

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. R5-2005-0014

NPDES NO. CA0082406

WASTE DISCHARGE REQUIREMENTS
FOR
MODOC JOINT UNIFIED SCHOOL DISTRICT
GEOTHERMAL PROJECT
MODOC COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Board) finds that:

1. The Modoc Joint Unified School District (hereafter Discharger) submitted a Report of Waste Discharge, dated 24 November 2003, and applied for a permit renewal to discharge waste under the National Pollutant Discharge Elimination System (NPDES) from the Modoc Joint Unified School District Geothermal Project. The discharge is presently governed by Waste Discharge Requirements Order No. 99-066, adopted by the Board on 11 June 1999.
2. The Discharger currently uses a geothermal production well AL-1 to heat Modoc High School. Well AL-1 was drilled in 1988 to 2424 ft and was deepened to 2940 ft in November 1991. Well AL-1 has been under production since 1990 for heating the gymnasium, social hall, wood shop, weight room, art room, autoshop, transportation and maintenance departments at Modoc High School. The heat is extracted by means of heat exchangers and a floor slab system, and no chemicals are added to the geothermal water. Use of the geothermal heating system is seasonal since heating is required only during the winter months. Annual usage starts in September and lasts until June.
3. The Discharger discharges spent geothermal water from the geothermal space heating system into a sub grade storm drain which discharges into the North Fork Pit River, approximately 400 feet west of the City of Alturas Main Street Bridge in Section 13, T42N, R12E, MDB&M, as shown on Attachment A, which is incorporated herein and made a part of this Order. The site lies within the Pit River Hydrologic Subarea No. 526.52 as defined on interagency hydrologic maps prepared by the State Department of Water Resources. Average discharge flows in September, October, and November are about 20 gpm, increasing to 50 gpm by December and gradually decreasing back to 20 gpm by June.
4. The Narrative Attached to NPDES Permit Renewal describes the geothermal production Well AL-1 as follows:

Production Well AL-1:

Estimated Average Flow: 30 gpm
Estimated Maximum Flow: 115 gpm
Theoretical Design Flow: 60 gpm

5. Analyses by staff and the monitoring results submitted by the Discharger for 2002-2004 show the following range in concentrations for the constituents in the geothermal water from the AL-1 wellhead:

<u>Constituent</u>	<u>Concentration</u>
pH	7.0-9.1
Electrical Conductivity	1750-3190 umhos/cm
Total Dissolved Solids (TDS)	1276-1,465 mg/L
Boron	10.7-13.4 mg/l
Arsenic	16.6-16.9 ug/L
Copper	2.1-5.6 ug/L
Lead	0.08-0.2 ug/L
Selenium	4.5-4.6 ug/L
Zinc	1.5-7 ug/L
Mercury (total)	1.79-2.19 ng/l

Analyses submitted by the Discharger for the discharge from the subgrade storm drain to the North Fork Pit River for 2002-2004 indicated the pH ranged from 6.2 to 8.4, temperature ranged from 62.1°F to 90.2°F, chloride ranged from 42 to 539 mg/L, and boron ranged from 0.97 mg/L to 1.2 mg/L. Maximum concentrations of pollutants in receiving water as a result of the discharge are most likely to occur in September through November when flow in the North Fork Pit River is low. Discharge rates of geothermal waters are maximum in the winter months between October and May, however Maximum flows in the North Fork Pit River normally occur in late winter and early spring during the period of maximum discharge. Flows decrease throughout the summer and are at a minimum in July and August when there is no discharge of geothermal water.

6. The Discharger owns a second geothermal production well, AL-2, which was to be used for heating of the Modoc Elementary-Middle School Complex. Geothermal water from AL-2 is high in Mercury (814 ng/L) and discharge to surface waters would require treatment to meet effluent limits. For this reason the resource has not been used. The

previous Order No. 99-066 prohibited discharge to surface waters and the prohibition is carried over in this Order. If the Discharger proposes to treat the spent geothermal water from AL-2, this Order may be reopened to include appropriate effluent limits for mercury. Grant funding from the U.S. Department of Energy may become available in the future for drilling an injection well, and if this occurs the Discharger would be able to use AL-2. Discharges to an injection well would not be covered under waste discharge requirements, but would be regulated by the California Department of Conservation, Division of Oil, Gas and Geothermal Resources.

7. The U.S. Environmental Protection Agency (USEPA) and the Board have classified this discharge as a minor discharge.

*WATER QUALITY CONTROL PLAN, NATIONAL TOXICS RULE, AND
CALIFORNIA TOXICS RULE*

8. The Regional Board adopted a *Water Quality Control Plan, Fourth Edition, for the Sacramento and San Joaquin River Basins* (hereafter Basin Plan). The Basin Plan designates beneficial uses, establishes water quality objectives, and describes an implementation program and policies to achieve water quality objectives for all waters of the Basin. This includes plans and policies adopted by the State Water Resources Control Board (SWRCB) and incorporated by reference, such as Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California" (Resolution No. 68-16). These requirements implement the Basin Plan. The Basin Plans, as amended, designate beneficial uses, establish water quality objectives, and contain implementation plans and policies for waters of the Basins. Pursuant to the California Water Code (CWC) Section 13263(a), waste discharge requirements must implement the Basin Plans.
9. U.S. EPA adopted the *National Toxics Rule* (NTR) on 22 December 1992, which was amended on 4 May 1995 and 9 November 1999, and the *California Toxics Rule* (CTR) on 18 May 2000, which was amended on 13 February 2001. These Rules contain water quality standards applicable to this discharge. The SWRCB adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (known as the State Implementation Policy or SIP) on 2 March 2000, which contains policies and procedures for implementation of the NTR and the CTR.
10. Resolution No. 68-16 requires the Regional Board, in regulating discharges of waste, to maintain high quality waters of the State until it is demonstrated that any change in water quality will be consistent with the maximum benefit to the people of the State, will not unreasonably affect beneficial uses, and will not result in water quality less than that described in the Regional Board's policies (e.g., water quality constituents in concentrations that exceed water quality objectives). The Regional Board has considered Resolution No. 68-16 and Federal antidegradation regulations at 40 CFR 131.12 and

compliance with these requirements will result in the use of best practicable treatment or control of the discharge. The impact on existing water quality will be insignificant.

BENEFICIAL USES

11. The Basin Plan identifies the following beneficial uses for the Pit River downstream of the discharge: municipal and domestic supply (MUN); agricultural irrigation and agricultural stock watering (AGR), body contact water recreation (REC-1), other non-body contact water recreation (REC-2), warm freshwater aquatic habitat (WARM), cold freshwater aquatic habitat (COLD), warm and cold spawning habitat (SPWN), and wildlife habitat (WILD).

The Basin Plan on page II-1.00 states: "Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning..." and with respect to disposal of wastewaters states that "...disposal of wastewaters is [not] a prohibited use of waters of the State; it is merely a use which cannot be satisfied to the detriment of beneficial uses."

12. The beneficial uses of groundwater are municipal and domestic supply (MUN), industrial service supply (IND), industrial process supply (PRO) and agricultural supply (AGR).

EFFLUENT LIMITATIONS AND REASONABLE POTENTIAL

13. Federal regulations at 40 CFR 122.44(d)(1) require effluent limitations for all pollutants that are or may be discharged at a level that will cause, have the reasonable potential to cause, or contribute to an in-stream excursion above a numeric water quality criterion (such as CTR criterion) or a narrative water quality criterion within a State water quality standard. These regulations also set forth a methodology for establishing effluent limitations based on narrative state water quality criteria [40 CFR 122.44(d)(1)(vi)(A-C)].
14. On 11 December 2000, the Discharger was issued a letter under the authority of California Water Code Section 13267 requesting effluent and receiving water monitoring to perform a reasonable potential analysis to determine if pollutants are or may be discharged at a level that will cause or have the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numeric water quality standard. The Discharger sampled the effluent from the discharge and receiving water on 8 April 2002 to determine if the priority pollutants established in the CTR and NTR were detected. Analytical results were submitted for volatile substances, semi-volatile substances, pesticides, metals, asbestos, 2,3,7,8-TCDD dioxin, and sixteen other dioxin congeners. Arsenic was detected in the effluent at a concentration of 16.6 ug/L, and in the North Fork Pit River above the discharge at 0.7 ug/L. None of the other priority pollutants were detected at concentrations which would cause or contribute to an in-stream excursion above a narrative or numeric water quality standard.

15. The current Maximum Contaminate Level (MCL) for arsenic is 50 ug/L (drinking water standard for human health). A new state MCL for drinking water of 10 ug/L will take effect in January 2006, in conformance with the federal MCL of 10 ug/L for arsenic. Water quality objectives for protection of aquatic life are 340 ug/L acute and 150 ug/L chronic. No monitoring has been conducted at the point of discharge from the subgrade storm drain and there is limited information available for receiving water concentrations of arsenic. The SIP, in Section 1.3, Step 8, provides that, "If data are unavailable or insufficient...the Regional Board shall establish interim requirements...that require additional monitoring for the pollutant in place of a water quality-based effluent limitation." The Regional Board finds that, at this time, there is insufficient information to determine if an effluent limit for arsenic is required. Therefore, the Discharger is required to conduct additional monitoring and reporting for arsenic, as specified in the attached Monitoring and Reporting Program, to provide sufficient information. If, after sufficient information has been collected, the Regional Board finds that an effluent limit for arsenic is necessary, then this Order may be reopened to include an appropriate effluent limit for arsenic.
16. Boron is not a priority pollutant, however, Boron has been detected in the effluent at a maximum concentration of 13,400 ug/L. The receiving water criterion used for protection of agriculture is 700 ug/L boron and the State Action Level for toxicity is 1,000 ug/L. The maximum background concentration in the North Fork Pit River above the discharge was reported as 120 ug/L. The 700 ug/L limit is based on the mid range of "sensitive" crops which include mainly stone fruit, tree crops, beans and berries. Highly sensitive crops include citrus and blackberry. None of these crops are grown or are likely to be grown in the area of concern. The reach of the Pit River likely to be affected by the discharge extends from Alturas to Canby. Pit River water in this reach is used for irrigation of pasture and forage crops, primarily alfalfa and triticale. Both of these crops are boron tolerant and could maintain yield with irrigation water in the 4,000 – 6,000 ug/L range. The maximum concentration of boron in receiving water would typically occur in September and October when there is low flow in the Pit River and moderate discharge rates of geothermal water. During this period the usage of irrigation water is low. Because of the type of crops grown and the pattern of irrigation usage, the 1,000 ug/L State Action Level has been used as the receiving water objective. Compliance with this objective would require at least a 15:1 dilution of receiving water to effluent.
17. The Basin Plan contains a narrative standard for toxicity, "All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, or aquatic life". Results for chronic bioassay analyses in 100% effluent indicated that there were significant reductions from the control in *Ceriodaphnia dubia* (*C. dubia*) reproduction, *Pimephales promelas* survival and growth, and a significant increase in the growth (cell count) of *Selenastrum capricornutum* growth. The most

sensitive impact was *C dubia* reproduction, for which there was a significant reduction for all dilutions above 6.25% (a 16:1 dilution).

18. This permit contains a required minimum dilution of 20:1 receiving water to effluent to ensure that there is no chronic toxicity and boron concentrations will not exceed the applicable objective in the receiving water. The required 20:1 dilution should result in receiving water concentrations of arsenic in compliance with the 10ug/L MCL. The minimum dilution requirement will require the Discharger to measure flow in the North Fork of the Pit River above the discharge. This Order also requires the Discharger to perform a mixing zone study and receiving water monitoring as specified in Provision 4. Based on the results of these studies this permit may be reopened to include appropriate effluent limits and/or to modify the required minimum dilution.
19. The Basin Plan states that, “The pH shall not be depressed below 6.5 nor raised above 8.5. Changes in normal pH levels shall not exceed 0.5 in fresh waters with designated COLD or WARM beneficial uses.” This Order requires the effluent pH to remain between 6.0 and 9.0 units, which is protective of receiving waters due to available dilution. These limits are consistent with the limits in the previous Order.
20. Federal Regulations for storm water discharges were promulgated by USEPA on 16 November 1990 (40 CFR Parts 122,123, and 124). The regulations require specific categories of facilities, which discharge storm water associated with industrial activity (storm water), to obtain NPDES permits and to implement Best Available Technology Economically Achievable and Best Conventional Pollutant Control Technology to reduce or eliminate industrial storm water pollution. There is no discharge of storm water associated with this discharge.
21. Monitoring is required by this Order for the purposes of assessing compliance with permit limitations and water quality objectives and gathering information to evaluate the need for additional limitations.
22. Section 13267 of the California Water Code states, in part, “(a) A regional board, in establishing...waste discharge requirements... may investigate the quality of any waters of the state within its region” and “(b) (1) In conducting an investigation... the regional board may require that any person who ... discharges ... waste...that could affect the quality of waters within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires. The burden, including costs, of these reports shall bear a reasonable relationship to the need for the report and the benefits to be obtained from the reports. The attached Monitoring and Reporting Program is issued pursuant to California Water Code Section 13267. The monitoring and reporting program required by this Order and the attached Monitoring and Reporting Program are necessary to assure compliance with these waste discharge requirements. The Discharger is responsible for the discharges of waste at the facility subject to this Order.

23. Effluent limitations, and toxic and pretreatment effluent standards established pursuant to Sections 301 (Effluent Limitations), 302 (Water Quality Related Effluent Limitations), 304 (Information and Guidelines), and 307 (Toxic and Pretreatment Effluent Standards) of the Clean Water Act (CWA) and amendments thereto are applicable to the discharge.
24. The action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA) (Public Resources Code Section 21100, et seq.), in accordance with Section 13389 of the California Water Code.
25. The Board has notified the Discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for this discharge and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.
26. The Board, in a public meeting, heard and considered all comments pertaining to the discharge.
27. This Order shall serve as an NPDES permit pursuant to Section 402 of the CWA, and amendments thereto, and shall take effect upon the date of hearing, provided USEPA has no objections.

IT IS HEREBY ORDERED that Order No. 99-066 is rescinded and the Modoc Joint Unified School District, its agents, successors, and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, and the provisions of the Clean Water Act and regulations and guidelines adopted thereunder, shall comply with the following:

A. Discharge Prohibitions:

1. Discharge of wastewater at a location or in a manner different from that described in Findings of this Order is prohibited.
2. The discharge of wastewater from AL-1 to the Pit River when dilution is less than 20:1 is prohibited.
3. The discharge of wastewater from AL-2 to surface waters is prohibited.
4. The by-pass or overflow of geothermal effluent from the collection, transport, or disposal facilities to land areas or surface waters other than those designated for disposal purposes is prohibited.

5. The discharge of hazardous or toxic substances, including petroleum products, is prohibited.

B. Effluent Limitations

1. The maximum 24-hour average discharge rate shall not exceed 115 gpm (0.166 mgd).
2. The discharge shall not have a pH less than 6.0 nor greater than 9.0.
3. Survival of test fish in 96-hour bioassays of undiluted waste shall be no less than:

Minimum for any one bioassay ----- 70%
Median for any three or more consecutive bioassays ----- 90%

C. Discharge Specifications

1. Neither the treatment nor the discharge shall cause a nuisance or pollution as defined by the CWC, Section 13050.
2. The discharge shall not cause degradation of any water supply.

D. Receiving Water Limitations

Receiving water limitations are based upon water quality objectives contained in the Basin Plan. As such, they are a required part of this permit.

The discharge shall not cause the following in the North Fork Pit River:

1. Concentrations of dissolved oxygen to fall below 7.0 mg/l.
2. Concentrations of Boron to exceed 1000 ug/L.
3. Concentrations of Arsenic to exceed 10 ug/L.
4. Oils, greases, waxes, or other materials to form a visible film or coating on the water surface or on the stream bottom.
5. Oils, greases, waxes, floating material (liquids, solids, foams, and scums), or suspended material to create a nuisance or adversely affect beneficial uses.
6. Aesthetically undesirable discoloration.

7. Fungi, slimes, or other objectionable growths.
8. The turbidity of receiving waters to increase over background levels by more than:
 - a. 1 NTU when background turbidity is between 0 and 5 NTUs;
 - b. 20 percent when background turbidity is between 5 and 50 NTUs;
 - c. 10 NTUs when background turbidity is between 50 and 100 NTUs; and
 - d. 10 percent when background turbidity is greater than 100 NTUs.

In determining compliance with the above limits, appropriate averaging periods may be applied upon approval by the Executive Officer.

9. The normal ambient pH to fall below 6.5, exceed 8.5, or change by more than 0.5 units.
10. Deposition of material that causes nuisance or adversely affects beneficial uses.
11. The normal ambient temperature to be altered by more than 5°F.
12. Radionuclides to be present in concentrations that exceed maximum contaminant levels specified in the California Code of Regulations (CCR), Title 22; that harm human, plant, animal, or aquatic life; or that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life.
13. Aquatic communities and populations, including vertebrate, invertebrate, and plant species, to be degraded.
14. Taste or odor-producing substances to impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin, or to cause nuisance or adversely affect beneficial uses.
15. Toxic pollutants to be present in the water column, sediments, or biota in concentrations that adversely affect beneficial uses; that produce detrimental response in human, plant, animal, or aquatic life; or that bioaccumulate in aquatic resources at levels which are harmful to human health.
16. Violations of any applicable water quality standard for receiving waters adopted by the Board or the SWRCB pursuant to the CWA and regulations adopted thereunder.

E. Provisions

1. The Discharger shall comply with all the items of the "Standard Provisions and Reporting Requirements for Waste Discharge Requirements (NPDES)," dated February 2004, which are part of this Order. This attachment and its individual paragraphs are referred to as "Standard Provision(s)."
2. The Discharger shall comply with the attached Monitoring and Reporting Program No. R5-2005-0014, which is part of this Order, and any revisions thereto, as ordered by the Executive Officer.

When requested by USEPA, the Discharger shall complete and submit Discharge Monitoring Reports. The submittal date shall be no later than the submittal date specified in the Monitoring and Reporting Program for Discharger Self-Monitoring Reports.

3. The Discharger shall submit by **1 July 2005** a report prepared by a civil engineer registered in the State of California which presents a survey of the stream channel cross sectional area at a range of elevations at the Estes Street bridge upstream of the discharge and proposal for measuring stream velocity and flow. Upstream flows shall be reported as soon as practicable but no later than **1 September 2005**.
4. The Discharger shall submit by **1 July 2005** a report prepared by a civil engineer registered in the State of California for conducting a mixing zone/dilution study conducted in accordance with the Section 1.4.2 of the SIP. The study shall be conducted during the 2005-2006 discharge period and results submitted not later than **1 July 2006**. Based on the results of these studies this Order may be reopened and appropriate effluent limits included and/or dilution credits may be modified.
5. The Discharger shall conduct the chronic toxicity testing specified in Monitoring and Reporting Program No. R5-2005-0014. If the testing indicates that the discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the water quality objective for toxicity, the Discharger shall submit a work plan to conduct a toxicity reduction evaluation (TRE), and upon approval conduct the TRE. This Order will be reopened to include a chronic toxicity limitation and/or a limitation for the specific toxicant identified in the TRE. Additionally, if a chronic toxicity water quality objective is adopted by the SWRCB, this Order may be reopened and a limitation based on that objective included.
6. This Order expires on **1 January 2010**, and the Discharger must file a Report of Waste Discharge in accordance with Title 23, CCR, not later than **180 days** in

advance of such date in application for renewal of waste discharge requirements if it wishes to continue the discharge.

7. Prior to making any change in the discharge point, place of use, or purpose of use of the wastewater, the Discharger shall obtain approval of, or clearance from, the SWRCB, Division of Water Rights.
8. In the event of any change in control or ownership of land or waste discharge facilities described herein, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to this office.

To assume operation under this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of the Order. The request must contain the requesting entity's full legal name; the state of incorporation, if a corporation; the name, address, and telephone number of the persons responsible for contact with the Board; and a statement. The statement shall comply with the signatory paragraph of Standard Provision D.6, and state that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request shall be considered a discharge without requirements, a violation of the California Water Code. Transfer shall be approved or disapproved in writing by the Executive Officer.

I, THOMAS R. PINKOS, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Regional Board, Central Valley Region, on 27 January 2005.

THOMAS R. PINKOS, Executive Officer

JFR:

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2005-0014

NPDES NO. CA0082406

FOR
MODOC JOINT UNIFIED SCHOOL DISTRICT
GEOTHERMAL PROJECT
MODOC COUNTY

This Monitoring and Reporting Program (MRP) is issued pursuant to California Water Code Sections 13267 and 13383 and describes requirements for monitoring effluent and receiving water. The Discharger shall not implement any changes to this MRP unless and until the Regional Board or Executive Officer approves such changes. Regional Board staff shall approve specific sample station locations prior to implementation of sampling activities.

All samples shall be representative of the volume and nature of the discharge or material sampled. The time, date, and location of each sample shall be recorded on a chain of custody form for the sample.

All water quality sampling and analyses shall be performed in accordance with the Monitoring and Reporting Requirements as outlined in the Standard Provisions of this Order. Water quality sample collection, storage, and analyses shall be performed according to 40 CFR Part 136, or other methods approved and specified by the Executive Officer. Water and waste analyses shall be performed by a laboratory approved for these analyses by the State Department of Health Services (DHS), except when a certified laboratory is not reasonably available to the Discharger, in which case a non-certified laboratory operating in compliance with an approved Quality Assurance-Quality Control program may be used.

EFFLUENT MONITORING

Effluent samples shall be collected of the discharge from AL-1 prior to dilution from any other sources. Effluent samples should be representative of the volume and nature of the discharge. Time of collection of a grab sample shall be recorded. The following shall constitute the effluent monitoring program:

<u>Constituent</u>	<u>Unit</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>
24-Hour Total Flow	gpd	Cumulative	Monday through Friday
pH	pH units	Grab	Monthly
Specific Conductance	µmhos/cm	Grab	Monthly

<u>Constituent</u>	<u>Unit</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>
Total Dissolved Solids	mg/l	Grab	Monthly
Boron	mg/l	Grab	Quarterly ¹
Arsenic	µg/l	Grab	Quarterly ¹
Acute Toxicity ²	% Survival	Grab	Semi-annually
Priority Pollutant Metals	µg/L	Grab	Once during life of Permit

¹ To be performed in October (fourth quarter) and January (first quarter) each year.

² 96-hour static bioassay using rainbow trout. Test to be performed once at the commencement of pumping in the fall and once during the period of maximum use in the winter.

RECEIVING WATER MONITORING

Receiving water monitoring shall be conducted monthly with the exception of flow which shall be monitored daily. All receiving water samples shall be grab samples. Receiving water samples shall be taken from the following:

<u>Station</u>	<u>Description</u>
R-1	50 feet upstream from the point of discharge to the Pit River
R-2	Stormwater drain pipe containing geothermal discharge
R-3	County Road 54 bridge on the North Fork of the Pit River

The following shall constitute the receiving water monitoring program:

<u>Constituent</u>	<u>Unit</u>	<u>Station</u>	<u>Sampling Frequency</u>
Flow	cfs	R-1	Daily
pH	pH units	R-1, R-2, R-3	Monthly
Temperature	°F	R-1, R-2, R-3	Monthly
Specific Conductivity	µmhos/cm	R-1, R-2, R-3	Monthly
Total Dissolved Solids	mg/l	R-1, R-2 R-3	Monthly
Boron	µg/l	R-1, R-2 R-3	Monthly/Quarterly ¹
Arsenic	µg/l	R-1, R-2 R-3	Monthly/Quarterly ¹
Priority Pollutant Metals	µg/L	R-1	Once during life of Permit

¹ Monthly during the first year, quarterly thereafter.

In conducting the receiving water sampling, a log shall be kept of the receiving water conditions throughout the reach bounded by Stations R-1 and R-3. Attention shall be given to the presence or absence of:

- a. Floating or suspended matter
- b. Discoloration
- c. Bottom deposits
- d. Aquatic life

Notes on receiving water conditions shall be summarized in the monitoring report.

THREE SPECIES CHRONIC TOXICITY MONITORING

Chronic toxicity monitoring shall be conducted to determine whether the effluent is contributing toxicity to the North Fork Pit River at a dilution of 1:20 (effluent to receiving water). The testing shall be conducted as specified in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms*, EPA 600-4-91-002, or latest edition. Chronic toxicity samples shall be collected at the discharge of the heat exchanger prior to its entering the storm drain. Twenty-four-hour composite or flow proportional samples shall be representative of the volume and quality of the discharge. Time of collection samples shall be recorded. As the North Fork Pit River has been shown to cause chronic toxicity for *Ceriodaphnia dubia* reproduction, it is acceptable to use laboratory water as the diluent. Chronic toxicity monitoring shall include the following:

Species: *Pimephales promelas*, *Ceriodaphnia dubia*, and *Selenastrum capricornutum*

Frequency: Once during the life of the permit

PRIORITY POLLUTANT METALS MONITORING

The State Water Resources Control Board (SWRCB) adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (known as the State Implementation Policy or SIP). The SIP states that the Regional Boards will require periodic monitoring (at least once prior to issuance and reissuance of a permit) for pollutants for which criteria or objectives apply and for which no effluent limitations have been established.

The Regional Board has determined that, based on priority pollutant data received to date, discharge of priority pollutants other than metals is highly unlikely. Accordingly, the Regional Board is requiring, as part of this Monitoring and Reporting Program, that the Discharger conduct effluent and receiving water monitoring (at a receiving water station upstream of the point of discharge) and analysis of priority pollutant metals **one time at least 180 days but no more than 365 days prior to expiration of this Order.**

The Discharger must analyze pH and hardness of the effluent and receiving water at the same time as priority pollutant metals. The priority pollutant metals for which this one-time analysis is required are as follows:

- Antimony
- Arsenic
- Beryllium
- Cadmium
- Chromium (III)
- Chromium (IV)
- Copper
- Lead
- Mercury
- Nickel
- Selenium
- Silver
- Thallium
- Zinc

Metals shall be analyzed by the USEPA methods listed below. Alternative analytical procedures may be used with approval by the Regional Board if the alternative method has the same or better detection level than the method listed.

Method Description	EPA Method	Constituents
Inductively Coupled Plasma/Mass Spectrometry (ICP/MS)	1638	Antimony, Beryllium, Cadmium, Copper, Lead, Nickel, Selenium, Silver, Thallium, Total Chromium, Zinc
Cold Vapor Atomic Absorption (CVAA)	1631	Mercury
Gaseous Hydride Atomic Absorption (HYDRIDE)	206.3	Arsenic
Flame Atomic Absorption (FAA)	218.4	Chromium VI

All priority pollutant metal analyses shall be performed at a laboratory certified by the DHS. The laboratory is required to submit the Minimum Level (ML) and the Method Detection Limit (MDL) with the reported results for each constituent. The MDL should be as close as practicable to the U.S. EPA MDL determined by the procedure found in 40 CFR Part 136. The results of analytical determinations for the presence of chemical constituents in a sample shall use the following reporting protocols:

- a. Sample results greater than or equal to the reported ML shall be reported as measured by the laboratory.
- b. Sample results less than the reported ML, but greater than or equal to the laboratory's MDL, shall be reported as "Detected but Not Quantified," or DNQ. The estimated chemical concentration of the sample shall also be reported.

- c. For the purposes of data collection, the laboratory shall write the estimated chemical concentration next to DNQ as well as the words "Estimated Concentration." Numerical estimates of data quality may be by percent accuracy (+ or – a percentage of the reported value), numerical ranges (low to high), or any other means considered appropriate by the laboratory.
- d. Sample results that are less than the laboratory's MDL shall be reported as "Not Detected" or ND.

REPORTING

The Discharger shall submit monthly monitoring reports to the Regional Board by the **first day of the second month** following sample collection (i.e., the January report is due by 1 March). All reports submitted in response to this Order shall comply with signatory requirements of Standard Provision D.6. Effective in January 2004, any NPDES effluent monitoring report received more than 30 days after its due date is subject to a \$3000 Mandatory Minimum Penalty [Water Code Section 13385]. An additional \$3000 penalty is required for each 30 days a report is late. If you have no discharge, you must still submit a report indicating that no discharge occurred, or you will be subject to the \$3000 Penalties.

In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner to illustrate clearly the compliance with waste discharge requirements.

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

The Discharger shall implement the above monitoring program on the first day of the month following effective date of this Order.

Ordered by: _____
THOMAS R. PINKOS, Executive Officer

27 January 2005
(Date)

JFR:

INFORMATION SHEET

ORDER NO. R5-2005-0014
MODOC JOINT UNIFIED SCHOOL DISTRICT
GEOTHERMAL PROJECT
MODOC COUNTY

GENERAL INFORMATION

Modoc Joint Unified School District submitted a Report of Waste Discharge, dated 24 November 2003, and applied for a permit renewal to discharge waste under the National Pollutant Discharge Elimination System (NPDES) from the Modoc Joint Unified School District Geothermal Project.

The Discharger currently uses a geothermal production well AL-1 to heat Modoc High School. Well AL-1 was drilled in 1988 to 2424 ft and was deepened to 2940 ft in November 1991. Well AL-1 is located immediately east of the school's garage and maintenance building. To date AL-1 is the deepest well drilled in the Alturas Basin. AL-1 produces about 50 gpm of water at 83° C. Static wellhead pressure is 40 psi. A review of the 1998-99 monitoring data for AL-1 indicates that the maximum 24-hour average flow was approximately 114 gpm. Funding for the project was provided by the California Energy Commission. Well AL-1 has been under production since 1990 for heating the gymnasium, social hall, wood shop, weight room, art room, auto shop, transportation and maintenance departments at Modoc High School. The heat is extracted by means of heat exchangers and a floor slab system, and no chemicals are added to the geothermal water. Use of the geothermal heating system is seasonal since heating is required only during the winter months. Annual usage starts in September and lasts until June.

The Discharger discharges spent geothermal water from the geothermal space heating system into a sub grade storm drain which flows south for approximately 2,000 feet and discharges and discharges into the North Fork Pit River, approximately 400 feet west of the City of Alturas Main Street Bridge in Section 13, T42N, R12E, MDB&M, as shown on Attachment A, which is incorporated herein and made a part of this Order. The site lies within the Pit River Hydrologic Subarea No. 526.52 as defined on interagency hydrologic maps prepared by the State Department of Water Resources. Average discharge flows in September, October, and November are about 20 gpm, increasing to 50 gpm by December and gradually decreasing back to 20 gpm by June.

The Narrative Attached to NPDES Permit Renewal describes the geothermal production Well AL-1 as follows:

Production Well AL-1:

Estimated Average Flow:	30 gpm
Estimated Maximum Flow:	115 gpm
Theoretical Design Flow:	60 gpm

Analyses by staff and the monitoring results submitted by the Discharger for 2002-2004 show the following range in concentrations for the constituents in the geothermal water from the AL-1 wellhead:

<u>Constituent</u>	<u>Concentration</u>
pH	7.0-9.1
Electrical Conductivity	1750-3190 umhos/cm
Total Dissolved Solids (TDS)	1276-1,465 mg/L
Boron	10.7-13.4 mg/l
Arsenic	16.6-16.9 ug/L
Copper	2.1-5.6 ug/L
Lead	0.08-0.2 ug/L
Selenium	4.5-4.6 ug/L
Zinc	1.5-7 ug/L
Mercury (total)	1.79-2.19 ng/l

Analyses submitted by the Discharger for the discharge from the sub grade storm drain to the North Fork Pit River for 2002-2004 indicated the pH ranged from 6.2 to 8.4, temperature ranged from 62.1°F to 90.2°F, chloride ranged from 42 to 539 mg/L, and boron ranged from 0.97 mg/L to 1.2 mg/L. Maximum concentrations of pollutants in receiving water as a result of the discharge are most likely to occur in September through November when flow in the North Fork Pit River is low. Discharge rates of geothermal waters are maximum in the winter months between October and May, however Maximum flows in the North Fork Pit River normally occur in late winter and early spring during the period of maximum discharge. Flows decrease throughout the summer and are at a minimum in July and August when there is no discharge of geothermal water.

The Discharger owns a second geothermal production well, AL-2, which was to be used for heating of the Modoc Elementary-Middle School Complex. Static wellhead pressure is 110 to 120 psi. Geothermal water from AL-2 is high in Mercury (814 ng/L) and discharge to surface waters would require treatment to meet effluent limits. For this reason the resource has not been used. The previous Order No. 99-066 prohibited discharge to surface waters and the prohibition is carried over in this Order. If the Discharger proposes to treat the spent geothermal water from AL-2, this Order may be reopened to include appropriate effluent limits for mercury. Grant funding from the U.S. Department of Energy may become available in the future for drilling an injection well, and if this occurs the Discharger would be able to use AL-2. Discharges to an injection well would not be covered under waste discharge requirements, but would be regulated by the California Department of Conservation, Division of Oil, Gas and Geothermal Resources.

BENEFICIAL USES

The Basin Plan identifies the following beneficial uses for the Pit River downstream of the discharge: municipal and domestic supply (MUN); agricultural irrigation and agricultural stock watering (AGR), body contact water recreation (REC-1), other non-body contact water recreation (REC-2), warm freshwater aquatic habitat (WARM), cold freshwater aquatic habitat (COLD), warm and cold spawning habitat (SPWN), and wildlife habitat (WILD). The Basin Plan on page II-1.00 states: "Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning..." and with respect to disposal of wastewaters states that "...disposal of wastewaters is [not] a prohibited use of waters of the State; it is merely a use which cannot be satisfied to the detriment of beneficial uses."

The beneficial uses of groundwater are municipal and domestic supply (MUN), industrial service supply (IND), industrial process supply (PRO) and agricultural supply (AGR).

WATER QUALITY CONTROL PLAN, NATIONAL TOXICS RULE, AND CALIFORNIA TOXICS RULE

The Regional Board adopted a *Water Quality Control Plan, Fourth Edition, for the Sacramento and San Joaquin River Basins* (hereafter Basin Plan). The Basin Plan designates beneficial uses, establishes water quality objectives, and describes an implementation program and policies to achieve water quality objectives for all waters of the Basin. This includes plans and policies adopted by the State Water Resources Control Board (SWRCB) and incorporated by reference, such as Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California" (Resolution No. 68-16). These requirements implement the Basin Plan. The Basin Plans, as amended, designate beneficial uses, establish water quality objectives, and contain implementation plans and policies for waters of the Basins. Pursuant to the California Water Code (CWC) Section 13263(a), waste discharge requirements must implement the Basin Plans.

The discharge as permitted herein is consistent with the provisions of State Water Resources Control Board Resolution No. 68-16. Geothermal water is pumped directly from the well to the heat exchanger and then to the sub grade storm drain, which discharges to the North Fork Pit River. In consideration of the conditions at the facility there are no additional requirements for a groundwater monitoring program.

U.S. EPA adopted the *National Toxics Rule* (NTR) on 22 December 1992, which was amended on 4 May 1995 and 9 November 1999, and the *California Toxics Rule* (CTR) on 18 May 2000, which was amended on 13 February 2001. These Rules contain water quality standards applicable to this discharge. The SWRCB adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (known as the State Implementation Policy or SIP) on 2 March 2000, which contains policies and procedures for implementation of the NTR and the CTR.

EFFLUENT LIMITATIONS AND REASONABLE POTENTIAL

Federal regulations at 40 CFR 122.44(d)(1) require effluent limitations for all pollutants that are or may be discharged at a level that will cause, have the reasonable potential to cause, or contribute to an in-stream excursion above a numeric water quality criterion (such as CTR criterion) or a narrative water quality criterion within a State water quality standard. These regulations also set forth a methodology for establishing effluent limitations based on narrative state water quality criteria [40 CFR 122.44(d)(1)(vi)(A-C)].

On 11 December 2000, the Discharger was issued a letter under the authority of California Water Code Section 13267 requesting effluent and receiving water monitoring to perform a reasonable potential analysis to determine if pollutants are or may be discharged at a level that will cause or have the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numeric water quality standard. The Discharger sampled the effluent from the discharge and receiving water on 8 April 2002 to determine if the priority pollutants established in the CTR and NTR were detected. Analytical results were submitted for volatile substances, semi-volatile substances, pesticides, metals, asbestos, 2,3,7,8-TCDD dioxin, and sixteen other dioxin congeners. Arsenic was detected in the effluent at a concentration of 16.6 ug/L, and in the North Fork Pit River above the discharge at 0.7 ug/L. None of the other priority pollutants were detected at concentrations which would cause or contribute to an in-stream excursion above a narrative or numeric water quality standard.

The current Maximum Contaminate Level (MCL) for arsenic is 50 ug/L (drinking water standard for human health). A new state MCL for drinking water of 10 ug/L will take effect in January 2006, in conformance with the federal MCL of 10 ug/L for arsenic. Water quality objectives for protection of aquatic life are 340 ug/L acute and 150 ug/L chronic. No monitoring has been conducted at the point of discharge from the sub grade storm drain and there is limited information available for receiving water concentrations of arsenic. The SIP, in Section 1.3, Step 8, provides that, "If data are unavailable or insufficient...the Regional Board shall establish interim requirements...that require additional monitoring for the pollutant in place of a water quality-based effluent limitation." The Regional Board finds that, at this time, there is insufficient information to determine if an effluent limit for arsenic is required. Therefore, the Discharger is required to conduct additional monitoring and reporting for arsenic, as specified in the attached Monitoring and Reporting Program, to provide sufficient information. If, after sufficient information has been collected, the Regional Board finds that an effluent limit for arsenic is necessary, then this Order may be reopened to include an appropriate effluent limit for arsenic.

Boron is not a priority pollutant, however, Boron has been detected in the effluent at a maximum concentration of 13,400 ug/L. The receiving water criterion used for protection of agriculture is 700 ug/L boron and the State Action Level for toxicity is 1,000 ug/L. The maximum background concentration in the North Fork Pit River above the discharge was reported as 120 ug/L. The 700 ug/L limit is based on the mid range of "sensitive" crops which include mainly stone fruit, tree crops, beans and berries. Highly sensitive crops include citrus and blackberry. None of these crops are grown or are likely to be grown in the area of concern. The reach of the Pit River likely to be

affected by the discharge extends from Alturas to Canby. Pit River water in this reach is used for irrigation of pasture and forage crops, primarily alfalfa and triticale. Both of these crops are boron tolerant and could maintain yield with irrigation water in the 4,000 – 6,000 ug/L range. The maximum concentration of boron in receiving water would typically occur in September and October when there is low flow in the Pit River and moderate discharge rates of geothermal water. During this period the usage of irrigation water is low. Because of the type of crops grown and the pattern of irrigation usage, the 1,000 ug/L State Action Level has been used as the receiving water objective. Compliance with this objective would require at least a 15:1 dilution of receiving water to effluent.

The Basin Plan contains narrative standards for toxicity. The Basin Plan states that, “All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal or aquatic life. . . . In addition effluent limits based upon acute biotoxicity tests of effluents will be prescribed where appropriate.” This order requires the Discharger to conduct annual testing for acute toxicity by a 96-hour static bioassay using Fathead Minnow. The minimum survival of test fishes in a 96-hour static bioassay of pure effluent for a single test is 70 %. The median survival for any three or more consecutive tests is 90 %. These limits are consistent with, or exceed the limits in the previous Order. Results for chronic bioassay analyses in 100% effluent indicated that there were significant reductions from the control in *Ceriodaphnia dubia* (*C. dubia*) reproduction, *Pimephales promelas* survival and growth, and a significant increase in the growth (cell count) of *Selenastrum capricornutum* growth. The most sensitive impact was *C dubia* reproduction, for which there was a significant reduction for all dilutions above 6.25% (a 16:1 dilution).

This permit contains a required minimum dilution of 20:1 receiving water to effluent to ensure that there is no chronic toxicity and boron concentrations will not exceed the applicable objective in the receiving water. The required 20:1 dilution should result in receiving water concentrations of arsenic in compliance with the 10ug/L MCL. The minimum dilution requirement will require the Discharger to measure flow in the North Fork of the Pit River above the discharge. This Order also requires the Discharger to perform a mixing zone study and receiving water monitoring as specified in Provision 4. Based on the results of these studies this permit may be reopened to include appropriate effluent limits and/or to modify the minimum dilution.

The Basin Plan states that, “The pH shall not be depressed below 6.5 nor raised above 8.5. Changes in normal pH levels shall not exceed 0.5 in fresh waters with designated COLD or WARM beneficial uses.” This Order requires the effluent pH to remain between 6.0 and 9.0 units, which is protective of receiving waters due to available dilution. These limits are consistent with the limits in the previous Order.

The Discharger injects small quantities of lubricating oil, (Chevron ISO 68 Turbine Oil), into the bearings of the submerged pump in geothermal well AL-1. Oil usage is approximately 55 gallons per 3 to 4 month period. There are no detectable total petroleum hydrocarbons by EPA 1664A in the effluent, however, the Discharger has been requested to explore the possibility of substituting Chevron Clarity® Hydraulic Oil which is ashless, zinc free and passes the acute toxicity (LC-50)

criteria adopted by the U.S. Fish and Wildlife Service, or one of the Chevron Lubricating Oil FM series, which are approved by the USDA for use where incidental contact with food might occur.

STORMWATER

Federal Regulations for storm water discharges were promulgated by USEPA on 16 November 1990 (40 CFR Parts 122,123, and 124). The regulations require specific categories of facilities, which discharge storm water associated with industrial activity (storm water), to obtain NPDES permits and to implement Best Available Technology Economically Achievable and Best Conventional Pollutant Control Technology to reduce or eliminate industrial storm water pollution. There is no discharge of storm water associated with this discharge.

RECEIVING WATER LIMITATIONS

The receiving water limitations contained in the draft Order are based on water quality objectives contained in the Basin Plan.

MONITORING AND REPORTING PROGRAM

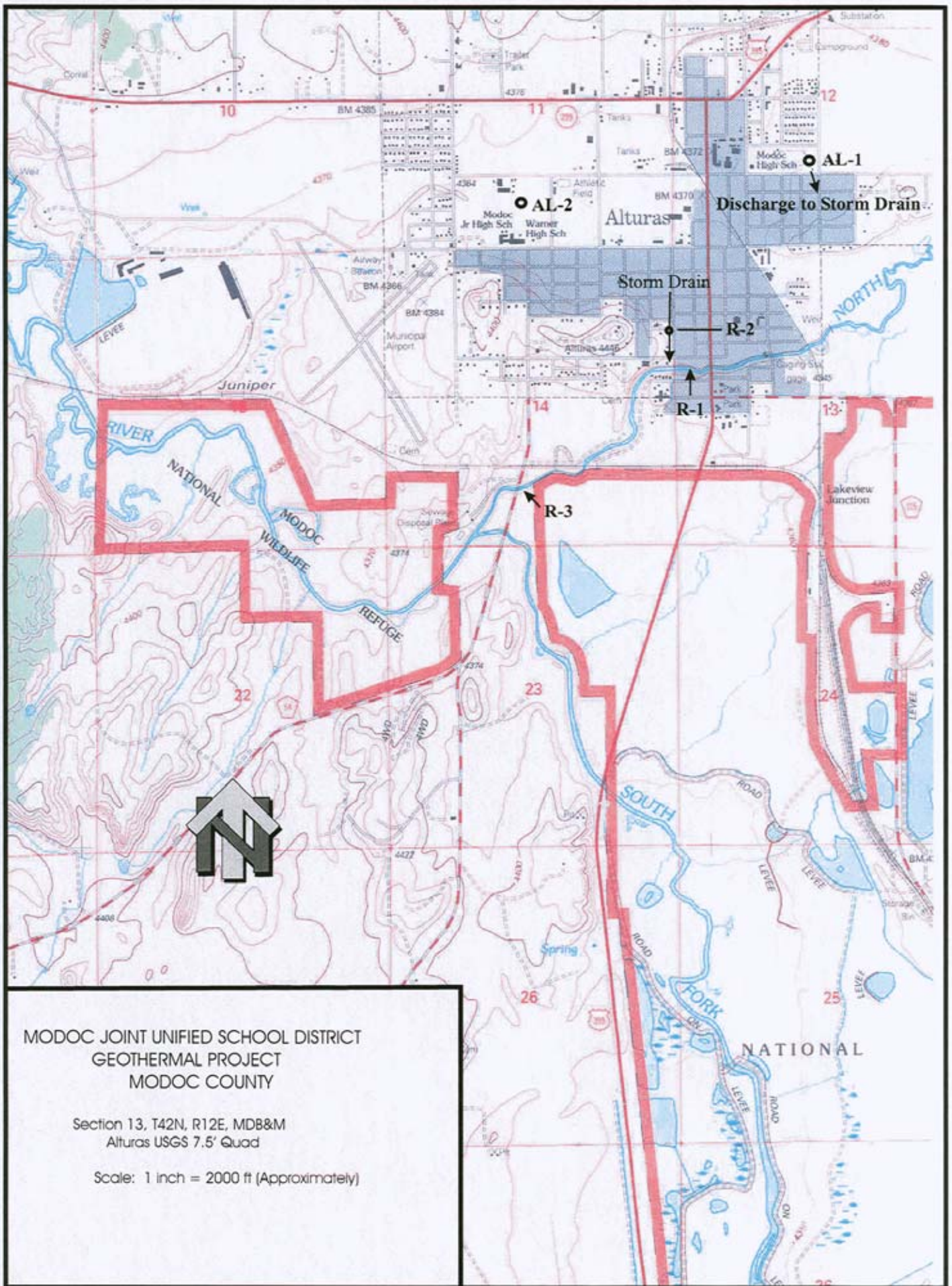
Section 308 of the CWA and U.S. EPA regulation 40 CFR 122.44 (i) require monitoring in permits to determine compliance with effluent limitations. Monitoring may also be required to gather data for future effluent limitations or to monitor effluent impacts on receiving water quality. Receiving water monitoring requirements are based on the Basin Plan and authorized by California Water Code Section 13383. The self-monitoring program requires monitoring of receiving water and effluent.

The Monitoring and Reporting Program includes monitoring of the effluent and receiving water for flow, pH, temperature, specific conductivity, total dissolved solids, boron and arsenic, and it includes visual monitoring of conditions upstream and downstream of the point of discharge. Acute toxicity monitoring of the effluent is required to assure compliance with the effluent limitation for toxicity in the Order. One time in the five year life cycle of the permit chronic toxicity monitoring is required to determine if the effluent is contributing toxicity to the receiving water. One time in the five year life cycle of the permit, receiving water must also be monitored, concurrently with effluent, for the CTR priority pollutant metals.

PROCEDURES ON REACHING FINAL DECISION ON DRAFT PERMIT

The tentative waste discharge requirements have been sent to the Discharger and interested parties for review (at least 30 days) prior to formal presentation to the Regional Board. Any contested items on the permit will be heard and considered for change prior to formal adoption at the Board Meeting.

27 January 2005



MODOC JOINT UNIFIED SCHOOL DISTRICT
GEOTHERMAL PROJECT
MODOC COUNTY

Section 13, T42N, R12E, MDB&M
Alturas USGS 7.5' Quad

Scale: 1 inch = 2000 ft (Approximately)