention arena, unlike dioxin which is a by-product of many processes and used less purposefully. If we start reducing mercury use now, our grandchildren may see some benefit." ARO

Contacts: Phil Bobel (650)329-2285; Mike Belliveau (650)728-5728; Bruce Jaffe (650)329-5155; Dareli Slotton (530)756-1001 or Lila Tang (510)622-2425.

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Responses to Comments from the Central Delta Water Agency

21-1. The commenter's concern regarding land application of biosolids on ground and surface waters which naturally flow into or eventually are discharged into the Sacramento/San Joaquin Delta are noted.

21-2. Based on conditions specific to California, the proposed GO is more restrictive than the Part 503 regulations. Additionally, the commenter is concerned about the land application of biosolids to areas that "unreasonably and unnecessarily jeopardize the public and the environment." The EIR was prepared to evaluate the effects of land application of biosolids on the public and the environment. The proposed GO also was designed to separate the land application of biosolids in sensitive areas (the exclusion areas), such as the jurisdictional Sacramento-San Joaquin River Delta from the rest of the state. Any proposals for land application in the exclusion areas would be subject to further environmental evaluation under CEQA.

21-3. The draft EIR concluded that the land application of biosolids would not result in significant and unavoidable environmental impacts. Furthermore, the draft EIR concluded that, with mitigation measures, all impacts would be considered less than significant. The commenters opinion regarding the conclusions of the EIR and the selection of the environmentally superior alternative is noted.

21-4. As noted in the comment, SWRCB staff did provide special consideration to the Delta by excluding it from coverage under the proposed GO. Also, the proposed GO does address issues such as flooding, surface water and groundwater. The potential impacts discussed for the statewide program are applicable to lands adjacent to and upstream of the Delta. With proper implementation of the proposed GO provisions and the mitigation measures in this EIR, offsite and downslope significant effects are not anticipated.

21-5. The commenter indicates that the draft EIR "fails to provide additional 'safety buffers' or 'uncertainty buffers' to protect the environment and the public from the extensive gaps in our scientific knowledge in this area."

The commenter cites a study with a quote from a paper by Straub, T. M., I. L. Pepper, and C. P. Gerba, 1993 entitled "Hazards from Pathogenic Microorganisms in Land-Disposed Sewage Sludge." This quote will be added to page 5-5 after the first paragraph, before the heading Emerging Pathogens of Concern:

> As an example of the unavoidable uncertainty associated with the impacts from pathogens in biosolids, the authors of the study, "Hazards from Pathogenic Microorganisms in Land-Disposed Sewage Sludge," explain the following:

> It should be recognized that the list of pathogens is not constant. As advances in analytical techniques and changes in society have occurred, new pathogens are recognized and the significance of well-known ones changes. Microorganisms are subject to mutation and evolution, allowing for adaptation to changes in their environment. In addition, many pathogens are viable but nonculturable by current techniques [cite], and actual concentrations in sludge are probably underestimated. Thus, no assessment of the risks associated with the land application of sewage sludge can ever be considered to be complete when dealing with microorganisms. As new agents are discovered and a greater understanding of their ecology is developed, we must be willing to reevaluate previous assumptions.

SWRCB staff is aware of these uncertainties and has therefore developed a conservative approach to regulating land application of biosolids. SWRCB staff will reevaluate its regulatory program as research provides additional information on risks associated with pathogens.

21-6. The comment presumes there are "gaps and shortcomings" in EPA's Part 503 regulations. This statement refers to Cornell Waste Management Institute's report, "The Case for Caution, Recommendations for the Land Application of Sewage Sludges and An Appraisal of the US EPA's Part 503 Sludge Rules." In developing the Part 503 regulations, EPA conducted a comprehensive risk assessment based on decades of research on hundreds of different pollutants. The risk assessment provided sufficient conservative measures to protect against adverse impacts to humans and the environment. While developing the risk assessment, it was determined that heavy metals clearly posed the greatest risk of all potentially toxic pollutants; therefore, limits for these metals were created.

As part of the EIR preparation for the proposed GO, current information was reviewed to determine if there have been any significant scientific data that could refute EPA's findings. Cornell's study was examined and it was determined that there is still a lack of sufficient scientific information to change the metals limits or add any additional limits for other pollutants other than molybdenum. Cornell's study referenced metals limits set in other countries that are more restrictive than those listed in the Part 503 regulations. Limits set in other countries are based on policy, not on a scientifically based risk assessment (see Master Response 12). The proposed GO goes beyond the Part 503 regulations and provides other measures to reduce the risk for public health impacts associated with the land application of biosolids.

21-7. See Response to Comment 21-6.

21-8. This comment assumes that the EPA did not have sufficient information to adequately evaluate the risk of the land application of biosolids. Dioxin and numerous other compounds were evaluated in the EPA risk assessment. Although there was limited information at that time on dioxin and some other chemicals, it appears that EPA offered sufficient conservative measures as part of the Part 503 regulations to protect human health and the environment. More information is now available on dioxin and EPA is using this data to develop limits for dioxin that can eventually be incorporated by the proposed GO if deemed appropriate by SWRCB staff. The EPA's proposed rule on dioxin was published in December 1999. As the EPA deems necessary, other pollutants may be regulated in the federal rules. These too will be considered by the SWRCB on a case by case basis.

In the case of dioxin, dioxin is everywhere, including in the food that humans consume. The most substantial source of dioxin to humans is from meat products. At best, biosolids have only a minor contribution of dioxin to soils. Air deposition has, by far, the greatest contribution of background dioxin levels in soils. Furthermore, dioxin levels in the U.S. are continuing to decrease over the years.

21-9. Comment noted; however, SWRCB staff respectfully disagrees with the commenter's conclusions regarding the need for more restrictive setback distances to the listed water resources. However, SWRCB staff does not disagree that increasing the setback distances would reduce potential impacts to water quality. The recommended measures would limit location and probability of impacts occurring. However, these measures would not change conclusions reached pursuant to CEQA guidelines for disclosing and identifying the significance of environmental impacts. As described in Master Response 13, analysis of potential environmental impacts to surface and groundwater resources were based partially on the risk assessments performed for development of the Part 503 regulations, additional conservative restrictions and prohibitions for land application under the proposed GO, and presumption that RWQCB staff will ensure that each biosolids application project adequately complies with the proposed GO and other water quality regulations.

In addition, Master Response 14 describes the rationale for analysis of the proposed GO's level of protection to groundwater resources from all potential contaminants. Recommended increases in setback distances to groundwater resources would be overly restrictive and inconsistent with comparable regulations for similar materials discharged from confined domestic livestock facilities, residential septic systems, agricultural fertilizer and pesticide use, areas where reclaimed treated wastewater is applied, and siting rules for landfills. Master Response 17 describes the rationale for evaluating impacts to surface waters under the provisions and protective measures in the proposed GO based on the inherently low probability of occurrence in such areas.

21-10. The SWRCB staff respectfully disagrees with the comment recommending restrictions to land applications of biosolids regarding minimum depth of groundwater. Master Response 13 describes the basis for analyzing potential impacts to groundwater from biosolids application under the proposed GO in relation to the risk assessments conducted for the Part 503 regulations. In addition, Master Responses 15 and 16 describe why risk assessments conducted for the Part 503 regulations were extremely conservative with respect to depth to groundwater.

21-11. The commenter presumes that “preferential flow paths” to groundwater provide a more conservative basis for the water quality impact analysis than that presented in the EIR. This presumption is not correct. See Master Response 16 for a detailed description of why preferential flow paths would not substantially affect the risk assessments of the groundwater pathway conducted for the Part 503 regulations.

21-12. Master Response 15 describes why the analysis of water quality impacts to groundwater from biosolids application was not dependent on a provision in the proposed GO for minimum vertical separation between biosolids application areas and the groundwater table.

21-13. The comment references two studies conducted that further criticize EPA’s presumption, as used in the Part 503 regulations, that metals cannot readily leach in soils. This presumption is also implied in the proposed GO. While these studies show that metals movement in soil can be higher under certain conditions, there is still a lack of conclusive scientific evidence that sludge applied metals readily leach through soil.

The comment’s referenced study (Camobreco et al. 1996) showed that metal mobility is higher in undisturbed soils, but the author stated that “. . . even with preferential flow, the metals still interact with the soil binding sites on the preferential flow paths.” The author also stated that “While this study demonstrates that preferential flows paths in undisturbed soil make a considerable difference when considering solute transport through soil, it may not be directly applicable to sludge-applied metals. Metals applied in this experiment were soluble metal salts, whereas metals in sewage sludge would not necessarily react in a similar matter since the high organic content of sludges retains metals strongly.”

The argument for increased metals mobility was based on the fact that some metals were unaccounted for in the metals balance. The argument also assumes that the fraction of metals that are not accounted for in the soil has leached. However, it has been shown that all metals in the soils cannot be extracted by conventional laboratory methods because of metals complexing in the soil. Conventional metal extraction methods used did not fully recover all the metals in the soils (Dowdy et al. 1991).

The comment also presumes that the presence of preferential flow paths in soil were overlooked by the SWRCB staff and may invalidate the environmental impact analysis conducted for the EIR. As described in Master Response 14, the analysis of potential impacts to groundwater under the proposed GO were primarily based on the protections afforded for nitrate contamination, which generally moves more readily in the soil-water column than trace metals or SOCs, for which extensive risk assessments were performed for the Part 503 regulation development process. The Part 503 risk assessments found that the groundwater pathway was not limiting for any trace metal or SOC in the final adopted pollutant limits (Master Response 13). In addition, Master Response 16 describes why preferential flow paths do not necessitate additional evaluation on the part of the SWRCB for analysis of groundwater quality impacts in the EIR.

21-14. The relationship between preferential flow paths, lack of GO provisions for minimum depth to groundwater, and the analysis of groundwater quality impacts are summarized in Master Responses 13, 14, 15 and 16.

21-15. See Response to Comment 21-13. The applicability of preferential flow paths to the analysis of groundwater quality impacts is described in Master Response 16.

21-16. The applicability of preferential flow paths to the analysis of groundwater quality impacts is described in Master Response 16.

21-17. The comment addresses the concern over virus movement from biosolids into groundwater by preferential flow. The comment assumes that the biosolids initially contain large amounts of pathogens. Biosolids undergo treatment prior to land application and must meet pathogen reduction requirements in the Part 503 regulations. As a result, land-applied biosolids contain reduced levels of pathogens. For Class A biosolids, to ensure that the biosolids have met the pathogen reduction requirements, the proposed GO requires that the biosolids are tested for fecal coliform as part of the pre application report, and annually thereafter. The pathogen levels in Class B biosolids are low enough that the risk of groundwater contamination of groundwater is less than significant when GO restrictions are complied with.

See Master Response 13 for additional provisions in the proposed GO that are more restrictive than the Part 503 regulations. The applicability of preferential flow paths to the analysis of groundwater quality impacts is described in Master Response 16.

21-18. The analysis of groundwater impacts regarding depth of groundwater and preferential flow paths is described in Master Responses 15 and 16.

21-19. The commenter notes, "the available scientific evidence indicates that viruses have migrated downward through the soil up to 60 feet. In the study entitled, 'Hazards from Pathogenic Microorganisms in Land-Disposed Sewage Sludge,' it states:"

> In contrast (to studies using viruses that are highly adsorbed in soil), Gerba and Bitton (1984) reported that coxsackie B3 virus was able to migrate 18.3 m when sewage effluent was applied to land used for artificial groundwater recharge. Downward migration from sludge-amended soils using viruses that adsorb poorly to soil like Group B coxsackie has not been studied....Only a limited number of virus groups have been studied to date." (See Attachment A to prior comments on NOP, dated December 1, 1998, page 76).

Dr. Charles Gerba, one of the authors of this study, indicated that this study was for sandy soils in which large quantities of water were applied. Viruses are more tightly bound to solids in areas where biosolids are applied and there is not as much water applied to provide a means of transport to groundwater. Also, the referenced groundwater recharge studies have different objectives than biosolids amendment to agricultural areas, that being maximizing the amount of water applied and percolation to groundwater. Agronomic nitrogen application rates will limit the amount of water and potential leaching to groundwater in areas where biosolids are applied due to the limitations related to nitrates.

21-20. The analysis of groundwater impacts regarding depth of groundwater and preferential flow paths is described in Master Responses 15 and 16.

21-21. The analysis of groundwater impacts regarding depth of groundwater is described in Master Response 15.

21-22. Commenter requests that the EIR address the extent to which coxsackie B3 can be present in Class A and Class B biosolids, and how it relates to Comments 21-19 and 21-20.

Coxsackie B3 virus survival in sewage sludges subjected to anaerobic digestion for 24 hours at 35EC was low (>99% reduction). For longer detention times (14 days at 32EC) survivals were even lower (>99.999% reduction) (Eisenhardt et al. 1977). The levels of virus present in digested sludges could be in excess of 1000 viruses/L even if treatment efficiency were 99% (Straub et al. 1993). See draft EIR References for Chapter 5.

Such high destruction in the basic processes used to reduce pathogens in biosolids forms a basis for the development of the Part 503 regulations.

21-23. In addition to pathogen reduction measures, the proposed GO has additional requirements such as setback distances during biosolids application of 10 to 2,500 feet, and waiting periods of 30 days to 36 months to protect against pathogen regrowth over longer periods of time. These measures protect humans against exposure to pathogens. Studies show that the survival rates and regrowth of pathogens in soil are extremely variable depending on several factors (Pepper et al. 1993).

No regulation is immune from irresponsible agencies or individuals. Applying biosolids that do not meet Class A or B requirements is no different from any other negligent practice. The EIR assumes that biosolids application will follow the proposed GO's requirements. Biosolids land application is subject to inspection by the producer as called for in the California Water Environment Association(CWEA) Manual of Good Practice for Land Application of Biosolids, and regulatory agencies, including RWQCBs and County Local Enforcement Agencies.

21-24. Commenter requests that the EIR address the extent to which other viruses with similar characteristics to coxsackie B3 (such as viruses that absorb poorly to soil) are present in Class A and Class B biosolids, and how it relates to comments 21-19 and 21-20.

Few studies have been performed to quantify viruses in biosolids. Efforts to measure viruses in biosolids have only recently been developed and are continuing (Goyal et al. 1984, Smith and Gerba 1982, and Payment and Trudel 1985, all as cited in Yanko 1988). The evaluation of compost quality was one of the most intensive studies done prior to the adoption of the Part 503 regulations (Yanko 1988).

Since the advent of the Part 503 regulations, more studies have focused on the destruction of pathogenic organisms (Huyard et al. [1998], Han and Dague [1997], Han et al. [1997], Watanbe et al. [1997], Volpe et al. [1993], and Aitken and Mullenix [1992]). Thermophilic anaerobic digestion has been evaluated because of the significant advantage of improved pathogen destruction with the potential of meeting the pathogen quality requirements of EPA's Class A biosolids. These studies have focused on bacterial reductions. Viral studies are more difficult to perform.

As alluded to in the Response to Comment 21-23, anaerobic digestion has been very effective in those studies where virus inactivation has been quantified.

New evaluations of thermophilic anaerobic digestion versus mesphilic anaerobic digestion to meet the Class A reduction requirements of the Part 503 regulations have been completed by the East Bay Municipal Utility District (Gabe et al. 1999).

21-25. Commenter requests that the EIR address the extent to which other viruses with similar characteristics to coxsackie B3 (such as viruses that absorb poorly to soil) can move more readily through the soil and how it relates to comments 21-19 through 21-24.

Specifically, commenter wants to know:

- whether viruses and other little-known contaminants and/or which we are not scientifically able to detect or study can move through soil similarly or more easily than coxsackie B3;
- whether viruses like group B coxsackie been studied;
- what virus groups have been studied;
- if these studies considered the preferential flow phenomenon.

The commenter noted, "The literature shows that metals movement through soil is still not well understood. The roles of preferential flow paths and soluble organic matter are especially unclear." (See Attachment H to prior comments on NOP dated December 1, 1998, page 742).

In regards to this point, Dr. Charles Gerba, co-author of a 1993 paper entitled "Hazards from Pathogenic Microorganisms in Land-Disposed Sewage Sludge," responds, "Both column experiments and field studies have shown that biosolid application to land does not result in virus transport to aquifers. Viruses have not been detected beneath biosolid application sites. It appears difficult for viruses to be released from biosolids. Coxsackie viruses are members of the enterovirus group and they are common in biosolids. The methods used in previous field studies were capable of detecting Coxsackie B3 virus; if it was a significant problem it should have been detected in the subsurface. Also, since field studies were conducted on virus migration from land applied biosolids, the issue of preferential flow aiding virus migration was taken into consideration. If it had been a significant issue, viruses should have been detected in the groundwater." (Gerba pers. comm.).

21-26. The commenter asked that the EIR address the issue of "Whether biosolids will be applied to lands which, due to their soil makeup and/or the presence of preferential flow paths, are similarly capable of transferring viruses (and other contaminants) 60 feet below the surface."

In regards to this point, see Response to Comment 21-25.

21-27. As described in Master Response 15, the SWRCB staff disagrees with the presumption that the lack of provision in the proposed GO for biosolids application regarding minimum depth to groundwater would cause groundwater impairment. As described in Master Response 17, flooding presents an increased risk beyond those evaluated for transport of contaminants in the Part 503 risk assessments. However, the probability of flooding on a field receiving biosolids through the GO review process is inherently low such that water quality impairment from such an infrequent occurrence is considered less than significant.

21-28. See Master Responses 13 and 14.

21-29. As described in Master Response 15, groundwater monitoring required for the proposed GO is not relied on as mitigation for potentially significant impacts under CEQA because it does not fully satisfy the requirement to reduce, minimize or avoid the impact. Master Responses 13 and 14 describe the basis for evaluating impacts to groundwater quality. The analysis presumes that biosolids application could occur continuously with normal farming practices designed to comply with provisions of the proposed GO. The Part 503 risk assessment specifically for groundwater was based on more conservative assumptions of biosolids application rates occurring continuously for 20 years (rather than the 15-year period of effect for the GO). This risk assessment assumed a depth to groundwater of 1 meter. Under this very conservative assumption, no significant effects were predicted.

Therefore, monitoring that is adopted on a site-specific basis by responsible RWQCB staff would not affect the degree or extent of potential impacts.

21-30. As stated in Master Response 15, groundwater monitoring required for the proposed GO is not relied on as mitigation for potentially significant impacts under CEQA because it does not fully satisfy the requirement to reduce, minimize or avoid the impact. Therefore, the SWRCB staff disagrees that discretionary changes made by the Executive Officers to required monitoring would necessarily increase the degree of potential groundwater quality impacts. Also see Response to Comment 21-29.

21-31. The discretionary authority that the proposed GO gives to RWQCB Executive Officers regarding groundwater monitoring has not deferred the impact analysis relative to groundwater quality. The EIR gives a thorough consideration of the potential for groundwater contamination in Chapter 3 (see pages 3-29 to 3-37). The discretion given in the proposed GO allows the Executive Officers to determine if groundwater monitoring would provide enough benefit to warrant the cost in specific project situations. Monitoring is not, in itself, proposed as a mitigation for potential groundwater impacts; it is an early detection method that can be used where depth to groundwater and soil conditions indicate it would be advisable. The Executive Officers have RWQCB technical staff to provide the analysis necessary to determine the value of monitoring.

This EIR is intended to provide CEQA compliance for any proposed land application project that meets the parameters in the proposed GO. The RWQCBs have the authority to use individual waste discharge requirements and undertake additional CEQA documentation for any proposed project that may fall outside the parameters of the proposed GO and may not be fully protective of the environment if it were regulated only by the conditions in the proposed GO.

21-32. Comment noted. The draft EIR, page 3-35, last sentence of second paragraph, is hereby revised as follows:

> In areas with shallow groundwater <u>and frequent biosolids application</u>, monitoring is required that would result in early detection if leaching of substantial quantities of pollutants were occurring.

Although trace metals, SOCs, and biological contaminants are not required to be monitored in wells, the more soluble compounds such as nitrate, total dissolved solids, and chloride must be monitored annually. As described in Master Response 15, if monitoring of these contaminants indicates impairment, the RWQCB engineer would then be able to evaluate whether there is a further risk from other less soluble contaminants and adjust future permitting practices to ensure resource protection.

21-33. Metals, pathogens, and organic chemicals travel at much slower rates than the constituents listed for groundwater monitoring in the GO. For this reason, those inorganic salts are the recommended indicators for measuring potential groundwater effects. This approach is prudent and scientifically defensible. The remaining numbered points discussed in Comment 21-33 are addressed as follows:

1. The proposed groundwater monitoring requires approval by the RWQCB Executive Officer. As stated in the Monitoring and Reporting Program of the GO, “a minimum” of three wells is required. This allows the flexibility to require more monitoring wells for larger sites.

2. Groundwater generally flows at a low rate. Best professional judgment establishes monitoring once per year as appropriate.

3. Monitoring wells are used to determine the gradients of the groundwater flow, including those exerted by potential wells .

4. The fecal coliform test, although not required in periodic testing, will not “detect” other pathogens, but may indicate the presence of such organisms. The inorganic constituents recommended as indicators for measuring potential groundwater effects will sufficiently indicate potential groundwater effects.

5. Tile drains are commonly used in areas where the groundwater is saline. In such cases, groundwater may not be designated as a municipal or agricultural source. However, in cases where tile drains are present and the groundwater monitoring is required, those factors must be weighed at the time the RWQCB Executive Officer is approving the groundwater monitoring system.

21-34. The groundwater monitoring program proposed in the proposed GO was developed and reviewed by SWRCB staff familiar with the latest groundwater quality monitoring protocol; this program has subsequently been reviewed by engineers and technical staff preparing the EIR who are also familiar with the design and implementation of effective groundwater monitoring programs. The SWRCB is the principal state agency responsible for protecting waters of the state to maintain their beneficial uses.

The list of constituents that must be tested for is in the preapplication report. The initial groundwater testing must include a full range of potential contaminants regulated by the GO. Subsequent annual testing relies heavily on monitoring for changes in nitrate, chloride and TDS levels as an indicator of any influence land application might have on groundwater quality. Refer to Master Responses 14 and 15 for a further explanation of this monitoring protocol. RWQCB staff have the authority and technical expertise to dictate the location of this monitoring relative to the land application operation and can propose additional monitoring requirements if deemed necessary to fully protect groundwater quality.

For those sites where groundwater quality monitoring is deemed necessary, monitoring will be required annually as long as the permit is in place. When the permit is withdrawn, the requirement will cease.

21-35. The comment indicates that the EIR lacks scientific information regarding the factors which contribute to horizontal and vertical movement of pathogens and contaminants once they reach the saturated zone (the groundwater aquifer). The commenter requests scientific information regarding these factors and asks:

- How far and how quickly will the various contaminants and pathogens travel vertically and horizontally in the saturated zone?

- What factors influence their movement?

- Will they concentrate near the top of the water table (will some of the pollutants and pathogens float? If so which ones?), or will they continually drive downward due to gravitational forces?

When biosolids are land-applied, the soil and biosolids particles form a filter mat that prevents most large particles from entering the subsurface groundwater. Usually, only soluble and colloidal particles and virus particles, and perhaps small bacteria, can enter the soil while larger organisms (such as helminth eggs) are retained on land (U.S. Environmental Protection Agency 1992). Filtration acts on the bacteria while adsorption retains viruses in the soil.

Vulnerability of a groundwater source to contamination depends on several factors, including the natural watershed characteristics, geology, soil permeability, soil slope and the amount of runoff. Human factors include reservoirs, wells, canals, and irrigation practices, in addition to the quality and amount of biosolids applied to a given site. Because these factors can influence the pathogens' vertical and horizontal movements on a site-specific basis, it is not possible to generalize these rates. Specific factors important to horizontal and vertical movement of pathogens and contaminants include the type of geologic structure and soil characteristics. The geologic transmissivity rating using the DRASTIC rating scale (U.S. Environmental Protection Agency 1987) shows little transport through shale and igneous rock (rated 1-3 on a 10-point scale) while sand and gravel ratings are in the range of 4-9 on a 10-point scale (high numbers indicate greater permeability). Soil permeabilities have been classified from very slow (0-0.6 inches/hour) to very rapid (> 20 inches/hour).

Course sand is the soil medium most conducive to pathogen transport because it is not a good filter medium for bacteria and is a poor adsorbent for viruses (Kowal 1985). For transport to occur from the soil surface to groundwater, there must be a route, such as cracks in the soils caused by dessication or from holes caused by roots, insects or animals, which can allow substantial transport to the subsoil. Subsurface fissured rock or limestone may also facilitate transport downward. However, there must be free liquid from biosolids application, rainfall, or irrigation water to provide a vertical transport mechanism. Then the depth to groundwater becomes a factor, as does the surface application rates or rainfall amounts (which must be sufficient to reach the groundwater via vertical downward movement). Movement rates will vary with soil type and hydraulic gradient.

Viruses in particular appear to have the greatest potential of all pathogens to migrate to groundwater. However, risk modeling efforts have shown that typically only 1 percent of pathogens present may be transferred to the subsurface and groundwater (assuming it is shallow) (Scarpino et al. 1988). Movement is slow to and within groundwater because the adsorption and desorption processes in the soil impede movement and slow progressive transport downward and laterally. Using saturated sites where wastewater is infiltrated (Gerba et al. 1991) showed that adsorption and/or filtration substantially reduced the density of virus (two-log reduction achieved by 15 feet of soil) when the wastewater was applied at a rate of 2 feet per day on a sandy soil. Biosolids application rates usually result in about two order of magnitude lower water application rates than a wastewater infiltration operation; thus even greater viral soil adsorption would be expected. Maximum survival times for viruses in soils at low temperatures (3 degrees to 10 degrees Centigrade) have been measured at 170 days (Kowal 1985). With the low irrigation and rainfall in California, and resultant low virus transport rates, it is highly unlikely that virus contamination of groundwater will occur.

Considerable efforts are underway to develop programs to protect groundwater users from consuming contaminated groundwater. This has resulted in national programs such as the Well Head Protection Program, Source Water Assessment Programs and comprehensive state groundwater protection programs under the Federal Safe Drinking Water Act, which designate time and distance-related zones which prohibit or limit potential water contaminants. As part of the groundwater disinfection rules being developed by the U.S. EPA, protection criteria have focused on dissolved contaminants and more recently on pathogens, including viruses.

Movement of contaminants and pathogens from biosolids applied soils will be very site-specific. First, the soil acts as a natural filtering mechanism controlling movement. For viruses and bacterial contaminants, soil particle size and the electrostatic forces within the pore water will control their movement vertically. Horizontal movement will be controlled similarly by these factors plus the localized movement of the groundwater. Differential movement is likely in aquifer where the underlying rock is course and unconfined which often occurs on flood plains. Given the siting constraints that the GO places on biosolids land application sites, flood plain application sites are unlikely to pose any problems since they will not be permitted.

21-36. The proposed GO is intended to provide for protection of beneficial uses, including drinking water supplies. Consistency between different State of California regulations is important when considering the rationale for adoption and scientific basis. The SWRCB believes that the 500-foot horizontal buffer recommended in the proposed GO is sufficient to prevent contamination of drinking water wells by pathogens and chemical contaminants when considered in the context of the other restrictions in the proposed GO dealing with contaminant levels, treatment to reduce pathogens and management practices to prevent water quality and soil contamination. In most counties, the minimum setback distance from septic tanks to domestic wells is 100 feet (Peters pers. comm.); thus, the setback recommended in the GO would provide a level of protection well above that required by most county environmental health departments.

21-37. The commenter notes that the EIR should also bear in mind the extremely low infection dose for many pathogens. The commenter states:

> Significant numbers of pathogens exist in sludge even after stabilization and treatment. If these pathogens can remain viable for extended periods of time, groundwater sources beneath sludge disposal and land application sites may become contaminated. Pathogens may not be significantly inactivated or removed by transport through the vadose zone. Once in groundwater, they may travel significant distances from the site. For viruses and parasites, the infectious dose is low, 1-50 organisms (Gerba 1986). If the concentration of either of these pathogens exceeds 10^3/mL of groundwater, there could be a significant risk of infection on an annual and lifetime basis (Gerba and Rose 1990). (See Attachment A to prior comments on NOP, dated December 1, 1998. Hazards, page 85).

University of Arizona microbiologist and researcher Dr. Charles Gerba, whose work was cited and who has undertaken extensive studies of sewage sludge and biosolids land application sites, replies:

> Both column experiments and field studies have shown that biosolid application to land does not result in virus transport to aquifers. Viruses have not been detected beneath biosolid application sites. It appears difficult for viruses to be released from biosolids. Coxsackie viruses are members of the enterovirus group and they are common in biosolids. The methods used in previous field studies were capable of detecting Coxsackie B3 virus and if it was a significant problem it should have been detected in the subsurface. Also, since field studies were conducted on virus migration from land applied biosolids, the issue of preferential flow aiding virus migration was taken into consideration. If it had been a significant issue, viruses should have been detected in the groundwater (Gerba pers. comm.).

21-38. Master Response 17 provides additional information regarding the evaluation of impacts to surface waters under the provisions and protective measures in the proposed GO, including the potential for impacts from flooding.

21-39. Master Response 17 provides additional information regarding the evaluation of impacts to surface waters under the provisions and protective measures in the proposed GO, including the potential for impacts from flooding. SWRCB staff does not dismiss the comments of EPA regarding its analysis of risks associated with biosolids application in floodplain areas. It is the position of the SWRCB staff that RWQCB staff receive ongoing training in the proper methods of evaluating and issuing waste discharge requirements given site-specific information that would be required in the Pre-Application Report; the proposed GO also provides a specific control for application within areas subject to significant erosion from runoff or flooding. Therefore, implementation of biosolids application projects under the proposed GO would pose a low risk to water quality because of washout from flood-prone areas.

21-40. Master Response 17 provides additional information regarding impacts to surface waters under the proposed GO's provisions and protective measures, including the potential for impacts from flooding.

21-41. See Master Response 13 for a description of the conservative risk assessment process conducted for the Part 503 regulation process, assumptions for evaluating potential water quality impacts to surface resources in the EIR, and reasons why the identified impacts were considered less than significant.

The comment is not correct in stating that only nine chemicals were evaluated. The risk assessments evaluated seven trace metals and 10 SOCs; however, EPA determined that regulations were not necessary for all the SOCs. The risk assessments determined that the concentrations for the metals were limited by environmental pathways other than the surface pathway; and the limiting concentrations of metals were much higher than for other pathways. The risk assessments for several trace metals (chromium, copper, lead and nickel) indicated that application could be unlimited and still pose very little risk of contamination. Because limiting concentrations of trace metals were lower for other pathways, biosolids application at those rates would further reduce the risk of contamination from the surface pathway. For example, the annual application of mercury is limited to 17 kilograms per hectare (kg/ha) to prevent contamination from the pathway of a child eating biosolids, whereas application of up to 1100 kg/ha of mercury could occur and still protect the surface water pathway. Biosolids application of 17 kg/ha mercury equates to a ratio that is 65 times lower than what is considered protective of the surface water pathway. This ratio is larger for all other trace metals.

SWRCB staff does not dispute specific arguments against the EPA risk assessment process of the surface pathway, based on other research studies found during the EIR scoping process. However, the extensive EPA Part 503 regulation development process was based on the combined experience, research and judgement of many professionals knowledgeable of waste management processes. SWRCB staff believes conservative factors in the Part 503 regulations and additional protective measures in the proposed GO provide substantive support of the EIR's impact conclusions.

21-42. The proposed GO prohibits direct discharge of biosolids into waters. Biosolids application projects under the proposed GO would have to maintain minimum setback distances from surface waters and areas of gully erosion or washout. These features must be documented on the Pre-Application Report. The SWRCB staff is confident that RWQCB staff have sufficient training, data resources, and review and enforcement authority at their disposal to carefully determine if a project would comply with these provisions. RWQCB staff can also reject a project, or request modifications to bring the project into conformance, or require individual WDRs if protective measures are not included that would prevent direct discharge.

21-43. Master Response 13 describes the basis for analysis of potential surface water quality impacts in the EIR and conservative factors in EPA's risk assessments conducted for the Part 503 regulations. Toxicity is generally associated with trace metals and SOCs, for which risk assessments were specifically conducted for the Part 503 regulations. Therefore, SWRCB staff believes the proposed GO will protect water quality standards for toxicity. If, however, any contradictory evidence becomes available that indicates toxicity was occurring because of land application of biosolids, the SWRCB could modify the GO program to reduce the potential adverse effects from toxicity.

21-44. Master Responses 13 and 17 generally describe the basis for the analysis of potential surface water quality impacts under the proposed GO. Responses to Comments 21-39, 21-41, 21-42, and 21-43 further address the analysis of surface water quality impacts. SWRCB staff believes the evidence supports the EIR's conclusions that risk to surface water quality impairment from biosolids application is sufficiently low, additional protective measures are included, and RWQCB staff have authority to require individual waste discharge requirements for any application project that they believe would not conform to the GO provisions. This ability for individual review includes consideration of a proposed land application site relative to areas of washout or gully erosion where materials could be carried offsite.

21-45. As described in Master Response 13, the Part 503 regulations were developed with several conservative assumptions regarding potential fate and transport mechanisms of contaminants to surface water. Response to Comment 21-39 also describes the basis for SWRCB staff opinions regarding the role that professional training of RWQCB staff and discretionary authority have in reducing potential impacts from typical waste application projects. Those responses are applicable to the analysis of water quality effects from exposure of biosolids application sites to stormwater runoff and irrigation water. SWRCB staff believes the evidence supports the EIR's conclusions that risk to surface water quality from biosolids application is sufficiently low, additional protective measures are included, and RWQCB staff has authority to require individual waste discharge requirements for any application project that they believe would not conform to the provisions of the proposed GO. RWQCB staff routinely evaluate effects of stormwater discharges in association with National Pollutant Discharge Elimination System (NPDES) permitting processes and are trained to properly evaluate potential exposure and contamination problems associated with biosolids application projects. Irrigation water poses no additional threat to water quality, since Part 503 regulations risk assessments were extremely conservative regarding the surface water pathway exposure route.

21-46. Master Response 13 generally describes the basis for the analysis of potential surface water quality impacts in the EIR and conservative factors in EPA's risk assessments conducted for the Part 503 regulations. See Response to Comment 21-45 for SWRCB response to potential effects of irrigation water and stormwater runoff.

21-47. SWRCB staff does not dispute that biosolids application projects have the potential to contribute small amounts of organic matter and total organic carbon (TOC) to water in the Delta and that this material could be a factor in the formation of trihalomethanes, which is a concern at drinking water treatment plants. The increase in trihalomethane concentrations in treated (chlorinated) drinking water is related to the TOC concentrations. Because biosolids will only be applied to carefully selected lands outside of the Delta, the effects of the biosolids on Delta TOC concentrations will be very small relative to the natural (vegetation) and agricultural (crop residues and peat soil oxidation) sources of TOC. Furthermore, the proposed GO requires specified setbacks from water bodies and the land application of biosolids in the Delta is not allowed under the proposed GO (an individual permit must be issued and further CEQA analysis would be required). SWRCB staff does not believe that the land application of biosolids under the proposed GO would be a significant contribution of TOC to Delta waters, individually or cumulatively, due to the GO's numerous requirements.

21-48. See Response to Comment 21-47.

21-49. Master Response 13 generally describes the basis for the analysis of potential surface water quality impacts in the EIR and conservative factors in EPA's risk assessments conducted for the Part 503 regulations. The controls in the Part 503 regulations and the proposed GO's additional controls are deemed adequate to protect the surface waters of the state from individual site and cumulative contributions of pollutants contained in biosolids. The soil medium and the required agricultural practices are a buffer and binder for the small amounts of heavy metals and other pollutants that are allowed to be present in biosolids applied to the land. The Clean Water Act has provisions that the SWRCB is using to assess cumulative or watershed-scale effects on water quality (total maximum daily load, or TMDL, provisions). The TMDL program generally consists of identifying contaminant sources in a watershed that has impaired water quality, determining reductions in contaminant loading necessary to improve the water quality to acceptable levels, and allocating these, in mass emissions, among the various discharges to improve water quality. Biosolids application projects could be subject to the TMDL process in any watershed that has a TMDL program.

21-50. The commenter notes that the EIR has failed to adequately investigate, document, discuss and analyze the potential for the numerous pathogens in Class A and Class B biosolids to enter the ground and surface waters, the air, or the land in the vicinity of the application sites.

The SWRCB staff disagrees with the comment. The information in the draft EIR and response to comments adequately discloses what is known about the potential for various types of pathogens to enter ground and surface waters, the air or soils at or near biosolids application sites.

21-51. There have been extensive reviews of the scientific literature and research supported by the EPA in developing the Part 503 regulations and in ongoing work to provide guidelines and methods for analyzing and managing biosolids. With regard to pathogens, a third edition of the document "Control of Pathogens and Vector Attraction in Sewage Sludge" will soon be published (James Smith, pers. comm.). This document and its predecessors (U.S. Environmental Protection Agency 1992) have provided specific treatment methods for meeting the Part 503 regulations and how to test for various pathogens in sludges. The research in this area has been used to develop the proposed GO controls on pathogens in biosolids. The potential for transport of pathogens to water, air, and soil has been thoroughly considered in the EIR (see Chapters 3, 4, 5 and 10).

21-52. The pathogen regrowth issue is discussed in the Response to Comment 10-4.

21-53. See Response to Comment 10-4.

21-54. The commenter believes the EIR should "also bear in mind and take into consideration our current inability to effectively detect pathogens." Comment noted; however, methods have improved for the detection of pathogens in the environment, including emerging pathogens such as adenovirus. While additional studies would confirm survival of these organisms during biosolid treatment and in the environment, existing information does not indicate that they would persist significantly longer than studied enteric pathogens. Current guidelines regarding biosolid treatment and land application are conservative regarding pathogen die-off and reduction in treatment. See Master Response 15 for additional information about microbial monitoring.

With the requirement for groundwater monitoring if the depth to groundwater is less than 25 feet, the RWQCBs will be able to determine if chemical contamination occurs. If contamination is eventually detected, additional testing might be proposed to determine if pathogens are present in groundwater at depth. To date, this has not been an issue of concern at biosolids application sites.

21-55. See Master Response 8.

21-56. The issue of the generation of pathogenic aerosols from biosolids land application was addressed in the draft EIR on pages 5-36 and 5-37 and in Appendix E of the draft EIR. Further discussion of the issue of worker exposure to aerosols was addressed in the Response to Comments 15-1, 15-2, 40-2 and 44-12. See discussion under Response to Comment 40-2 for a description of Mitigation Measure 5-3, which recommends that workers involved in the mixing, loading or spreading operations be provided respirators or dust masks for added protection to reduce potential exposure. The setbacks proposed in the proposed GO are not based on specific modeling results, but are general and designed to provide an adequate buffer between land application activities and various beneficial uses.

21-57. The commenter cites research reported in a study entitled "Mobility and Solubility of Toxic Metals and Nutrients in Soils Fifteen Years After Sludge Application" by McBride (1995), to state his view of significant potential short-term and long-term impacts on soil productivity from biosolids land applications, and requests further discussion and documentation of this issue.

The SWRCB staff has reviewed scientific articles on potential land productivity impacts from incorporation of biosolids containing low levels of metals, including the article cited. This article's author (McBride) was particularly concerned over the Part 503 Regulations' allowable loading limits on the typically acidic soils of the northeastern United States, and further documented the concern over biosolids applications to acidic soils in the publication by Cornell Waste Management Institute entitled "The Case for Caution: Recommendations for Land Application of Sewage Sludge and an Appraisal of the U.S. EPA's 503 Sludge Rules" (Cornell Waste Management Institute1997). As the commenter notes elsewhere in the comment letter, there remains some scientific controversy over this issue.

One of the most thorough reviews of this issue was completed by the National Research Council (NRC) in 1996, in the publication entitled "Use of Reclaimed Water and Sludge in Food Crop Production" (National Academy of Sciences 1996). This publication included a review of the 1995 McBride paper. The NRC did not conclude significant impacts on land productivity from biosolids associated metals additions, except perhaps on some types of acidic soils.

The USDA Agricultural Research Service recently analyzed this issue and reported its findings in an article entitled "Long-term Effects of Biosolids Applications on Heavy Metal Bioavailability in Agricultural Soils" (Sloan et al. 1996). It concluded that biosolids-applied cadmium was still in a form that is easily extracted from soil and readily available for uptake by lettuce more than 15 years after application. The other metals evaluated, including chromium, copper, nickel, lead, and zinc, were not found to be more plant-available.

A review of this literature, including the above article and other similar studies, and publications on soil conditions in California, concludes that metals toxicity and land productivity impacts would largely be limited to certain unique soil conditions in California (sandy, acidic, and with low organic matter content and low cation exchange capacities). This would impact certain metals-sensitive crops such as lettuce. This issue, was thoroughly and adequately discussed in the draft EIR, led to the conclusion that potentially significant impacts could occur in certain situations. Mitigation Measure 4-1 was developed to offset this potential impact.

Please note that the Pre-Application Report included at the end of the proposed GO (Appendix A) requires a fairly complete characterization of soil conditions, including soil pH and cation exchange capacity. Mitigation Measure 4-1 recognizes the potential impact on land productivity in certain soil conditions and places limitations on biosolids applications or crop choice on these sites. This mitigation measure is adequate as written to address this issue. (Please see the Response to Comment 26-28 for recommended revisions to Mitigation Measure 4-1.)

21-58. Because the proposed GO is a statewide program and conditions in California vary significantly, the EIR that has been prepared is necessarily programmatic in nature. The goal of the proposed GO and its EIR is to provide regulatory control and environmental evaluation only for those existing or proposed land application operations that can fully comply with the biosolids quality, site physical characteristics and site management conditions prescribed in the proposed GO. The programmatic impact analysis is sufficient to provide decision makers with the necessary environmental evaluation to support an action on a permit request that meets all these parameters. A checklist will be used by RWQCB staff to determine if specific projects are subject to requirements of the GO. If proposed projects deviate from the conditions in the proposed GO and the EIR, the RWQCBs will require that the applicant pursue individual waste discharge requirements and undergo further CEQA review.

21-59. The SWRCB believes that the alternatives in the EIR gives decision makers a reasonable range of options to consider in compliance with CEQA. The SWRCB developed the alternatives by first predicting the types of impacts that might occur, should the proposed GO be implemented. These alternatives were presented to the public through the scoping process to determine if other feasible alternatives exist that would reduce the proposed GO's potentially significant adverse effects. The Modified Provisions and Specifications Alternative and the Land Application Ban Alternative are clearly capable of mitigating or eliminating the identified potentially significant adverse effects; the alternatives proposed by the commenter would also address some of the potentially adverse effects, primarily those associated with public health risk. But it is felt that the mitigation measures proposed for the GO and the existing alternatives provide sufficient opportunities for the decision maker to consider ways to avoid or minimize the potential adverse effects of the project.

The last alternative suggested by the commenter (separation of food processing sludges from other organic sludges) would address only a small portion of the material intended for regulation under the proposed GO. The intent of the proposed GO is to regulate any material meeting the definition of biosolids, and therefore, consideration of only food processing sludges would not meet the project's objectives.

21-60. Additional testing for other contaminants are not required because:

- # The levels of unregulated contaminants are at extremely low levels in biosolids.
- # Contaminants listed in comment were evaluated when developing the Part 503 regulations. The EPA determined, either through risk assessments of detected chemicals or elimination because of extremely low levels, that environmental risk did not warrant testing and restrictions.
- # Data indicates that the levels of contaminants are continually decreasing in biosolids due to the implementation of pretreatment programs.
- # EPA continually studies various pollutants in biosolids and will provide limits when there is sufficient information that a health risk exists.

21-61. The levels of radionuclides in biosolids have and will continue to be reviewed. Regulatory responsibilities are shared by federal, state, and local agencies.

The Nuclear Regulatory Commission (NRC) issues permits for disposal of radioactive materials in the sewer system. Concentrations and quantities of radionuclides are based on a dose limit that could be received by an individual member of the public, assuming certain conservative conditions in calculating the potential dose.

Another source of protection from radioactivity is the EPA Producer of Toxic Waste (POTW) "pretreatment" program under the Safe Drinking Water Act. This program is designed to protect POTWs by preventing the introduction of pollutants (including radionuclides) into sewer systems that would interfere with the operation of a POTW, including interference with its use or disposal of sewage sludge.

In response to the request by John Glenn, the General Accounting Office (GOA) published the report, "Actions Needed to Control Radioactive Contamination at Sewage Treatment Plants." in May 1994. The report included a recommendation that NRC determine the extent of the contamination and establish limits for radionuclide levels.

Radioactivity in sewage sludge has also been examined by the EPA. The EPA report "Radioactivity in Sewage Sludge" stated that most radionuclides in sewage sludge were present at low concentrations. At most sites, sewage sludge contained radionuclides from medical treatment and research facilities. Because of their short half-lives, the medical contaminants were found to not produce a significant dose when sludge was land-applied

Requiring rigorous testing for radionuclides in biosolids is not necessary because POTWs do test biosolids for radioactivity to protect its own workers from radioactive exposure. NRC has developed a guidance document for POTWs for sampling and testing of biosolids for radioactivity.

Ongoing testing by the NRC and EPA is occurring at sites with the highest potential for contamination. This effort is expected to confirm previous testing, which found the levels of radionuclides in biosolids contribute insignificantly to background radiation levels.

21-62. Under the proposed GO, groundwater monitoring is required when biosolids are land applied more then twice in a 5-year period when depth to groundwater is less than 25 feet. The RWQCB Executive Officer also has the authority to require additional monitoring if deemed necessary for site-specific reasons. This monitoring is considered adequate to protect public health because of the proposed GO's other required precautions, including sludge treatment before land application and setbacks from domestic water supply wells (the setback is greater than that required for septic tanks).

21-63. The proposed GO already precludes application of biosolids on slopes steeper than 10%, unless an erosion and sediment control plan is prepared by a qualified professional, as described in the GO. The erosion control plan shall describe the site conditions that justify application of biosolids to the steeper slopes and shall specify the application and management practices necessary to ensure containment of the biosolids on the application site and to prevent soil erosion. The proposed GO also does not permit biosolids applications in areas subject to gully erosion. Further, the proposed GO precludes application of biosolids to water-saturated ground and during periods of rain sufficient to cause runoff to leave the application site. The proposed GO requires groundwater monitoring when biosolids would be applied in coarse-textured soils in which groundwater is less than 25 feet below the surface. Although the commenter is correct in that coarse-textured soils may allow relatively rapid movement of leachate to groundwater, 25 feet of soil thickness is considered adequate to protect the groundwater from biosolid-derived pollutants. The Cornell Waste Management Institute's recommendations are effectively included in the proposed GO.

21-64. The commenter recommends incorporating the recommendations of the Cornell Waste Management Institute study (Cornell Waste Management Institute 1999) into the GO requirements. These include considering expanding pathogen testing to include fecal coliform and salmonella, and require non-detection of salmonella for Class A sludge (page 34).

Comment noted. SWRCB staff has relied on the testing requirements specified in the Part 503 regulations to meet the definitions for Class A and Class B biosolids with exception to Salmonella testing. If EPA testing requirements change or more restrictive mandates are developed, then the SWRCB can consider amending the proposed GO to incorporate such requirements.

21-65. The CWMI comments are, in several parts, oriented at conditions in the northeastern United States, where importing of biosolids is a very real issue. However, from a conceptual standpoint, biosolids derived from out of state are applicable under the proposed GO. Such cases are not believed to be an issue since the U.S. EPA's risk-based standards are derived from the National Sewage Sludge Survey. Also, other than highly treated agricultural products, biosolids management in California is mostly internal with some export to other states. Thus, the EIR is addressing reasonably anticipated land applications of biosolids under the proposed GO.

21-66. This comment refers to a CWMI recommendation regarding application of Class B sludges. The proposed GO provides a conservative approach to regulating Class B biosolids, with setback requirements, storage and application timing controls, and restrictions on the timing of growing crops or introducing grazing animals at application sites. The ecological and animal health effects have been thoroughly reviewed in this EIR (see Chapters 4, 5 and 7). A consideration of necessity has not been included in the proposed GO and is not considered appropriate.

21-67a. Regulation of Exceptional Quality biosolids by the proposed GO should not be viewed as an exemption. Such applications not applicable to the proposed GO may be issued individual waste discharge requirements, as determined on a case-by-case basis.

21-67b. Master Responses 13, 14, 15, 16 and 17 generally describe the basis for the analysis of potential surface and groundwater quality impacts in the EIR regarding EPA's risk assessments conducted for the Part 503 regulations, additional protective measures in the proposed GO, and the authority of RWQCB staff to use monitoring and professional judgement to determine if a specific biosolids application project will protect water quality. Biosolids application projects that qualify under one of the proposed GO's allowed exemptions for application rate or field size would continue to still be regulated by public health law and local ordinances. Any applications of the size and extent required for an exemption, given the requirement for EQ-level treatment, would be more conservative than application rates used for the Part 503 regulations risk assessments. Therefore, the master responses listed above provide the basis for evaluating the potential water quality impacts of those exemptions. The analysis in the EIR includes potential impacts of the entire GO program; individualized analyses of the listed exemptions to the proposed GO are not deemed necessary.

21-67c. Biosolids not subject to the proposed GO may be subject to other regulatory processes, such as California Department of Food and Agriculture labeling requirements and individual WDRs. The description of all potential regulatory processes, including the application process for a waiver or individual waste discharge requirement, is not relevant to the impact analysis in this EIR. These are existing processes not affected by the proposed GO.

21-68. There have been few studies of the concentrations of viable cryptosporidia oocysts in biosolids. As stated on draft EIR pages E-11 through E-14, no outbreaks of the disease have been associated with biosolids to date. Flooding of pastures where cattle graze has been a source of cryptosporidium when downstream water treatment facilities have operated at maximum efficiency. A great deal of research and upgrading of facilities has been underway to protect public water supplies from the potential presence of cryptosporidium and giardia, two protozoans which have been emerging pathogens of concern.

Research indicates that the protozoan parasites are largely killed during anaerobic sludge digestion. They do occur in large numbers in anaerobically digested sludge, but previous testing methods could not assess long-term viability. New methods can assess the viability of these organisms, but these methods have not yet been applied to biosolids. The parasites are unlikely to survive longer than enteric bacteria or viral pathogens in the biosolids after land application (Dr. Charles Gerba pers. comm.). They are inactivated rapidly at warm temperatures and under low moisture conditions.

21-69. See Master Response 6.

21-70. For concerns about enforcement, see Master Response 1. Many generators are also dischargers and are therefore covered by the proposed GO. There are numerous federal, state, and regional regulations applicable to generators that are not part of the proposed GO. These include: sewage sludge regulations (40 CFR Part 503), landfill requirements (40 CFR Parts 257 and 258), the Clean Air Act, and the Resource Conservation and Recovery Act. Furthermore, the biosolids must meet the requirements of the proposed GO, regardless of whether the generator or discharger is responsible.

21-71. See Master Response 1.

21-72. The National Sewage Sludge Survey has documented the quality of sewage sludge on a national level. This information, combined with data submitted during the GO application process, sufficiently characterizes the material proposed for land application. All testing must be performed by a Department of Health Services-certified laboratory. Such laboratories are subject to periodic Quality Control/Quality Assurance evaluations. Testing of biosolids, as required by the federal regulations, vary depending on the size of the wastewater treatment plant. Seasonal fluctuations that would cause a municipal sludge to be classified as a hazardous waste are not known to occur.

21-73. Finding 22 of the proposed GO has been modified to read "Environmental Impact Report" instead of ~~Mitigated Environmental Impact Report.~~

21-74. As described in Master Response 14, the EIR does not regard groundwater monitoring as mitigation for potential impacts. Similarly, surface water quality monitoring would not reduce potential surface water quality impacts. SWRCB staff believes surface water quality monitoring at all biosolids application sites is not necessary. SWRCB staff reserves the right to require monitoring if there is any indication that contamination may be occurring. This monitoring could be conducted by the SWRCB staff, by staff at each RWQCB, or the GO program could be amended to require individual application projects to conduct surface water quality monitoring.

21-75. Provision No. 15 in the proposed GO allows for the RWQCB to enter the site and sample for substances or parameters to evaluate compliance. Enforcement of all waste discharge requirements, with listed penalties, may be found in Chapter 5 of the California Water Code.

21-76. The 30-day requirement is established from the "Technical Support Document for Reduction of Pathogens Vector Attraction in Sewage Sludge" by Eastern Research Group for the United States Environmental Protection Agency, Document No. PB93110609, p. 2-11 to 2-15, 1992. The 33-foot filter strip requirement was taken from "Soil and Water Conservation for Productivity and Environmental Protection" by Frederick R. Troeh, Prentice-Hall Inc., Englewood Cliffs, N.J., 07632, p. 263 to 264, 1980. The controls established in those documents were subjected to technical review and are considered effective.

21-77. In most cases, biosolids must undergo testing to show that it is not hazardous waste. The testing is based on CCR Title 22, Division 4.5, Chapter 11 requirements (Identification and Listing of Hazardous Waste). The requirements contain an extensive list of pollutants for which biosolids must be tested. The public has access to all testing results. This requirement is clearly stated in the proposed GO (Prohibition 11).

Only after the biosolids have passed all the tests in the requirements can the material be considered for land application under the proposed GO. A preapplication report, which lists additional testing results that must be reported, must be filed with the RWQCB. Testing of individual truckloads of biosolids would be very costly and the need is not supported by existing data on municipal sludge quality. Pretreatment programs and periodic sludge quality testing are designed to avoid the presence of pollutants at hazardous levels in sludge destined for land application.

21-78. See Response to Comment 21-77.

21-79. Saturated soil at the point of application is where the biosolids and soil interface. This is usually at the surface of the soil.

21-80. This prohibition has been revised to be less subjective. The text of the proposed GO, as found in Prohibition No. 15 of Appendix A, now reads as follows:

The application of biosolids in areas where biosolids are subject to gully erosion or washout offsite is prohibited.

There is no evidence that the prohibitions in this comment are needed to fully protect public health and water quality.

21-81. See Master Response 6.

21-82. Class B biosolids receive less treatment for potential pathogens and therefore have a higher probability to contain significantly higher pathogens. Accordingly, discharges from such sites have more potential for adverse effects off site and therefore require more precaution when land-applied.

21-83. See Master Response 3.

21-84. The Executive Officer is supported by RWQCB staff, which can include registered civil engineers, certified geologists, certified engineering geologists, and certified hydrogeologists specializing in water quality issues. As specified in the proposed GO in Appendix A of the draft EIR and the final EIR, the setback cannot be less than 100 feet. This is the setback specified for domestic wells from animal or fowl enclosures as specified in the Water Well Standards: State of California, Bulletin 74-81.

21-85. The commenter states that the EIR should include more information on biosolids storage facilities. The storage areas in question are only intended for use for less than 7 days and that storage facilities are required to be covered within 24 hours. The GO requires a cover to be maintained until applied.

21-86. See Responses to Comments 14-3, 14-5 and 14-17.

21-87. As part of the proposed mitigation for this project, Mitigation Measure 4-3 would require the state to track and identify biosolids application sites. The system and its records would be kept indefinitely and would be available to prospective land buyers.

21-88. The Pre-Application Report requires a map that shows the surrounding area, including wells. USGS maps and Department of Water Resources records usually include known historical wells. As such, further elaboration is believed unnecessary.

21-89. The character of biosolids coming from a particular source does not differ significantly, so testing every truck is unwarranted. Testing frequencies are established in federal regulations and vary with the size of the wastewater treatment plant. The proposed GO requires that data to be submitted to the RWQCB. See Responses to Comments 21-75 and 21-77.

21-90. The necessity of this requirement is unsubstantiated in the comment and not believed to be necessary to protect the environment.

21-91. The validity of tracking pollutants in the soil is deemed to have little benefit, and is an unnecessary cost to the citizens and dischargers that accept biosolids. The EPA risk assessment established cumulative pollutant loading rates based on additions of biosolids to the soil. The state is proposing a similar program. As such, tracking of pollutants in the soil does not measure compliance. Pathogens are not deemed to persist. Other pollutants are not expected to be significant.

21-92. The need to require surface water monitoring by individual farmers who use biosolids is not justified by the findings of the EIR. It is acknowledged that such monitoring would add to the knowledge bases regarding this material and the water quality impacts from use of fertilizers as a whole. However, the need for individual farmers to monitor their tailwater, runoff, and tilewater solely because of the use of biosolids is not justified given the controls contained in the proposed GO.

21-93. The reference to "Category b" in the last sentence of the third paragraph on page ES-7 is correct.

21-94. See Master Responses 7 and 8 for a full discussion of these restrictions on reentry.

The text of Mitigation Measures 4-2 and 5-2 are apparently confusing. In response, the second sentence of each mitigation measure is revised as follows:

> The proposed GO should also be revised to ~~prohibit grazing animals from using a site~~ require that grazing of animals be deferred for at least 60 days after.....
>
> This same text change has been made in Table 15-1.

21-95. Comment noted; the second sentence of the last paragraph on p. 5-34 is amended as follows:

> The proposed GO contains sufficient provisions to prevent such occurrences (setbacks, minimum distances to wells, ~~minimum depth to groundwater,~~ runoff controls, and prohibitions to long-term storage piles where concentrations of pathogens might be higher if leached to groundwater.

21-96. See Master Response 13 and Response to Comment 21-8.

21-97. Table 15-1, "Mitigation Monitoring Program" has been revised and is included as Appendix C of this document.

21-98. The commenter stated that the EIR failed to provide public agencies and the public with detailed information about the effect of the proposed project, failed to provide mitigation measures to reduce significant impacts, and did not adequately analyze alternatives. The SWRCB does not agree with the commenter's opinion. The EIR was prepared with a sufficient degree of analysis to provide the decision makers with information while enables them to intelligently take account of environmental consequences when making the decision whether to approve the project. SWRCB staff prepared this EIR in good faith and with full public disclosure. A team of qualified individuals developed the EIR and conducted peer review of the analysis. SWRCB staff worked closely with the technical consultants and independently reviewed the entire EIR. Public scoping meetings were conducted to solicit comments from the public regarding the proposed GO, public hearings were held to inform the public and agencies of the potential environmental impacts of implementing the proposed GO, and alternatives consistent with the State CEQA Guidelines were evaluated.

EASTERN MUNICIPAL
WATER DISTRICT

September 10, 1999

Todd Thompson
State Water Resources Control Board
901 P Street
Sacramento, CA 95814

Re: Comments on DEIR and the Statewide GO for Land Application of Biosolids

Dear Mr. Thompson:

Eastern Municipal Water District (EMWD) is concerned that Mitigation Monitoring Program in Chapter 15 of the Draft Environmental Impact Report is unnecessarily restrictive. In item 7-1, the discharge is required to provide the following information in the pre-application report:

- Indicate whether the land application site contains natural terrestrial habitat areas,
- Indicate whether the land application site has been fallow for more than one year,
- Submit a report that states whether special-status species occur on the site.
- If special-status species occur on the site, the report must identify the measures that will be taken to mitigate or avoid impacts on these species. The report must be prepared by a qualified biologist. 22-1

EMWD's concern is that landowners, growers, and appliers are not qualified to know whether the first and third condition exists without the use of a qualified biologist. The effect of this requirement, whether or not the site as been fallow for more than one year, will be that biological surveys may be required for all land application sites. This requirement is costly, would require U.S. Fish and Wildlife review, and not consistent with the risks of the proper use of biosolids as a soil amendment and fertilizer on agricultural property. In addition, the agricultural community routinely put fields in a fallow state to restore the productivity of the land. The landowners and growers using manures or commercial fertilizers do not have to indicate whether habitat exists or whether special status species occur on the site. If this requirement is enacted, it should only be required on land that has been fallow for more than five years.

Mailing Address: Post Office Box 8300 Perris, CA 92572-8300 Tel (909) 928-3777 Fax (909) 928-6177
Location: 2270 Trumble Road Perris, CA 92570

In regards to the General Order requirements, EMWD supports the issuance of the permit to the landowner, since the landowner has reason to protect the value of the property, and growers may change from year to year. We also believe the land applier should also be held liable for site operations and proper use of buffer zones, perhaps as a joint permittee. 22-1 (cont)

If you have any questions, please feel free to call me at (909) 928-3777, ext. 6327.

Sincerely,

Anne Briggs

Anne Briggs
Compliance Officer

cc: Tony Pack, Deputy General Manager, Operations and Administration
Mike Luker, Director of Water Reclamation
Gary Ethridge, Director of Environmental and Regulatory Compliance

Responses to Comments from the Eastern Municipal Water District

22-1. The commenter is concerned that Mitigation Measures 7-1 and 7-2 are unnecessarily restrictive and suggests that the threshold for requiring the submittal of biological reports for land that has been fallow for more than one year be extended to 5 years. The commenter also questions the need for these requirements since they do not apply to landowners and growers using manures or commercial fertilizers. Mitigation Measures 7-1 and 7-2 were developed to protect sensitive biological resources that could be present at sites that were not previously in agricultural use (such as open lands being converted to agriculture). It should be noted that the land application of biosolids will primarily be used on land in agricultural production. Because, based on Jones & Stokes' biologist's professional judgement, special-status species could re-enter areas that have been left fallow for more than one year, it is important to require surveys of these areas to protect biological resources.

Regarding the commenter's concern about landowners and growers not being qualified to determine if natural terrestrial habitats are present at the land application site, if a site has been fallow for more than 1 year, a report must be prepared by a qualified biologist. If the site where the land application of biosolids is proposed has been actively farmed, the likelihood of natural terrestrial habitat being present is nil because the area has already been disturbed.

Furthermore, the SWRCB is required to address the potential impacts of the land application of biosolids on biological resources, pursuant to the State Water Code Section 13274, which states, "The general waste discharge requirement shall . . . include provisions to mitigate significant environmental impacts, potential soil erosion, odors, the degradation of surface water quality or fish or wildlife habitat." Proposals to use biosolids for soil conditioning or adding nutrients is regulated through a permitting process and triggers the need to comply with the Water Code and CEQA. Currently, the use of animal manures or chemical fertilizers do not trigger a similar permitting process. Nonetheless, all landowners, including farmers, are subject to the regulations implementing the federal Endangered Species Act; therefore, they must consider impacts on protected species, regardless of the source of fertilizer material.

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Chief Engineer and General Manager

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To: Todd Thompson
SWRCB

Date: 9/10/99

From: Mike Sullivan

\# of pages: 10
(including this page)

Fax Operator:
(and extension number)

Comments: Thanks Todd. Have a good weekend.

COUNTY SANITATION DISTRICTS
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CHARLES W. CARRY
Chief Engineer and General Manager

September 10, 1999
File No: 31-320.10

Mr. Todd Thompson
State Water Resources Control Board
901 "P" Street
Sacramento, CA 95814

Dear Mr. Thompson:

Draft Environmental Impact Report (DEIR)
Covering General Waste Discharge Requirements for Biosolids Land Application

The County Sanitation Districts of Los Angeles County would like to first express appreciation for the great amount of work which has been put into this project thus far. It is very beneficial to have a thorough state review of all issues related to this matter, which has caused a great deal of controversy and strong reactions in many localities. As the number of counties that enact, or are considering, restrictive land application ordinances grows it is increasingly important that a broad state review be balanced and scientifically based. The state review must also consider the importance of recycling its own waste streams, as well as the environmental impacts of that recycling effort. A thorough and balanced review which "contains requirements that are base on sound science and best professional judg(e)ment" (quoted from the DEIR Executive Summary) should provide regulations in which all concerned localities can be confident of the protection of public health. 23-1

The following comments are expressed based on the order in which each section of related text appears in the DEIR. Deletion recommendations are shown with ~~strikeouts~~ and additions are shown with <u>underlines</u>.

No.	Section	Page	Comment	
1	Executive Summary	ES-3	Correction should be made in the last paragraph of this page as follows "The California Association of ~~Sanitery~~ <u>Sanitation</u> Agencies (CASA)". This correction must also be made throughout the DEIR.	23-2
2	Executive Summary	ES-6	The first sentence on this page should be amended as follows "and contains requirements that are based on sound science and best professional judg<u>e</u>ment."	23-3
3	Executive Summary	ES-6	The last sentence states that " The identification of permitted activities under the GO does not preempt or supersede the authority of local agencies to prohibit, restrict, or control biosolids reuse." This sentence is unnecessary. Although it may be correct under current law, that situation could change, and inclusion of this language could unnecessarily lead to a challenge to the GO if it is based on this premise. The sentence should be deleted and text added to indicate that more restrictive local regulations should be based on an increased risk due to unique local conditions that were not examined under the DEIR. The same comment applies to last sentence on Page 2-10 of Chapter 2.	23-4

4	Executive Summary	ES-9	The 10th bullet item on this page should be amended as follows "no application or incorporation into the soil is permitted when wind may reasonably be expected to cause particles of biosolids to become airborne ~~particulates to~~ and drift from the site". Particles of dust or other material, whether related to biosolids application or not, will be limited by current farming regulations.	23-5
5	Executive Summary	Table ES-1	Comments on Mitigation Measures listed in this section will be discussed under the chapters with which they are associated.	23-6
6	Executive Summary	Table ES-1 Page 3	The first listed impact on this page should be amended as follows "Potential soil degradation at recreation-area appleication sites".	23-7
7	Chapter 2	2-8	The first bullet item on this page states that the GO is intended to "comply with Section 13274 of the California Water Code and the judicial order by the Superior Court of California for the County of Sacramento by adopting statewide general WDRs for the discharge of dewatered, treated, or chemically fixed sewage sludge (biosolids) for beneficial use as a fertilizer and/or soil amendment". Section 13274 of the California Water Code states "The state board or a regional board, upon receipt of applications for waste discharge requirements for discharges of dewatered, treated, or chemically fixed sewage sludge and other biological solids, shall prescribe general waste discharge requirements for that sludge and those other solids. General waste discharge requirements shall replace individual waste discharge requirements for sewage sludge and other biological solids, and their prescription shall be considered to be a ministerial action." It is unclear whether there will be an immediate effect on existing WDRs, an effect during the renewal process, or no effect at all. It must be made clear that the GO is not required to replace existing site specific WDRs either immediately or upon renewal, but is an option for each RWQCB during either the renewal or initial permitting process. Otherwise, there would be unintended and undesirable consequences such as loss of valid site specific conditions, inappropriate regulation of sites over 2,000 acres, ... etc.	23-8
8	Chapter 2	2-12	The last paragraph of this page states that the "biosolids that are to be applied to land under the GO must comply with minimum standards for concentrations of 10 metals, nine of which are regulated under the Part 503 regulations. The scientific basis for inclusion of a further constituent to a list developed through a scientific, risk based analysis must be provided.	23-9
9	Chapter 2	Table 2-4	Chromium should be deleted from this table unless a scientific based justification is provided.	23-10
10	Chapter 2	Table 2-5	Molybdenum should be deleted from this table unless a scientific based justification is provided. The USEPA is in the process of developing a risk based cumulative loading limit for molybdenum and projects publication of results by the end of 1999. It should be stated that when this limit is adopted by the USEPA that it will be automatically included in the GO.	23-11
11	Chapter 2	2-15	The first paragraph requires that "storage areas must be covered between October 1 and April 30 during periods of runoff-producing precipitation". An allowance should be made for uncovered storage facilities that are designed to collect and impound runoff which would be either legally reused or disposed.	23-12

12	Chapter 3	3-17	The second paragraph on this page states that the "semivolatile organic compounds (SVOCs) generally are present in low amounts in municipal biosolids." It goes on to say that the "Part 503 regulations do not require that biosolids be tested for SOCs (Synthetic Organic Compounds) ; however, the proposed GO monitoring program would require testing of biosolids for PCBs and SVOCs." The reason given for this requirement is that "much less is known about soil accumulation, plant uptake, and concentration mechanisms of SOCs in soil." While benefits of this monitoring may exist, scientific reasons should be given which explain why certain compounds were chosen and others were not. It must also be clearly stated what will be done with this information and to what standards it will be compared. Having this type of information prior to collection of the data will help in obtaining public acceptance of any conclusions.	23-13
13	Chapter 3	3-34	The fourth bullet item on this page states that the "propose GO includes concentration limits and cumulative loading rates for chromium and molybdenum. The proposed GO is therefore more restrictive than the existing Part 503 regulations that do not include limits for these trace metals". If document is to be truly based on sound science and best professional judgement, the utilization of limits for these two constituents must be delayed. Inclusion of limits that were rejected by the source of the scientific study that produced the limits is not reasonable. As previously stated, the USEPA is in the process of developing a risk based cumulative loading limit for molybdenum and projects publication of results by the end of 1999. It can be stated that when this limit, or any other limit is added by the USEPA to the 503 Regulations, that it will be automatically included in the GO.	23-14
14	Chapter 4	4-12	Mitigation Measure 4-2 recommends extending the grazing restriction after land application of biosolids to 90 days. This extension is unnecessary and should be removed. The 30 day restriction found in the 503 Regulations was based on scientific data and has been found to be adequate to protect animal health. The conclusion at the end of this mitigation measure is that it "will promote maximum biodegradation of SOCs and pathogens before grazing animals are exposed to the soil." This conclusion is not based on a scientific study and until it is determined what, if any, measurable biodegradation occurs between the 30th and 90th days after biosolids application should be removed. Additionally, it appears that a typographical error exists in that the wording of this mitigation measure does not match the wording used in Table 15-1.	23-15
15	Chapter 5	5-29	Mitigation Measure 5-2 also recommends an extension of the grazing restriction after land application of biosolids. The comment is the same as for Comment No. 14.	23-16
16	Chapter 6	6-7	Part (a) of Mitigation Measure 6-1 requires that "no application of Class B biosolids shall be permitted within an area defined in the GO as having a high potential for public exposure unless the biosolids are injected". In principle this restriction has merit, but the definition of a "High Potential for Public Exposure Area" must be modified. The definition supplied in the GO is: Land located within one-half mile of a developed border of a populated area. This definition is vague and unworkable. It is possible for an area fitting this definition to actually have extremely low public exposure and for an area outside of this one-half mile restriction to have relatively high public exposure. The definition should be replaced with wording contained on Page 6-7: Land located within one-half mile of educational facilities, facilities designated for recreation activities other than hunting, fishing, or wildlife conservation, places of public assembly, hospitals, or similar sensitive receptors.	23-17

17	Chapter 7	7-11	The third paragraph on this page states that "Biosolids Application could result in the loss of special-status plants or animals if it is applied to natural terrestrial habitats (i.e. rangelands) or any land that have been fallow for more thant year." It should be clearly stated what the special-status plants or animals are and the time frame that ground is allowed to remain fallow must be extended. During normal farming practices, especially on the marginal land to which biosolids is generally applied, land can often be left fallow for periods of time exceeding one year. Requiring a report prepared by a qualified biologist after such a short period of time would be an unwarranted hardship on the farming community and would discourage biosolids reuse. This time frame should be extended to represent an actual period under which reversion to a native status could actually occur, such as five years or more.	23-18
18	Chapter 8	8-4	Mitigation measure 8-1 proposes that "land applications in the habitat range of the pupfish should be reviewed for their proximity to enclosed water bodies that could be occupied by pupfish. If such water bodies are near the land application areas, setbacks of 500 feet should be required." The 'habitat range of the pupfish' should be clearly defined and the mitigation measure should be amended as follows: "water bodies that ~~could~~ <u>are reasonably expected to</u> be <u>naturally</u> occupied by pupfish." Also, the setback increase from 100 feet to 500 feet must be substantiated by scientific evidence showing its necessity.	23-19
19	Chapter 10	10-5	The last paragraph on this page states that the GO "prohibits the release of any visible airborne particles from the application site during biosolids application or during incorporation of biosolids into the soil." This prohibition must be changed to reflect actual farming conditions. Dust generation due to farming operations is already controlled through other regulatory means and the purpose of the eleven setback requirements already in the GO is to minimize this type of impact. The way this restriction is worded, even dust blowing from one application site to an adjacent application site would be restricted. The intent of this prohibition is to prevent any biosolids particles from becoming airborne and having an impact on air quality offsite. This can be accomplished by changing the wording in this paragraph, in the second paragraph on Page 10-9, and in the GO to "any visible airborne <u>biosolids</u> particulates".	23-20
20	Chapter 10	10-6	The last paragraph on this page states that the "Emissions are considered significant if they exceed the most stringent significance thresholds for air districts where biosolids are applied in the greatest volumes". This statement is inaccurate. The thresholds of significance should be those applied by the respective air district for CEQA purposes and not simply the most stringent three air districts.	23-21

21	Chapter 10	10-7	Mitigation Measure 10-1 proposes to limit vehicle miles traveled (VMT), on paved roads, by biosolids transport vehicles to 4,800 VMT per day. The basis for this is unclear. The vehicle emissions appear to be estimated for the total miles traveled for a project and not the miles traveled within a given air basin. The total miles traveled within each air basin should be compared against the significance thresholds established by the APCD for that air basin. The study of this impact should be completed in this manner and should also include mitigation measures such as alternatively fueled vehicles. The study should also take into account the secondary impacts that a VMT limit would have if it made utilization of biosolids untenable. If biosolids usage were eliminated due to this limitation, the result would be that farm operations would have to haul in and apply inorganic fertilizer and other sources of nutrients and the biosolids would have to be hauled to remote landfills. The cumulative effect would be that emissions from biosolids transport vehicles might be reduced but a net increase in emissions would result.	23-22
22	Chapter 10	10-8	Mitigation Measure 10-2 proposes to limit biosolids transport vehicles, on unpaved roads, to 67 VMT per day. The same arguments from comment No. 21 apply to this mitigation measure. In addition, it is unclear whether this limit applies to spreaders or front-end loaders. Alternate methods to control dust from unpaved roads, such as limiting the speed of vehicles, should also be studied.	23-23
23	Chapter 11	11-6	Mitigation Measure 11-1states that the "transporter will avoid the use of haul routes near residential land uses to the extent possible." A clear definition of 'near residential land uses' should be provided.	23-24
24	Chapter 13	13-3	Mitigation Measure 13-1 requires that the RWQCB engineer review the Notice of Intent and determine whether a nitrate contamination problem exists or if the "proposed project would pose and imminent threat of contributing to or causing exceedances of water quality standards for nitrate". This language is vague and subject to wide interpretations. A clear definition of what is an 'imminent threat' to water quality standards should be provided.	23-25
25	Chapter 15	Table 15-1	This table should be modified to reflect the aforementioned changes to the mitigation measures.	23-26
25	Appendix A	Page 1	The SWRCB General Order for land application of biosolids was developed as a basis for the DEIR. The DEIR was required because of a SWRCB finding that the negative declarations prepared by the Central Valley and Lahontan RWQCBs for their General Orders and Exceptional Quality (EQ) Waiver were not adequate. The GO regulates both Class A and B biosolids, which are not EQ, and certain EQ biosolids because "public acceptance to large scale uses has indicated the need for oversight at this time, regardless of the actual threat to water quality". The criteria used to determine which EQ biosolids applications would be permitted, and which would not, is arbitrarily based on biosolids content of the material, loading rate, and area of application. The SWRCB is outside its area of authority and does not have the right to regulate any activity based on perception. Further, the SWRCB should have developed regulatory guidelines which parallel the baseline which was initially questioned (i.e. a General Order for non-EQ biosolids and an EQ Waiver). The GO should therefore be restricted only to non-EQ biosolids. Otherwise all use of compost and other "products" will be subject to this permit, which will result in a marketing disadvantage for those products and may ultimately end any efforts to reuse higher quality biosolids. Sections 1.a and 1.b on this page should be deleted.	23-27

27	Appendix A	Page 2	Section 2 states that oversight of EQ biosolids is necessary due to the "perception of unregulated dumping". This requirement is based neither on sound science nor best professional judgement and Section 2 should be deleted in its entirety.	23-28
28	Appendix A	Page 3	Section 3.n. contains a definition for High Potential for Public Exposure Areas which should be changed, as described in Comment No. 16, to the following: "Land located within one-half mile of educational facilities, facilities designated for recreation activities other than hunting, fishing, or wildlife conservation, places of public assembly, hospitals, or similar sensitive receptors."	23-29
29	Appendix A	Page 5	Section 3.ak. defines tailwater as "Excess water discharged to surface water bodies resulting from crop irrigation." Certain farming operations have tailwater collection system that impound this flow for return to the fields. This definition should be modified as follows. "Excess water ~~discharged to surface water bodies~~ resulting from crop irrigation."	23-30
30	Appendix A	Page 8	Section 10 states that "The National Research Council established a committee to review the methods and procedures used by the U.S. EPA while forming the basis of the 40 CFR 503. The National Research Council's members are drawn from the National Academy of Sciences, National Academy of Engineering, and the Institute of Medicine. Committee members included university professors from the schools of law, science, and agriculture; a state health official; a food industry professional; a professional from a sanitation agency; and a professional consultant. After a three-year study (starting in 1993), the committee made some recommendations for improvement but also stated: 'Established numerical limits on concentration levels of pollutants added to cropland by sludge are adequate to assure the safety of crops produced for human consumption.' As a result of the peer review, monitoring for organic chemicals and using fecal coliform testing as a parameter for determining Class A pathogen reductions is included in this General Order." First of all, there is no NRC committee recommendation to monitor biosolids for organic chemicals. The recommendation was that when the USEPA conducts the second National Sewage Sludge Study, they should strive to improve the integrity of the data by using more consistent sampling and data-reporting methods in order to show whether or not toxic organic compounds are present in biosolids at concentrations too low to pose a human/animal health and environment risk. Secondly, the recommendation to use the fecal coliform test in place of the Salmonella test deals with acceptable product quality. While the SWRCB may impose this restriction on non-compost Class A biosolids, it is outside the SWRCB's jurisdiction with respect to compost quality. Compost quality is regulated under the authority of the California Integrated Water Management Board through their composting regulations in Title 14, Chapter 3.1 and it is recommended that changes to product quality be uniformly instituted there.	23-31

31	Appendix A	Page 9	Section 15 states that "This General Order shall primarily apply to the land owner of sites using biosolids, but may also include, as determined by those involved in the operation, the individuals, companies, or municipalities generating, transporting and placing the biosolids (Class A or Class B) and the land lessee, in conjunction with the land owner." It is not clear why the General Order will "primarily apply to the land owner" since in many instances the land owner does not directly manage the land application activities. A land owner that is not the land applier has chosen to receive an agricultural product and has contracted with the applier to provide this product. It is recommended that the General Order apply primarily to the applier and that the General Order contain requirements for the landowner and lessee to certify that they agree to use the material and that they understand and agree to comply with all site restrictions required by regulation. It is also unclear what is meant by "as determined by those involved in the operations". Section 15 should be revised as follows: "This General Order shall primarily apply to ~~the land owner of sites using biosolids, but may also include, as determined by those involved in the operation,~~ the individuals, companies, or municipalities ~~generating, transporting and~~ engaged in the placement of ~~placing the~~ biosolids (Class A or Class B) on land for use as a soil amendment (Applier). Such Applier is required to inform and obtain certifications as appropriate from other parties including generators, transporters, land owners, and land lessees to satisfy all requirements of this General Order ~~and the land lessee, in conjunction with the land owner.~~"	23-32
32	Appendix A	Page 14	The ceiling concentration (mg/kg dry weight) levels listed in Section A.12. for copper, lead, and chromium are 2500 mg/kg, 350 mg/kg, and 3,000 mg/kg, respectively. These limits should be modified to match the scientifically based limits contained in the 503 Regulations, or scientific justification should be made for them to remain. The limits for copper and lead should then be 4300 mg/kg and 840 mg/kg, respectively, on a dry weight basis. The limit for chromium should be deleted.	23-33
33	Appendix A	Page 15	Section 14 states that "Any visible airborne particulates leaving the application site during biosolids applications or during incorporation of biosolids at the permitted site is prohibited." As described in Comment No.19, the wording should be amended as follows: "Any visible airborne biosolids particulates leaving the application site during biosolids applications or during incorporation of biosolids at the permitted site is prohibited."	23-34
34	Appendix A	Page 15	Section A.15. States that "the application of biosolids in areas where biosolids are subject to erosion or washout offsite is prohibited." The meaning of this prohibition is unclear and a definition of the aforementioned areas should be provided.	23-35
35	Appendix A	Page 15	Section B.1 states that "All biosolids subject to this General Order shall comply with the applicable pathogen reduction standards listed in 40 CFR 503.32. In addition to those standards, all biosolids meeting Class A standards shall not have a maximum fecal coliform concentration greater than 1,000 MPN per gram of biosolids." Both the USEPA and the CIWMB have established pathogen reduction standards in compost which allow for the use of either a *Salmonella* or fecal coliform limit. It is recommended that the SWRCB exempt compost from this specification or petition the CIWMB to change the limit for all composts. If the SWRCB chooses to pursue regulation of pathogens in biosolids, it is recommended that the GO include provisions that will allow for the inclusion of a revised Salmonella test method upon adoption by USEPA.	23-36

36	Appendix A	Page 15	USEPA's 40 CFR 503 requirement for the tracking of metals based on cumulative loading limits (Part 503, Table 2) is misapplied here. Part 503 does not require metals to be tracked for high quality biosolids (i.e. biosolids with metals concentrations less than Part 503, Table 3 concentrations). It is illogical to use a scientifically derived risk based rule and then apply the rule in a subjective manner. The further inclusion of background soils metals is also illogical. USEPA took into consideration existing background soils metals when developing the cumulative loading limits. The scientific basis for the cumulative loadings were designed to limit incremental risk attributed solely to biosolids additions, not background soils. Furthermore, concentrations (mg/kg) and loadings (kg/hectare) are two different factors which are not additive. Also, the molybdenum cumulative loading limit should be removed from the GO due to the court ruling deleting this limit from the federal regulation, as discussed in Comment No. 13. It is recommended that the SWRCB use Part 503, Tables 2 and 3 in the establishment of pollutant limits and let the Final Environmental Impact Report determine whether there is a need for the GO to be more stringent.	23-37
37	Appendix A	Page 17	Section B.8. lists land application setback requirements. The setbacks required in this section should be consistent with other regulatory limits and the CWEA Manual of Good Practice, as noted in Mitigation Measure 5-1. The following changes should be made: "(b) ~~500~~ 200 feet from domestic supply wells" and "~~(f) 10 feet from agricultural buildings~~".	23-38
38	Appendix A	Page 18	Section C.6. states that "Biosolids' storage facilities that contain biosolids between October 1 and April 30 shall be covered during periods of runoff inducing precipitation." As discussed in Comment No.11, an allowance should be made for uncovered storage facilities that are designed to collect and impound runoff which would be either legally reused or disposed.	23-39
39	Appendix A	Page 20	Section D.7. should be amended as follows: "The discharger shall be responsible for informing all biosolids transporters, ~~and growers~~ appliers, and land owners associated with ~~using~~ the site of the conditions contained in this General Order." The term 'growers' is undefined.	23-40
40	Appendix A	Pre-Application Report	Section 1.c. requires a mapping of staging areas. This will be irrelevant because staging areas can be anywhere near the border of an appliable field and are meant to limit compaction of soil. The wording should be amended as follows: "Storage ~~or staging~~ areas".	23-41
41	Appendix A	Pre-Application Report	Section 2 requires that a "separate Pre-Application Report must be filled out for each different biosolids' source." This method of reporting will lead to confusion regarding the overall site operation. The form should be modified to allow for all sources of biosolids to be reported in a single site Pre-Application Report.	23-42
42	Appendix A	Pre-Application Report	The Constituent Concentration Table in the Pre-Application Report is confusing as to what soil sampling is required. The scientific basis for requiring pH, fecal coliform, PCBs, aldrin/dieldrin, and semi-volatile organics analyses has yet to be established. Also, how the data would be used and what standards it would be evaluated against is not established. Refer to Comment Nos. 36 and 35 regarding recommendations for soil sampling and fecal coliform analysis.	23-43

43	Appendix A	Pre-Application Report	Section 5 states that "For biosolids' application operations where minimum depth to ground water is less than 25 feet, a ground water monitoring program consisting of a minimum of three monitoring wells (one upgradient, two downgradient) for each application area is required and shall be in place prior to any application of biosolids if the discharger intends to apply biosolids more than three times within a ten-year period at any particular location. A report specifying location, construction, and development details of ground water monitoring wells shall be submitted to the RWQCB prior to the installation. In addition, a mean sea level (MSL) reference elevation shall be established for each well in order to determine water elevations." The groundwater monitoring program should be deleted entirely for several reasons. The basis for requiring agronomic application rates in the first place is to protect against groundwater degradation. It makes far more sense to emphasize the groundwater contamination prevention aspect of any program by focusing on appropriate application rates. Additional monitoring is unnecessary and will almost surely make beneficial use of biosolids prohibitively expensive for many sites. This will in turn force the use of chemical fertilizers, which can be much more of a groundwater contamination concern but requires no such monitoring.	23-44
44	Appendix A	Pre-Application Report	Section 6 requires that "A biosolids' storage plan must be attached. (Even if no *on-site* biosolids storage will be provided)." This requirement is unduly onerous and the wording should be amended as follows: "A biosolids' storage plan must be attached (~~Even~~ if no on-site biosolids storage will be provided, a contingency plan for inclement weather operation must be attached.	23-45
45	Appendix A	Pre-Application Report	The storage information, erosion control plan, and spill response plan should be submitted with the NOI and not the Pre-Application Report. Otherwise, redundant material will be submitted with each Pre-Application report.	23-46
46	Appendix A	Pre-Application Report	Section 8.b.3. requires the following: "Identify all load restrictions for each traveled roadway." This requirement should be eliminated, as the time required to evaluate every road that every truck may travel on in any given area is not feasible. The proposed traffic route required in 8.b.1 is adequately descriptive.	23-47
47	Appendix A	Pre-Application Report	The annual report submittal date should be moved from January 15 to February 15. This will allow for sufficient report preparation time for dischargers operating multiple project sites.	23-48

The County Sanitation Districts of Los Angeles County appreciate every opportunity to provide input to this process and would like to thank all concerned for their efforts in preparation of the DEIR. Should you have any questions or require any additional information, please do not hesitate to contact me at (562) 699-7411, extension 2824.

Very truly yours,

Michael Sullivan
Biosolids Recycling Coordinator

MS:ms

Responses to Comments from the Los Angeles County Sanitation Districts

23-1. The commenter's opinions about the need for a statewide review of issues relating to biosolids management are noted. No response is necessary.

23-2. The requested correction has been made to the draft EIR, at the beginning of the final paragraph on page ES-3 and other occurrences:

> The California Association of ~~Sanitary~~ Sanitation Agencies (CASA) . . .

23-3. The commenter's preferred spelling is noted.

23-4. As acknowledged, under current law, more restrictive local ordinances and laws may supersede federal and state regulations. However, the statement refers to the authority of those local governments to take such measures. Should that authority no longer exist, that portion of the proposed GO would not have any bearing. But, in accordance with Provision No. 12, the remainder of this proposed GO would remain valid. The text of proposed GO, Finding No. 17 of Appendix A, now reads:

> This General Order sets minimum standards for the use of biosolids as agricultural, horticultural, silvicultural, or reclamation site soil amendments and does not preempt or supersede the authority of local agencies to prohibit, restrict, or control the use of biosolids subject to their control, as allowed under current law. It is the responsibility of the discharger to make inquiry and obtain any local governmental agency permits or authorizations prior to the application of biosolids at each site.

Please see Response to Comment 14-7.

23-5. This portion of the proposed GO and draft EIR has been changed. The text for the 10th bullet on page ES-9 of the draft EIR now reads:

> ~~no application or incorporation into the soil is permitted when wind may reasonably be expected to cause airborne particulate to drift from the site~~ the application of biosolids containing a moisture content of less than 50 percent is prohibited;

This change, along with an incorporation requirement, addresses drifting pathogen dust issues. Also see Master Response 9.

23-6. The comment is noted; no response is necessary.

23-7. The requested correction has been made to the draft EIR in the first impact on page 3 of Table ES-1:

> Potential soil degradation at recreation-area ~~apploication~~ application sites

23-8. See Master Response 2.

23-9. See Master Response 4.

23-10. See Master Response 4.

23-11. See Master Response 4.

23-12. See Response to Comment 18-7.

23-13. See Response to Comment 1-4.

23-14. See Master Response 4.

23-15. See Master Response 7.

23-16. See Master Response 8.

23-17. See Master Response 11.

23-18. Special-status plants and animals are listed in Tables F-1 and F-2 in Appendix F of the draft EIR. The sources of the lists are included at the end of the tables. The requirement for conducting biological resource surveys on properties that have been left fallow for more than one year has been retained. Many special-status species in California are capable of recolonizing tilled land when it is left undisturbed for one year. The SWRCB does not intend to place such a severe hardship on landowners, such that biosolids application will be discouraged. But it is dedicated to complying with federal and state law requiring consideration of adverse effects on sensitive biological resources as it uses its discretionary authority. Also see Response to Comment 22-1.

23-19. Mitigation Measure 8-1 on page 8-4 of the draft EIR is modified by adding the following statement at the end of the paragraph:

> There are several species of pupfish in southern California. Their current occupied habitat is confined to several small springs, Salt Creek and the Amargosa River in southern Inyo and northern San Bernardino counties in the vicinity of Death Valley National Monument, and San Felipe Creek and the Salton Sea in Imperial County. Exact locations of habitat can be found in Moyle et al. 1989.

The decision to increase the setback from 100 feet to 500 feet is based on a knowledge of surface soil and geologic conditions in southern California desert areas and professional judgement. Conditions exist in these areas where very coarse surface soils are underlain by relatively impermeable subsurface layers, promoting lateral rather than vertical movement of groundwater. Where these conditions might exist adjacent to and upslope of isolated water bodies occupied by pupfish, it would be prudent to allow an extra buffer to protect this sensitive species from groundwater contaminants, primarily nitrates. The knowledge that these conditions exist in isolated parts of the state is sufficient scientific justification for providing the extra margin of protection. It is not expected that this requirement will be an unfair or untenable burden on existing or future land application operations.

23-20. The text for page 10-5, last paragraph, first sentence in the draft EIR is revised as follows:

> ~~The proposed GO also prohibits the release of any visible airborne particles from the application site during biosolids application or during incorporation of biosolids into the soil.~~ The proposed GO also requires biosolids to be at least 50 percent moisture and to be incorporated within 24 hours in arid areas and 48 hours in all other areas.

Also see Master Response 9.

23-21. See Master Response 5.

23-22. See Master Response 5.

23-23. See Master Response 5.

23-24. The term "near land residential uses" is intended to refer to predominantly residential neighborhoods along surface streets and highways. A specific quantitative definition is not practical. It is assumed that trucks delivering biosolids and those making deliveries to agricultural operations will use the same routes.

23-25. RWQCB staff members are routinely required to make independent risk assessments of contamination. Therefore, assessment of whether the biosolids application under the proposed GO will contribute to existing nitrate contamination in groundwater should not pose any undue burden on RWQCB staff. In addition, it is general knowledge which groundwater basins have widespread nitrate contamination. In practice, land application projects subject to Mitigation Measure 13-1 are those proposed for areas with existing and acknowledged nitrate problems. Consequently, there would be a limited need for RWQCB staff members to make independent judgments regarding the need for protective measures beyond those contained in the proposed GO.

23-26. Table 15-1 has been modified and is included as Appendix C to this document.

23-27. The SWRCB and RWQCBs regulate biosolids under Section 13274 of the California Water Code. That portion of the code does not exempt any class of sludge products from being subject to regulation. As proposed, the GO is not proposing to regulate products applied at usual rates. However, SWRCB staff believes that biosolids applied at higher loading rates is more likely to be a dumping operation than an application for legitimate farming or other soil use application. Such applications are cause for environmental concern. Finding No. 2 has been rewritten to more clearly state this issue. The text of the proposed GO, as found in Finding No. 2 of Appendix A, now reads:

> EQ biosolids may not necessitate regulation in the future. However ~~public acceptance~~ it is believed that ~~to~~large scale uses~~has indicated the need for~~ currently require oversight ~~at this time~~, regardless of the actual threat to water quality while done at agronomic rates and using best management practices. Accordingly, this General Order can be applied to such sites to ensure that biosolids are being properly used ~~of~~ and not an activity of unregulated dumping ~~necessitates that t~~. This regulatory tool may be used to regulate material that is land applied at a high loading rate to discourage poor management and reduce risk to the public and the environment.

23-28. See Response to Comment 23-27.

23-29. See Response to Comment 16-18 and Master Response 11.

23-30. Comment noted. The definition of tailwater has been changed. The text of the proposed GO, as found in Finding No. 3(an) of Appendix A, now reads:

> Tailwater: Excess water resulting in a discharge~~d~~ offsite to a surface water ~~bodies~~ body and resulting from crop irrigation.

23-31. It is true that the National Research Council recommended sampling for certain SOCs in the next National Sewage Sludge Survey. However, no survey has been started for such pollutants. See Response to Comment 1-4 regarding SOCs.

The SWRCB and RWQCBs regulate biosolids under Section 13274 of the California Water Code. That portion of the code does not exempt any class of sludge products from being subject to regulation. As proposed, the GO is not offering to regulate products applied at usual application rates. But, the SWRCB staff believes that sludge products applied at higher loading rates can be more of a disposal operation than an application for legitimate farming. Such applications are cause for environmental concern.

23-32. See Responses to Comments 14-3, 14-5 and 14-17.

23-33. See Master Response 4.

23-34. See Response to Comments 5-1. 16-28, 23-5, and 23-20, and Master Response 9.

23-35. See Response to Comment 21-80.

23-36. See Master Response 6.

23-37. Using the risk-based cumulative pollutant loading limits for biosolids (contained in Part 503.13 Table 3) to control land application of high-quality biosolids, when applied at higher loading rates, is not a misapplication of the risk-based limits. When biosolids are loaded at rates higher than the rates assumed by EPA, pollutants in soils may build up rapidly toward those levels established by the cumulative pollutant loading rate. No evidence has been provided that indicates differences between the metals in exceptional quality biosolids and biosolids not qualifying as Exceptional Quality (except differences in concentration per unit volume of biosolids). The EPA risk assessment assumed 100% metal availability. There is a risk that higher quality biosolids could be applied at rates high enough to create a hazard. Also, for including background pollutants, see Response to Comment 14-19 and Master Response 4 regarding molybdenum.

23-38. The setback for agricultural buildings, except occupied onsite residences which is now listed at 50 feet, has been omitted. However, the setback for a domestic well is consistent with the CWEA manual cited in the comment. Also see Master Response 3.

23-39. See Responses to Comments 18-7 and 21-85.

23-40. Comment noted. Grower is now defined in the proposed GO. The text of the proposed GO, as found in Finding No. 3 of Appendix A, now includes Grower as follows:

> o. Grower: Person or entity primarily responsible for planting, maintaining and harvesting or allowing the use of crops and/or range land for domestic animal or human use.

Provision 7. has been written as follows:

> The discharger shall be responsible for informing all biosolids transporters, appliers, and growers using the site of the conditions in this General Order.

23-41. Comment noted. Staging is now eliminated from the list of items to be identified on the required map in the Pre-Application Report.

23-42. Comment noted. This portion of the text of the proposed GO, as found in the Pre-Application Report of Appendix A, now reads as follows:

~~A separate Pre-Application Report~~The section below must be filled out for each different biosolids' source. If additional space is required, copy this section and attach.

23-43. PCBs, aldrin/dieldrin, and some semi-volatile organic compounds, as discussed in the National Academy of Sciences Peer Review (NASPR), were detected in more than 5 percent of the samples. NASPR's recommendation was to obtain more data on those pollutants in sludges. Fecal coliform is still in the table, but not required unless applicable (Class A). The test for pH is required for evaluation of lime stabilized material. Soil sampling is now clarified so as to not include PCB, pesticides, or SOCs.

23-44. When groundwater is within 25 feet of the ground surface and the applier intends to make multiple applications over time, monitoring for compliance with agronomic applications is desirable and not believed to be an economic burden.

23-45. How biosolids destined for the land application site is handled can have a direct effect on compliance. Handling material and storing it, as necessary, is something that all biosolids projects need to consider before the start of operation. Accordingly, such information is required in the proposed GO.

23-46. This information is now in the Notice of Intent. It also remains in the Pre-Application Report for cases where the original information has changed.

23-47. This requirement has been removed.

23-48. See Response to Comment 16-41.

CITY OF SAN JOSÉ, CALIFORNIA

SAN JOSÉ / SANTA CLARA WATER POLLUTION CONTROL PLANT
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ENVIRONMENTAL SERVICES DEPARTMENT

September 10, 1999

Todd Thompson
Associate Water Resources Control Engineer
Division of Water Quality
State Water Resources Control Board
P.O. Box 944213
Sacramento, CA 94244-2130

Re: Comments to DEIR for General WDR's for Biosolids Land Application

Mr. Thompson:

The San Jose/Santa Clara Water Pollution Control Plant offers the following comments to the Draft Environmental Impact Report covering General Waste Discharge Requirements for Biosolids Land Application:

1. Monitoring of EQ biosolids

Requiring the monitoring of EQ biosolids imposes an additional burden on a landholder, in addition to that by requiring background testing of the base soil. I believe the EPA's basis for choosing the pollutant limits (for EQ) was no accumulation problems with "average" base soil, so baseline testing does seem indicated. But if it can be demonstrated that pollutant concentrations in the base soil are at or below the EPA's "average" no monitoring of EQ biosolids should be required. 24-1

2. Leak-proof Trucks

Perhaps some distinction needs to be made between trucks carrying dry or very close to dry biosolids and those carrying liquid or semi-liquid biosolids. The trucks cum conveyor bottom commonly used to haul and spread dry biosolids do not leak the dry material (at least not when properly maintained) but would not be liquid tight. Indeed to make them so would make it hard to clean them between loads. 24-2

3. Proposed Molybdenum Concentration Limits

I understand that the limits for molybdenum are those from the original EPA part 503 rules from 1993, which EPA has abandoned. As I understand that EPA plans to issue revised molybdenum limits the general discharge requirements should take this into account. Or at least include mechanisms to revise the limits to conform to EPA's current thinking (assuming that EPA adequately justifies their numbers). 24-3 24-3 (cont)

4. Pathogen Tests

I also understand that EPA is revising the indicator organisms and testing protocols for pathogens. As with the molybdenum limits, some acknowledgement, or mechanism to revise the general discharge requirements to conform to EPA's procedures is suggested. 24-4

Sincerely

William K. Rudman, Jr.
Sanitary Engineer

Responses to Comments from the City of San Jose, Environmental Services Department

24-1. See Responses to Comments 16-15 and 23-37.

24-2. Comment noted. This requirement has been broken down to address the type of biosolids. The text of the proposed GO, as found in Biosolids Storage and Transportation Specifications No. 11 and 12 of Appendix A, now reads:

> 11. All biosolids shall be transported in covered vehicles capable of containing the designated load.~~and~~
>
> 12. All biosolids having a water content that is capable of leaching liquids shall be transported in leak proof vehicles.

24-3. See Master Response 4.

24-4. Provision 13 of the proposed GO states that the GO can be revised based on new regulations or policies at the discretion of the SWRCB. Also, please see Master Response 6.

HARPER & SHELL
Associates

William P. Harper
Mary K. Shell

August 17, 1999

State Water Resource Control Board
Attn: Todd Thompson, Associate Water Resource Control Engineer
Division of Water Quality
P.O. Box 944213
Sacramento, CA 94244-2130

Dear Mr. Thompson:

I respectfully submit the following comments in response to the Draft EIR for General Waste Discharge Requirements for Biosolids Land Application. I am a Chemical Engineer by professional training with over thirty years of experience working with technical and environmental issues. It is with this background that I make the following comments. There are numerous areas in which your draft EIR does not adequately address issues arising from the disposal of sewage sludge on farm land in California, but I wish to address one specific area.

The draft EIR is seriously flawed and totally inadequate to support inclusion in the General Order (GO) disposal of sewage sludge/industrial waste on irrigated farm lands and/or over usable water aquifers.

Supporting information in the draft EIR shows 148,000 dry tons per year being applied in Kern County. The overwhelming majority of this material is imported into the county from southern California. The southern California waste systems co-mingle large volumes of industrial wastes with their sewage. This multiplicity of industrial waste streams contain high levels of heavy metals and other dangerous industrial wastes. The studies sited in the draft EIR do not evaluate in any meaningful way waste streams containing these high levels of industrial wastes. 25-1
Consequently, the conclusion of these studies (which are questionable in themselves), provide no meaningful information regarding the types of sledges/industrial wastes being imported from southern California into Kern County. This fundamental deficiency in the draft EIR makes it impossible to make findings that support including in the GO disposal of sewage sludge/industrial waste from southern California on irrigated farm lands or over usable water aquifers. Until meaningful studies are conducted dealing with the specific waste streams from southern California, this disposal must be excluded from the GO.

Thank you for the opportunity to comment.

Sincerely,

William P. Harper

William P. Harper

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