

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

SAN FRANCISCO BAY REGION

ORDER NO. 88-065  
NPDES NO. CA0029289

WASTE DISCHARGE REQUIREMENTS FOR:

U. S. DEPARTMENT OF ENERGY  
and  
LAWRENCE LIVERMORE NATIONAL LABORATORY  
LIVERMORE  
ALAMEDA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region, hereinafter called the Board, finds that:

1. Lawrence Livermore National Laboratories (LLNL) operates a research facility under contractual agreements with the U. S. Department of Energy (DOE). Lawrence Livermore National Laboratory and the U. S. Department of Energy are hereinafter both referred to as dischargers. For the purposes of this Order, DOE will be responsible for compliance in the event that LLNL fails to comply with the requirements of this Order.
2. By application dated August 3, 1987, the dischargers have applied for issuance of waste discharge requirements and a permit to discharge waste ground water under the National Pollutant Discharge Elimination System (NPDES).
3. Hazardous materials have been used, stored, and disposed of on the property since it was first used by the federal government, in the 1940's as a Naval Air Station, and later as a research facility for the U. S. Department of Energy and its predecessor, the U. S. Atomic Energy Commission.
4. Hydrogeologic investigations conducted between 1983 and 1987 show that soil and ground water beneath the site are polluted with solvents and chemicals that have either current or historical useage onsite. These pollutants include trichloroethylene (TCE), 1,1,1-trichloroethane (TCA), tetrachloroethylene (PCE), 1,1-dichloroethylene (1,1-DCE), 1,1-dichloroethane (1,1-DCA), carbon tetrachloride, and other halogenated organic and petroleum hydrocarbons.

5. Suspected sources of releases of hazardous waste are from onsite landfills (a common means of disposing of waste during Navy site use), spillage from outdoor storage facilities that existed throughout the site, leakage from underground storage tanks and pipelines, and past discharges to the site storm drain system. Hazardous waste release resulting from current research or maintenance activities is not presently ongoing.
6. More than 180 monitoring wells have been installed by the dischargers, and are located both onsite and in the southwest offsite area. Ground water monitoring data indicate that ground water is polluted in several locations beneath the site, and that a plume of polluted ground water extends offsite from the southwest, flowing in a northwesterly direction.
7. The vertical and horizontal extent of plumes beneath the site has not been fully defined. The offsite plume extends about 4000 feet northwest from the MW-116 area, and is about 2000 feet wide and 50 to 120 feet thick. Additional studies are being conducted to further define the extent and migration characteristics of the offsite plume.
8. This permit covers several investigative and remedial activities that will generate polluted ground water as waste. These activities are proposed to be conducted in both onsite and offsite areas, and include:

Short term discharges:

- a. Routine sampling - 3 to 5 well bore volumes removed from monitor wells prior to obtaining regular ground water samples for water quality analysis
- b. Well development - preparation of new monitor wells
- c. Hydraulic testing - 1 hour to 2 day pump tests

Long term discharges:

- d. Pilot study pump test - long term pump test to develop remedial design criteria
  - e. Remedial treatment - subject to approval by EPA, but may consist of ground water extraction and treatment prior to discharge at effluent limitations set by this Order
9. Waste generated from routine sampling, well development and hydraulic testing will reach maximum flows ranging from approximately 800 to approximately 40,000 gallons per day (gpd). These three activities will most likely occur on an intermittent basis, but if all three of these activities are conducted simultaneously, maximum flows may reach approximately 51,000 gallons per day.

10. Waste generated from the pilot study test discharge will be about 180,000 gallons per day initially for Treatment System B in Fall of 1988, and reach a maximum flow of about 360,000 gallons per day when all three pilot systems are operating simultaneously between about January and May 1, 1990. Of the 360,000 gallons, 144,000 gallons discharged from Treatment System A will be managed under separate Waste Discharge Requirements. When a permanent remedial alternative is selected by EPA, and if it consists of ground water extraction and treatment, remedial treatment discharge may reach an anticipated maximum total flow of approximately 1,250,000 gallons per day.
11. Polluted ground water, to be extracted during the course of the activities listed in Finding 8. above, is proposed to be treated using air strippers prior to discharge. There may be some ground water extracted that is not contaminated, and that will meet the effluent limits of this order without treatment. Treated waste ground water will be discharged to the ground, to storm sewers, which flow into Arroyo Seco and Arroyo Las Positas, or discharged directly into the arroyos. When sufficient flow of storm water occurs in the arroyos, treated waste ground water may flow through the Alameda Creek drainage, and into San Francisco Bay north of the Dumbarton Bridge.
12. The portion of the Livermore-Amador ground water basin which LLNL occupies, part of the Spring and Mocho I subbasins, is recognized as a ground water recharge area in the San Francisco Bay Basin Plan and in technical reports submitted by the dischargers. One goal of this permit is to maximize retention of discharged ground water within the Spring and Mocho I subbasins.
13. The dischargers plan to conduct studies to determine the rate or magnitude and locations of recharge which occur along Arroyo Seco and Arroyo Las Positas. A portion of the treated waste ground water that is discharged to the arroyos will recharge to the ground water system, but the effluent limits of this Order are anticipated to preclude adverse impacts on ground water in the Spring and Mocho I subbasins.
14. This permit will allow discharge of treated ground water either directly to the ground surface, or into the surface drainage system (surface drainage channels, storm drains, Arroyo Seco or Arroyo Las Positas). Discharge from pilot study treatment systems will be allowed under this permit until May 1, 1990.

15. The Regional Board adopted a revised Water Quality Control Plan for the San Francisco Bay Region (Basin Plan) on December 17, 1986. The Basin Plan contains water quality objectives and discharge prohibitions for the Livermore-Amador valley and all of its subbasins.
16. The existing and potential beneficial uses for surface waters in the Livermore-Amador ground water basin including Arroyo Mocho, Arroyo Seco, Arroyo Las Positas, Arroyo de la Laguna and their tributaries are:
  - a. Contact and non-contact water recreation
  - b. Wildlife habitat
  - c. Ground water recharge
  - d. Fish migration and spawning
17. The existing and potential beneficial uses of the ground waters underlying the Livermore-Amador Valley ground water basin and its subbasins are:
  - a. Municipal and Domestic supply
  - b. Industrial supply
  - c. Industrial service supply
  - d. Agricultural supply
18. The Basin Plan prohibits discharge of wastewater which has "particular characteristics of concern to beneficial uses" (a) "at any point where the wastewater does not receive a minimum initial dilution of at least 10:1 or into any nontidal water, dead-end slough, similar confined water, or any immediate tributary thereof" and (b) "to Alameda Creek (watershed) when no natural flow occurs."
19. The Basin Plan allows for exceptions to the prohibitions referred to in Finding 18 above when it can be demonstrated that a net environmental benefit can be derived as a result of the discharge.
20. Exceptions to the prohibitions referred to in Finding 18, and which apply to Lawrence Livermore National Laboratory, are warranted because the discharge is an integral part of a program to clean up contaminated ground water and thereby produce an environmental benefit, and because receiving water concentrations are expected to be below levels that would effect beneficial uses. Should studies indicate chronic effects, not currently anticipated, the Board will review the requirements of this Order based upon Receiving Water Limitations B.1.e.

21. The Basin Plan prohibits discharge of "all conservative toxic and deleterious substances, above those levels which can be achieved by a program acceptable to the Board, to waters of the Basin". The dischargers' ground water extraction and treatment system and associated operation, maintenance, and monitoring plan constitutes an acceptable control program for minimizing the discharge of toxicants to waters of the State.
22. Effluent limitations of this Order are based on the Basin Plan, State plans and policies, U. S. Environmental Protection Agency guidance, and best engineering and geologic judgement as to best available technology economically achievable.
23. The issuance of waste discharge requirements for this discharge is exempt from the provisions of Chapter 3 (commencing with Section 21100) of Division 13 of the Public Resources Code (CEQA) pursuant to Section 13389 of the California Water Code.
24. The Board has notified the dischargers and interested agencies and persons of its intent to issue waste discharge requirements for the discharge and has provided them with the opportunity for a public hearing and an opportunity to submit their written views and recommendations.
25. The Board, in a public meeting, heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED that the dischargers, 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. EFFLUENT LIMITATIONS

1. The effluent limit for any discharge to the ground surface onsite and where discharge volumes do not exceed 10,000 gallons per day (as specified under Provision C.5), shall be treated before discharge to meet concentrations of less than two times the action level for each compound specified by the California Department of Health Services for drinking water, but in no case greater than a total of 100 ppb volatile organic compounds.
2. The effluent at the point(s) of discharge to Arroyo Seco, Arroyo Las Positas, surface drainage channels and storm drains (as specified under Provision C.6 and C.7)

shall not contain constituents in excess of the following:

<u>Constituent</u>	<u>Units</u>	<u>Instantaneous Maximum</u>
<u>Metals</u>		
Antimony	mg/l	1.46
Arsenic	ug/l	360
Beryllium	ug/l	0.68
Boron	mg/l	7
Cadmium	ug/l	5
Chromium +3	mg/l	2.5
Chromium +6	ug/l	16
Copper	ug/l	10
Iron	mg/l	3
Lead	ug/l	100
Manganese	ug/l	500
Mercury	ug/l	2.4
Nickel	ug/l	134
Selenium	ug/l	100
Silver	ug/l	1.2
Thallium	ug/l	130
Zinc	ug/l	170
<u>Volatile Organic Compounds</u>		
Benzene	ug/l	0.7
Tetrachloroethylene	ug/l	4
Vinyl Chloride	ug/l	2
Total Volatile Organic Compounds	ug/l	5
Total Volatile Organic Compounds include, but are not limited to:		
Benzene, Bromoform, Carbon Tetrachloride, Chlorobenzene, Chlorodibromomethane, Chloroethane, Chloroform, 1,1-Dichloroethane, 1,2-Dichloroethane, 1,1-Dichloroethylene, 1,2-Dichloropropane, Ethyl benzene, Tetrachloroethylene, Toluene, trans-1,2-Dichloroethylene, 1,1,1-Trichloroethane, 1,1,2-Trichloroethane, Trichloroethylene, Trichlorofluoromethane, Xylene(s), Vinyl Chloride		
<u>Acid Extractable Organic Compounds</u>		
2,4-Dimethylphenol	ug/l	400
Phenol	ug/l	5
2,4,6-Trichlorophenol	ug/l	5
<u>Base/Neutral Extractable Organic Compounds</u>		
1,4-Dichlorobenzene	ug/l	5
Napthalene	ug/l	620
Phenanthrene	ug/l	5
Pyrene	ug/l	5

3. The pH of the discharge shall not exceed 8.5 nor be less than 6.5.
4. In any representative set of samples, the discharge of waste shall meet the following limit of quality:

TOXICITY: The survival of test fishes acceptable to the Executive Officer in 96-hour bioassays of the effluent as discharged shall be a median of 90% survival and a 90 percentile value of not less than 70% survival.

B. RECEIVING WATER LIMITATIONS

1. The discharge of wastes shall not cause the following conditions to exist in waters of the State at any place:
  - a) floating, suspended, or deposited macroscopic particulate matter or foam;
  - b) bottom deposits or aquatic growths;
  - c) alteration of temperature or apparent color beyond present natural background levels;
  - d) visible, floating, suspended, or deposited oil or other products of petroleum origin;
  - e) toxic or other deleterious substances to be present in concentrations or quantities which will cause deleterious effects on aquatic biota, wildlife, or waterfowl, or which render any of these unfit for human consumption either at levels created in the receiving waters or as a result of biological concentrations.
2. The discharge of waste shall not cause the following limits to be exceeded in waters of the State in any place within one foot of the water surface:
  - a) pH:                   The pH shall not be depressed below 6.5 nor raised above 8.5, nor caused to vary from normal ambient pH levels by more than 0.5 units.
3. This discharge shall not cause a violation of any applicable water quality standard for receiving waters adopted by the Board or the State Water Resources Control Board as required by the Federal

Water Pollution Control Act and regulations adopted thereunder. If more stringent applicable water quality standards are promulgated or approved pursuant to Section 303 of the Federal Water Pollution Control Act or amendments thereto, the Board will revise and modify this Order in accordance with such more stringent standards.

C. PROVISIONS

1. The dischargers shall comply with all sections of this order immediately upon starting any discharge. For the purposes of enforcing this Order, the U. S. Department of Energy shall be responsible for achieving full compliance with this Order within 60 days of the Executive Officer's determination that the Lawrence Livermore National Laboratory has failed to comply with the requirements of this Order.
2. The dischargers shall comply with the self-monitoring program as adopted by the Board and as may be amended by the Executive Officer. As new ground water extraction and treatment systems are completed, the schedule of monitoring specified in Part B, Table 1, of the Self-Monitoring Program will be reviewed.
3. The dischargers shall also notify the Regional Board if the Self-Monitoring Program results indicate, or if a discharge or any activity (to include all site investigation activity) has occurred or will occur which would result in the discharge of any toxic pollutant which is not limited by this Order.
4. The dischargers shall identify and utilize treatment methods in addition, or as an alternative to, air stripping if effluent limits for metals, acid extractable organic compounds, and base/neutral extractable organic compounds, as stipulated in this permit, are exceeded.
5. Discharge of treated waste ground water to the ground may occur only:
  - a. within Lawrence Livermore National Laboratory legal site boundaries while conducting routine sampling, well development or hydraulic testing,
  - b. if the total effluent volume does not exceed 10,000 gallons per day,
  - c. if the total VOC's in the discharge do not exceed concentrations of two times the action

- level for each compound specified by the California Department of Health Services for drinking water, or does not exceed the limits under Effluent Limitation A.1, and,
- d. if discharge waters do not flow into any surface waterway, drainage or storm sewer, or,
  - e. in offsite areas while conducting routine sampling, well development, or hydraulic testing if it has been shown that the pumped water contains concentrations of VOC's less than those listed in item A.2 and permission is obtained from property owners.
6. Discharge of treated waste ground water to the storm sewers may occur only:
    - a. within Lawrence Livermore National Laboratory legal site boundaries,
    - b. in offsite areas if the discharge point to a waterway can be identified, and a receiving water sample point is established (if the new discharge point is downstream from all existing receiving water sample points) as discussed under item I.C., Part B, Self-Monitoring Program,
    - c. for any investigative or remedial activity that generates effluent at all volumes, and,
    - d. if the discharge complies with all Effluent Limitations.
  7. Discharge of treated waste ground water directly to Arroyo Seco and Arroyo Las Positas may occur:
    - a. in offsite or onsite areas,
    - b. for any investigative or remedial activity that generates effluent at all volumes, and
    - c. if the discharge complies with all Effluent Limitations.
  8. Total discharge from all pilot study treatment systems shall not exceed about 360,000 gallons per day nor occur after May 1, 1990.
  9. Effluent generated from Treatment System A shall not be discharged to Arroyo Seco at any point of the arroyo that crosses or is upstream of the main body of the off site plume, unless the channel is lined to prevent infiltration from the point of discharge downstream through the body of the plume. Discharge from Treatment System A will be managed under separate Waste Discharge Requirements.

10. Any discharge to a location other than the discharge point(s) specified in Provisions 5. through 7. of this Order, or discharge of any hazardous constituent not specified in the Effluent Limitations, will require a modification to this Order or submission of a second NPDES application.
11. The dischargers shall comply with all items of the attached "Standard Provisions, Reporting Requirements and Definitions" dated December, 1986, except items A.10, B.2, B.3, C.8 and C.11.
12. This Order expires April 20, 1993. The dischargers must file a report of waste discharge in accordance with Title 23, Chapter 3, Subchapter 9 of the California Administrative Code not later than 180 days in advance of such expiration date as application for issuance of new waste discharge requirements.
13. This Order is issued to the dischargers in support of investigation and cleanup activities undertaken pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA). Pursuant to CERCLA Section 120, all response actions taken by the dischargers must be consistent with all guidelines, rules, regulations, and criteria developed by the U. S. Environmental Protection Agency (EPA) pursuant to CERCLA. Issuance of this Order does not constitute approval by the State of California or EPA for any response activities. Rather, this Order is meant to facilitate the investigation of the extent of pollution, the evaluation of potential remedies, and the initiation of any selected remedy by specifying the manner in which waste ground water from monitoring well development and sampling, from hydraulic testing, from pilot studies, and from any selected remedy(s) may be discharged, contingent upon State of California and EPA approval of each specific action, as required by CERCLA and appropriate State law.
14. This Order shall serve as a National Pollutant Discharge Elimination System Permit pursuant to Section 402 of the Clean Water Act or amendments thereto, and shall become effective 10 days after date of its adoption provided the Regional Administrator, Environmental Protection Agency, has no objection. If the Regional Administrator objects to its issuance, the permit shall not become effective until such objection is withdrawn.

I, Roger B. James, Executive Officer, do hereby certify that the foregoing is a full, true and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on April 20, 1988.



Roger B. James  
Executive Officer

Attachments:

Standard Provisions & Reporting Requirements, December 1986  
Self-Monitoring Program

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
SAN FRANCISCO BAY REGION

SELF-MONITORING PROGRAM

FOR:

U. S. DEPARTMENT OF ENERGY

\*

and

LAWRENCE LIVERMORE NATIONAL LABORATORY

LIVERMORE, ALAMEDA COUNTY

NPDES NO. 0029289

ORDER NO. 88-065

CONSISTS OF:

PART A, January, 1987

and,

PART B, Adopted April 20, 1988

PART B

U. S. DEPARTMENT OF ENERGY  
AND  
LAWRENCE LIVERMORE NATIONAL LABORATORY  
LIVERMORE, ALAMEDA COUNTY

I. DESCRIPTION OF SAMPLING STATIONS

A. INFLUENT

<u>Station</u>	<u>Description</u>
I-001	At a point in ground water extraction, collection and treatment, utilizing Treatment System A (located near MW-103), immediately prior to treatment.
I-002	At a point in ground water extraction, collection and treatment, utilizing Treatment System B (located west of MW-218), immediately prior to treatment.
I-003	At a point in ground water extraction, collection and treatment, utilizing Treatment System C (located near MW-109), immediately prior to treatment.
I-004 to I-XXX	At a point in ground water extraction and treatment that uses a single or multiple well treatment system, immediately prior to any treatment. These points will be assigned by the the dischargers to all monitoring or extraction wells for activities listed in Finding 8. of the Order when such activities are initiated. Once assigned, each number will be used in all future extraction events for the same well.

B. EFFLUENT

<u>Station</u>	<u>Description</u>
E-001	At a point in ground water extraction and treatment, using Treatment System A, immediately following treatment and prior to discharge to surface waters or drainage ways.

- E-002 At a point in ground water extraction and treatment, using Treatment System B, immediately following treatment and prior to discharge to surface waters or drainage ways.
- E-003 At a point in ground water extraction and treatment, using Treatment System C, immediately following treatment and prior to discharge to surface waters or drainage ways.
- E-004 to E-XXX At a point in ground water extraction and treatment, using single or multiple well treatment systems, immediately following treatment and prior to discharge onto the ground or into either the on site storm drain system or into surface waters/drainage ways. These points will be assigned by the dischargers to all monitor or extraction wells, for activities listed in Finding 8. and for Provisions 5. to 7. of the Order when such activities are initiated. Once assigned, each number will be used in all future extraction events for the same well.

C. RECEIVING WATERS

<u>Station</u>	<u>Description</u>
R-001	At a point in the north flowing drainage ditch east of Vasco Road, between 50 and 100 feet downstream (north) from the effluent discharge point for Treatment System B.
R-002	At a point in Arroyo Seco between 50 and 100 feet downstream (west) from the effluent discharge point for Treatment System C.
R-003 to R-XXX	At a point in Arroyo Las Positas or Arroyo Seco, or any surface drainage way, between 50 and 100 feet downstream from any effluent discharge point, established by the dischargers.

## II. SCHEDULE OF SAMPLING AND ANALYSIS

The schedule of sampling and analysis is provided in the attached Table 1.

## III. MODIFICATIONS TO PART A

### A. Additions:

Add Section E.1.e.3), to read:

Stream gage height measurements and their conversion to stream flow measurements.

### B. Deletions:

Sections D.2.b., D.2.d., D.2.g., D.2.h., E.1.e.1), E.3., and E.4.

### C. Modifications:

All items of Self Monitoring Program Part A, Dated January, 1987, shall be complied with except for the following modifications:

1. Section D.2.a. shall be changed to read as follows:

Samples of effluent shall be collected on days coincident with influent grab sampling unless otherwise stipulated. The Board or Executive Officer may approve an alternative sampling plan if it is demonstrated to the Board's satisfaction that expected treatment facility operating conditions warrant a deviation from the standard sampling plan.

2. Section D.2.e. shall be changed to read as follows:

If any instantaneous maximum limit is exceeded, the sampling frequency shall be increased to daily until two samples collected on consecutive days show compliance with the instantaneous maximum limit.

3. Section D.3.b. shall be changed to read as follows:

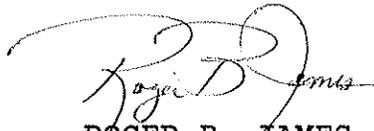
Receiving water samples shall be collected at each station on each sampling day. Samples shall be collected within the discharge plume and

downcurrent of the discharge point so as to be representative, unless otherwise stipulated.

4. In Section F.1., the phrase:  
"...shall be maintained by the discharger and accessible (at the waste treatment plant),..." shall be changed to read as follows:  
"...shall be maintained by the dischargers and accessible (at the dischargers' facility),..."
5. Information requested in Section G.4.e. shall be prepared in a format similar to EPA form 3320-1 and shall be submitted to the EPA's Superfund Division rather than the Enforcement Division.
6. The Annual Report required in Section G.5. shall be submitted in place of the end of the year monthly report.

I, Roger B. James, Executive Officer, hereby certify that the foregoing Self-Monitoring Program:

1. Has been developed in accordance with the procedure set forth in this Regional Board's Resolution No. 73-16 in order to obtain data and document compliance with waste discharge requirements established in Regional Board Order No. 88-065.
2. Was adopted by the board on April 20, 1988.
3. May be reviewed at any time subsequent to the effective date upon written notice from the Executive Officer or request from the dischargers, and revisions will be ordered by the Executive Officer or Regional Board.

  
ROGER B. JAMES  
Executive Officer

Attachments: Table 1  
Site Map



**TABLE I (continued)**  
**SCHEDULE FOR SAMPLING, MEASUREMENTS, AND ANALYSIS**

Sampling Station	I001- I004- I003 IXXX		E001- E004- E003 EXXX		R001- R003- R002 RXXX							
	G	G	G	G	G	G						
<b>TYPE OF SAMPLE</b>	G	G	G	G								
Mercury (mg/l & kg/day)	I/S	I/S	I/S	I/S			I/S	I/S				
Nickel (mg/l & kg/day)	"	"	"	"			"	"				
Zinc (mg/l & kg/day)	"	"	"	"			"	"				
PHENOLIC COMPOUNDS (mg/l & kg/day)												
All Applicable Standard Observations			E	E			E	E				
Bottom Sediment Analyses and Observations												
Total Identifiable Chlorinated Hydrocarbons (ng/l & kg/day)												
EPA 601 (ug/l & kg/l)	W/M	W/M	D/W	D/W			W/M	W/M				
EPA 624 (ug/l & kg/l)	I/A*	I/A*	I/A*	I/A*								
EPA 602 & 625 (ug/l & kg/l)	I/A	W/M	I/A	D/W			I/A	W/M				
Total Dissolved Solids & Chlorides (mg/l & kg/l)	Q	Q	Q	Q			Q	Q				

\* - When EPA 624 is performed, it is not necessary to perform EPA 601

**LEGEND FOR TABLE**

**TYPES OF SAMPLES**

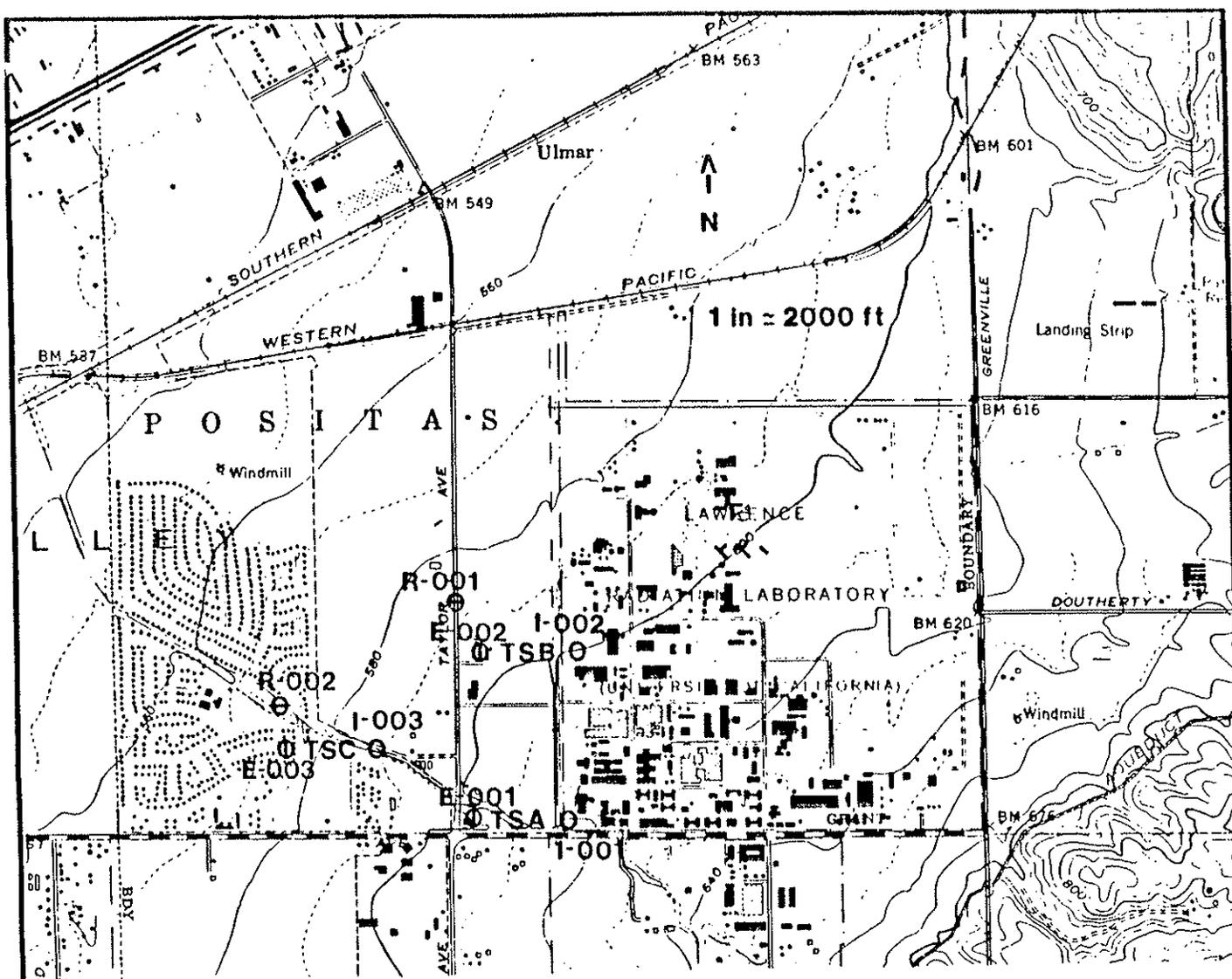
- G = grab sample
- C-24 = composite sample - 24-hour
- C-X = composite sample - X hours  
(used when discharge does not continue for 24-hour period)
- Cont = continuous sampling
- DI = depth-integrated sample
- BS = bottom sediment sample
- O = observation

**TYPES OF STATIONS**

- I = intake and/or water supply stations
- A = treatment facility influent stations
- E = waste effluent stations
- C = receiving water stations
- P = treatment facilities perimeter stations
- L = basin and/or pond levee stations
- B = bottom sediment stations
- G = groundwater stations

**FREQUENCY OF SAMPLING**

- E = each occurrence
- H = once each hour
- D = once each day
- W = once each week
- M = once each month
- Y = once each year
- 2/H = twice per hour
- 2/W = 2 days per week
- 5/W = 5 days per week
- 2/M = 2 days per month
- 2/Y = once in March and once in September
- Q = quarterly, once in March, June, Sept. and December
- 2H = every 2 hours
- 2D = every 2 days
- 2W = every 2 weeks
- 3M = every 3 months
- Cont = continuous
- D/W = Daily for the first week, weekly thereafter
- W/M = Weekly for the first 4 weeks, monthly thereafter
- I/A = One sample during the first week of discharge, annually thereafter
- I/S = One sample during the first week of discharge, semi-annually thereafter



**LEGEND**

TSA Treatment Systems A to C

Sampling Stations:

- I-001 Influent Station
- ⊙ E-001 Effluent Station
- ⊗ R-001 Receiving Water Station

Base map from LLNL Monthly Progress Report dated September 15 to October 15, 1987.

STATE OF CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD SAN FRANCISCO BAY REGION		
<b>MAP OF SAMPLING STATIONS          NPDES PERMIT SELF-MONITORING          PROGRAM</b>		
DRAWN BY:	DATE:	DRWG. NO.