4.5 SOLID AND LIQUID WASTE DISPOSAL TO LAND

The Regional Board regulates the disposal of waste to land under Chapter 15, Division 3, Title 23, of the California Code of Regulations, known as “Chapter 15.” Chapter 15 applies to wastes which cannot be discharged directly or indirectly to waters of the State and which therefore must be discharged to land for treatment, storage, or disposal.

Types of operations in the Lahontan Region which are subject to Chapter 15 include solid waste disposal sites (landfills), industrial wastewater ponds (surface impoundments), septage and sludge disposal (see “Septage and Sludge Disposal” in Section 4.4), mining and geothermal operations (see “Mining, Industry, and Energy Development”), and some confined animal facilities (see “Agriculture”). This section contains: (1) a summary of the pertinent sections of Chapter 15, (2) a discussion of Region-specific requirements and prohibitions, and (3) a discussion of the Solid Waste Assessment Test Program.

Chapter 15

Chapter 15 contains minimum, prescriptive standards for proper management of applicable wastes. Regional Boards may impose more stringent requirements to accommodate regional and/or site-specific conditions.

Dischargers may propose alternatives to the construction or prescriptive standards contained in Chapter 15 if they can show that the prescriptive standard is not feasible (i.e., too difficult or costly to implement, or not likely to perform adequately under the given circumstances). The proposed alternative must be able to provide equivalent management of the waste, and must not be less stringent than the prescribed standards.

Discharges to land which may be exempt from Chapter 15 are listed in Appendix D.

Wastes fall into four categories under the current classification system. These four categories are: Hazardous, Designated, Non-Hazardous, and Inert, and are defined in Appendix D. Hazardous and Designated wastes can often be generated by the same source and may differ only by their concentrations of given constituents.

Wastes must be disposed of differently depending on their liquids content and the waste category into which they fall. A table containing the Summary of Waste Management Strategies for Discharge of Waste to Land (see Appendix D) shows the proper level of containment for the various categories of waste. A table containing Geologic and Siting Criteria for Classified Waste Management Units is included in Appendix D.

Receiving water monitoring is required at all waste management units. Appendix D discusses the monitoring requirements for the various classes of waste management units, and describes the progressive phases of monitoring.

The routine ground water monitoring conducted during the entire compliance period of a project's life is referred to as “detection monitoring.” If a leak is detected during the course of detection monitoring, an “evaluation monitoring” program must be established. If the evaluation monitoring verifies the presence of a leak, a “corrective action program” must be established and conducted until the problem has been successfully corrected.

Vadose zone monitoring must be conducted at all waste management units. Appendix D discusses the minimum requirements for an acceptable vadose zone monitoring program.

Special requirements for confined animal facilities are discussed in Article 6 of Chapter 15. These facilities are also subject to other portions of Chapter 15 as applicable. Confined animal facilities are discussed in detail in the section entitled “Agriculture.”

Under Chapter 15, mining waste discharges are only subject to the requirements of Article 7, or other portions of Chapter 15 as referenced by Article 7. Mining wastes are also subject to regulation under the Surface Mining and Reclamation Act (SMARA, CA Public Resources Code, Title 14, Division 2, Chapter 9). Article 7 and SMARA are discussed in detail in the section entitled “Mining, Industry, and Energy Development.”

An inactive waste management unit can still pose a threat to water quality. In fact, due to the nature of some wastes and the characteristics of some disposal sites, sometimes water quality problems do not become evident until years after a site has closed. Therefore, Chapter 15 requires that all waste management units have a plan for acceptable closure procedures and post-closure maintenance and monitoring.

Solid and Liquid Waste

Requirements

Solid wastes are disposed of in a landfill or Solid Waste Disposal Site (SWDS). A landfill, as defined in Chapter 15, is a waste management unit at which waste is discharged in or on land for disposal. A landfill may be classified as Class I, II, or III, depending on the type of waste being accepted, but the term "landfill" typically refers to a Class III municipal solid waste landfill which accepts only inert or non-hazardous, municipal solid waste. Landfills are an integral component of most communities in the Lahontan Region, except for those of the Lake Tahoe Basin. Solid waste generated in the Lake Tahoe Basin is exported out of the Basin.

"Hazardous" solid wastes must be disposed of in Class I landfills or waste piles. "Designated" solid wastes must be disposed of in Class I or II landfills or waste piles. Liquid wastes may not be disposed of to Class III waste management units. Rather, liquid wastes must be discharged to Class I or II surface impoundments, depending on their classification.

Discharges from solid and liquid waste management units can impact both ground and surface waters. The receiving water most likely to be at risk from a waste management unit is the ground water beneath the site. Precipitation or runoff may enter the unit and contact the waste, percolate through it, and travel to ground water, carrying constituents of the waste with it. Solid waste may contain enough free liquids to form a leachate and travel to ground water. Vapors may migrate from a waste management unit into the soils and ground water below the unit. Gases forming in a closed waste management unit may pressurize the unit and force contaminants into the ground water. A liquid waste impoundment may leak its contents into the soils and ground water beneath the unit. Liquids may exit a waste management unit and travel to nearby surface waters. Uncontained solid waste may also be transported to surface waters by wind.

The Regional Board regulates all the active waste management units and some of the closed units in the Region under waste discharge requirements which contain pertinent Chapter 15 regulations. Some of the applicable requirements include:

1. Waste management units must be sited in locations where they will not extend over a known Holocene fault or into areas with inadequate separation from ground water.

2. Waste management units must be constructed to minimize (Class III) or prevent (Class I and II) the possibility of leachate contacting ground water. This may be done by siting the unit in an area where the depth to ground water is very great or where natural geologic features will provide containment. A Class III waste management unit may also have a clay or synthetic liner with a leachate collection and removal system (LCRS), if there is a possibility that ground water could be impacted by leakage from the unit. Class I and II units must be lined. A discharger may propose engineered alternatives to the Chapter 15 containment requirements, but the alternatives must provide equal or greater protection to the receiving waters at the site, per Article 1.

3. To minimize or prevent the formation of leachate, solid waste management units shall be covered periodically with soil or other approved materials. Runoff from offsite should be prevented from entering a waste management unit and contacting the wastes in the unit.

4. The potential receiving waters shall be monitored. A waste management unit shall have sufficient ground water monitoring wells at appropriate locations and depths to yield ground water samples from the uppermost aquifer to provide the best assurance of the earliest possible detection of a release from the waste management unit. Perched ground water zones shall also be monitored. Background monitoring should be conducted for one year prior to opening a new waste management unit.

   Chapter 15 requires that the vadose zone shall be monitored at all new sites and at any existing site, unless it can be shown to the satisfaction of the Regional Board that there are no vadose zone monitoring devices that would work at the site, or that installation of vadose zone monitoring devices would require unreasonable dismantling or relocating of permanent structures.

5. All operating waste management units must have an approved closure/post-closure monitoring and maintenance plan and their operators must provide the Regional Board with assurance that sufficient funds are irrevocably committed to ensure that the site will be properly reclaimed and maintained.

6. The operator of a waste management unit must obtain and maintain assurances of financial responsibility for foreseeable releases from the unit.

Municipal Wastewater Sludge

Management

Wastewater sludge (biosolids) is a by-product of wastewater treatment. Raw sludge usually contains 93 to 99.5 percent water with the balance being solids that were present in the wastewater and that were added to or cultured by wastewater treatment processes. Most POTWs treat the sludge prior to ultimate use or disposal. Normally, this treatment consists of dewatering and/or digestion. In some cases, such as at Lake Arrowhead and Barstow, a portion of the sludge is incinerated.

Treated and untreated sludges may contain high concentrations of heavy metals, organic pollutants, pathogens, and nitrates. Storage and disposal of municipal sludges on land can result in degradation of ground and surface water if not properly performed. The Regional Board currently regulates handling and disposal of sludge pursuant to Chapter 15 and Department of Health Services (DHS) standards for sludge management (Cal. Code of Regs., Title 22, Division 4, Section 60301).

Sludge may be placed in a Class III landfill (see section on Chapter 15) if it can meet the following requirements, otherwise it must be placed in a Class II surface impoundment:

1. The landfill is equipped with a leachate collection and removal system, ***and***

2. The sludge must contain at least 20 percent solids if primary sludge, or at least 15 percent solids if secondary sludge, mixtures of primary and secondary sludges, or water treatment sludge, ***and***

3. A minimum solids-to-liquid ratio of 5:1 by weight must be maintained to ensure that the co-disposal will not exceed the initial moisture-holding capacity of the nonhazardous solid waste. The Regional Board may require that a more stringent solids-to-liquid ratio be maintained, based on site-specific conditions.

In addition to landfilling, sludge may be disposed of in a number of other ways, provided it meets the requirements specific to the given disposal method. Sludge may be incinerated, applied to land as a soil amendment, made into commercial fertilizer, or stockpiled in piles or drying beds. Generally, the Regional Board regulates the disposal of sludge under the requirements for the treatment plant which generates the sludge. However, for land application of sludge, separate waste discharge requirements for the landowner will be considered. The State's Integrated Waste Management Board (CIWMB) also regulates the disposal of sludge.

The USEPA has promulgated a policy of promoting those municipal sludge management practices that provide for the beneficial use of sludge while maintaining or improving environmental quality and protecting public health. On February 19, 1993, the USEPA published final sewage sludge regulations in 40 CFR Part 503. The regulations are intended to assure that use and disposal of sewage sludges comply with federal sludge use and disposal criteria developed by USEPA. The State Board or the CIWMB may develop a state sludge management program consistent with the USEPA policy and criteria for land application, surface disposal, and incineration of sewage sludge. Applicable federal regulations for the disposal of sewage sludge in municipal solid waste landfills are contained in 40 CFR Parts 257 and 258 (Subtitle D).

Subtitle D

These federal regulations apply to municipal solid waste landfills (Class III landfills under California's “Chapter 15”). The Subtitle D regulations outline the classification of municipal landfills, siting criteria, design criteria, operation procedures, water quality monitoring parameters and standards, closure and post-closure care requirements, and financial assurance guidelines, similar to Chapter 15. USEPA considers Subtitle D to be minimum standards for landfill operation. States may have equal or more stringent requirements, but may not have less stringent requirements. If a state's landfill regulation program meets USEPA's approval, that state may apply to become a USEPA “approved state” for landfill regulation, and Subtitle D provisions do not apply. However, if all or a part of a state's regulations do not meet USEPA's approval, more stringent portions of Subtitle D take precedence until that state modifies its program and obtains approval. California has obtained approval from USEPA.

Discharge Prohibitions that Apply to Solid Wastes

Discharge prohibitions that apply to solid wastes and prohibition exemptions are described in the Waste Discharge Prohibitions section of this Chapter, and in Chapter 5 (Lake Tahoe Chapter).

Solid Waste Water Quality Assessment Test (SWAT)

Section 13273 was added to the California Water Code with Assembly Bill (AB) 3525. This section required the State Board to rank the approximately

2,100 active and inactive solid waste disposal sites throughout the State on the basis of the potential threat they may pose to water quality. The State Board approved a ranked list of solid waste disposal sites, containing 13 ranks with 150 sites per rank, and an incomplete Rank 14.

On July 1, 1987, operators of landfills in Rank 1 were to submit solid waste assessment test (SWAT) reports. By July 1 of each succeeding year, the SWAT reports were due for landfills in the next rank, through rank fourteen, due July 1, 2001. The Porter-Cologne Water Quality Control Act (CA Water Code § 13273[b]) requires SWAT reports to contain the following:

1. An analysis of the surface and ground water on, under, and within one mile of the solid waste disposal site to provide a reliable indication of whether there is any leakage of hazardous constituents.

2. A chemical characterization of the soil-pore liquid in those areas which are likely to be affected if the solid waste disposal site is leaking, as compared to geologically similar areas near the solid waste disposal site which have not been affected by leakage or waste discharge.

The Regional Board must review the SWAT report to determine whether any hazardous waste has migrated into the receiving waters. If hazardous waste has migrated, the Regional Board must notify the Department of Health Services and the Integrated Waste Management Board, and take appropriate remedial action (CA Water Code § 13273[e]). As of August 1992, the Lahontan Region has approximately 161 solid waste disposal sites on the SWAT list, with an average of twelve sites in each rank. A number of solid waste disposal sites throughout the Lahontan Region were not included on the SWAT list, due to age, size, type of wastes being accepted, and other reasons.

Toxic Pits Cleanup Act

The Toxic Pits Cleanup Act of 1984 (TPCA) required that all impoundments containing liquid hazardous wastes or free liquids containing hazardous waste be retrofitted with a liner/leachate collection system, or dried out by July 1, 1988, and subsequently closed to remove all contaminants or contain any residual contamination.

4.6 GROUND WATER PROTECTION AND MANAGEMENT

The Lahontan Region includes over 1,581 square miles of ground water basins. Ground waters in the Region supply high quality drinking water and irrigation water, as well as industrial service supply, wildlife habitat supply, and aquaculture supply waters. Ground waters in the Region also provide a source of freshwater for the replenishment of inland lakes and streams of varying salinity.

Historic and ongoing agricultural, urban, and industrial activities can degrade the quality of ground water. Discharges to ground water from these activities include: underground and aboveground tank and sump leaks, agricultural and industrial chemical spills, landfill leachate, septic system failures, and chemical seepage via shallow drainage wells and abandoned wells. Severe ground water overdraft has occurred in portions of the Region. Ground water overdraft can affect beneficial uses of surface waters such as wetlands and springs, particularly in dry areas, by reducing natural flows into these areas. It can concentrate trace chemicals, including naturally occurring salts and contaminants resulting from human activities. Overdraft can lead to land subsidence and surface soil cracking. Some soil types (fine grained silts and clays), once compacted, can never again hold as much water upon rewatering of the aquifer. Increased ground water pumping in overdrafted aquifers can draw pollutants toward wells. Imported water used for ground water recharge, if it is of naturally lower quality than local ground water, is a discharge because it contains contaminants above background concentrations (Sawyer 1988). Discharges from some types of construction projects (e.g., placement of fill in wetlands) can reduce ground water recharge.

The resulting impacts on ground water quality from these discharges are often long-term and difficult to remediate. Remediation is often very costly. Consequently, as waste discharges are identified, prompt and expedient efforts to clean up and contain the source areas, as well as to prevent further ground water quality impacts, must be undertaken. Activities that may potentially affect ground waters must be managed to ensure that ground water quality is protected.

The following sections describe the beneficial uses, water quality objectives, and water quality control (implementation) measures specific to ground waters. Much of the information on beneficial uses, water quality objectives, and some of the control measures are described in more detail elsewhere in this Basin Plan. Appropriate references to other parts of this Basin Plan are included.

Beneficial Uses

For purposes of this Basin Plan, “ground water” includes all subsurface waters in the Lahontan Region. Ground water basins in the Region are shown on maps located in Plates 2A and 2B. Beneficial uses applicable to ground waters in the Region include: municipal and domestic water supply (MUN), industrial process supply (IND), agricultural supply (AGR), freshwater replenishment to surface waters (FRSH), wildlife habitat (WILD), water contact recreation (REC-1), water quality enhancement (WQE), and aquaculture supply (AQUA). Beneficial uses of specific ground water basins in the Region are designated in Table 2-2 of this Basin Plan.

Unless otherwise designated by the Regional Board, all ground waters are considered suitable, or potentially suitable, for municipal or domestic water supply (MUN). In making exceptions, the Regional Board will consider the criteria referenced in Regional Board Resolution No. 6-89-94, “Incorporation of “Sources of Drinking Water Policy” into the Water Quality Control Plans (Basin Plans),” where:

- The total dissolved solids (TDS) exceed 3,000 mg/L (5,000 uS/cm, electrical conductivity) and the ground water is not reasonably expected by the Regional Board to supply a public water system; *or*

- There is contamination, either by natural processes or by human activities (unrelated to a specific pollution incident), that cannot reasonably be treated for domestic use using either Best Management Practices or best economically achievable practices; *or*

- The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day; *or*

- The aquifer is regulated as a geothermal energy producing source or has been exempted administratively pursuant to 40 CFR § 146.4 for the purpose of underground injection, or fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do

not constitute a hazardous waste under 40 CFR § 261.3.

Water Quality Objectives for Ground Water

The Nondegradation Objective (State Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California" is described in Chapter 3 of this Basin Plan and applies to ground waters. Other water quality objectives for ground water consist primarily of narrative objectives combined with a limited number of numerical objectives, and are included in Chapter 3 of this Basin Plan. Ground waters shall not contain concentrations of bacteria, chemical constituents, radioactivity, or substances producing taste and odor in excess of the ground water objectives described in Chapter 3. These objectives define the upper concentration or other limit that the Regional Board considers protective of beneficial uses. These objectives apply to all ground waters, rather than only at a wellhead, at a point of consumption, or at point of application of discharge.

As mentioned above, a limited number of numerical objectives are included in this Basin Plan. The Regional Board is limited in its resources to independently establish numerical ground water objectives for all constituents in all ground water basins.

Numerical ground water objectives for individual ground water basins may be developed in the future. As the Regional Board obtains information which provides more detailed delineation of beneficial uses within basins, revised objectives may be developed to protect these beneficial uses.

Regional Board Control Measures for Ground Water Protection and Management

To protect ground water resources, the Regional Board allows few waste discharges to land. (See the "Solid and Liquid Waste Disposal to Land" section of this Chapter.) Those that are permitted (e.g., landfills) are closely regulated under existing laws and regulations to maintain and to protect ground water quality for beneficial uses. Another category of discharges to land is individual waste disposal systems (e.g., septic systems). In most instances, the Regional Board has waived its regulation of individual waste disposal systems provided that counties (and some cities) in the Region regulate the systems. Specific provisions of the regulation are included in Memoranda of Understanding (MOUs) with each county or city. The MOUs stipulate that regulation of the systems must comply with all Regional Board requirements (see "Wastewater" section of this Chapter).

Discharges of hazardous and nonhazardous waste, and the waste management units at which the wastes are discharged (e.g., landfills, surface impoundments), are regulated by the Regional Board through waste discharge requirements to properly contain the wastes, and to ensure that effective monitoring is undertaken to protect water resources of the Region (also see "Solid and Liquid Waste" section of this Chapter). These waste discharges are also concurrently regulated by other State and local agencies. Local agencies implement the State's solid waste management programs as well as local ordinances governing the siting, design, and operation of solid waste disposal facilities (usually landfills) with the concurrence of the California Integrated Waste Management Board (CIWMB). The CIWMB also has direct responsibility for review and approval of plans for closure and post-closure maintenance of solid waste landfills. The Department of Toxic Substance Control (DTSC) issues permits for all hazardous waste management, treatment, storage, and disposal facilities. The State Board, Regional Boards, CIWMB and DTSC have entered into a Memorandum of Understanding to coordinate their respective roles in the concurrent regulation of these discharges.

The laws and regulations governing both hazardous and nonhazardous solid waste disposal have been revised and strengthened in recent years. Implementation of these laws and regulations through the following programs is summarized below: California Code of Regulations, Title 23, Chapter 15; Resource Conservation and Recovery Act; Toxic Pits Cleanup Act; Solid Waste Assessment Tests. (See the "Solid and Liquid Waste" section of this Chapter for detailed control actions).

California Code of Regulations, Title 23, Chapter 15

Referred to as "Chapter 15," this is the most significant regulation used by the Regional Board in regulating hazardous and nonhazardous waste treatment, storage, and disposal. These regulations include very specific siting, construction, monitoring and closure requirements for all existing and new waste treatment, storage, and disposal facilities. Chapter 15 requires operators to provide assurances of financial responsibility for initiating and completing corrective action for all known or reasonably foreseeable releases from their waste management

units. Detailed technical criteria are provided for establishing water quality protection programs, and corrective action programs for releases from waste management units. Chapter 15 requires the review and update of waste discharge requirements for all hazardous waste treatment, storage, and disposal sites by January 1, 1993 and for all nonhazardous waste, storage, and disposal sites by July 1, 1994. Chapter 15 defines waste types to include hazardous wastes, designated wastes, nonhazardous solid wastes, and inert wastes.

The Federal Resource Conservation and Recovery Act (RCRA)

The State implements RCRA's Subtitle C (Hazardous Waste Regulations for Treatment, Storage, and Disposal) through the DTSC and the Regional Boards. In August 1992, the USEPA formally delegated RCRA Subtitle C program implementation authority to DTSC. As described above, regulation of hazardous waste discharges is also included in the California Code of Regulations ("Chapter 15"). (Chapter 15 monitoring requirements were also amended in August 1991 so as to be equivalent to RCRA requirements). These will be implemented through the adoption of waste discharge requirements for hazardous waste sites covered by RCRA. The discharge requirements will then become part of a State RCRA permit issued by DTSC.

Federal regulations required by the RCRA's Subtitle D have been adopted for municipal solid waste landfills (40 CFR Parts 257 & 258). The USEPA has approved California's Subtitle D program (see Section 4.5 for more information about Subtitle D). USEPA delegation of authority to the State Board for implementation of Subtitle I (Underground Storage Tanks) is pending.

Toxic Pits Cleanup Act

The Toxic Pits Cleanup Act of 1984 (TPCA) required that all impoundments containing liquid hazardous wastes or free liquids containing hazardous waste be retrofitted with a liner/leachate collection system, or dried out by July 1, 1988, and subsequently closed to remove all contaminants or contain any residual contamination.

Solid Waste Assessment Tests (SWATs)

Section 13273, added to the California Water Code in 1985, requires all owners of both active and inactive nonhazardous landfills to complete a Solid Waste Assessment Test (SWAT) to determine if hazardous wastes have migrated from the landfill into ground water. There were 161 sites identified in the Lahontan Region subject to this program. Pursuant to a list adopted by the State Board, 150 site owners statewide per year would complete this evaluation by 2001. The SWAT program is discussed in detail in the "Solid and Liquid Waste" section of this Chapter.

Underground Storage Tank Program

Implementation of the Underground Storage Tank (UST) Program is unique, as the Health and Safety Code gives local agencies the authority to oversee investigation and cleanup of UST leak sites. The Corrective Action regulations (23 Cal. Code of Regs., Ch. 16, Article 11) use the term "regulatory agency" in recognition of the fact that local agencies have the option to oversee site investigation and cleanup, in addition to their statutory mandate to oversee tank permitting, leak reporting, and tank closure. Several local agencies now have the authority (through Local Oversight Program contracts with the State Board or Memoranda of Understanding with the Regional Board) to act on the Regional Board's behalf in requiring investigations and cleanup. The Regional Board retains the authority to approve case closure.

Reports of leaking USTs are submitted by local agencies (city, county, etc.) and by private parties to the Regional Board. Submittals are on a standard form that complies with Proposition 65 notification (Underground storage tank Unauthorized Releases [Leak]/Contamination Site Report). The local agencies forward copies of the leak reports to the Regional Board. (See also "Proposition 65 Program" in Section 4.2.)

The cleanup and enforcement elements of the program are shared between the Regional Board and the local agencies. Regional Boards are responsible for oversight of investigation and remediation where unauthorized releases from USTs pose a threat to, or have impacted, water quality. Local agencies, such as County Health Services, are responsible for tank permitting, monitoring, and removal, and the investigation and remediation of releases that do not pose a threat to water quality. Additionally, several local agencies have contracted with the State Board under the Local Oversight Program (LOP) to oversee the investigation and remediation of releases that threaten or have impacted water quality.

The California Code of Regulations, Title 23, Division 3, Chapter 16, contains State regulations regarding underground tank construction, monitoring, repair, release reporting, and corrective action. The objectives of the regulations are to:

- Place all USTs storing hazardous substances, covered by law, under permit;
- Ensure that all existing USTs, covered by law, meet standards for the detection of releases of hazardous substances;
- At the time of application for an UST permit, ensure that all new USTs covered by law, meet standards to prevent releases of hazardous substances;
- Ensure that the UST program complies with the federal UST requirements and secure authorization from USEPA to regulate USTs in the State;
- Identify leaking USTs and decide whether the Regional Board or local implementing agency will have the lead for supervision of cleanup within 90 days of the discovery of a leak. Undertake cleanup supervision of 10-25% of existing backlogged and new leak cases each year. The annual caseload will depend on the severity of the water quality problems and the availability of Regional Board resources to oversee cleanup;
- Provide funding for eligible local agencies, under a local oversight program, for the oversight of leaking UST cleanup;
- Ensure that appropriate cleanup actions are undertaken in a timely manner at UST sites which have no identifiable Responsible Party (RP) or which have an insolvent RP (orphan site);
- Ensure that all tank integrity tests, conducted within the State, are performed by or under the direct supervision of a licensed tank tester;
- Require all existing underground pressurized piping to be equipped with an automatic leak detector;
- Ensure that all UST owners and operators shall maintain evidence of financial responsibility for taking corrective action and for compensating third parties for bodily injury and property damage caused by a release;
- Require secondary containment for pressurized piping, corrosive protection for tanks, and spill and overfill prevention equipment for UST systems.

Number of UST Cases in the Region

As of July, 1993, a total of 591 leaking USTs had been documented in the Lahontan Region. Of these 591 releases, approximately 150 (25%) have impacted ground water. A list of these UST releases and the status of investigation and remediation at each site is published quarterly by staff of the Regional Board.

Areas With the Greatest Number of UST Releases Affecting Ground Water

Throughout the Lahontan Region several areas have been identified as containing a significant number of leaking USTs that have impacted ground water. Generally, these areas are light industrial/service areas that typically have shallow ground water and/or coarse soils. Because of the significant number of documented releases in these areas, a substantial amount of geologic and hydrologic data have been generated.

UST Cleanup Trust Fund (SB 2004)

In 1991 the State Legislature passed SB 2004, which required that 0.006 cents be paid by tank owners to the State for each gallon of petroleum products stored in a UST. This tax program generates revenue to provide a maximum of $990,000 grant money per claim for investigation and remediation to those persons who operated or owned USTs that have leaked. The fund reimburses monies that are spent by the discharger during investigation and cleanup. Staff of the Regional Board and State Board are responsible for reviewing technical proposals for investigation and remediation to ensure plans are technically and economically effective.

Dischargers applying for the fund are separated into “A,” “B,” “C,” and “D” categories. These categories are generally based on gross annual income, with “A” applicants having the least income. Since the fund is designed to assist those dischargers with the least financial ability to conduct investigation and remediation, “A” applicants have the highest priority for funding. Since many tank owners and operators lack resources, assistance from the fund increases opportunities for remedial actions.

UST Remediation Goals

Regional Board staff is responsible for ensuring that dischargers are required to clean up and abate the effects of discharges in a manner that promotes attainment of background water quality, or the highest water quality which is reasonable if

background levels of water quality cannot be restored. Factors to be considered include: environmental characteristics of the hydrographic unit under consideration, past, present and future beneficial uses of the water, economic factors, and the need to prevent nuisance (CA Water Code § 13241).

Source Removal

The most important factor in ground water remediation is source removal. Sources of ground water pollution at UST sites include leaking tanks and piping, existing soil pollution, and free-phase petroleum products that may be floating on top of the water table. These major sources can feasibly be removed in the short-term at minimal costs as compared to the long-term process necessary to clean up the dissolved phase portion of ground water pollution.

Interim Remedial Actions for USTs

At a site where a leak has occurred from a UST, sources of ground water pollution can be removed in the short-term while investigation of the extent of ground water pollution and ground water remedial design is on-going. Interim remedial actions are considered a cost-effective method of protecting water quality and beneficial uses. Interim remedial actions include the following:

- *Removal of Free-Phase Petroleum Hydrocarbons.* Petroleum products typically spread laterally on top of the water table and within the capillary fringe prior to dissolving into the ground water. Until completely dissolved, this "free product" provides a continuing source of pollution both to the ground water and capillary fringe soils. Removal of this free product can be accomplished while any further investigation of soil and ground water pollution is being conducted.

- *Remediation of Contaminated Soil.* If polluted soils are in direct contact with the ground or surface waters, these soils may pose a continuing threat to water quality and adversely impact beneficial uses. Volatile organic constituents may move within unsaturated soils by leaching or in a vapor phase, which may adversely impact water quality and beneficial uses. This soil pollution can feasibly be removed while investigation of ground water pollution is continuing.

- *Ground Water Pollution Containment.* Containment of ground water pollution as an interim remedial action is necessary if: (a) petroleum constituents in the ground water pose an immediate threat to water supplies or public health and safety, or (b) the pollution plume appears to be migrating off-site at a rate that will limit the dischargers ability to later remediate the pollution. Containment may also be required as a part of overall site remediation.

Dissolved Phase Ground Water Remediation

In cases where ground water has been impacted, dissolved phase ground water pollution must be remediated. Remedial activities shall be conducted to assure that pollution is cleaned up in a manner that: (a) is consistent with maximum benefit to the people of the State, (b) does not unreasonably affect present and anticipated beneficial uses of such water, and (c) does not result in water quality less than that prescribed in the water quality control plans and policies adopted by the State and Regional Boards.

Ground Water Monitoring

In order to determine the effectiveness of any ground water remedial action, ground water monitoring will be necessary. Ground water monitoring may also be necessary to track the movement of pollution plumes, and can be used to monitor any natural degradation of ground water pollution.

Reports of Waste Discharge

The Regional Board requires that dischargers file a report of waste discharge (RWD) when any waste is proposed to be discharged to land or surface waters. RWDs are required for treated ground water discharges to land and surface waters, for in-situ soil and ground water bioremediation projects where substances other than oxygen are being discharged, and for large scale ex-situ bioremediation projects where liquids are being discharged. For specific treatment discharges, a listing of information to support a RWD is available from the Regional Board office. Once a RWD is filed, the Regional Board may issue a waiver or may adopt Waste Discharge Requirements (WDRs) for the discharge.

Cleanup Levels

In addition to the following discussion of cleanup levels for soil and ground water at a UST site, reference should be made to Section 4.2 of this Basin Plan.

Section 2725, Article 11, Chapter 16, Title 23 of the California Code of Regulations outlines what elements are required to be included in a Corrective Action Plan (CAP). Section 2725(g) requires the establishment of target cleanup levels for ground

water in the final CAP. Any CAP that proposes final ground water cleanup levels above background must include justification demonstrating that the Plan: (1) is consistent with maximum benefit to the people of the State, (2) will not unreasonably affect present and anticipated beneficial uses of such water, and (3) will not result in water quality less than that prescribed in the water quality control plans and policies adopted by the State and Regional Boards.

Prior to the initiation of a corrective action, it may not be feasible to generate sufficient technical justification to support not remediating ground water to background concentrations. Target levels are recommended to be set at minimum laboratory detection limits (background) for petroleum related constituents. Technical and economic feasibility of attaining background can best be determined during the remedial process. Dischargers shall consider those items listed in Title 23, Chapter 15, Article 5, Section 2550.4d (Cal. Code of Regs.) in presenting their justification. Final justification for not remediating to background levels may include, but not be limited to, chemical transport modelling, evidence of asymptotic concentrations of pollutants over a duration during remediation, and social/economic considerations.

Final cleanup levels may be allowed between background and established water quality standards in certain cases. (Established standards include primary and secondary drinking water standards and USEPA Health Advisory levels.) Any proposal to remediate ground waters to levels between background and an established numerical water quality standard must include a justification for such degradation. Any justification must consider those items listed in Title 23, Chapter 15, Article 5, Section 2550.4d (Cal. Code of Regs.).

The City of Bishop

The majority of documented releases in the Bishop area have occurred in the light industrial/service area along Hwy. 395 (Main Street). Depth to ground water along Main Street ranges from three to eight feet below ground surface (bgs). Ground water dominantly flows east toward the Owens River.

Soils in the Bishop area are variable. Coarse alluvial cobbles and boulders are present on the alluvial fan of the eastern Sierra Nevada range at the western edge of Bishop. However, throughout the City, soils appear to be predominantly clayey sands and clayey silts with low permeability characteristics. A shallow unconfined aquifer is present beneath the City of Bishop at depths ranging from three to eight feet below ground surface. The ground water gradient of this aquifer throughout the City of Bishop is gently sloping. Additionally, the low permeability soils result in slow ground water velocities.

Municipal supply wells for the City of Bishop are located east and north of known petroleum dispensing facilities. No known water supply wells are located in areas of known or suspected ground water pollution.

Dischargers at several UST sites in the City of Bishop have installed ground water monitoring wells. The results of well sampling indicate that pollution plumes have little or no natural degradation without active remediation, but these plumes also migrate very slowly.

UST Policy for Bishop. Based on the principles of State Board Resolution No. 92-49, Board staff has developed a policy to set time schedules for completing soil and ground water cleanup. To the extent feasible, schedules will be set to coincide with the availability of resources, including UST Trust Funds. The policy specifically applies to potential Trust Fund “A,” “B,” and “C” applicants in specific hydrogeologic areas of Bishop. The policy is as follows:

1. When USTs are removed, all identified soil pollution will be excavated to the property boundaries to the depth of the ground water table (depth to ground water in Bishop ranges from 3 to 8 feet below ground surface). Contaminated soil beneath existing onsite buildings will not be required to be removed at this time.

2. Soil samples will be collected from all excavation sidewalls to document effective removal of contaminated soils or the location of any remaining soil contamination that persists offsite.

3. The discharger will remove any fuel found floating on the water table surface.

4. Field investigation methods (such as Hydropunch™ and cone penetrometers) can be effectively used to preliminarily define the lateral extent of ground water pollution. This data will then be used to locate a maximum of three ground water monitoring wells that approximately define the down-gradient extent of ground water pollution. It is expected that these wells will be installed offsite.

5. Monitoring of the ground water will be conducted by the discharger. Monitoring includes laboratory

analysis of ground water samples collected from the installed monitoring wells. The discharger will continue to remove any identified fuel found floating on the water table surface.

6. The UST owner/operator would not be required to perform additional soil or dissolved phase ground water remediation until SB 2004 funding is available, provided that the discharger supplies the Regional Board documentation that a grant application has been filed with the State Board.

7. Dissolved phase ground water remediation would only be required prior to receiving SB 2004 funding if it becomes evident that the discharger will not qualify for SB 2004 funding, or the pollution poses an imminent threat to public health. This policy does not change the overall remedial goals of the Regional Board.

UST Discharges in Hydrogeologic Areas Other than Bishop

Ground water pollution plumes may migrate slowly in other areas of the Region besides Bishop. However, data must be generated in these additional areas that conclusively demonstrates that these conditions exist. In areas where it can be conclusively demonstrated that hydrological conditions similar to Bishop exist, the above policy may be applied to remediation of UST release sites. In areas where pollution plumes do not migrate slowly, failure to initiate ground water remediation in the short-term may result in a substantially more extensive condition of pollution, and may also increase the threat to public health and safety.

Aboveground Storage Tanks

Spills and leaks from aboveground petroleum storage tanks and their associated piping can cause contamination of surface and ground waters. In the past, aboveground storage tanks in California were operated without requirements for secondary containment or for maintaining spill contingency plans.

The State enacted the Aboveground Petroleum Storage Act (APSA) in 1990 (CA Health and Safety Code § 25270, Chapter 6.67). The APSA requires owners or operators of specified aboveground petroleum storage tanks to file a storage statement describing the location and capacity of their facility, submit a filing fee, and perform specified spill prevention and response actions. The APSA also grants authority to the Regional Boards to, under certain circumstances, require the installation of leak detection systems, secondary containment, and/or ground water monitoring.

The APSA does not apply to tanks containing products such as propane, which are not liquid at standard temperatures and pressures.

The Regional Board will conduct periodic inspections of aboveground tanks. The schedule of inspections will focus on those facilities which are near navigable waters, potable water supplies, and/or near sensitive ecosystems.

Spills, Leaks, Investigation, and Cleanup (SLIC) Program

Sites managed within the SLIC Program include sites with pollution from recent or historic spills, subsurface releases (e.g., pipelines, sumps), complaint investigations, and all other unauthorized discharges that pollute or threaten to pollute surface and/or ground waters. Investigation, remediation, and cleanup at SLIC sites proceed as directed in State Board Resolution No. 92-49 as described below. (For further details regarding the SLIC Program, see Section 4.2, “Spills, Leaks, Complaint Investigations, and Cleanups.”)

Federal Superfund Program

The federal “Superfund” program was established in 1980 with the passage of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The CERCLA provided funding and guidelines for the cleanup of the most threatening hazardous waste sites in the nation. High priority sites scheduled for cleanup under this program are placed on the National Priority List (NPL).

To clean up pollution at federal military sites, the State has signed a Memorandum of Agreement with the Department of Defense which established procedures under which site investigation and cleanup will proceed. Investigation and cleanup at these sites must meet the requirements of the USEPA “Superfund” hazardous waste cleanup program. This involves completion of a formal Preliminary Assessment, Site Investigation, and Remedial Investigation and Feasibility Study, leading to a Record of Decision on an acceptable Remedial Action Plan. (For further details, see Section 4.12, “Military Installations.”).

Implementation of State Board Resolution No. 92-49 “Policies and Procedures for Investigation, Cleanup

and Abatement of Discharges Under Water Code Section 13304"

This Resolution contains policies and procedures that all Regional Boards shall follow for the oversight and regulation of investigations and cleanup and abatement activities resulting from all types of discharge or threat of discharge subject to Section 13304 of the Water Code. State Board Resolution No. 92-49 outlines the five basic elements of a site investigation. The Resolution requires that the Regional Board ensure that the discharger is aware of and considers minimum cleanup and abatement methods. (For further details, see Section 4.2, "Spills, Leaks, Complaint Investigations, and Cleanups.")

Ground Water Overdraft and Related Water Quality Problems

Ground water overdraft can affect water quality, particularly in terms of total dissolved solids and organic compounds. (See also "Water Quality/Quantity Issues; Water Export and Storage," in Section 4.9 of this Chapter for additional discussion of ground water problems.)

The Regional Board will consider issuance of waste discharge requirements for ground water recharge with imported water which is of lower quality than local ground water. The Regional Board will also consider issuance of waste discharge requirements for projects which would interfere with ground water recharge. The Regional Board will consider monitoring ground water extraction in contaminated basins to ensure that pumping patterns do not cause the migration of pollutants within the basins, causing contaminants to move to unpolluted areas of the basins.

Agricultural Activities

Irrigation practices, pesticide and fertilizer use, and confined animal operations can adversely impact the quality and beneficial uses of ground water. The Regional Board encourages the use of Best Management Practices to minimize water quality impacts from these activities.

The Regional Board participates in a statewide monitoring program for pesticides in ground water, as mandated by the Pesticide Contamination Prevention Act (AB 2021). When appropriate, the Regional Board also issues waste discharge requirements to regulate discharges of waste and/or wastewater from irrigated fields and operations such as confined animal facilities. (See "Agriculture" section, later in this Chapter, for further details.)

Stormwater Management

Infiltration of stormwater is a common treatment method (see Section 4.3, "Stormwater"). It allows removal of nutrients and some other constituents through physical filtration or adsorption, and through biological uptake by plant roots and soil microorganisms. However, in areas with high ground water tables, infiltration may lead to ground water contamination by toxic metals, deicing salts, and/or organic compounds which are common in urban stormwater. In these cases pretreatment to remove toxic stormwater constituents before infiltration, or choice of an alternative treatment method may be necessary. Regional Board staff will review proposals for infiltration of stormwater on a case-by-case basis, and place appropriate conditions in waste discharge permits to ensure protection of ground water quality.

Regional Board staff is currently conducting a study to determine the effectiveness of infiltration trenches in the treatment of surface runoff and in the protection of ground water. Three infiltration trenches in South Lake Tahoe are being studied. Ground water up and down gradient of each trench, and soil moisture from varying depths is being collected and analyzed. Data will be evaluated to determine whether any pollutants are entering ground water via the trenches, and whether any reduction of pollutants in runoff is occurring as the runoff percolates from the bottom of the trenches to the ground water. Contingent on available funding, the Regional Board may continue the study over the next one to five years.

Federal Control Measures for Ground Water Protection and Management

1. A number of federal statutes (e.g., the Clean Water Act, the Resource Conservation and Recovery Act, the Safe Drinking Water Act, the Comprehensive Environmental Response, Compensation and Liability Act, and the Federal Insecticide, Fungicide, and Rodenticide Act) provide the U.S. Environmental Protection Agency (USEPA) with the authority to prevent and control sources of ground water contamination, as well as to clean up existing contamination. USEPA recognized that these authorities to protect ground water were fragmented among many different statutes and were largely undefined. As a result, in 1984, the USEPA adopted a Ground Water Protection Strategy to articulate the problem and USEPA's role in ground water protection. The Strategy provides a system for internal coordination as

well as a strengthening of state programs (National Research Council 1986). Guidelines have been issued for USEPA decisions affecting ground water protection and cleanup. The guidelines include a three-tiered system for classification of ground water. Class I is a strict nondegradation category for irreplaceable drinking water supplies and aquifers associated with ecologically vital systems; Class II includes current and potential sources of drinking water and waters having other beneficial uses; Class III consists of nondrinkable water based on existing poor quality and isolation from drinking water aquifers. The USEPA accords different levels of protection to each water class and is developing guidelines on how the classes will be applied. In its Strategy, the USEPA intends to apply its classification system through all of its programs.

2. The USEPA has authority, under Section 1424 of the Safe Drinking Water Act, to designate certain ground waters as "**sole source aquifers**." There are no USEPA designated sole source aquifers in the Lahontan Region, although ground waters eligible for this designation may exist. Any federal financially-assisted project proposed within an area receiving this designation will be subject to USEPA review to ensure that the project is designed and constructed to protect water quality. The criteria for sole source designation are:

   - The aquifer must be the sole or principal source of drinking water for the area.
   - No economically feasible alternative drinking water sources exist within the nearby area.
   - If contaminated, a significant public health hazard would result.

Ground Water Control Actions by other State Agencies

1. California does not have statewide comprehensive ground water management laws; management is shared by many agencies using authority provided by various State statutes. The California Department of Water Resources' role in ground water management and protection is to provide technical assistance to other agencies, collect data, and conduct investigations. The responsibility of protecting ground water from pollution is shared with the State Board by other departments within the California Environmental Protection Agency (e.g., Department of Pesticide Regulation, Department of Toxic Substances Control, Integrated Waste Management Board, and Office of Environmental Health Hazard Assessment).

2. California water rights law does not require State permits for ground water diversions, except for underground waters which flow in defined channels (e.g., the lower Mojave River). Possible means of addressing the water quality impacts associated with ground water pumping and overdraft include use of nuisance law, the Public Trust doctrine, and existing State Board authority. Adjudication of ground water rights is also possible; this could result in court appointment of a watermaster, with court-defined authority ranging from monitoring and recording to broad management powers. The State Board may also place conditions to protect ground water in grant contracts or water rights permits for surface water use (Sawyer 1988). Adjudications to protect the quality of ground water are further discussed in Section 2100 and Section 2101 of the California Water Code. Water Code Section 2100 allows the State Board to file a Superior Court action or to intervene in an existing or proposed adjudication proceeding to "restrict pumping, or to impose physical solutions, or both, to the extent necessary to prevent destruction or irreparable injury to the quality of such water.

3. Improperly constructed, altered, maintained, or destroyed wells (including monitoring wells) are potential pathways for introducing contaminants to ground water. Such wells can act as conductors or pipelines through which waters of varying water quality can commingle. This may result in the degradation of high quality water supplies. The potential for ground water quality degradation increases as the number of wells and borings in an area increases.

   Improperly constructed, altered, maintained, or destroyed wells can facilitate ground water quality degradation by:

   - Allowing contaminants or poor quality water to enter ground water from the surface.
   - Allowing ground water from polluted or naturally poor quality aquifers to migrate (via the well annulus), thus contaminating high quality aquifers.
   - Allowing the well bore to be used for illegal waste disposal.

   Permanently inactive or "abandoned" wells that have not been properly destroyed pose a serious

threat to water quality. They are frequently forgotten and become dilapidated with time, and thus can become conduits for ground water quality degradation. In addition, humans and animals can fall into wells left open at the surface.

The California Department of Water Resources (DWR) is responsible for establishing statewide well standards for the protection of water quality (CA Water Code § 231). State law (CA Water Code § 13801), also requires each county, city, or water agency where appropriate, to adopt ordinances that meet or exceed DWR standards for proper well placement, construction, and abandonment. The same law specifies that local governments which fail to adopt an adequate well ordinance shall enforce the DWR standards. State well standards are found in DWR Bulletins No. 74-81 and 74-90, entitled "Water Well Standards, State of California."

4. Section 13169 of the California Water Code authorizes the State Board to develop and implement a ground water protection program, as provided under the Safe Drinking Water Act, Section 300 and following of Title 42 of the United States Code, and any federal act that amends or supplements the Safe Drinking Water Act. This authority allows the State Board to apply for and accept State ground water protection grants from the federal government, and to take any additional action as may be necessary or appropriate to assure that the State's ground water protection program complies with any federal regulations issued pursuant to the Safe Drinking Water Act or any federal act that amends or supplements the Safe Drinking Water Act.

Ground Water Control Actions by Local Agencies

1. The roles of local agencies in regulation of individual waste disposal systems and in oversight of underground storage tanks are described above.

2. County water districts have broad authority to conserve, protect, and replenish ground water supplies. The Subdivision Map Act allows cities and counties to adopt ground water recharge facility plans, construct recharge facilities, and charge a fee for the construction of such facilities as a condition of approval for subdivision maps and building permits (Sawyer 1988).

3. State law permits the formation of local ground water management districts. A few such districts have been established within the Lahontan Region. Local governments should strictly enforce well construction and abandonment standards. Where wellhead protection ordinances have been adopted, they should be strictly enforced.

Recommended Control Actions for Ground Water Protection and Management

1. The potential exists for physical solutions to water quality problems related to ground water overdraft, such as provision of alternative water supplies, artificial recharge, or the establishment of physical barriers or injection carriers to pollutants. Such solutions can be required by the courts in connection with water rights adjudications, or as part of ground water management programs which could include regulation and augmentation of supply. Physical solutions could also be authorized during approval of water development projects. These solutions may involve conjunctive use projects where surface waters are used for ground water recharge or as a substitute supply for ground water users. It is important to manage ground and surface waters as an interconnected resource (Sawyer 1988).

2. Basic data are needed to evaluate potential threats to ground water quality and beneficial uses. This database should contain information on hydrogeology, soil characteristics, ground water location and level, ground water quality, ground water movement, water well location and construction, ground water extractions, land use, waste discharges, potential and existing pollution sources (e.g., landfills, underground storage tanks, significant quantities of chemicals used in land use practices such as pesticides and fertilizers, concentrated areas of septic system use, and drilling operations) and extent of contamination. A database of this type would also be useful to determine cumulative impacts of discharges and other activities on ground water basins. This database could be maintained by the Regional Board. Most of the information could be obtained from other agencies.

3. Ground water quality monitoring is essential to determine to what extent ground water beneficial uses and water quality are threatened and to evaluate the effectiveness of any actions implemented to protect beneficial uses and water quality. The Regional Board will encourage ground water quality monitoring. All data

collected should be entered into STORET or compatible databases.

4. In areas of high septic system density, nitrate and chloride levels should be monitored to detect contamination to ground water from the septic systems.

5. The U.S. Soil Conservation Service, Resource Conservation Districts and U.C. Cooperative Extension Farm Advisors will be encouraged by the Regional Board to promote Best Management Practices such as minimal applications of fertilizers and other chemicals to protect ground waters.

6. The Regional Board will encourage the formation of local ground water management districts. The districts should cooperate with the Regional Board in the regulation of such things as ground water recharge and irrigation practices to conserve ground water.

7. Local governments should consider land use zoning to restrict the type and amount of development in critical ground water recharge areas.

8. To conserve ground water resources, the Regional Board will encourage the use of Best Management Practices to minimize water use for agricultural, landscape, and turf irrigation.

9. To conserve ground water resources, the Regional Board will encourage the use of reclaimed water wherever feasible without adversely impacting beneficial uses. (Regional Boards are required, when establishing water quality objectives, to consider the need to develop and use reclaimed water.)

10. Regional Board staff, in reviewing environmental documents for projects which could affect ground water quality, should ensure that CEQA requirements for public disclosure on impacts, alternatives and mitigation measures are fulfilled.

11. The Regional Board should consider holding public fact finding hearings on specific ground water quality/quantity problems. Such hearings could result in recommendations for State Board action.

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4.7 MINING, INDUSTRY, AND ENERGY PRODUCTION

The primary industries[1] in the Lahontan Region are mining and mineral processing. Other industries in the Region include lumber mills, energy production facilities, chemical manufacturing facilities, and concrete and asphalt batch plants.

Nearly all industrial operations have the potential to produce "general" types of water quality impacts, similar to those of any large construction site (e.g., erosion/sedimentation and spillage of motor vehicle fluids). Additionally, each type of industrial operation may pose its own industry-specific threats to water quality. For example, lumber mills can contribute significant quantities of tannins, lignins, BOD, and color to receiving waters. Concrete batch plants can contribute TDS, high alkalinity, and metals to receiving waters. Mining operations can contribute cyanide, heavy metals, or acid mine drainage to receiving waters.

General Discharge Limitations

Waste discharge requirements are prescribed for each discharger on a case-by-case basis; however, in every case, industrial and municipal effluent discharged to waters of the Region shall contain essentially none of the following substances:

- Chlorinated hydrocarbons
- Toxic substances
- Harmful substances that may bioconcentrate or bioaccumulate
- Excessive heat
- Radioactive substances
- Grease, oil, and phenolic compounds
- Excessively acidic and basic substances
- Heavy metals such as lead, copper, zinc, mercury, etc.
- Other deleterious substances

Furthermore, any person who is discharging or proposes to discharge waste, other than into a community sewer system, must file a Report of Waste Discharge (RWD) with the Regional Board unless this requirement is waived by the Regional Board. Detailed lists of information needed in the RWD can be obtained from Regional Board staff. Upon receipt of the RWD, the Regional Board, with information and comments received from state agencies and the public, will prescribe discharge requirements including any appropriate limitations on biological and mineral constituents, as well as toxic or other deleterious substances. Additionally, revised waste discharge reports may be required prior to additions of waste, changes in treatment methods, changes in disposal area or increases in effluent flow.

Discharge requirements will be established that are consistent with the water quality objectives for the receiving water (see Chapter 3 of this Plan), including wasteload allocations or Total Maximum Daily Loads (TMDLs) established for the discharge, the State Board's "non-degradation" policy, the federal anti-degradation and anti-backsliding regulations, and the principle of obtaining the optimum beneficial use of the Basin's water resources.

Mining and Mineral Processing Operations

Many quarries exist in the Lahontan Region, extracting such commodities as iron ore, pumice, marble, limestone, talc, and asbestos. Most such quarries do not use chemical extraction processes, and effects on water quality are usually limited to the general impacts described above.

Sand and gravel quarries are also fairly common in the Region, and are of concern because they often occur in riparian and/or floodplain areas. In general, discharges from sand and gravel operations comply with water quality objectives; such operations are usually considered to be minor, because potential adverse water quality impacts can most often be mitigated with relatively simple measures. The final restoration phase is the most critical—at the end of the project, the site must be stabilized, revegetated, and/or restored in a manner which will ensure long-term water quality protection.

An unknown number of recreation prospectors use "dry wash" or recirculating water systems to gravity separate gold. These activities have the potential to

[1] **Note:** For purposes of this Basin Plan, "industry" is defined as any servicing, producing, manufacturing or processing operation of whatever nature, including, but not limited to: mining, gravel washing, geothermal operations, air conditioning, ship building and repairing, oil production, storage and disposal operations, or water well pumping. (This definition is taken from California State Water Resources Control Board and California Regional Water Quality Control Board, 1989). The word "industry" may have a broader meaning in other contexts; for example, in the sense used by modern economists, one of the largest "industries" in the Lahontan Region is tourism. However, the waste discharge prohibitions, effluent limitations, and control measures in this Basin Plan should be understood in the context of the more narrow definition above.

degrade water quality and beneficial uses by disturbing streambeds and riparian and floodplain areas.

The mining operations which pose the most significant threat to water quality in the Lahontan Region are hard rock mining for precious metals (e.g., gold or silver). Toxic chemicals, such as cyanide or mercury, are often leached through ores to obtain precious metals. The chemical leaching process involves placement of crushed ore material onto a liner (heap leaching) or into a tank or vat (vat leaching), and saturation of the ore with the leaching chemical solution ("barren" solution). The solution leaches metals as it percolates through the ore, then drains to a pond ("pregnant" solution pond) where the metals can be recovered. Spent ores are washed with water to remove any remaining chemical solution prior to disposal.

Ore preparation generally involves some crushing or pulverizing. This process exposes a maximum amount of ore surface area for the chemical leaching process. This also maximizes the amount of surface area that will be exposed to the elements after the ore has been processed and disposed. Prolonged exposure to the elements (and/or to acid mine drainage) will result in the leaching of heavy metals and/or salts which the ore may contain.

Acid mine drainage (AMD) is the product of sulfurous rock, bacteria, water, and oxygen. This highly acidic drainage is associated with mining because, although it may occur naturally, mining activities tend to enhance the formation of AMD by opening tunnels (introducing water and/or oxygen to subterranean sulfurous rock) and by exposing large quantities of susceptible rock to the elements (waste tailings piles). Once AMD formation has been established, control is extremely difficult. The best control is prevention.

Water is utilized in mining operations for dust control, equipment cooling, make-up for leaching solutions, and for other purposes. In sand and gravel quarrying, water is used to wash aggregate. Process water may become contaminated with metals, salts, toxic chemicals, oils and greases, fuels, and/or sediments. If allowed to escape containment, process water is likely to impact or threaten to impact receiving waters. When a mining operation ceases, large water-filled ponds often remain on the site. These ponds may threaten receiving waters by concentrating on-site contaminants (becoming toxic pits), and by overflowing into surface waters.

Regulatory Authority

Mining waste discharges are regulated under Article 7 of Chapter 15 (Cal. Code of Regs.). Further regulations for mines are contained in the California Water Code, Section 13260.

All mining operations are subject to the Surface Mining and Reclamation Act (SMARA, CA Public Resources Code, Title 14, Division 2, Chapter 9). SMARA requires that anyone proposing to conduct a mining operation file a reclamation plan with (and be permitted by) the Lead Agency (typically the County) in the area where the mine is to be sited. The reclamation plan must include, in part, a description of the type of operation to be conducted; the initiation and termination dates; and a description of the manner in which reclamation will be accomplished, including a description of the manner in which contaminants will be controlled and mining waste will be disposed of, and a description of the manner in which rehabilitation of affected streambed channels and streambanks to a condition of minimizing erosion and sedimentation will occur. The reclamation plan is a useful tool for the Regional Board in evaluating the level of regulation appropriate for a given operation. Whatever the level of regulation the Board decides upon, the operation will be regulated by the Lead Agency, and the operator will be required to reclaim the site at the end of the operation.

Federal Superfund Program

The federal "Superfund" program was established in 1980 with the passage of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The CERCLA provided funding and guidelines for the cleanup of the most threatening hazardous waste sites in the nation. High priority sites scheduled for cleanup under this program are placed on the National Priority List (NPL). The federal government normally places large sites with identified problems on the Superfund list for cleanup. Ideally, the owner(s) or responsible parties are then required to conduct cleanup operations. However, if the owner(s) cannot be located or do not have sufficient funds, the cleanup becomes the responsibility of federal or state government. Smaller sites, or sites without identified problems may also pose significant threats to water quality, but do not make it onto the Superfund list. Once these sites are identified, they must be handled on a case-by-case basis by the Regional Board, ideally by responsible parties, but otherwise by State or local agencies.

Active Mine Sites

Case History—Mountain Pass Mine and Mill Operations

The Mountain Pass Rare Earth Mine, first located in 1949, is in the Ivanpah district of the South Lahontan Basin. The district was mined intermittently until 1940, for silver, lead, zinc, and copper.

The Mountain Pass Mine and Mill is currently operated by Molycorp. The ore body consists of carbonates, sulfates, bastnaesite, and quartz. Bastnaesite is a rare earth fluorocarbonate which contains lanthanide (rare earth) metals. Lanthanide metals include cerium, lanthanum, samarium, gadolinium, neodymium, praseodymium, and europium, and are used in such things as lighter flints, ultraviolet absorbing glass, coloring agents for glass, and television tubes.

The Mountain Pass Mine and Mill is an open pit mine with milling, beneficiation, and processing facilities. The three major milling plants are the flotation plant, chemical plant, and separation plant. Mine wastewaters were discharged to percolation ponds onsite until 1980, causing degradation of underlying ground waters. Most mine wastewater is currently collected from various discharge points at the mill site and discharged to a 100-acre evaporation pond located on Ivanpah Dry Lake about 13 miles to the east. Mine waste overburden is stockpiled onsite. Process water, tailings, and product storage ponds still exist at the millsite.

Major water quality concerns at the Mountain Pass Mine include the continued leakage from the active main tailings pond. This leakage continues to degrade ground water already polluted by dissolved minerals, nitrates, and sodium lignin sulfonate, which is a surfactant used in the floatation plant. Other concerns included inactive waste disposal sites and lead sulfide precipitates stored at the Molycorp hazardous waste storage site. Molycorp is currently working under Regional Board and Department of Toxic Substances Control schedules to correct the problems.

Abandoned/Historic Mines

In the past, mining operations were often conducted with little concern for immediate or future environmental impacts. Tailings were placed in waterways, ore processing occurred on unlined ground surfaces, toxic chemicals were often not rinsed from ore prior to ore disposal, and no effort was made to reclaim exposed slopes. As a result, numerous old, mostly abandoned, mine sites are now severely impacting surface and ground waters in the Lahontan Region. Many surface waters in the Region, such as Monitor Creek, Leviathan Creek, Bodie Creek, and the Carson River, have moderate to high levels of heavy metals, salts, and/or mercury, due at least in part to past mining activities. High levels of metals have been detected in fish tissue under the State Board's Toxic Substances Monitoring Program. Surface and ground waters are also being impacted by acid mine drainage and severe erosion problems at mine sites.

Case History—Leviathan Mine

The Leviathan Mine, located in Alpine County, is the most significant abandoned mine site in the Lahontan Region. The soil and underlying geology of the site are sulfur-rich, and the mine has primarily been exploited for that mineral (although the earliest mining at the site was for metals). Operations at the site began in 1863, and continued under various owners until the late 1960s.

Until 1952, operations at the site involved tunnel mining, with minimal impact to nearby surface waters. In 1952, Anaconda Copper Company purchased the site and began an open-pit mining operation, dumping tailings directly into surface waters (Leviathan Creek). Acid mine drainage (AMD) then began leaching into surface waters in significant quantities.

After a fish kill occurred in 1959, Anaconda implemented some mitigation measures, but the impacts were difficult to control. In 1962, the Regional Board determined that the mine should be regulated, and requested a report of waste discharge from Anaconda. Anaconda responded by removing all the previously installed mitigation measures and selling the mine to Alpine Mining Enterprises, a small corporation with no assets.

The Regional Board adopted waste discharge requirements on Alpine Mining Enterprises in 1962 and spent the next several years trying unsuccessfully to make Alpine Mining Enterprises correct the AMD and erosion problems at the site. In 1969, the Regional Board referred the matter to the Attorney General, but litigation efforts were stymied by Alpine Mining Enterprises' lack of resources and the apparent lack of recourse against Anaconda under California law.

In 1978, California voters approved a bond measure which enacted the State Assistance Program (SAP), and the State Board granted the Regional Board $3.76 million from this bond act to address the Leviathan Mine problem, which was now causing occasional cattle kills and which had left an eight mile stretch of Leviathan and Bryant Creeks sterile. At

about the same time, the Regional Board successfully negotiated with ARCO, the now parent company of Anaconda, for a $2.337 million settlement in lieu of litigation. As part of the settlement, the State of California purchased the mine for $50,000. The State Board was given the responsibility of overseeing restoration activities at the mine. The State Board assigned much of the oversight responsibility to the Regional Board.

In 1985, a restoration project was completed and the mine site was revegetated. The reclamation strategy was designed (by Brown and Caldwell Consulting Engineers) to control or eliminate approximately 75 percent of the AMD pollution previously entering Leviathan Creek. However, the plant species selected for revegetation were not tolerant to site conditions, and most of the plants have since died. This has left acres of eroding slopes which are currently inundating the mine's pollution abatement facilities with sediment, jeopardizing their function. Earth is also eroding from beneath the mine's pollution abatement facilities, undermining their structural stability. Additionally, the road system at the site has little drainage control and is contributing to the erosion and sedimentation problem. The eroding slopes and resulting contaminated sediment loads also endanger the restoration of the potential beneficial uses of the Leviathan Creek system.

Water quality monitoring data (for parameters including nickel, aluminum, iron, arsenic, sulfate, total dissolved solids, and pH) indicates a significant decrease in pollutant concentrations since the project was constructed. However, downstream beneficial uses have not been fully restored, pollutant loading is still significant, and all monitoring has been conducted during drought years when production of AMD is expected to be at a minimum.

On June 9, 1989, the USEPA issued its final decision on Section 304(*l*) of the Clean Water Act. As a result of this decision, Leviathan Creek was identified on the Section 304(*l*)(1)(B) “short list” as a waterbody impaired by toxic pollutants, specifically arsenic and nickel. Concurrently, the Leviathan Mine was listed under Section 304(*l*)(1)(C) as the point source contributing toxics to Leviathan Creek. In addition, the State of California submitted Aspen, Bryant and Leviathan Creeks for inclusion on the 304(*l*)(1)(A) “long list” as waterbodies not meeting State water quality standards.

The Section 304(*l*) listing required the State of California to prepare an Individual Control Strategy (ICS) for the Leviathan Mine by February 4, 1990. USEPA and the Lahontan Regional Board discussed a coordinated effort on the ICS during a workshop in January, 1991. No further actions have been taken by the State or Regional Board to pursue the ICS since that time.

Control Measures for Mining and Mineral Processing

1. The Regional Board shall review all new mining, mineral processing, and exploratory operations (and existing unpermitted operations on a case-by-case basis) and issue conditional waivers, waste discharge requirements, or NPDES permits for operations that may (individually or cumulatively) result in potentially significant impacts to water quality or beneficial uses.

2. To control general water quality threats posed by mining and mineral processing operations, Best Management Practices (BMPs) shall be required, including mechanical or vegetative soil stabilization, runoff collection/treatment systems, vehicle fluid containment facilities, etc. Process water, aggregate washwater, and/or dust control water should be contained in ponds or behind dikes, or otherwise treated to remove sediments. (See BMP and stormwater control discussions in Section 4.3 and in the introduction to this Chapter).

3. Specific control measures include the following:

   - **Gravel and Sand Operations:** The Executive Officer may issue a conditional waiver to any site where all operations and washwaters are confined to land, no discharge to surface waters, including wetlands, will occur, and stockpiles are protected from flooding. If disturbance is proposed in a wetland, Clean Water Act Section 401/404 Water Quality Certification must be obtained.

   - **Leaching Operations:** The Regional Board shall regulate all discharges of cyanide or other toxic chemicals used in precious metal extraction, regardless of the size of the operation. Toxic chemicals should be prevented from escaping any portion of the leaching cycle. Pregnant and barren solution impoundments and leach pads should be lined and monitored; leaching vats and chemical storage facilities should haveadditional containment (e.g., an outer tank) and monitoring. If toxic chemicals are identified in underlying soils or ground water, the leaching process should be stopped until the leak can be located and repaired, and the contamination remediated.

- **Hard Rock Mining:** When new mining operations are proposed, the discharger must comprehensively test waste materials for acid generation potential. Waste which has a high acid generation potential must be placed in engineered containment or otherwise disposed of to either prevent AMD formation or to contain any AMD which is generated. The potential for leaching of soluble metals and salts should also be evaluated prior to commencement of operation at a new mine site. Mine wastes which will generate significant quantities of metals or salts should be disposed of to engineered containment or otherwise prevented from contaminating surface or ground waters.

Recommended Future Actions for Mining and Mineral Processing

1. Pursuant to 304(*l*) regulations, the State Board must consider funding various remediation alternatives for the Leviathan Mine. The Regional Board shall consider the following alternatives and recommend some or all of them to the State Board for consideration:

   - **Control eroding slopes and mine tailings.** Implement a comprehensive slope stabilization and revegetation program specifically designed to establish plants that are tolerant to acidic soil and low water conditions, such as those which occur at the mine site. The established plants and structural improvements should stabilize the soils and significantly reduce erosion and sediment transport to pollution abatement facilities as well as the Leviathan Creek system. An established vegetative cover will also reduce stormwater percolation and the resultant generation of AMD.

   - **Control roadside drainage and erosion.** Regrade roads for proper drainage and install drainage control and treatment structures. By properly directing the concentrated runoff from roads and installing drainage structures, the integrity of the roads will be maintained while erosion and sediment transport to streams will be reduced.

   - **Control excess AMD.** Construct projects to reduce the pollution loading to area surface waters, construct an additional holding pond to contain AMD overflow from the existing evaporation ponds, and/or establish a wastewater treatment system to treat AMD overflows from the existing evaporation ponds to Leviathan Creek.

   - **Reline the ponds**

   - **Examine water diversion to prevent AMD formation**

2. In order to maintain the beneficial effects of the pollution mitigation project at Leviathan Mine, a number of regular maintenance activities must be conducted. These include: (1) periodic fence repairs, (2) annual sediment removal from drainageways, (3) flow regulation to and between ponds, (4) emergency repairs, and (5) periodic water quality monitoring to ensure that pollution levels are not increasing. Over the long-term, major efforts will be required to either rehabilitate the existing project or to otherwise reduce the level of pollutants leaving the site.

3. The Regional Board should investigate the water quality impacts of other inactive mines and identify and implement appropriate control actions.

4. The Regional Board should consult with the California Department of Fish and Game to develop leaching operations control measures to protect wildlife from lethal chemicals. Such control measures could include covering or otherwise containing all waters with chemical concentrations at levels lethal to wildlife.

Industrial Activities other than Mining and Mineral Processing

Cement production. There are currently several large cement production facilities located in the southern part of the Lahontan Region. These facilities quarry mineral products, crush and blend them proportionally, heat them together in a kiln, and then crush finely the resulting klinker product to form cement. The cement manufacturing process can result in degradation of both surface and ground water quality due to parameters and constituents including pH, chloride, sulfate, potassium, sodium, calcium, and metals such as chromium.

Two significant waste types are generated during cement production. The first, kiln dust, is off-specification product that is unable to meet the cement industry's alkalinity requirements because of the type of raw minerals mined at some plants. (Not all cement plants produce kiln dust.) Kiln dust is frequently dumped onsite near the plants and spread.

The pH of kiln dust is usually very high, ranging from 11 to 13.5 pH units. Due to its corrosive pH,

kiln dust can be classified as a “hazardous” waste (under Title 23, Chapter 15, Cal. Code of Regs.). However, if a particular manufacturer has been granted a variance from the California Department of Toxic Substances Control, the Regional Board may find that their kiln dust could be classified as a “designated” waste (under Title 23, Chapter 15, Cal. Code of Regs.) or a “special” waste (under Title 22, Cal. Code of Regs.). The USEPA is currently studying this issue to determine how kiln dust should be classified.

The second type of waste, kiln refractory liner brick, is used to line the kilns and historically contained leachable amounts of chromium in concentrations considered hazardous. Often, when kiln brick containing chromium was replaced, it was disposed onsite. Recently, the kiln brick composition has been reformulated and new brick is now available that does not contain chromium. Currently, when kiln bricks are replaced, most cement plants will crush and recycle the old bricks through the cement manufacturing process.

Concrete production. There are numerous concrete batch plants throughout the Region. Concrete batch plants combine gravel, water, and cement to form concrete. Liquid and semi-solid waste from truck and equipment washout is produced. This waste is very alkaline (the pH may be as high as 12.5 in fresh cement), is high in TDS, and may contain assorted heavy metals. The washout may contain various additives or other chemicals that are used in concrete production. This wastewater is usually disposed to a settling pond, and then to a sewer (POTW) or to onsite percolation ponds. Waste concrete, left over from individual projects, is often disposed onsite by dumping in a large pile, where it hardens

Asphalt production. Asphalt batch plants generally involve mixing petroleum products (usually diesel fuel) with earthen materials. Large quantities of both materials are generally stored onsite. Water quality can be significantly degraded if these materials reach water courses.

Lumber mills. Lumber mills generally consist of outdoor log and lumber storage, indoor milling facilities, energy cogeneration facilities, and waste piles/ponds. Threats to water quality include wastewater from log watering (high in tannins, lignins, color, BOD, etc.), process wastewater from energy cogeneration (high in TDS, plus any chemical additives), ash from energy cogeneration (highly alkaline, possibly high in metals), and spillage of wood treatment chemicals (such as cupric arsenate, pentachlorophenol, etc.).

Control Measures for Industrial Activities other than Mining and Mineral Processing

1. Industrial operations in the Lahontan Region shall be reviewed on a case-by-case basis, and regulated as appropriate. Conditional waivers, waste discharge requirements, or NPDES permits shall be issued as necessary to protect water quality and beneficial uses.

2. To control general water quality threats posed by erosion and stormwater from industrial operations, Best Management Practices (BMPs) shall be used, including mechanical or vegetative soil stabilization, runoff collection/treatment systems, vehicle fluid containment facilities, etc. (See BMP and stormwater control discussions in Section 4.3 and in the introduction to this Chapter). If industrial wastewater is being discharged to a wastewater treatment plant, pretreatment of the wastewater may be required (refer to Pretreatment Policy, discussed in Section 4.4, “Wastewater”).

3. The Regional Board should continue to review Notices of Intent (NOIs) for statewide Industrial Stormwater NPDES permits, and should issue individual permits when needed to protect water quality.

Specific control measures applicable to industrial operations are as follows:

4. **Cement Industry:** The Regional Board shall regulate cement kiln dust disposal and all ready mix cement plants where water quality could be impacted. Wastewater from cement batch plants is considered to be a designated waste, and may need to be discharged to a lined impoundment, if site-specific characteristics (e.g., soil type, depth to ground water, ground water quality, etc) will not protect ground water from degradation. The Regional Board will consider, on a case-by-case basis, the need to line cement wastewater ponds. Solid or semi-solid wastes should be deposited in landfills or other legal points of disposal unless the discharger can demonstrate that the waste will not pose a threat to water quality if deposited onsite.

5. **Asphalt Batch Plants:** Waste control measures are fairly straightforward at such sites. Petroleum products should be stored in tanks, and the tanks placed in lined holding areas. If spillage to soil occurs, contaminated soils should be scraped up, stored on a liner, and incorporated into asphalt as soon as possible. A berm (or other runoff control)

should be placed downgradient from earthen material stockpiles.

6. **Lumber mills:** Waste control measures include lined ponds for untreated wastewater, containment of surface runoff, and proper storage and disposal of ash (ash is usually landfilled, but may also be used as a soil amendment).

Recommended Future Actions for Industrial Activities

1. The Regional Board should consider developing a policy for addressing the disposal of "off-specification" concrete. Possible policy might include requiring that the material be stored on a liner or stored indoors, or that ground water monitoring be conducted around the on-site spreading areas.

2. The Regional Board should consider developing a policy or policies for addressing the large, potentially toxic pits left at mining operations. Possible policies might include (but are not limited to) requiring that the pits be filled at the end of a site's operation, requiring long-term financial assurance to correct future water quality problems resulting from the pits, or lining the pits.

Energy Production

There are several facilities in the Lahontan Region that produce electricity or provide energy for heating purposes. These facilities utilize sources including geothermal fluids, solar energy, fossil fuels, biomass, and hydroelectric power. Facilities producing energy from these sources all generate some type of waste products which can impact water quality if not properly treated, contained or disposed. (The disposal of wastes to land is discussed separately in "Wastewater and Solid Waste" and the "Ground Water Protection" sections of this Chapter).

Potential adverse impacts to water quality may result from the following waste stream components: spent geothermal fluids, cooling tower blowdown, boiler blowdown, ash, and supply water treatment system wastewater. Constituents which can impact water quality include: total dissolved solids (TDS), sediment, heavy metals, solvents, biocides, and residual chlorine. The temperature of discharged water can also affect receiving waters. Additionally, with hydroelectric projects, there may be flow depletions in the affected reach of the river or stream, resulting in impacts to water quality and beneficial uses.

Geothermal

Geothermal resources in the Lahontan Region have been explored and developed in the Surprise Valley, the Honey Lake Valley, Bridgeport Valley, Long Valley near Mammoth Lakes, and the Coso Known Geothermal Resource Area northwest of Ridgecrest. Exploration is currently underway at Fort Irwin. Geothermal resources found in the Region provide many opportunities for alternative energy development. Geothermal power plants extract hot water through large wells drilled from 500-10,000 feet below the surface. The hot water is either passed through heat exchangers (binary process) to create steam to generate electricity, or is used directly for space heating or in a heat exchange process to heat water for domestic and/or commercial uses. Hot water return flows from these processes are usually injected back into the geothermal reservoirs through separate wells, but in some cases are discharged to surface waters or to land. Geothermal steam and condensate may be highly mineralized and corrosive, and special precautions must be taken to ensure that geothermal development will not create pollution problems. Besides spent geothermal fluids, other wastes discharged from geothermal exploratory and production projects are: cuttings from well drilling operations, and fluids from well testing. Until it can be shown that such activities can be conducted without risk of water quality degradation, the Regional Board will oppose further consideration of geothermal exploration or development in the Eagle Lake Basin, Lassen County (see Resolution 82-7 in Appendix B).

Fossil fuels

Fossil fuel energy production facilities in the Lahontan Region include coal-fired steam plants and a gas compressor station. Future development of fossil fuel powered steam plants could occur in the South Lahontan Basin to meet the increasing energy needs of Southern California. Southern California Edison Company operates a coal gasification facility and a coal-fired steam plant using coal fines or underflow from a traditional coal-fired steam plant in Nevada. Waste discharges result from the following components: cooling tower blowdown, boiler blowdown, sulfur recovery processes, slag (from coal gasification) or fly-ash (from coal-fired plants), and supply water treatment system wastewater. The primary concern with the wastewater is the high concentration of total dissolved solids that threaten the water quality of underlying aquifers. Because of the high concentrations of salts and the further concentration through evaporation, the liquids in the waste ponds are considered designated wastes under Chapter 15. Southern California Gas Company operates a gas compressor station that

discharges cooling tower blowdown water. The water discharged is of better quality than a nearby well used for irrigation, so most of the wastewater is being reclaimed for irrigation; the remaining water is discharged to an unlined evaporation-percolation pond.

Solar

Solar energy stations use a heating transfer fluid (HTF) to transfer heat from solar energy to water, in order to create steam for generating electricity. Waste stream components include: cooling tower blowdown, sodium regeneration water, demineralization blowdown, solar boiler blowdown, supply water treatment system wastewater, and power block runoff. Biocides are used in the cooling towers to prevent biological growth; the resulting waste products are acids and amines. Blowdown water contains sulfuric salts, due to the use of sulfuric acid to minimize scale buildup in condensers. The wastewaters are similar to those described for fossil fuel facilities and are considered designated wastes under Chapter 15. The HTF is not considered a waste, since it is used for production and is recirculated in a closed system. However, HTF spills do occur and the contaminated soil is classified as a waste. Such contaminated soil must be removed and properly treated and/or stored prior to disposal at an appropriate facility.

Biomass

Several energy production facilities exist in the Region that utilize biomass as a fuel source. Biomass fuels are typically the products or by-products of logging or milling operations, however, household, medical, or other wastes may also be proposed for incineration. The primary water quality concern is the disposal of ash produced by such facilities. Such ash is often hazardous due to high pH and/or metals content. Ash generated by energy production facilities must be tested to determine its degree of hazard and disposed of in compliance with Chapter 15.

Hydroelectric Power

Hydroelectric power, or hydropower, is the power generated by conversion of the energy of running water. Hydroelectric facilities are usually constructed in or immediately adjacent to the water body being utilized. Water may be diverted from the water body, run through the facility, and returned to the river at some point downstream. Alternately, the flow of the entire river may be utilized. Impacts to a water body from hydroelectric projects include erosion and sedimentation resulting from construction, increased turbidity and temperature, and possibly discharge from turbines in the watercourse. Additionally, there may be flow depletions in the affected portion of the stream and loss of habitat and reduction in the recreational/aesthetic quality of the stream, resulting in impairment of the beneficial uses.

Control Measures for Energy Production

1. The Regional Board regulates energy production facilities through the adoption of waste discharge requirements (WDRs) which specify effluent limitations, receiving water limitations, and other provisions in accordance with all applicable laws, regulations, and policies. The WDRs can also prohibit certain discharges, such as PCBs or waste discharges to surface waters or land. Spill control and prevention plans and closure plans, including assurance of financial responsibility, are required. Self-monitoring programs are issued along with the WDRs. The Regional Board may consider issuing a waiver of waste discharge requirements for interim discharges or where discharges are appropriately controlled by another permitting authority.

2. When adopting or amending WDRs for energy facilities, the Regional Board shall implement the following measures wherever appropriate:

   - Where interim waste discharges (such as drilling cuttings and test waters) are proven to be non-hazardous and no impacts to water quality will occur, discharges may be allowed to unlined sumps. Wastes left after evaporation may be buried on site. Such discharges would likely not require regulation by the Regional Board.

   - Where discharges may impact water quality or the waste is considered hazardous, wastes shall be discharged to lined ponds. Closure will require a synthetic liner for capping, or removal of cuttings to an appropriate disposal location. Such discharges would likely require waste discharge requirements or other regulation by the Regional Board.

   - Wastewaters from energy production facilities may be used for dust control during construction and operation where no adverse impacts to surface water or ground water quality will occur and where the wastewater is not hazardous.

   - Waste discharges from energy production facilities may be allowed to land (irrigation) or to unlined ponds where the effluent quality is similar to or of better quality than the receiving waters. Monitoring will be required to ensure that adverse impacts to the water quality of the

receiving waters (either the underlying ground water or the nearby surface waters) will not occur.

3. For all proposed **geothermal operations**, the Regional Board encourages re-injection of spent geothermal fluids to an aquifer with similar water quality as the best measure to protect surface waters and good quality ground waters. If re-injection is not possible, the Regional Board will require all other proposed methods of disposal of spent geothermal fluids to result in a discharge which complies with all provisions of this Basin Plan.

   The Regional Board will coordinate with other permitting authorities to determine whether WDRs are appropriate. Where adequate water quality protection can be provided by another permitting authority, the Regional Board may choose not to issue a waste discharge permit. The California Division of Oil and Gas (CDOG), which has jurisdiction and responsibility for geothermal development, supervises all well drilling and abandonment activities on private lands. CDOG also implements the Underground Injection Control Program, including the reinjection of geothermal fluids on private lands. The Regional Board works closely with the CDOG to regulate these facilities in accordance with the Memorandum of Agreement (MOA) between the State Board and CDOG as amended by State Board Resolution No. 88-61. The U.S. Bureau of Land Management and the U.S. Environmental Protection Agency have responsibility for regulation of reinjection on federal lands.

4. For proposed **hydroelectric projects**, the Regional Board will coordinate permitting processes with the Federal Energy Regulatory Commission (FERC) and the State Board. All hydroelectric projects which will produce energy for sale must comply with the FERC licensing process, or acquire an exemption from FERC. The FERC licensing process includes an optional preliminary permit, giving the permitted developer “first-in-line” status for a given project, while feasibility and environmental impact studies are performed for the project. After review of the feasibility studies, FERC may deny the license, grant it without conditions, or reserve continuing jurisdiction. Projects with capacity of 5 MW or less may be exempt from any FERC licensing requirements if the proposed facility is located at an existing dam, or will use an existing natural water feature. FERC also exempts projects producing 100 KW or less. (Note that hydro projects exempt from FERC may still require State water rights permits and/or waste discharge permits). All FERC licenses have expiration dates. Applicants for relicensing must complete the pre-filing requirements two years prior to the expiration of the current license. Before FERC will issue a license, applicants must provide evidence of compliance with State water rights laws.

   Section 401 of the Clean Water Act requires that applicants for a federal license or permit, such as a FERC license, for any activity which may result in a discharge to navigable waters, obtain a water quality certification from the State. The federal agency cannot issue the permit or license unless the State issues or waives 401 certification, and any conditions of the State's certification must be included as conditions of the federal permit or license. If the State denies the request, the federal permit or license cannot be issued. If the State fails to act on the request for certification within a mandated timeframe, the request is deemed waived. The State Board is the California agency designated to issue Section 401 certifications for hydroelectric projects. The certification process, as related to hydropower projects, is described below.

   Water Rights Permit. An applicant for development of hydropower must either possess a valid water right or else apply for one to the State Board. Generally, the State Board requires that the feasibility studies be nearly completed in order to show that the applicant has demonstrated diligence in acquiring a water rights permit. The State Board will also only issue one water rights permit per site. In the case of competing water rights applications, the Water Board will wait until the FERC permit is granted.

   Protests regarding water rights applications must be filed with the State Board within the 45 or 60-day review period indicated in the notice of application for water rights. If the protestants and applicant cannot resolve their differences directly, the State Board will resolve the issue during an evidentiary hearing.

   California Environmental Quality Act (CEQA). Action cannot be taken by the State Board on a request for water quality certification for a hydroelectric project (Section 401 Certification) until compliance with CEQA is demonstrated. Whether or not a water rights permit is required for the project, the State Board will ordinarily be the lead agency for CEQA purposes. Until the State Board adopts an appropriate CEQA

document or determines that the proposed project is exempt, no action will be taken on water quality certification. If the project proponent is a local agency, that agency should be the lead agency under CEQA. Again, no action on water quality certification will be taken until the local agency adopts an appropriate CEQA document.

Section 401 Water Quality Certification. When a complete application and request for water quality certification has been received by the Regional Board, the Board immediately forwards the application and certification request to the State Board. The State Board 401 coordinator and the Regional Board coordinate to make a certification decision (certification issued, issued with conditions, or denied) within the mandated timeframe. The Regional Board may adopt waste discharge requirements in addition to Section 401 Water Quality Certification for hydroelectric projects. However, the WDRs may be preempted by FERC license provisions.

As a result of January 1, 1993 legislation, the State and Regional Boards have limited authority over hydroelectric projects. Their authority includes:

- Full authority over projects which are exempt from FERC licensing (the Los Angeles Department of Water and Power's Owens River Gorge facility is exempt).
- For multi-purpose projects, the State and Regional Boards may apply its requirements to the use of the project for irrigation, municipal use, or similar purposes.
- The State may still apply its water right requirements to the extent necessary to protect proprietary rights.
- The State may apply authority assigned or delegated to it under other federal laws, including water quality certification authority under Section 401 of the Clean Water Act, as described above.

5. For **hydroelectric projects**, in addition to the control actions described in No. 1 and 2 above, the Regional Board will recommend, as appropriate, the following as conditions of waste discharge permits and/or as recommended conditions for Section 401 Water Quality Certification:
   - Temporary and permanent erosion and drainage control measures during project construction and operation, including ongoing sediment cleanout from diversion structures, and stabilization of all disturbed areas associated with the project (e.g., transmission lines, access roads).
   - Mitigation of effects from reduced flows on maintenance of water quality and instream beneficial uses (including impacts on riparian habitat).
6. For **cogeneration facilities**, boiler blowdown and other process waters high in Total Dissolved Solids or conditioning chemicals should be appropriately contained (either by a liner system or by natural geologic containment). Ground water monitoring should be conducted around process water disposal areas.

Recommended Future Actions for Energy Production

In cooperation with other appropriate local, state, and federal agencies, and private landowners, the Regional Board should develop a monitoring program to detect water quality trends, identify problem areas, and determine any needed levels of action.

4.8 LAND DEVELOPMENT

The construction and maintenance of urban and commercial developments can impact water quality in many ways. Construction activities inherently disturb soil and vegetation, often resulting in accelerated erosion and sedimentation. Stormwater runoff from developed areas can also contain petroleum products, nutrients, and other contaminants.

This section contains a discussion of the potential water quality impacts expected to result from land development activities, followed by control measures to reduce or offset water quality impacts from such activities.

Construction Activities and Guidelines

Construction activities often produce erosion by disturbing the natural ground surface through scarifying, grading, and filling. Floodplain and wetland disturbances often reduce the ability of the natural environment to retain sediment and assimilate nutrients. Construction materials such as concrete, paints, petroleum products, and other chemicals can contaminate nearby water bodies. Construction impacts such as these are typically associated with subdivisions, commercial developments, and industrial developments.

Control Measures for Construction Activities

The Regional Board regulates the construction of subdivisions, commercial developments, industrial developments, and roadways based upon the level of threat to water quality. The Regional Board will request a Report of Waste Discharge and consider the issuance of an appropriate permit for any proposed project where water quality concerns are identified in the California Environmental Quality Act (CEQA) review process. Any construction activity whose land disturbance activities exceed five acres must also comply with the statewide general NPDES permit for stormwater discharges (see “Stormwater” section of this Chapter).

The following are guidelines for construction projects regulated by the Regional Board, particularly for projects located in portions of the Region where erosion and stormwater threaten sensitive watersheds. The Regional Board recommends that each county within the Region adopt a grading/erosion control ordinance to require implementation of these same guidelines for all soil disturbing activities:

1. Surplus or waste material should not be placed in drainageways or within the 100-year floodplain of any surface water.

2. All loose piles of soil, silt, clay, sand, debris, or other earthen materials should be protected in a reasonable manner to prevent any discharge to waters of the State.

3. Dewatering should be performed in a manner so as to prevent the discharge of earthen material from the site.

4. All disturbed areas should be stabilized by appropriate soil stabilization measures by October 15th of each year.

5. All work performed during the wet season of each year should be conducted in such a manner that the project can be winterized (all soils stabilized to prevent runoff) within 48 hours if necessary. The wet season typically extends from October 15th through May 1st in the higher elevations of the Lahontan Region. The season may be truncated in the desert areas of the Region.

6. Where possible, existing drainage patterns should not be significantly modified.

7. After completion of a construction project, all surplus or waste earthen material should be removed from the site and deposited in an approved disposal location.

8. Drainage swales disturbed by construction activities should be stabilized by appropriate soil stabilization measures to prevent erosion.

9. All non-construction areas should be protected by fencing or other means to prevent unnecessary disturbance.

10. During construction, temporary protected gravel dikes, protected earthen dikes, or sand bag dikes should be used as necessary to prevent discharge of earthen materials from the site during periods of precipitation or runoff.

11. Impervious areas should be constructed with infiltration trenches along the downgradient sides to dispose of all runoff greater than background levels of the undisturbed site. Infiltration trenches are not recommended in

areas where infiltration poses a risk of ground water contamination.

12. Infiltration trenches or similar protection facilities should be constructed on the downgradient side of all structural drip lines.

13. Revegetated areas should be continually maintained in order to assure adequate growth and root development. Physical erosion control facilities should be placed on a routine maintenance and inspection program to provide continued erosion control integrity.

14. Waste drainage waters in excess of that which can be adequately retained on the property should be collected before such waters have a chance to degrade. Collected water shall be treated, if necessary, before discharge from the property.

15. Where construction activities involve the crossing and/or alteration of a stream channel, such activities should be timed to occur during the period in which stream flow is expected to be lowest for the year.

16. Use of materials other than potable water for dust control (i.e., reclaimed wastewater, chemicals such as magnesium chloride, etc.) is strongly encouraged but must have prior Regional Board approval before its use.

Specific Policy and Guidelines for Mammoth Lakes Area

To control erosion and drainage in the Mammoth Lakes watershed at an elevation above 7,000 feet (Figure 4.8-1), the following policy and guidelines apply:

Policy:

A Report of Waste Discharge is required not less than 90 days before the intended start of construction activities of a **new development** of either (a) six or more dwelling units, or (b) commercial developments involving soil disturbance on one-quarter acre or more.

The Report of Waste Discharge shall contain a description of, and time schedule for implementation, for both the **interim erosion control measures** to be applied during project construction, and **short- and long-term erosion control measures** to be employed after the construction phase of the project. The descriptions shall include appropriate engineering drawings, criteria, and design calculations.

Guidelines:

1. Drainage collection, retention, and infiltration facilities shall be constructed and maintained to prevent transport of the runoff from a 20-year, 1-hour design storm from the project site. A 20-year, 1-hour design storm for the Mammoth Lakes area is equal to 1.0 inch (2.5 cm) of rainfall.

2. Surplus or waste materials shall not be placed in drainageways or within the 100-year flood plain of surface waters.

3. All loose piles of soil, silt, clay, sand, debris, or earthen materials shall be protected in a reasonable manner to prevent any discharge to waters of the State.

4. Dewatering shall be done in a manner so as to prevent the discharge of earthen materials from the site.

5. All disturbed areas shall be stabilized by appropriate soil stabilization measures by October 15 of each year.

6. All work performed between October 15th and May 1st of each year shall be conducted in such a manner that the project can be winterized within 48 hours.

7. Where possible, existing drainage patterns shall not be significantly modified.

8. After completion of a construction project, all surplus or waste earthen material shall be removed from the site and deposited at a legal point of disposal.

9. Drainage swales disturbed by construction activities shall be stabilized by the addition of crushed rock or riprap, as necessary, or other appropriate stabilization methods.

10. All nonconstruction areas shall be protected by fencing or other means to prevent unnecessary disturbance.

11. During construction, temporary erosion control facilities (e.g., impermeable dikes, filter fences, hay bales, etc.) shall be used as necessary to prevent discharge of earthen materials from the site during periods of precipitation or runoff.

12. Revegetated areas shall be regularly and continually maintained in order to assure adequate growth and root development. Physical erosion control facilities shall be placed

on a routine maintenance and inspection program to provide continued erosion control integrity.

13. Where construction activities involve the crossing and/or alteration of a stream channel, such activities shall be timed to occur during the period in which streamflow is expected to be lowest for the year.

Land Development/Urban Runoff Control Actions for Susan River Watershed

1. To protect riparian vegetation and wetlands from land disturbance activities, the Regional Board shall recommend that Lassen County and the City of Susanville require new development or any land disturbing activities to include buffer strips of undisturbed land, especially along the Susan River and its tributaries.

2. The Regional Board, with assistance from the City of Susanville and the California Department of Transportation (Caltrans), should conduct monitoring of the Susan River and Piute Creek within the City of Susanville to assess impacts from urban runoff. Control measures should be planned and implemented based on the results of the monitoring. The monitoring plan should be developed to identify nonpoint sources needing control. Monitoring proposals will be submitted by the Regional Board, and work will be conducted as resources allow and as the Susan River gains priority.

3. The Regional Board shall encourage and assist other agencies in watershed restoration efforts along the Susan River.

4. The Regional Board shall encourage the City of Susanville and Lassen County to adopt a comprehensive grading ordinance. These ordinances should require, for all proposed land disturbing activities, the use of Best Management Practices to reduce erosion and stormwater runoff, including but not limited to temporary and permanent erosion control measures.

5. The Regional Board shall encourage the City of Susanville, Lassen County and Caltrans to implement Best Management Practices to reduce erosion and stormwater runoff when constructing and maintaining roads, both paved and unpaved, under their jurisdiction.

Road Construction and Maintenance

Road construction activities often involve extensive earth moving, including clearing, scarifying, excavating for bridge abutments, disturbing or modifying floodplains, cutting, and filling. Additionally, the potential for land disturbance exists from construction materials, equipment maintenance, fuel storage facilities, and general equipment use.

Once constructed, impervious road surfaces create another source of water pollution. Oils, greases, and other petroleum products, along with such toxic materials as battery acid, antifreeze, etc., may be deposited along the road surfaces. These contaminants become suspended or dissolved in any stormwater runoff that is generated on the road surfaces. Unless otherwise treated, these contaminants will flow toward local surface or ground waters. (See “Stormwater” section of this Chapter.)

Road maintenance can be potentially threatening to water quality in a number of ways. Below-grade culverts slowly fill with sediment and are cleaned out periodically, sometimes by flushing accumulated sediment into downstream drainageways. Grading of shoulders and drainageways can detach sediments and increase the risk of erosion into nearby surface waters. Road surfaces may be repainted or resealed with materials that harden quickly, but which can be washed off while still fresh by stormwater runoff.

In the winter, roads are often snowy, icy, or wet. To reduce winter road hazards, maintenance crews may remove the snow or ice, apply sand to provide added traction, and/or apply deicing chemicals to melt the snow and ice. Sand is rapidly dissipated or crushed by the traffic, and must be replaced frequently. Great quantities of sediment enter drainageways and/or surface waters due to this practice. Snow may be removed mechanically via snowplow or snowblower. This practice is not particularly detrimental to water quality in itself, but the snow often carries substances from the roadway when removed. Sediments, chemical deicers, and vehicle fluids may travel much farther than they would otherwise, possibly reaching area surface waters. Ice and small accumulations of snow may be removed with chemical deicers. The deicer in widest use is rock salt (sodium chloride), due to its low cost, high availability, and predictable results.

Winter road maintenance was brought to the forefront in 1989 when significant numbers of roadside trees in the Lake Tahoe Basin suddenly started dying. The public outcry caused many environmental groups and regulatory agencies, including the Regional Board, to look more closely at what had been a more or less unscrutinized, unregulated process in the past. Data began to show that Caltrans was using very high amounts of salt each winter, and the figure seemed to increase from one year to the next. The consensus of the various regulatory agencies was that Caltrans should reduce salt use, explore various alternate deicers, and monitor the impacts of salt applications on soil, water, and vegetation. Salt use decreased significantly from 1989-1992, due to more careful application procedures and to drought conditions.

However, Caltrans' monitoring of vegetation showed minimal and temporary salt accumulation within the vegetation. During the spring, any salt that had accumulated in the vegetation was flushed out from the plant material. The impacts of chemical deicers on fish and wildlife within the Lahontan Region have not been studied.

Control Measures for Road Construction and Maintenance

(Additional control measures for roads are included in the “Stormwater” section of this Chapter.)

The Regional Board regulates road construction and maintenance projects within the Lahontan Region, concentrating efforts on major construction and construction in sensitive areas. Major construction projects and those projects in sensitive areas are most often regulated under individual WDRs, and are routinely inspected. Less significant projects may be issued conditional waivers of WDRs. The Regional Board has also adopted road maintenance waste discharge requirements for some county governments in the Region. Road construction and maintenance in the Lake Tahoe Basin is also regulated under municipal NPDES Stormwater Permits (see Chapter 5).

For all road projects, the Board requires that construction be conducted in a manner which is protective to water quality, and that, at the end of a given project, the site be restabilized and revegetated. These requirements are detailed in a Management Agency Agreement with Caltrans regarding the implementation of BMPs. Additionally, all road projects are to be in compliance with the Caltrans Statewide 208 Plan (CA Dept. of Transportation 1980), which was approved by the State Board in 1979. This Plan contains a commitment to implement BMPs, but does not include great detail on the BMPs themselves. The State Board should encourage Caltrans to update its 208 plan to provide such detail, with particular attention to:

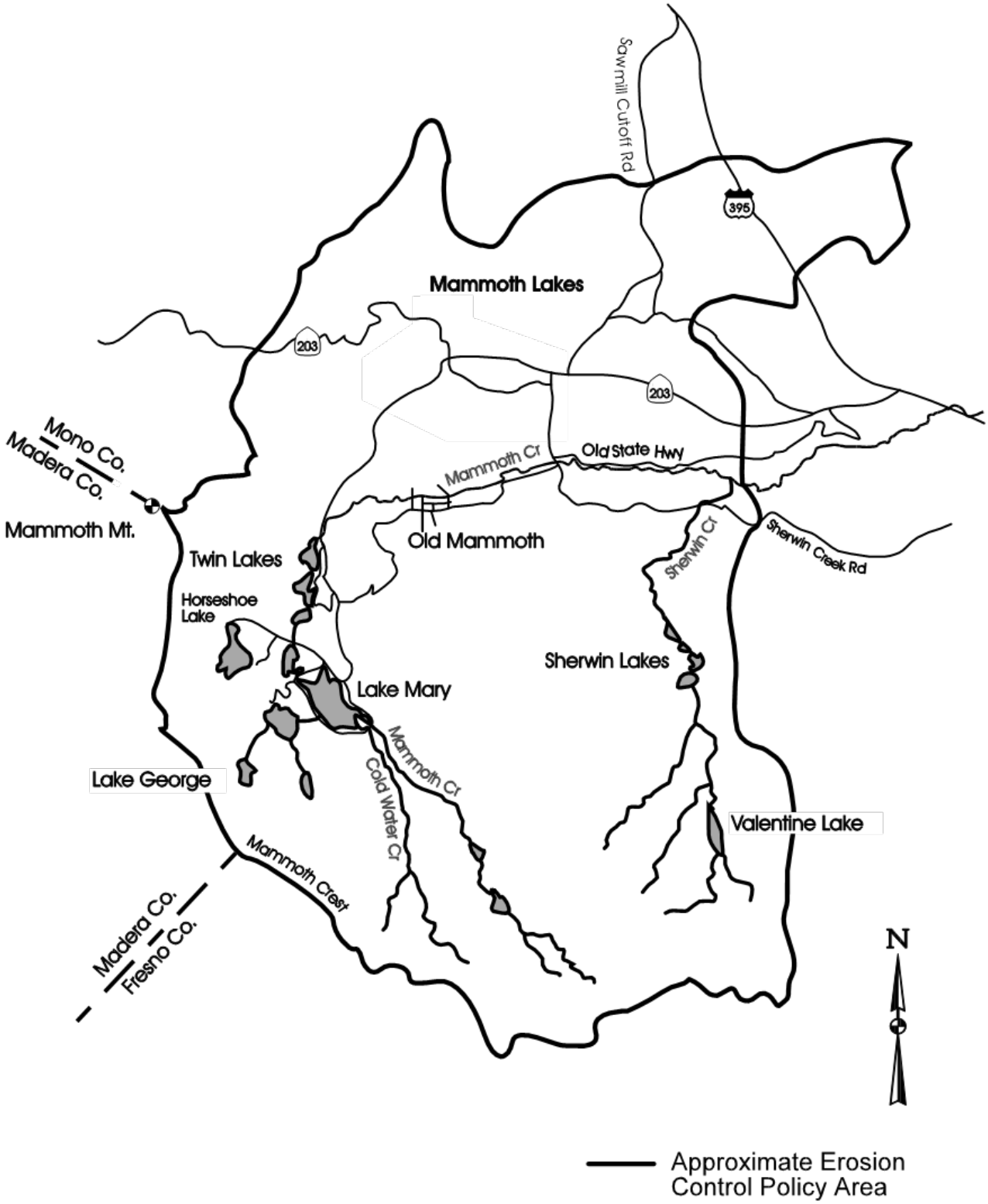
- stormwater/erosion control along existing highways
- erosion control during highway construction and maintenance
- reduction of direct discharges (e.g., through culverts)
- reduction of runoff velocity
- infiltration, detention and retention practices
- management of deicing compounds, fertilizer, and herbicide use
- spill cleanup measures
- treatment of toxic stormwater pollutants

Since much of the implementation of BMPs on highways is done by Caltrans' contractors, the selection of qualified contractors and ongoing education of construction and maintenance personnel on BMP techniques are particularly important.

Existing facilities should be retrofitted to treat stormwater runoff and to restabilize all eroding slopes in a manner consistent with the pollutant load reduction requirements described by the Lake Tahoe TMDL.

The Regional Board should allow salt use to continue as one component of a comprehensive winter maintenance program. However, the Regional Board should continue to require that it be applied in a careful, well-planned manner, by competent, trained crews. Should even the “proper” application of salt be shown to cause adverse water quality impacts, the Regional Board should then require that it no longer be used in environmentally sensitive areas, such as the Lake Tahoe Basin. Similarly, should an alternate deicer be shown to be effective, environmentally safe, and economically feasible, its use should be encouraged in lieu of salt.

Figure 4.8-1
OWENS HYDROLOGIC UNIT



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