APPENDIX E

Anlab
ANALYTICAL LABORATORY
1910 S STREET, SACRAMENTO, CALIFORNIA 95814 • 916-447-2946 • FAX 916-447-8321

May 7, 1993

City of Sacramento
921 10th Street, Suite 500
Sacramento, CA 95814
Attn: Bruce Barboza

Anlab I.D. AC08734 Client Code: 122
SAMPLE DESCRIPTION: PRODUCTION WELLS P1 & P2
Matrix: W
Sample collection date: 04/21/93 Time: 14:15
Lab submittal date: 04/21/93 Time: 15:12
Turn-Around-Time: REG Sample Disposal: LAB

TEST PARAMETER	UNITS	TEST RESULT	DETECTION LIMIT
BOD (5) by EPA 405.1	mg/l	8.8	3
Tot. Suspended Solids, EPA 160.2	mg/l	30	3.0
Arsenic EPA 206.2	mg/l	0.035	0.0040
Cadmium EPA 200.7	mg/l	ND	0.010
Chromium EPA 200.7	mg/l	0.026	0.020
Copper EPA 200.7	mg/l	ND	0.020
Lead EPA 200.7	mg/l	ND	0.10
Mercury EPA 245.2	mg/l	ND	0.00020
Nickel EPA 200.7	mg/l	ND	0.050
Silver EPA 200.7	mg/l	ND	0.010
Zinc EPA 200.7	mg/l	0.026	0.010
Multicomponent analysis: EPA 601 PURGEABLE HALOCARBONS			
Bromodichloromethane	ug/l	ND	0.5
Bromoform	ug/l	ND	0.5
Bromomethane	ug/l	ND	0.5
Carbon tetrachloride	ug/l	ND	0.5
Chlorobenzene	ug/l	ND	0.5
Chloroethane	ug/l	ND	0.5
2-Chloroethyl vinyl ether	ug/l	ND	1.0
Chloroform	ug/l	ND	0.5
Chloromethane	ug/l	ND	0.5
Dibromochloromethane	ug/l	ND	0.5
1,2-Dichlorobenzene (o-DCB)	ug/l	ND	0.5
1,3-Dichlorobenzene (m-DCB)	ug/l	ND	0.5
1,4-Dichlorobenzene (p-DCB)	ug/l	ND	0.5
Dichlorodifluoromethane	ug/l	ND	0.5
1,1-Dichloroethane (1,1-DCA)	ug/l	ND	0.5
1,2-Dichloroethane (1,2-DCA)	ug/l	ND	0.5
1,1-Dichloroethene (1,1-DCE)	ug/l	ND	0.2
trans-1,2-Dichloroethene	ug/l	ND	0.5
1,2-Dichloropropane	ug/l	ND	0.5

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May 6, 1993
City of Sacramento Anlab I.D. AC08734 (continued)

TEST PARAMETER	UNITS	TEST RESULT	DETECTION LIMIT
Multicomponent analysis: EPA 601 PURGEABLE HALOCARBONS (continued)			
cis-1,3-Dichloropropene	ug/l	ND	0.5
trans-1,3-Dichloropropene	ug/l	ND	0.5
Dichloromethane (MeCl2)	ug/l	ND	1.0
1,1,2,2-Tetrachloroethane	ug/l	ND	0.5
Tetrachloroethene (PCE)	ug/l	ND	0.5
1,1,1-Trichloroethane (1,1,1-TCA)	ug/l	ND	0.5
1,1,2-Trichloroethane (1,1,2-TCA)	ug/l	ND	0.5
Trichloroethene (TCE)	ug/l	ND	0.5
Trichlorofluoromethane (Freon 11)	ug/l	ND	0.5
Vinyl chloride (VC)	ug/l	ND	1.0
Multicomponent analysis: EPA 602 PURGEABLE AROMATICS			
Benzene	ug/l	ND	0.5
Chlorobenzene	ug/l	ND	0.5
1,2-Dichlorobenzene (o-DCB)	ug/l	ND	0.5
1,3-Dichlorobenzene (m-DCB)	ug/l	ND	0.5
1,4-Dichlorobenzene (p-DCB)	ug/l	ND	0.5
Ethylbenzene	ug/l	ND	0.5
Toluene	ug/l	ND	0.5
Xylenes	ug/l	ND	0.5

ND = Not Detected

Report Approved By: Marilyn Fuq

:ldd

Appendix F (Missing)

Appendix G (Missing)

APPENDIX H

DRAFT

PROPOSED
DETECTION MONITORING AND REPORTING PROGRAM

FOR
THE CITY OF SACRAMENTO 28TH ST. LANDFILL
CLASS III SOLID WASTE DISPOSAL SITE
SACRAMENTO COUNTY

ORDER NO. 93-XX

CONSISTS OF

PARTS I, II, AND III

MAY 1993

PART I

A. GENERAL

Landfill location, description, acreage

B. SAMPLING AND ANALYTICAL METHODS

Sample collection, storage, and analysis shall be performed according to the most recent version of Standard USEPA Methods, and in accordance with an approved sampling and analysis plan. Water and waste analysis shall be performed by a laboratory approved for these analyses by the State of California. Specific methods of analysis must be identified. The director of the laboratory whose name appears on the certification shall supervise all analytical work in his/her laboratory and shall sign all reports of such work submitted to the Regional Board. All monitoring instruments and equipment shall be properly calibrated and maintained to ensure accuracy of measurements. In addition, the Discharger is responsible for seeing that the laboratory analysis of all samples from Monitoring Points and Background Monitoring Points meets the following restrictions:

1. The methods of analysis and the detection limits used must be appropriate for the expected concentrations.

2. "Trace" results -- results falling between the [MDL] Facility Specific Method Detection Limit and the facility-specific practical quantitation limit [PQL] -- shall be reported as such, and shall be accompanied both by the estimated MDL and PQL values for that analytical run and by an estimate of the constituent's concentration.

3. MDLs and PQLs shall be derived by the laboratory for each analytical procedure, according to State of California laboratory accreditation procedures. These MDLs and PQLs shall reflect the detection and quantitation capabilities of the specific analytical procedure and equipment used by the lab, rather than simply being quoted from USEPA analytical method manuals. If the lab suspects that, due to a change in matrix or other effects, the true detection limit or quantitation limit for a particular analytical run differs significantly from the laboratory-derived MDL/PQL values, the results shall be flagged accordingly, along with an estimate of the detection limit and quantitation limit actually achieved.

4. All QA/QC data shall be reported, along with the sample results to which it applies, including the method, equipment, and analytical detection limits, the recovery rates, an explanation for any recovery rate that is less than 80%, the results of equipment and method blanks, the results of spiked and surrogate samples, the frequency of quality control analysis, and the name and qualifications of the person(s) performing the analyses. Sample results shall be reported unadjusted for blank results or spike recovery.

5. Upon receiving written approval from the Executive Officer, an alternative statistical or non-statistical procedures can be used for determining the significance of analytical results for a constituent that is a common laboratory contaminants (i.e., methylene chloride, acetone, diethylhexyl phthalate, and di-n-octyl phthalate) during any given Reporting Period in which QA/QC samples show evidence of laboratory contamination for the constituent. Nevertheless, analytical results involving detection of these analytes in any background or downgradient sample shall be reported and flagged for easy reference by Regional Board staff.

6. Unknown chromatographic peaks shall be reported, along with an estimate of the concentration of the unknown analytes. When unknown peaks are encountered, second column or second method confirmation procedures shall be performed to attempt to identify and more accurately quantify the unknown analyses.

7. In cases where contaminants are detected in QA/QC samples [i.e., field, trip, or lab blanks], the accompanying sample results shall be appropriately flagged.

8. The MDL shall always be calculated such that it represents a concentration associated with a 99% reliability of a non-zero result.

C. DEFINITION OF TERMS

1. The **"Monitored Media"** are those water- bearing media that are monitored pursuant to this Monitoring and Reporting Program. The Monitored Media may include: (1) ground water in the uppermost aquifer, in any portion of the zone of saturation [§2601 of Chapter 15] in which it would be reasonable to anticipate that waste constituents migrating from the Unit could be detected, and in any perched zones underlying the Unit, (2) any bodies of surface water that could be measurably affected by a release, and (3) soil pore liquid beneath and/or adjacent to the Unit.

2. The **"Constituents of Concern [COC]"** are those constituents which are likely to in the waste in the Unit or which are likely to be derived from waste constituents, in the event of a release. The Constituents of Concern for this Unit are listed in Specification B.4.a of this Program.

3. The **"Monitoring Parameters"** consist of a short list of constituents and parameters used for the majority of monitoring activity. The Monitoring Parameters for this Unit are listed in Specification B.5 of this Order. Monitoring for the short list of Monitoring Parameters constitutes "indirect monitoring", in that the results are used to indirectly indicate the success or failure of adequate containment for the longer list of Constituents of Concern.

4. The **"Volatile Organics Composite Monitoring Parameter for Water [VOC_{water}]"** are composite Monitoring Parameters addressing all volatile organic constituents detectable in a sample of water. [See Part III.A.2 of this Program for additional discussion of these Monitoring Parameters.]

5. **"Standard Observations"** refers to:
a. Water

    1) Floating and suspended materials of waste origin: presence or absence, source, and size of affected area;

    2) Discoloration and turbidity: description of color, source, and size of affected area;

    3) Evidence or odors: presence or absence, characterization, source, and distance of travel from source;

    4) Evidence of beneficial use: presence of water associated wildlife;

    5) Flow rate; and

    6) Weather conditions: wind direction and estimated velocity, total precipitation during the previous five days and on the day of observation;

    7) Water elevation to the nearest 1/100th foot -above mean sea level.

6. **"Matrix Effect"** refers to any increase in the Method Detection Limit or Practical Quantitation Limit for a given constituent as a result of the presence of other constituents -- either of natural origin or introduced through a release -- that are present in the sample of water or soil-pore gas being analyzed.

7. **"Facility-Specific Method Detection Limit [MDL]"**, for a given analytical laboratory using a given analytical method to detect a given constituent [in spite of any Matrix Effect] **means** the lowest concentration at which the laboratory can regularly differentiate -- with 99% reliability -- between a sample which contains the constituent and one which does not.

8. **"Facility-Specific Practical Quantitation Limit [PQL]"**, for a given analytical laboratory using a given analytical method to determine the concentration of a given constituent [in spite of any Matrix Effect] **means** the lowest constituent concentration the laboratory can regularly quantify within specified limits of precision that are acceptable to the regional Board Executive Officer.

9. **"Reporting Period"** means the duration separating the submittal of a given type of monitoring report from the time the next iteration of that report is scheduled for submittal; therefore, the reporting period for analysis of all Constituents of Concern is five years, and for Monitoring Parameters it is six months ["Summer/Fall" = April 1 to September 30; "Winter/Spring" = October 1 to March 31]. The Reporting Period for the Annual Summary Report extends from April 1 of the previous year to March 31 of the current year. The due date for any given report will be 30 days after the end of its Reporting Period, unless otherwise stated.

10. **"Receiving Waters"** refers to any surface water which actually or potentially receives surface or ground waters which pass over, through, or under waste materials or contaminated soil. In this case the following surface water bodies are considered "receiving waters": American River.

11. **"Affected Persons"** refers to all individuals who either own or reside upon the land that directly overlies any part of that portion of a gas- or liquid-phase release that has migrated beyond the facility boundary.

D. RECORDS TO BE MAINTAINED

Written reports shall be maintained by the Discharger and shall be retained for a minimum of five years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge or when requested by the Board. Such records shall show the following for each sample:

1. Identity of sample and of the Monitoring Point or Background Monitoring Point from which it was taken, along with the identity of the individual who obtained the sample;

2. Date and time of sampling;

3. Date and time that analyses were started and completed, and the name of the personnel performing each analysis;

4. Complete procedure used, including method of preserving the sample, and the identity and volumes of reagents used;

5. Calculation of results;and

6. Results of analyses, and the MDL and PQL for each analysis.

E. REPORTS TO BE FILED WITH THE BOARD

1. Detection Monitoring reports will be submitted annually [ref 23 CCR 15 Article 5, 2550.7(e) (14)]. The results of any monitoring done more frequently than required at the locations specified herein shall be included in the annual Detection Monitoring reports to the Board. Every five years, the Discharger shall submit a report concerning the direct analysis of all Constituents of Concern as indicated in Part II.E. **["COC Report"]**. All reports shall be submitted no later than one month following the end of their respective Reporting Period. The reports shall be comprised of at least the following:

   a. Letter of Transmittal

   A letter transmitting the essential points in each report shall accompany each report. Such a letter shall include a discussion of any requirement violations found since the last such report was submitted, and shall describe actions taken or planned for correcting those violations. If the Discharger has previously submitted a detailed time schedule for correcting said requirement violations, a reference to the correspondence transmitting such schedule will be satisfactory. If no violations have occurred since the last submittal, this shall be stated in the letter of transmittal. Monitoring reports and the letter transmitting the monitoring reports shall be signed by the City of Sacramento Solid Waste Division Manager or by his/her duly authorized representative, if such representative is responsible for the overall operation of the facility from which the discharge originates. The letter shall contain a statement by the official, under penalty of perjury, that to the best of the signer's knowledge the report is true, complete, and correct;

   b. Each Detection Monitoring Report and each COC Report shall include a compliance evaluation summary. The summary shall contain at least:

      1) For each monitored ground water body, a description and graphical presentation of the velocity and direction of ground water flow under/around the Unit, based upon water level elevations taken during the collection of the water quality data submitted in the report;

      2) **Pre-Sampling Purge for Samples Obtained From Wells:** For each monitoring well addressed by the report, a description of the method and time of water level measurement, of the type of pump used for purging and the placement of the pump in the well, and of the method of purging (the pumping rate, the equipment and methods used to monitor field pH, temperature, and conductivity during purging, the calibration of the field equipment, results of the pH, temperature, conductivity, and turbidity testing, the well recovery time, and the method of disposing of the purge water);

3) **Sampling:** For each Monitoring Point and Background Monitoring Point addressed by the report, a description of the type of pump -- or other device -- used and its placement for sampling, and a detailed description of the sampling procedure [number and description of the samples, field blanks, travel blanks, and duplicate samples taken, the type of containers and preservative used, the date and time of sampling, the name and qualifications of the person actually taking the samples, and any other observations];

4) **Post-Sampling Purge [§2550(e)(12)(B)]:** For each monitoring well addressed by the report, a description of how the well was purged to remove all portions of the water that was in the well bore while the sample was being taken;

c. A map or aerial photograph showing the locations of observation stations, Monitoring Points, and Background Monitoring Points; and areas where filling has been completed during the previous calendar year;

d. For each Detection Monitoring Report and each COC Report, include laboratory statements of results of all analyses demonstrating compliance with Part l.B;

e. An evaluation of the effectiveness of the leachate monitoring and control facilities, and the run-on/run-off control facilities.

f. The quantity and types of constes discharged and the locations in the Unit where waste has been placed since submittal of the last report.

2. **Annual Summary Report**

The Discharger shall submit an annual report to the Board covering the previous monitoring year. The reporting period ends March 31. The report shall contain:

a. For each Monitoring Point and Background Monitoring Point, submit in graphical format **{§2550.7(e)(14) of Article 5].** The laboratory analytical data for all samples taken within at least the previous five calendar years. Each such graph shall plot the concentration of one or more constituents over time for a given Monitoring Point or Background Monitoring Point, at a scale appropriate to show trends or variations in water quality. The graphs shall plot each datum, rather than plotting mean values. For any given constituent or parameter, the scale for background plots shall be the same as that used to plot downgradient data. On the basis of any aberrations noted in the plotted data, the Executive Officer may direct the Discharger to carry out a preliminary investigation

[§2510(d)(2)], the results of which will determine whether or not a release is indicated;

b. All monitoring analytical data obtained during the Reporting Period presented in tabular form as well as on 5.25" diskettes, either in MS-DOS/ASCII format or in another file format acceptable to the Executive Officer. Data sets too large to fit on a single 360 K.B. diskette may be submitted on disk in a commonly available compressed format [e.g., PK-ZIP or NORTON BACKUP]. The Regional Board regards the submittal of data in hard copy and on diskette as "...the form necessary for..." statistical analysis [§2550.8(h)], in that this facilitates periodic review by the Board's statistical consultant;

c. A comprehensive discussion of the compliance record, and the result of any corrective actions taken or planned which may be needed to bring the Discharger into full compliance with the waste discharge requirements;

d. A written summary of the ground water and soil-pore gas analyses, indicating any changes made since the previous annual report; and

e. An evaluation of the effectiveness of the leachate monitoring and control facilities, and of the run-off/run-on control facilities;

f. A summary and certification of completion of all Standard Observations [Part I.C.7.] for the Unit, for the perimeter of the Unit, and for the Receiving Waters; and

g. The quantity and types of wastes discharged and the locations in the Unit where waste has been placed since submittal of the last such report.

3. <u>CONTINGENCY REPORTING</u>

a. The Discharge shall report by telephone concerning any seepage from the disposal area immediately after it is discovered. A written report shall be filled with the Board within seven days, containing at least the following information:
   1) A map showing the location(s) of seepage;
   2) An estimate of the flow rate;
   3) A description of the nature of the discharge (e.g., all pertinent observations and analyses); and
   4) corrective measures underway or proposed

b. Should the initial statistical comparison [Part III.A.1] or non-statistical comparison [Part III.A.2] indicate, for any Constituent of Concern or Monitoring Parameter, that a release is tentatively identified, the Discharger

shall immediately notify the Regional Board verbally as to the Monitoring Point(s) and constituents(s) or parameter(s) involved, shall provide written notification by certified mail within seven days of such determination [§2550.8(j)(1)], and shall carry out a discrete retest in accordance with Parts II.C.1. and III.A.3. If the retest confirms the existence of a release, the Discharger shall carry out the requirements of Part I.E.3.d. In any case, the Discharger shall inform the Regional Board of the outcome of the retest as soon as the results are available, following up with written results submitted by certified mail within seven days of completing the retest.

c. If either the Discharger or the Regional Board determines that there is significant physical evidence of a release [§2550.1(3) of Article 5], the Discharger shall immediately notify the Regional Board of this fact by certified mail [or acknowledge the Regional Board's determination] and shall carry out the requirements of Part I.E.3.d. for all potentially-affected monitored media.

d. If the Discharger concludes that a release has been discovered:
   1) If this conclusion is <u>not</u> based upon "direct monitoring" of the Constituents of Concern, pursuant to Part II.C.3., then the Discharger shall, within thirty days, sample for all Constituents of Concern at all Monitoring Points and submit them for laboratory analysis. Within seven days of receiving the laboratory analytical results, the Discharger shall notify the Regional Board, by certified mail, of the concentration of all Constituents of Concern at each Monitoring Point. Because this scan is not to be tested against background, only a single datum is required for each Constituent of Concern at each Monitoring Point [§2550.8(j)(1)];
   2) The Discharger shall, within 90 days of discovering the release, submit a Revised Report of Waste Discharge proposing an Evaluation Monitoring Program meeting the requirements of §2550.8(k)(5) and §2550.9 of Article 5; and
   3) The Discharger shall, within 180 days of discovering the release, submit a preliminary engineering feasibility study meeting the requirements of §2550.8(k)(6) of Article 5.

e. Any time the Discharger concludes -- or the Regional Board Executive Officer directs the Discharger to conclude -- that a liquid- or gaseous-phase release from the Unit has proceeded beyond the facility boundary, the Discharger shall so notify all persons who either own or reside upon the land that directly overlies any part of the plume **[Affected Persons]**.
   1) Initial notification to Affected Persons shall be accomplished within 14 days of making this conclusion and shall include a description of the Discharger's current knowledge of the nature and extent of the release; and
   2) Subsequent to initial notification, the Discharger shall provide updates

to all Affected Persons -- including any newly Affected Persons -- within 14 days of concluding there has been any material change in the nature or extent of the release.

Part II: MONITORING AND OBSERVATION SCHEDULE

A. SURFACE WATER MONITORING -

1. The American River to the North of the waste management facility will be sampled upstream of the facility at sampling location R1 and downstream at sampling location R2. R1 and R2 shall be sampled on a monthly basis. Monthly samples will be analyzed for the following parameters: EC, pH, and CL. The river flow and river elevation shall also be noted at the time of sampling. EPA Method 601 and 602 analysis shall be performed annually on R1 and R2 samples. This analysis shall be performed in August or September.

   Surface water monitoring shall also be performed as described in the 28th Street Landfill's Storm Water Monitoring Program dated January 1993 and the Industrial Sewer Use Permit No. 153-0293 dated December 29, 1992. These documents are contained in Appendix X and X. Monitoring points for the Storm Water Monitoring Program are Maintenance Hole #12 at the intersection of 28th Street and A Street, the American River sampling locations R1 and R2, and the landfill's two detention ponds S1 and S2. Sampling at these locations vary in accordance with the Storm Water Monitoring Program, but do not occur more than quarterly.

   Sampling related to the landfill's Industrial Sewer Use Permit shall be performed on a quarterly basis at maintenance hole #12. Constituents and concentration limits are as noted in the permit.

   Surface water flows from the compost program site are not directly monitored. Surface water flows are channeled to drainage inlets along 28th Street. These drainage inlets are upstream of Maintenance Hole #12, and composite samples taken at that location include any runoff from the compost program site.

   All surface water monitoring locations are identified on Figure X. All surface water samples shall be analyzed for the following:

Parameter/Constituent	Report in Units of	Test Method
Calcium	mg/l	EPA 6010
Magnesium	mg/l	EPA 6010

Potassium	mg/l	EPA 6010
Sodium	mg/l	EPA 6010
Bicarbonate	mg/l	EPA 310.1

Parameter/Constituent	Report in Units of	Test Method
Nitrate	mg/l	EPA 300.0/352.1
Sulfate	mg/l	EPA 300.0/375.4
Chemical Oxygen Demand	mg/l	EPA 410.1
Dissolved Oxygen	mg/l	Field Determined

Dissolved metals to include Cadmium, Lead, Mercury, Nickel, Copper, Chromium, Zinc, and metals filtration.

All surface water samples shall be collected within four hours. If a surface water sampling station has insufficient flow to collect a sample, a statement to that effect may be submitted in lieu of data for that particular surface water sample.

The Discharger shall determine at each sampling station whether there is a statistically significant increase over water quality protection standards for each parameter and constituent analyzed.

B. LEACHATE MONITORING

The lined landfill unit's leachate sump shall be inspected monthly for leachate generation. Upon detection of leachate in a previously dry LCRS, the Discharger shall discontinue monthly inspection, shall immediately sample the leachate and shall continue to take one sample of the leachate quarterly thereafter [ref 23 CCR 15 Article 15,2550.7 (e) (12) (B) (2)]. Leachate samples shall be analyzed for the following, and this data shall be included in the annual Detection Monitoring report to the Board:

Parameter/Constituent	Report in Units of	Sampling Frequency
Flow Rate	gallons/day	Monthly
pH (field)	pH units	Monthly

Parameter/Constituent	Report in Units of	Sampling Frequency
Specific Conductance (field)	μumhos/cm	Monthly
Total Organic Carbon	mg/l	Quarterly
Total Dissolved Solids	mg/l	Quarterly
Dicarbonate	mg/l	Quarterly
Calcium	mg/l	Quarterly
Carbonate	mg/l	Quarterly
Chloride	mg/l	Quarterly
Sodium	mg/l	Quarterly
Sulfate	mg/l	Quarterly
Sulfides (including H S)	mg/l	Quarterly
Magnesium	mg/l	Quarterly
Potassium	mg/l	Quarterly
Nitrate (as N)	mg/l	Quarterly
Total Kjeldahl Nitrogen	mg/l	Quarterly
Ammonia (as N)	mg/l	Quarterly
Dissolved Iron[1]	mg/l	Quarterly
Manganese[1]	mg/l	Quarterly
Volatile Organics[2]	μg/l	Quarterly

ICAP[1] - Analysis to be used for the following:

Aluminum	mg/l	Semiannual[3]
Antimony	mg/l	Semiannual[3]
Cadmium	mg/l	Semiannual[3]
Total Chromium	mg/l	Semiannual[3]
Copper	mg/l	Semiannual[3]
Nickel	mg/l	Semiannual[3]
Silver	mg/l	Semiannual[3]
Thallium	mg/l	Semiannual[3]
Zinc	mg/l	Semiannual[3]

AA[4] - Analysis to be used for the following:

Arsenic	mg/l	Semiannual[3]
Lead	mg/l	Semiannual[3]
Mercury	mg/l	Semiannual[3]
Selenium	mg/l	Semiannual[3]

[1] Inductively Coupled Argon Plasma Atomic Emission Spectroscopy (ICAP) shall be used for analysis of these constituents.

[2] EPA Methods 601 and 602 shall be used. All peaks shall be reported.

[3] In February and in August for semiannual samples, if liquid is present. If liquid is not present in August, at first detection of liquid thereafter (for Leachate monitoring only).

[4] Atomic Absorption Spectroscopy (AA) shall be used for analysis of these constituents.

C. Waste Monitoring

The Discharger shall monitor all wastes discharged to the Class III landfill modules on a monthly basis for the following parameters, and shall include this data in the annual Detection Monitoring report submitted to the Board:

Parameter	Report in Units of
1. Quantity discharged	cy and tons
2. Type of material discharged (Residential, Commercial, etc)	___
3. Source of material discharged	___
4. Minimum elevation of discharge	feet/tenths MSL
5. Capacity of landfill module remaining	percent
6. Capacity of landfill WMU remaining	percent
7. Capacity of landfill facility remaining	percent
8. Location and aerial extent of disposal of waste	

D. WATER SAMPLING/ANALYSIS FOR DETECTION MONITORING

Monitoring Parameter Report Due Annually, Constituent of Concern Reports Due Every Five Years (details below)

1. Thirty-Day Sample Procurement Limitation. For any given monitored medium, the samples taken from all Monitoring Points and Background Monitoring Points to satisfy the data analysis requirements for a given Reporting Period shall all be taken within a span not exceeding 30 days, and shall be taken in a manner that insures sample independence to the greatest extent feasible [§2550.7(e)(12)(B) of Article 5]. Ground water sampling shall also include an accurate determination of the ground water surface elevation and field parameters [temperature and electrical conductivity] for that Monitoring Point or Background Monitoring Point [§2550.7(e)(13)]; Ground water elevations taken prior to purging the well and sampling for Monitoring

Parameters shall be used to fulfill the Spring and Fall ground water flow rate/direction analyses required under Part II.C.6. Statistical or non-statistical analysis shall be carried out as soon as the data is available, in accordance with Part III of this program.

2. "Indirect Monitoring" for Monitoring Parameters Done Annually. For each monitored medium, all Monitoring Points assigned to Detection Monitoring [Part II.C.4., below] and all Background Monitoring Points shall be monitored once each Spring and Fall [Winter/Spring and Summer/Fall Reporting Periods end on March 31 and September 30, respectively] for the Monitoring Parameters listed in Specification B.5 of this Order. Monitoring for Monitoring Parameters shall be carried out in accordance with Parts II.C.1 and III of this Program.

3. "Direct Monitoring" of all Constituents of Concern Every Five Years. In the absence of a release being indicated (1) pursuant to Parts II.C.2 and III.A.3. for a Monitoring Parameter, (2) based upon physical evidence, pursuant to Part I.E.3.c., or (3) by a study required by the Executive Officer based upon anomalies noted during visual inspection of graphically-depicted analytical data [Part I.E.2.a.] **then** the Discharger shall sample all Monitoring Points and Background Monitoring Points for water-bearing media -- not including soil pore gas -- for all Constituents of Concern every fifth year, beginning with the year of adoption of this revised Order, with successive direct monitoring efforts being carried out alternately in the Spring of one year [Reporting Period ends March 31] and the Fall of the fifth year thereafter [Reporting Period ends September 30]. Direct monitoring for Constituents of Concern shall be carried out in accordance with Parts II.C.1 and III of this Program, and shall encompass only those Constituents of Concern that do not also serve as a Monitoring Parameter.

4. Monitoring Points and Background Monitoring Points for Each Monitored Medium: The Discharger shall sample the following Monitoring Points and Background Monitoring Points in accordance with the sampling schedules given under Parts II.C.2. and II.C.3. [immediately foregoing], taking enough samples to qualify for the most appropriate test under Part III:

   a. **For ground water in the uppermost aquifer:** The Monitoring Points shall be Point of Compliance wells B1, B3, B4, B6, C7, and C8; the Background Monitoring Points shall be wells C-9 and C-10. The location of the wells listed above are shown on Figure X.

   b. **For surface water in the American River:** The Monitoring Point is R2 (Downstream) and Background Monitoring Point is R1 (Upstream).

5. Quarterly Determination of Ground Water Flow Rate/Direction [§2550.7(3)(15) of Article 5]:
The Discharger shall measure the water level in each well and determine ground water flow rate and direction in each ground water body described in Part II.C.4. at least quarterly, including the times of expected highest and lowest elevations of the water level for the respective ground water body. This information shall be included in the yearly monitoring reports required under Part II.C.2.

6. Detection Monitoring Parameters & Constituents:
Each of the Detection Monitoring network wells shall be sampled once quarterly for the following parameters and constituents. Quarterly sampling points shall include the times of expected highest and lowest elevations of the water surface.

Parameter/Constituent	Report in Units of	Test Method
Volatile Organic Compounds	µg/l	EPA 601/602
Calcium	mg/l	EPA 6010
Magnesium	mg/l	EPA 6010
Potassium	mg/l	EPA 6010
Sodium	mg/l	EPA 6010
Bicarbonate	mg/l	EPA 310.1
Nitrate	mg/l	EPA 300.0/352.1
Sulfate	mg/l	EPA 300.0/375.4

The Discharger shall determine at each sampling station whether there is a statistically significant increase over water quality protection standards for each parameter and constituent analyzed.

The ground water surface elevation (in feet and hundredths, M.S.L.) in all ground water monitoring wells shall be measured to the nearest .01 feet on a quarterly basis. These elevations shall be used to determine the velocity and direction(s) of ground water flow on a quarterly basis. This information shall be displayed on a water table contour map and/or ground water flow net for the facility.

Removal or replacement of monitoring wells from the monitoring network must be approved by the Board staff. Such wells shall be properly destroyed within 90 days of removal from the monitoring network.

E. Water Quality Protection Standards

The Water Quality Protection Standards for the Detection Monitoring Program shall consist of the list of Constituents of Concern, the Concentration Limits for each constituent, and the Point of Compliance and all additional monitoring points specified herein.

1. The Constituents of Concern for surface, and ground waters shall be as follows:

Parameter/Constituent	Report in Units of	Test Method
Volatile Organic Compounds	µg/l	EPA 8240
Semivolatile Organic Compounds	µ/l	EPA 8270
Chlorinated Pesticides and PCBs	µg/l	EPA 8080
Chlorophenoxy Herbicides	µ/l	EPA 8150
Metals	mg/l	EPA 6010 & Series 7000
Bicarbonate	mg/l	EPA 310.1
Chloride	mg/l	EPA 300.0
Nitrate	mg/l	EPA 200.0/352.1
Sulfate	mg/l	EPA 300.0/375.4
Total Kjeldahl Nitrogen	mg/l	EPA 351.4
Electrical Conductivity	µumhos/cm	EPA 120.1
pH (field)	pH units	EPA 150.1
Total Dissolved Solids	mg/l	EPA 160.1

In addition, the Constituents of Concern for surface water shall include the following:

Chemical Oxygen	mg/l	EPA 410.1
Dissolved Oxygen	mg/l	field determined

2. Concentration Limits. Concentration limits for the Detection Monitoring Program shall be calculated using the tolerance Interval Method with a 95% confidence level. The tolerance interval for each constituent shall be calculated separately for surface water, and each ground water monitoring zone. Concentration limits shall be continuously updated and recalculated as additional monitoring data is obtained. Any downgradient monitoring points that yield samples outside the tolerance interval will be retested or moved into the Evaluation Monitoring Program in accordance with 23 CCR 15 Article 5, section 2550.8.

3. Monitoring Procedures. The Discharger is required to perform sampling, analysis, and observations according to the schedule specified above, using the sampling and analytical methods specified in this program. Sampling and analysis methods shall be as follows.

   Prior to pumping monitoring wells for sampling, the ground water surface elevation shall be measured (within 0.01 feet) in each well. Prior to sampling the Discharger shall purge each well until pH and specific conductance have stabilized, but no less than three well bore volumes.

   Travel blanks shall be taken for each ice chest or cooler with samples of volatile organics analysis. Samples shall be tracked and controlled through approved chain of custody procedures. Any modifications to sampling, analytical, or handling procedures must receive prior approval of the Executive Officer.

Part III: STATISTICAL AND NON-STATISTICAL ANALYSIS OF SAMPLE DATA DURING A DETECTION MONITORING PROGRAM

A. The Discharger shall use the following methods to compare the downgradient concentration of each monitored constituent or parameter with its respective background concentration to determine if there has been a release from the Unit. For any given data set, proceed sequentially down the list of statistical analysis methods listed in Part III.A.1., followed by the non-statistical method in Part III.A.2., using the first method for which the data qualifies. If that analysis tentatively indicates the detection of a release, implement the retest procedure under Part III.A.3.

1. Statistical Methods. The Discharger shall use one of the following statistical methods to analyze Constituents of Concern or Monitoring Parameters which exhibit concentrations exceeding their respective MDL in at least ten percent of the background samples taken during the Reporting Period. Except for pH, which uses a two-tailed approach, the statistical analysis for all constituents and parameters shall be one-tailed [testing only for statistically significant increase relative to background]:

   a. One-Way Parametric Analysis of Variance (ANOVA), followed by multiple comparisons §2550.7(e)(8)(A)]. This method requires at least four independent samples from each Monitoring Point and Background Monitoring Point during each sampling episode. It shall be used when the background data for the parameter or constituent, obtained during a given sampling period, has not more than 15% of the data below the PQL. Prior to analysis, replace all "trace" determinations with a value

halfway between the PWL and MDL values reported for that sample run. The ANOVA shall be carried out at the 95% confidence level. Following the ANOVA, the data from each downgradient Monitoring Point shall be tested at a 99% confidence level against the pooled background data. If these multiple comparisons cause the Null Hypothesis [i.e., that there is no release] to be rejected at any Monitoring Point, the Discharger shall conclude that a release is tentatively indicated for that parameter or constituent;

b. One-Way Non-Parametric ANOVA (Kruskal-Wallis Test), followed by multiple comparisons. This method requires at least nine independent samples from each Monitoring Point and Background Monitoring Point; therefore, the Discharger shall anticipate the need for taking more than four samples per Monitoring Point, based upon past monitoring results. This method shall be used when the pooled background data for the parameter or constituent, obtained within a given sampling period, has not more than 50% of the data below the PQL. The ANOVA shall be carried out at the 95% confidence level. Following the ANOVA, the data from each downgradient Monitoring Point shall be tested at a 99% confidence level against the pooled background data. If these multiple comparisons cause the Null Hypothesis (i.e., that there is no release) to be rejected at any Monitoring Point, the Discharger shall conclude that a release is tentatively indicated for that parameter or constituent; or

c. Method of Proportions. This method shall be used if the "combined data set" -- the data from a given Monitoring Point in combination with the data from the Background Monitoring Points -- has between 50% and 90% of the data below the MDL for the constituent or parameter in question. This method (1) requires at least nine downgradient data points per Monitoring Point per Reporting Period, (2) requires at least thirty data points in the combined data set and (3) requires that $n * P > 5$ [where n is the number of data points in the combined data set and P is the proportion of the combined set that exceeds the MDL]; therefore, the Discharger shall anticipate the number of samples required, based upon past monitoring results. The test shall be carried out at the 99% confidence level. If the analysis results in rejection of the Null Hypothesis [i.e., that there is no release], the Discharger shall conclude that a release is tentatively indicated for that constituent or parameter; or

2. Non-Statistical Method. The Discharger shall use the following non-statistical method for the VOC_{water} Composite Monitoring Parameters and for all Constituents of Concern which are not amenable to the statistical tests under Part III.A.1; each of these groupings of constituents utilizes a separate variant

of the test, as listed below. Regardless of the variant used, the method involves a two-step process: [1] from all constituents to which the variant applies, compile a list of those constituents which exceed their respective MDL in the downgradient sample, yet do so in less than ten percent of the applicable background samples; and [2] evaluate whether the listed constituents meet either of two possible triggering conditions. For each Monitoring Point, the list shall be compiled based on either (1) the data from the single sample [for that constituent] taken during that Reporting Period from the Monitoring Point, or (2) [where several independent samples have been analyzed for that constituent at a given Monitoring Point] from the sample which contains the largest number of constituents. Background shall be represented by the data from all samples taken from the appropriate Background Monitoring Points during that Reporting Period [at least one sample from each Background Monitoring Point]. The method shall be implemented as follows:

a. For the Volatile Organics Composite Monitoring Parameter for Water Samples [VOC_{water}]: For any given Monitoring Point, the VOC_{water} Monitoring Parameter is a composite parameter addressing all VOCs detectable using USEPA Method [NOTE: See Discussion & insert most appropriate method] -- including at least all 47 VOCs listed in Appendix 1 to 40 CFR 258, and all unidentified peaks. Compile a list of each VOC which (1) exceeds its MDL in the Monitoring Point sample [an unidentified peak is compared to its presumed MDL]. and also (2) exceeds its MDL in **less than** ten percent of the samples taken during the Reporting Period from that medium's Background Monitoring Points. The Discharger shall conclude that a release is tentatively indicated for the VOC_{water} Composite Monitoring Parameter if the list **either** (1) contains two or more constituents, or (2) Contains one constituent that exceeds its PQL;

b. For Constituents of Concern: Compile a list of constituents that exceed their respective MDL at the Monitoring Point yet do so in less than ten percent of the background samples taken during that reporting period. The Discharger shall conclude that a release is tentatively indicated if the list either (1) contains two or more constituents, or (2) contains one constituent which exceeds its PQL.

3. Discrete retest [§2550.7(e)(8)(E) of Article 5]. In the event that the Discharger concludes that a release has been tentatively indicated [under Parts III.A.1 or III.A.2], the Discharger shall -- within 30 days of this indication -- collect two new suites of samples for the indicated Constituent(s) of Concern or Monitoring Parameter(s) at each indicating Monitoring Point, collecting at least as many samples per suite as were used for the initial test. Resampling of the Background Monitoring Points is optional. As soon as the

data is available, the Discharger shall rerun the statistical method [or both] of the retest data suites confirms the original indication, the Discharger shall conclude that a release has been discovered. All retests shall be carried out only for the Monitoring Point(s) for which a release is tentatively indicated, and only for the Constituent of Concern or Monitoring Parameter which triggered the indication there, as follows:

a. In an ANOVA method was used, the retest shall involve only a repeat of the multiple comparison procedure, carried out separately on each of the two new suites of samples taken from the indicating Monitoring Point;

b. If the Method of Proportions statistical test was used, the retest shall consist of a full repeat of the statistical test for the indicated constituent or parameter, using the new sample suites from the indicating Monitoring Point;

c. If the non-statistical method was used:

1) Because the VOC Composite monitoring Parameters [VOC_{water} or VOC_{spg}] each address, **as a single parameter**, an entire family of constituents which are likely to be present in any landfill release, the scope of the laboratory analysis for each retest sample shall include all VOCs detectable in that retest sample. Therefore, a confirming retest for either parameter shall have validated the original indication even if the suite of constituents in the confirming retest sample(s) differs from that in the sample which initiated the retest;

2) Because all Constituents of Concern that are jointly addressed in the non-statistical testing under Part III.A.2.c. remain as individual Constituents of Concern, the scope of the laboratory analysis for the non-statistical retest samples shall be narrowed to involve only those constituents detected in the sample which initiated the retest.

B. Response to VOC Detection in Background

1. Except as indicated in Part III.B.2., any time the laboratory analysis of a sample **from a Background Monitoring Point**, sampled for VOCs under Part III.A., shows either (1) two or more VOCs above their respective MDL, **or** (2) one VOC above its respective PQL, **then** the Discharger shall immediately notify the Regional Board by phone that possible background contamination has occurred, shall follow up with written notification by certified mail within seven days, and shall obtain two new independent VOC samples from that Background Monitoring Point and send them for laboratory analysis of all detectable VOCs within thirty days. If either or both the new samples

validates the presence of VOC(s) at that Background Monitoring Point, using the above procedure, the Discharger shall:

(a) immediately notify the regional Board about the VOC(s) verified to be present at that Background Monitoring Point, and follow up with written notification submitted by certified mail within seven days of validation; and

(b) within 180 days of validation, submit a report -- acceptable to the Executive Officer -- which examines the possibility that the detected VOC(s) originated from the Unit and proposing appropriate changes to the monitoring program.

2. If the Executive Officer determines, after reviewing the report submitted under Part III.B.1.b, that the VOC(s) detected originated from a source other the Unit, the Executive Officer will make appropriate changes to the monitoring program.

3. If the Executive Officer determines, after reviewing the report submitted under Part III.B.1.b, that the detected VOC(s) most likely originated from the Unit, the Discharger shall assume that a release has been detected and shall immediately begin carrying out the requirements of Part I.E.2.d.

APPENDIX I

DEPARTMENT OF
PUBLIC WORKS

SOLID WASTE DIVISION

CITY OF SACRAMENTO
CALIFORNIA

921 TENTH STREET
SUITE 500
SACRAMENTO, CA
95814-2715

916-449-5757

DAVID A. PELSER
SOLID WASTE
DIVISION MANAGER

March 1, 1991

Mr. Steve E. Rosenbaum, Engineering Geologist
California Regional Water Quality Control Board
3443 Routier Road
Sacramento, California 95827

RE: CITY OF SACRAMENTO CORRECTIVE ACTION PROGRAM TASKS 1 AND 2

Dear Mr. Rosenbaum:

Attached herewith is one copy of the City of Sacramento 28th Street landfill's Corrective Action Program Tasks 1 and 2. Should you have any questions please call me at 449-8281.

Sincerely,

Keith A. Johnson
Senior Engineer

Enclosures

cc: David A. Pelser, Division Manager
FILE: LF-2.1

FINAL REPORT

City of Sacramento 28th Street Landfill
Groundwater Corrective Action Program Tasks 1 and 2

Prepared By

Solid Waste Division

of

City of Sacramento Department of Public Works

March 1, 1991

Pursuant to the 28th Street Landfill's current Waste Discharge Requirements (Board Order #88-207, December 14, 1988) a Corrective Action Program was submitted to the Central Valley Regional Water Quality Control Board (CVRWQCB) on January 31, 1990. The Corrective Action Program outlined six tasks which were to be accomplished by the City of Sacramento. This report is intended to satisfy Tanks 1 and 2 of the Short Term Groundwater Remediation Workplan, which is part of that Corrective Action Program.

Task 1 - The groundwater data collected after the June 1987 SWAT report will be analyzed. Current gradients and groundwater flow vector diagrams will be produced from this data. Additional analysis of the current groundwater data will help provide a better understanding of the groundwater regime underlying the landfill. The rate of transport and transport mechanism for the affected groundwater will be assessed along with the vertical and horizontal extent of the any plume. In addition, aquifer characteristics such as horizontal and vertical confinement, hydraulic conductivity, and recharge rates will be studied.

Task 2 - The characteristics of the contaminates such as the density, solubility, concentration, and possible plume size will be investigated. Both tasks 1 and 2 will also be completed by January

31, 1991.

Tasks 3, 4, 5 and 6 involve maintenance of positive landfill surface drainage, installation of a landfill gas collection system, completion of the final cover section, and monitoring the network of water quality wells for an additional year after the completion of the landfill's final cover. These tasks are ongoing or will be performed in the future.

Site geology was covered in detail in the June 1987 Solid Waste Assessment Test Report, and the January 31, 1990 Corrective Action Program, and therefore it will not be addressed in this report. Appendix A contains a list of the past technical reports prepared for the site. Figure 1a shows a compilation of the approximate locations of all the groundwater monitoring wells, production wells and exploratory borings on or near the landfill. Figure 1b is a recent topographic map of the site. No additional exploratory borings were drilled as a result of this report. It is anticipated that some additional subsurface information may be required in the future.

Groundwater Equipotential Maps

Figures 2 through 15 display equipotential lines representing groundwater elevations across the site. Table 1 contains the raw groundwater elevation data used to produce the equipotential figures. In past reports these figures were prepared manually by interpolating between known groundwater elevations at the 19 groundwater monitoring wells surrounding the site. Due to the time consuming nature of this process, the placement of equipotential lines between known data points was approximated after only a few interpolations. The figures contained in this report were prepared by a computer program (Surfer, Version 3.0, or GEO-EAS, Version 1.2.1) which performs many interpolates between the available data and calculates the placement of the equipotential lines. The program is considered to be more accurate than the manual approach because more interpolations can be performed. The figures prepared by the computer substantially agree with the manually produced maps in most cases.

The figures indicate that the predominate flow of groundwater across the site is to the South. Groundwater streamlines, if they were to be added to the figures, would be at right angles to the equipotential lines shown. Reversals of flow, which were documented in the June 1987 SWAT report, are not generally present in 1989 or 1990. This can probably be attributed to the lower than normal precipitation experienced in the last several years and the

consistently low elevation of the American River when compared to years with normal rainfall.

The historic reversals in flow across the site have been attributed to bank storage in the levees and adjacent landfill subsurface soils due to high river levels. High River levels were followed by periods of low river levels causing stored groundwater to flow North. The lack of groundwater flow to the North in 1989 and 1990 ensures that groundwater which may be affected by the landfill does not enter the American River.

The landfill's groundwater regime is heavily influenced by the American River. High American River flows will tend to cause a larger Southerly gradient across the site. It should be noted that the American River elevation can change rapidly, depending upon the Bureau of Reclamation's strategy for regulating flows. There have been several months where, by chance, groundwater monitoring information was gathered immediately after a drastic change in the level of the American River. Due to the time delay between a change in the elevation of the American River and the corresponding effect on the monitoring wells to the South, some River elevations did not match the adjacent monitoring information. In some cases, this caused the computer drawn equipotential contour lines to cross the River, which is incorrect. To force the computer to correctly interpret the groundwater information, some River elevations different from the original data, were artificially imposed on the

program.

Groundwater Vector Analysis

The groundwater migration distances were calculated using the results of the vector analysis. The rectilinear flow velocity or specific discharge **V**, (**V=ki** where **k** is the permeability and **i** is the groundwater gradient) is the apparent velocity of groundwater across the site. Groundwater velocity through the soil was calculated using Darcy's equation. Darcy's equation, **v=ki/n**, where **n**=porosity of the soil, would yield the actual velocity of a water particle across the site. Based on boring log information, the effective porosity was estimated to be 30%. Using the porosity, an hydraulic conductivity of 375 gal./day/foot and gradients of .0009 and .00048 feet per foot, the average linear velocity ranges from 0.161 feet per day to 0.086 feet per day.

Two annual groundwater vector analyses were performed; one for the year 1989 and one for 1990, (see Figures 16 and 19). Vector diagrams were developed based upon groundwater velocities along the orthogonal N-S and E-W axes. Travel distances were calculated using once monthly hydraulic gradient field measurements, Darcy's Law, and the number of days in each month. Data from wells B1, B4, B6, and C7 were used for the vector analysis. The two analyses yielded similar results, (i.e. the general direction of travel of the groundwater is to the south). Based on the resultant vectors shown

as bold arrows in the figures, the migration distances and directions were as follows:

Well B4 - 1990

Migration of 25 feet bearing S 31^0 W

Well B1 - 1990

Migration of 18 feet bearing S 13^0 E

Well B4 - 1989

Migration of 33 feet bearing S 23^0 W

Well B1 - 1989

Migration of 28 feet bearing S 7^0 W

Although the direction of flow is similar to the direction indicated in the SWAT report, the theoretical distance traveled by the groundwater as determined by this analysis is less. This could be attributed to shallower gradients. The diagrams also indicate one directional flow of the groundwater during those years, i.e. flows each month were to the South with essentially no flow back to the North. Northern flows would counteract some of the progress made by the affected groundwater in the Southerly direction, and increase dispersion.

The northern groundwater gradients between wells B1 and B4 were largest in January 1990 (.0009 ft/ft.) and smallest in March 1990 when there was no gradient at all. The eastern gradient between wells B1 and C7 were largest in January 1990 (.00048 ft/ft) to the

east, and smallest in August 1990 when there was not gradient at all. There was no western movement of groundwater between wells B1 and C7.

Vertical gradients can be measured at the two shallow/deep well pairs in the groundwater monitoring well network. Vertical downward gradients were measured at wells C11D and C11S (Tables 2 & 3). No sizeable downward gradient was measured at wells C14 and D18. The downward gradient at wells C11S and C11D were postulated in the June 1987 SWAT report to be caused by the Mize agricultural well. This downward gradient would tend to promote downward migration of affected groundwater in this area if the two aquifers were in communication. Water quality monitoring results indicate that leachate parameters at Well C11D have not significantly increased, which would indicate a hydraulic barrier between the two aquifers. Wells C14 and D18 do not indicate the same degree of downward gradient. There are no deep production wells near well D18 to draw down the lower aquifer and create such a gradient.

Constituent Concentration Maps

Figures 20 through 39 display groundwater monitoring results for various constituents. Areas which are of greatest concern are delineated by "Bulls Eye" contour patterns. Contaminate concentrations were contoured using a computer program (Surfer,

Version 3.0) which interpolates between the 19 groundwater monitoring wells sampled by the City. Figures were prepared for pH, FE, CL, COD, and EC. These are standard leachate indicator parameters. Figures 20 through 40 can be compared with pH, EC and COD figures prepared for the September 20, 1989 Verification Monitoring Program Status Report, and the January 31, 1990, Corrective Action Plan Submittal.

Although the concentration contour maps do include some landmarks, this report includes a clear half tone overlay of the entire area which can be placed over the contour maps to provide additional landmarks. The overlay also contains monitoring well labels. Consistent with the landfill's Waste Discharge Requirements, wells B1, B3, B4, B6, C7, and C8 constitute points of compliance with cleanup levels, while wells C9 and C10 are background wells.

A comparison of the second and fourth quarter 1989 COD concentration plots with the second and fourth quarter 1990 concentration plots indicated that COD levels have increased slightly in monitoring wells surrounding the 113 acre permitted landfill. Average COD levels in wells B1, C7 and C8 are as follows:

2nd Quarter 1989 Average COD Levels - 25 ppm

4th Quarter 1989 Average COD Levels - 27 ppm

2nd Quarter 1990 Average COD Levels - 34 ppm

4th Quarter 1990 Average COD Levels - 34.2 ppm

1990 COD concentration plots do not indicate a clearly defined plume migrating to the South of the 113 acre permitted landfill. Monitoring well C11S, which is to the South of wells B1, C7,and C8, has COD levels similar to background levels.

A comparison of second and fourth quarter 1989 EC concentration plots with second and fourth quarter 1990 concentration plots indicate that, similar to the COD information, the EC levels have increased slightly in the monitoring wells surrounding the 113 acre permitted landfill. Average EC levels in wells B1, C7, and C8 are as follows:

2nd Quarter 1989 Average EC Levels - 820	umhos/cm
4th Quarter 1989 Average EC Levels - 830	umhos/cm
2nd Quarter 1990 Average EC Levels - 992	umhos/cm
4th Quarter 1990 Average EC Levels - 957	umhos/cm

An area of elevated contamination levels is delineated in the second and fourth quarter 1990 EC concentration plots. To some extent this area of increased EC concentrations has migrated to the south, although confirmation of continued expansion of the area of contamination will require further monitoring. Significant expansions of the contaminate area could prompt an acceleration of the corrective action program. Other leachate parameters have generally shown minor increases less significant than COD and EC.

The need for additional monitoring information downgradient and south of Well C11S may be justified if continued expansion in the area of contamination is documented. The groundwater monitoring well network which is currently in place is extensive enough to limit gaps in the monitoring information.

In general, the area with the highest concentrations of leachate parameters is to the west of the permitted 113 acre City owned landfill site. The highest levels of CL, COD, and EC were located near or directly over areas which were landfilled 25 to 30 years ago. Fourth quarter 1990 EC and CL data were also plotted in three dimensions using the Surfer 3D capability, Figures 40 and 41. The Z axis of these plots is contaminate concentration. These figures must be compared with the two dimensional plots prepared from the same data to accurately locate the concentration peaks.

Interestingly, the pH and FE contour maps for 1990 indicate that the greatest deviation from background levels is at, or slightly to the south of, the 113 acre permitted landfill. This is an indication of the reducing environment in the landfill which is discussed further in the contaminate transport characteristics section.

Constituent concentration maps only provide an indication of how far leachate has traveled in the past. Predicting the distance the contaminates will travel in the future using mathematical models is

a complex problem and beyond the scope of this report. (To simplify mathematical models so that a solution may be achieved, highly idealized field conditions must be used and therefore the applicability of the final results is questionable.) However, if the primary mode of contaminate transport is related to groundwater flow, a comparison of the current data with past years data is useful. Keeping in mind that the magnitude of the groundwater gradient must be taken into account, contaminate movement distances may be extrapolated using the 1989 and 1990 vector analysis distances.

CONTAMINATE TRANSPORT CHARACTERISTICS

The range of contaminates contained in the groundwater underlying the landfill are a function of the composition of the leachate generated by the landfill. The composition of leachate produced from municipal solid waste landfills is highly variable depending on factors such as refuse age, refuse composition, the rate of infiltration, landfill depth and landfill temperature. (Also, if the waste is processed in some way, such as baling, the rate at which contaminates are released from the refuse is reduced.) The leaching behavior and mobility of contaminates such as metals depends on many additional factors, some of which are advection, dispersion, adsorption, and biologic degradation.

Advection is the transport of contaminates at a velocity equivalent to the groundwater flow. In one year contaminates would be expected to travel, via the bulk motion of the groundwater, the distances calculated in the vector analysis for groundwater movement across the site. Differing values of hydraulic conductivity within the aquifer and different groundwater gradients will yield differing groundwater velocities and migration rates. Since the site is underlain by alluvial deposits with a wide range of hydraulic conductivities, and the groundwater monitoring wells may not accurately characterize the entire site, contaminates may have migrated farther than would be expected by analyzing the constituent concentration maps.

Dispersion refers to the dilution of a contaminate by molecular diffusion and fluid mixing. Dispersion of a contaminate can ether accelerate or retard it's movement. Values of the dispersivity of soil vary greatly and laboratory values are usually found to be incorrect when field tracer tests are performed. The decrease in contaminate concentrations vs distance from the landfill can be partially attributed to dispersion. The decrease in leachate concentrations vs the distance from the landfill is also related to the solubility of the constituent, as chemicals have a tendency to migrate from areas of high concentrations to areas of low concentrations.

Adsorbtion/desorbtion refers to the retention of contaminates in

the soil by means of partitioning between the aqueous phase and solids. This process is most significant for organic and metal contaminates and is influenced by the physical and chemical characteristics of the adsorbing surface and the contaminate. Contaminants which are hydrophobic will adsorb to soil particles rather than stay in solution. Contaminates that adsorb strongly to subsurface particles are retarded in their movement. This may explain the lack of certain organic constituents in the landfills perimeter monitoring wells. Desorbtion of iron from saturated soils may explain the high iron concentrations. Therefore, iron may not be a valid indicator of leachate migration.

Adsorbtion/desorbtion of metals is primarily controlled by two factors, pH and redox potential. Reducing conditions may be associated with a low pH resulting from the formation of CO_2 and organic acids caused by microbial degradation of organics in an anaerobic environment. This is typically the case for saturated subsurface soils underlying a landfill. Anaerobic conditions would enhance the mobility and concentration of metals in saturated subsurface soils. An example of this can be seen when sampling many of the landfill's perimeter monitoring wells. Iron is present in an anaerobic environment in it's ferrous form, which is much more soluble than the ferric form. When groundwater samples are taken, the water turns brown within minutes, as the ferric form is created in the presence of oxygen and precipitates out of solution.

Biologic degradation of organic contaminates will result in a reduction in the concentration of many contaminates. Although the micro-organisms can be introduced artificially, they are also naturally occurring in subsurface soils. Biologic degradation of organic constituents in the unsaturated and saturated zones may be another explanation for the lack of organics in the perimeter monitoring wells.

Much research has been done on the composition of landfill leachate. The leachate generated by the 28th Street Landfill is probably similar to that of a typical landfill, although the percentage of yard and garden refuse in the City's waste stream is higher. To date no leachate has been generated in the expansion area's leachate collection system and therefore no laboratory data is available on the 28th Street landfill's leachate. Typical leachate parameters, as listed in the book "Leachate from Municipal Landfills" by James Lu and Bert Eichenberger, are as follows: COD average of 10,000ppm with a range of 1,000 to 100,000ppm, FE average of 100ppm with a range of 10 to 1,000ppm, CL average of 1,000ppm with range of 100 to 4,000ppm, an average pH of 6, and EC average of 5,000 with a range of 1000 to 7,500umhos/ml.

These typical leachate parameters can be compared with average fourth quarter 1990 compliance well data for the same parameters, COD average 19ppm, FE average 57ppm, CL average 40ppm, pH average 6.6, and EC average 692umhos/cm. The compliance well values are

substantially lower then typical leachate values. This could be explained by either the attenuation factors listed above, or a small amount of leachate actually being generated. The migration distances and flow reversals contained in the June 1987 SWAT report groundwater vector diagrams would cause a large amount of leachate/groundwater mixing which would promote leachate dilution in the underlying groundwater. A trend of increasing constituent levels in the compliance monitoring wells would suggest that, as shown in the 1990 vector diagrams, less leachate mixing is occurring. This reduction in mixing is counteracted by several factors including the fact that much of the unlined 78 acre portion of the landfill has reached final grade and is sloped to drain and the final cover section has been applied to 14 acres of the 78 acre section. These factors have reduced the infiltration rate into the refuse and will therefore reduce the amount of leachate generated.

LEACHATE MOBILITY

Leachate mobility is dependent upon the constituent involved. The relative mobility of the constituents typically found in leachate has not been studied to a great extent. A report prepared for the EPA by Griffen and Shimp states that iron, chlorides, COD, hardness, and sodium were the most mobile and were good indicators of leachate. However, chloride is ranked as the best indicator of leachate contamination when background chloride levels are below 50 ppm.

Iron was solubilized from the soil by migrating leachate and thus iron concentrations were shown to be higher than in the original leachate. A report prepared for the EPA by Fuller indicated that COD levels were also slightly increased due to migration through soil.

CONSTITUENTS OF CONCERN

Compliance monitoring well data indicates that volatile organic compounds have posed little or no problem at the site. Typical landfill leachate contains some volatile organics. Anaerobic conditions which exist within a landfill produce bacteria which may break down volatile organics and produce vinyl chloride as an end product. This theory was postulated during the Aerojet groundwater investigation where volatile organic compounds such as TCE were degraded to Vinyl chloride by bacteria. The interior of a landfill is a very active biologic environment. Minerals and metals would be relatively unaffected by this biologic process, but organic compounds would be significantly affected. The landfill's groundwater monitoring wells have not indicated the presence of any volatile organic compounds other than vinyl chloride, and it is assumed that some biologic degradation of organic compounds is taking place.

The constituents of concern detected in the groundwater underlying the site are predominately elevated levels minerals and metals.

These contaminates are not largely effected by biodegradation. Constituents such as minerals and metals can be leachate parameters but are also naturally occurring in the American River and in groundwater in the Sacramento Valley. Minerals and metals are in some cases present in the vicinity of the landfill in concentrations above the WDR's water quality protection standards or the State primary drinking water maximum contamination levels (MCL's).

Landfill Gas Collection System

The 28th Street Landfill's phase 1 methane gas collection system has been in operation since late November, 1990. The system is currently collecting 500 cubic feet of gas per minute. Within the next few weeks gas production will be increased by 60%. This increase will be accomplished by the addition of a compressor to the gas processing system.

Phases 2 and 3 of the collection system will be installed as additional portions of the landfill reach final elevation. Installation of some of the Phase 2 gas collection wells will begin this summer.

The collection system is equipped with a condensate retrieval system which has been designed to collect the maximum amount of

condensate, with minimal amounts running back into the gas wells. The system is currently collecting 200 gallons per day of condensate. The collection system is, in effect, drying out the landfill by extracting hot, moist gas. This process should theoretically reduce the amount of leachate generated within the landfill and ultimately influence the amount of leachate entering the groundwater.

The landfill gas collection system may also reduce the amount of CO_2 in contact with the groundwater. Landfill gas is a combination of approximately 50% methane and 50% CO_2. A diminished amount of CO_2 in contact with the groundwater, (producing carbonic acid?) may improve the low pH and high FE parameters in the vicinity of the 113 acre landfill. The effects of the landfill gas collection system start-up have not been detected in the landfill's perimeter gas probes to date. When reductions in gas concentrations in the perimeter probes are detected, reductions in the landfill gas concentrations in subsurface soils in contact with groundwater would also be expected.

Landfill Final Cover

Approximately 14 acres of the landfill has received final cover to date. An additional 6 to 10 acres is scheduled to receive final cover in summer 1991. Based upon recently completed capacity calculations, the 78 acre unlined portion of the landfill should

reach final capacity in September 1991. Completion of the final cover section over the 78 acre unlined landfill will take place in mid to late 1992, after completion of the 2' foundation layer.

The construction of the landfill's final cover section is intended to drastically reduce the infiltration of water into the refuse. To quantify this reduction, HELP model simulations were performed for the final cover section discussed in the landfill's closure plan. The final cover section consists of a 2' minimum thickness of concrete and asphalt rubble mixed with soil, overlain by a 1'thick barrier clay layer, overlain in turn by a 1' thick soil layer capable of supporting grass.

The results of the HELP model simulation indicate that, of the 17.87 inches of annual precipitation averaged over a 32-year period of record, an average of 4.6 inches per year, or less than 26 percent of normal, will percolate through the final cover profile. A corresponding decrease in leachate generation can be expected as a result of the application of the final cover section.

Groundwater Pumping/Drawdown Test

As part of Corrective Action Program Task 1, additional information on the shallow groundwater aquifer characteristics were to be provided. Some information is available as a result of groundwater

pump tests performed during the Landfill's Expansion area investigation. These pump tests were short term, they did not reach a steady state, and the discharge rates were relatively low.

The 1983 Brown and Caldwell study measured drawdown, specific capacity, and transmissivity at five borings surrounding the expansion area. As a result of these tests an average hydraulic conductivity of 375 gpd/ft^2 was derived. Fine sand hydraulic conductivities are in the range of 100 to 1000 gpd/ft^2. Hydraulic conductivities for silty and poorly sorted gravel encountered in some exploratory borings could be substantially higher.

Figure 43 diagrams the installation of the groundwater production well inside the expansion area's existing groundwater pump station. Access to the pump station will be maintained after the expansion area is filled by adding additional sections of reinforced concrete pipe to the top of the pump station. Check valves will be installed to prevent any reverse flow back into the production well when it is not in use.

Figure 44 is a geologic cross section through the pump station. The production well depth will be extended to the theoretical base of the gravel layer, as recorded during the installation of well C11D. The last 15 feet of the production well's casing will be screened. As shown on the geologic cross section, the well screening will be in the silty gravel and silty sand subsurface

layers. Well production in the range of 5 gallons per minute per wet foot of 8" slotted casing is expected.

Figures 45 and 46 are groundwater equipotential plots for two pumping schemes, 25 gallons per minute and 50 gallons per minute. Appendix B contains the details of how these figure were developed. Theoretical capture zones for each pumping scheme are similar. Based on this information it is proposed to install a 50 gallon per minute submersible pump in the 8" casing, and allow it to run for 200 consecutive days. Steady state drawdowns would be measured at adjacent groundwater monitoring wells and the actual capture zone for that discharge rate will be determined. This test will provide the necessary information to implement, if necessary, a long term remedial action plan. Information gained from this test could be used to implement hydrodynamic alternative 1 contained in the January 31, 1990 Corrective Action Program.

This pumping scheme is a field test and not a cleanup program. However, the location of groundwater pump station is very close to the observed peak leachate concentrations shown on the concentration plots. Well C-7 decontamination efforts in mid January 1991 indicate that discharge rates of as little as 7.14 gallons per minute can be effective in reducing contaminate concentrations near the monitoring well. During this decontamination episode 27,346 gallons of water was pumped into the combined sewer system and vinyl chloride concentrations in C-7 were

reduced by 40%.

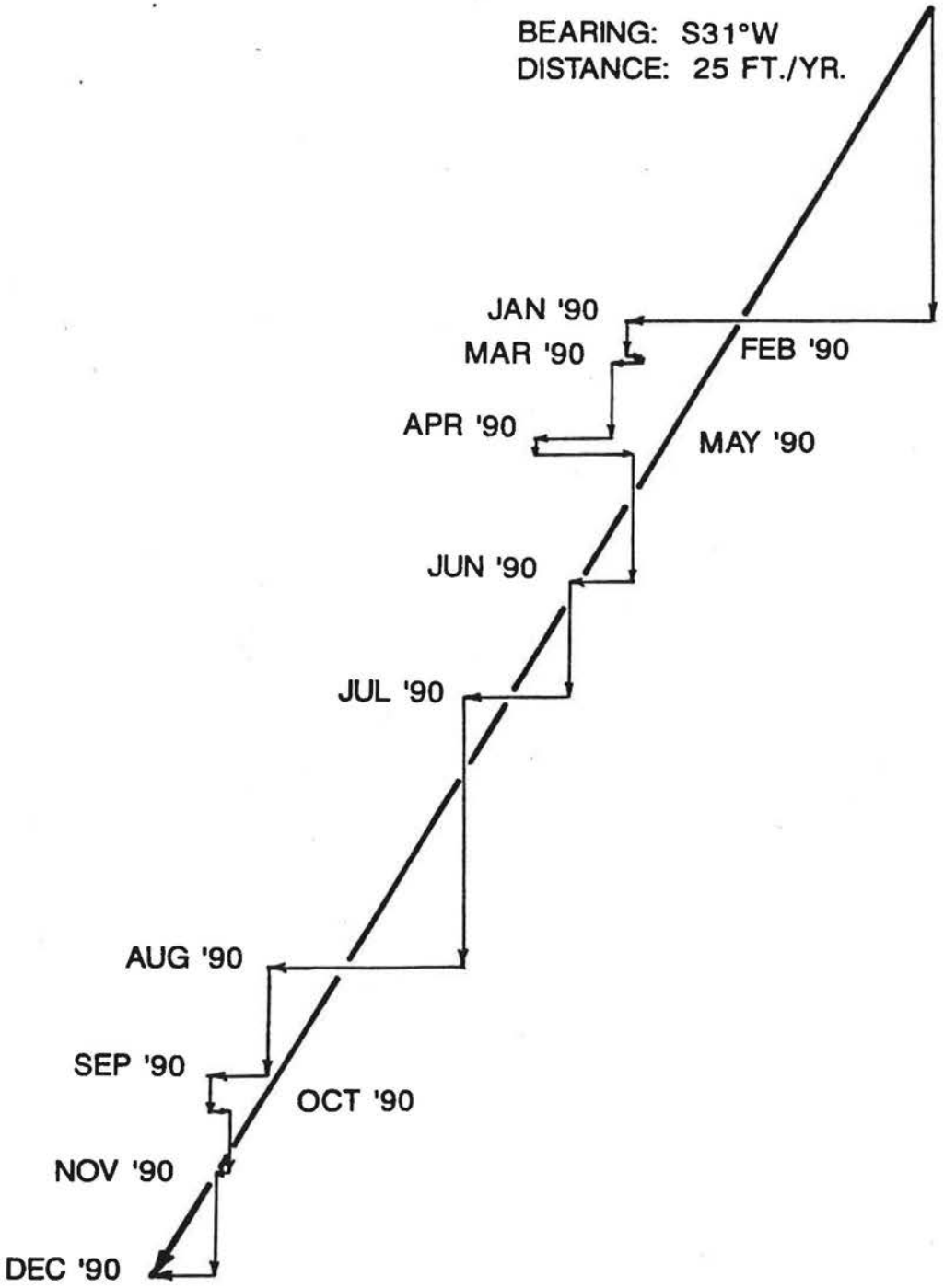
An industrial sewer use permit is required before the Solid Waste Division can begin discharging water into the combined sewer system for treatment at the Regional County Sanitation facility. The 28th Street Landfill has a current industrial sewer use permit, but in addition to the annual fee charged for the permit, treatment and capacity fees will also be charged once pumping begins. These fees were calculated, at a 50 gpm discharge rate, to approach $6,000.

CONCLUSIONS

The contaminate concentration plots indicate that there are two locations in the study where groundwater is being affected. The area to the west of the 113 acre permitted landfill is an old inactive landfill which does not have positive surface drainage, is no longer producing significant quantities of landfill gas, and also lacks an active microbial population. By contrast the permitted 113 acre landfill is producing large quantities of gas, and has a very active microbial population. These two environments affect the groundwater differently. The old landfill to the west displays high CL and high EC levels but low levels of iron and near-background pH values. The 113 acre landfill displays moderate CL and EC values, but high FE values. This area also has low pH values which are concomitant with the high FE values.

28TH ST. LANDFILL GROUND WATER FLOW VECTOR DIAGRAM AT WELL B4

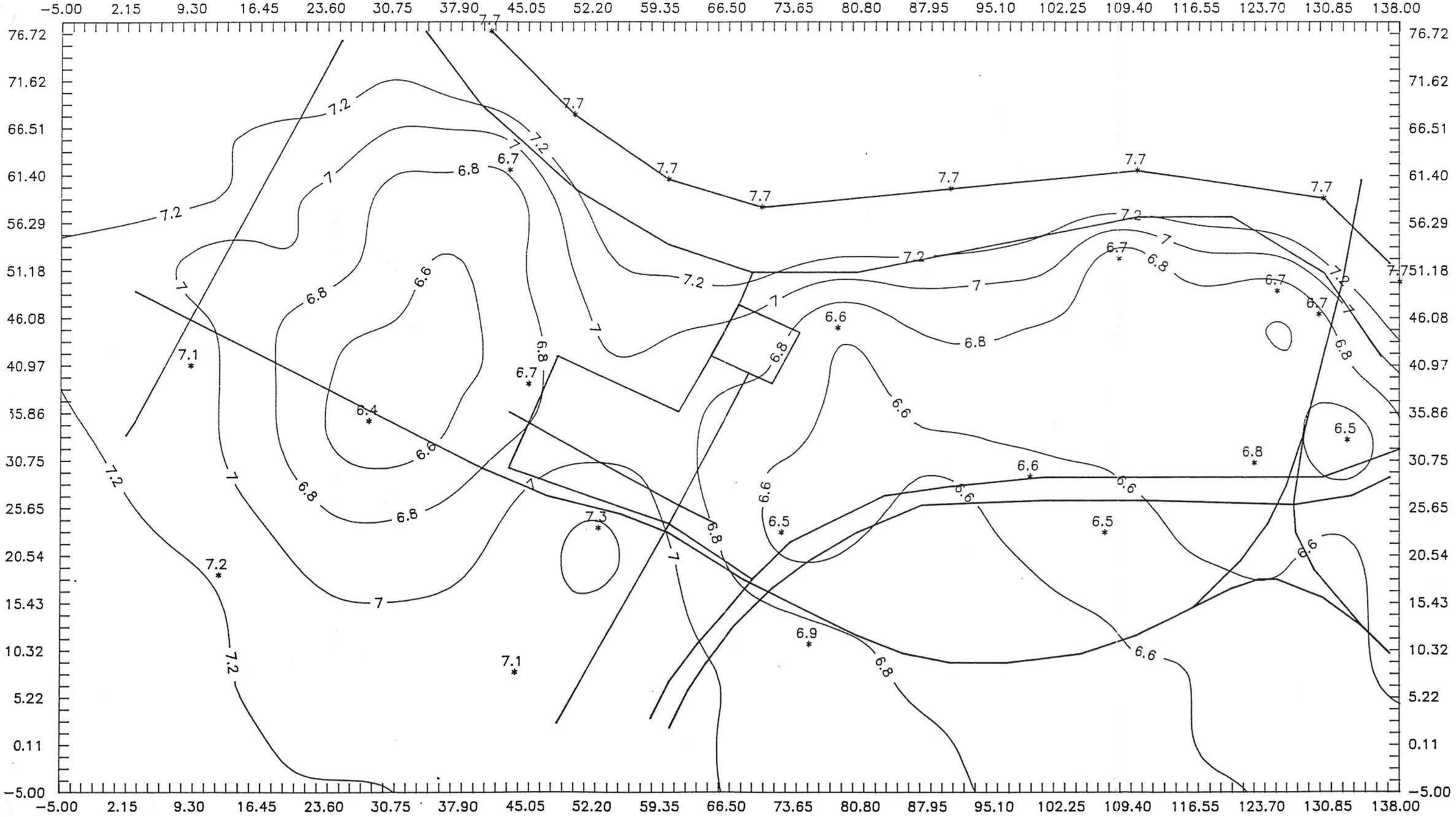
JANUARY 1990 THRU DECEMBER 1990



SCALE: 1"=3'

FIGURE 19

FIRST QUARTER 1990 PH DATA

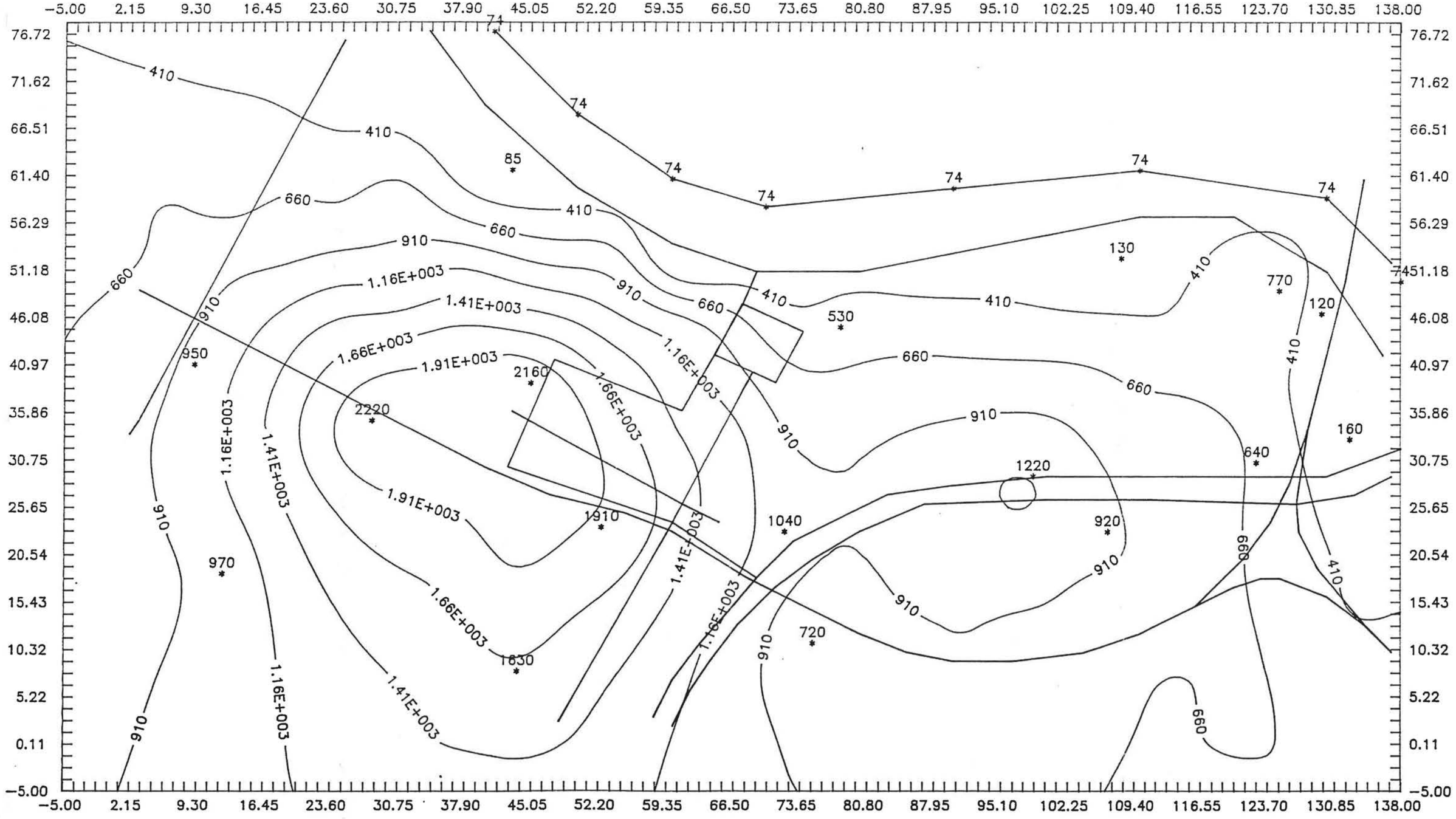


SCALE 1:10 **UNITS**

1"=600'

FIGURE 20

FIRST QUARTER 1990 EC DATA

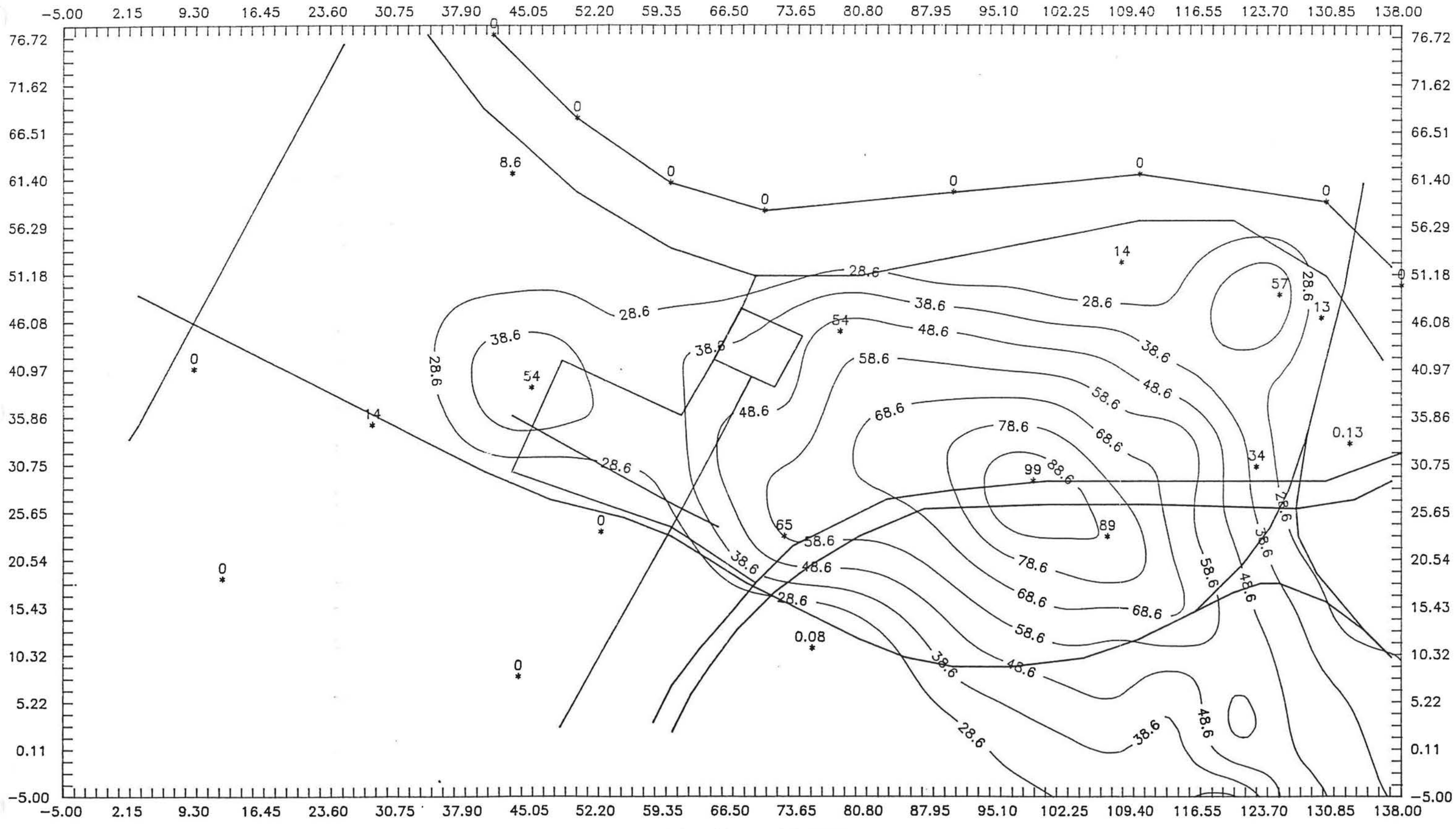


SCALE 1:10 **UNITS**

1"=600'

FIGURE 21

FIRST QUARTER 1990 FE DATA

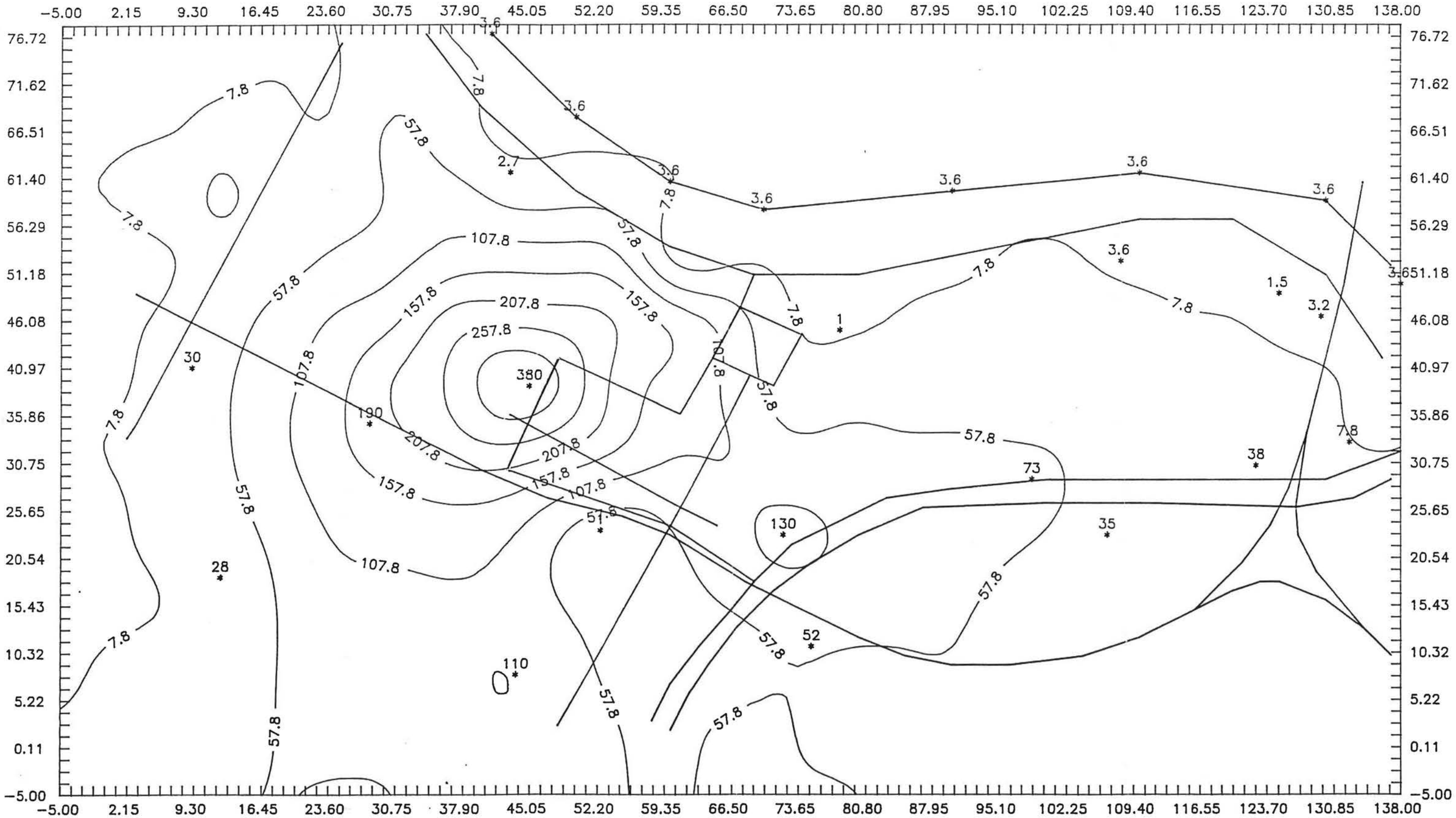


SCALE 1:10 **UNITS**

1"=600'

FIGURE 22

FIRST QUARTER 1990 CL DATA

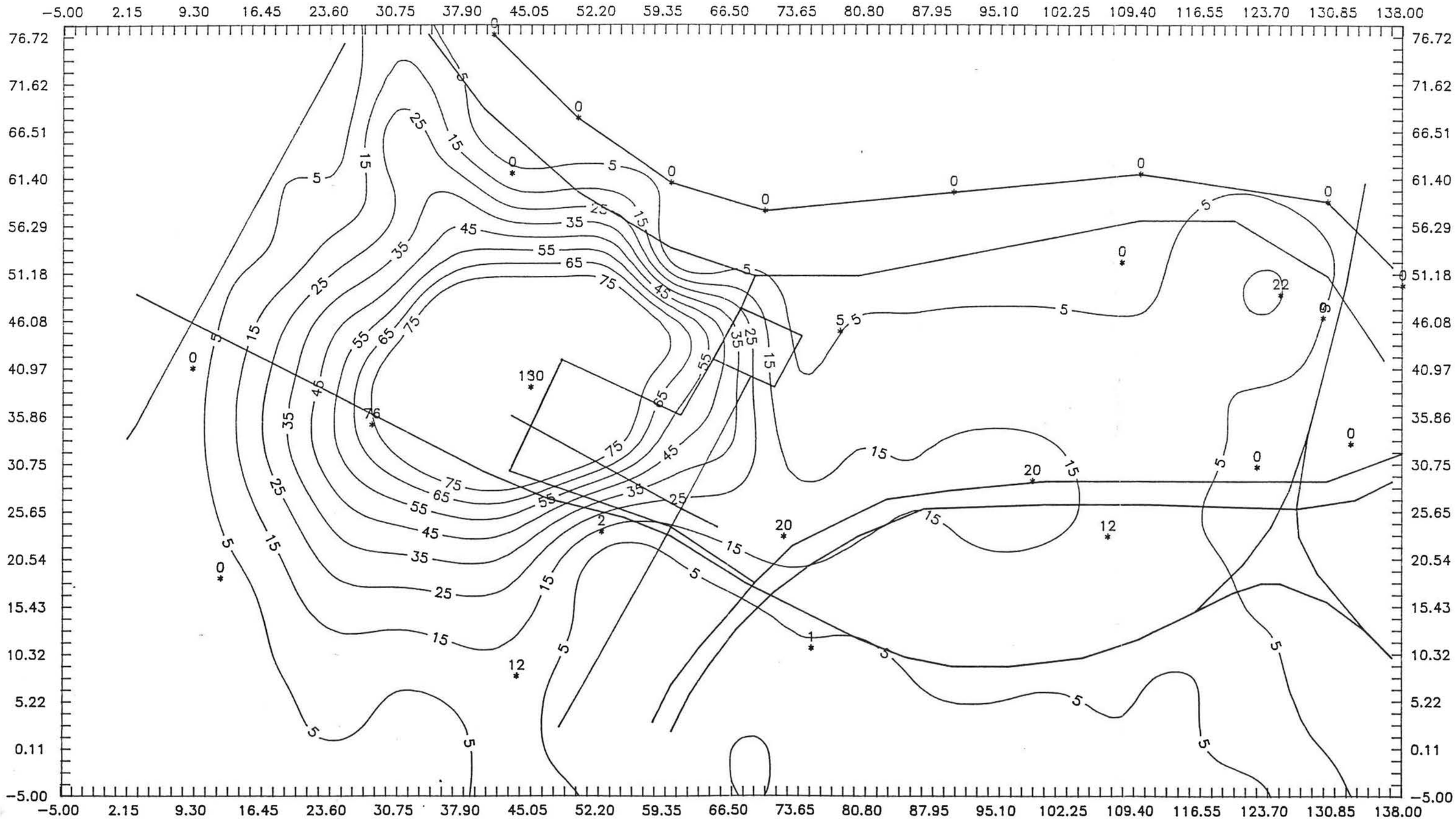


SCALE 1:10 **UNITS**

1"=600'

FIGURE 23

FIRST QUARTER 1990 COD DATA

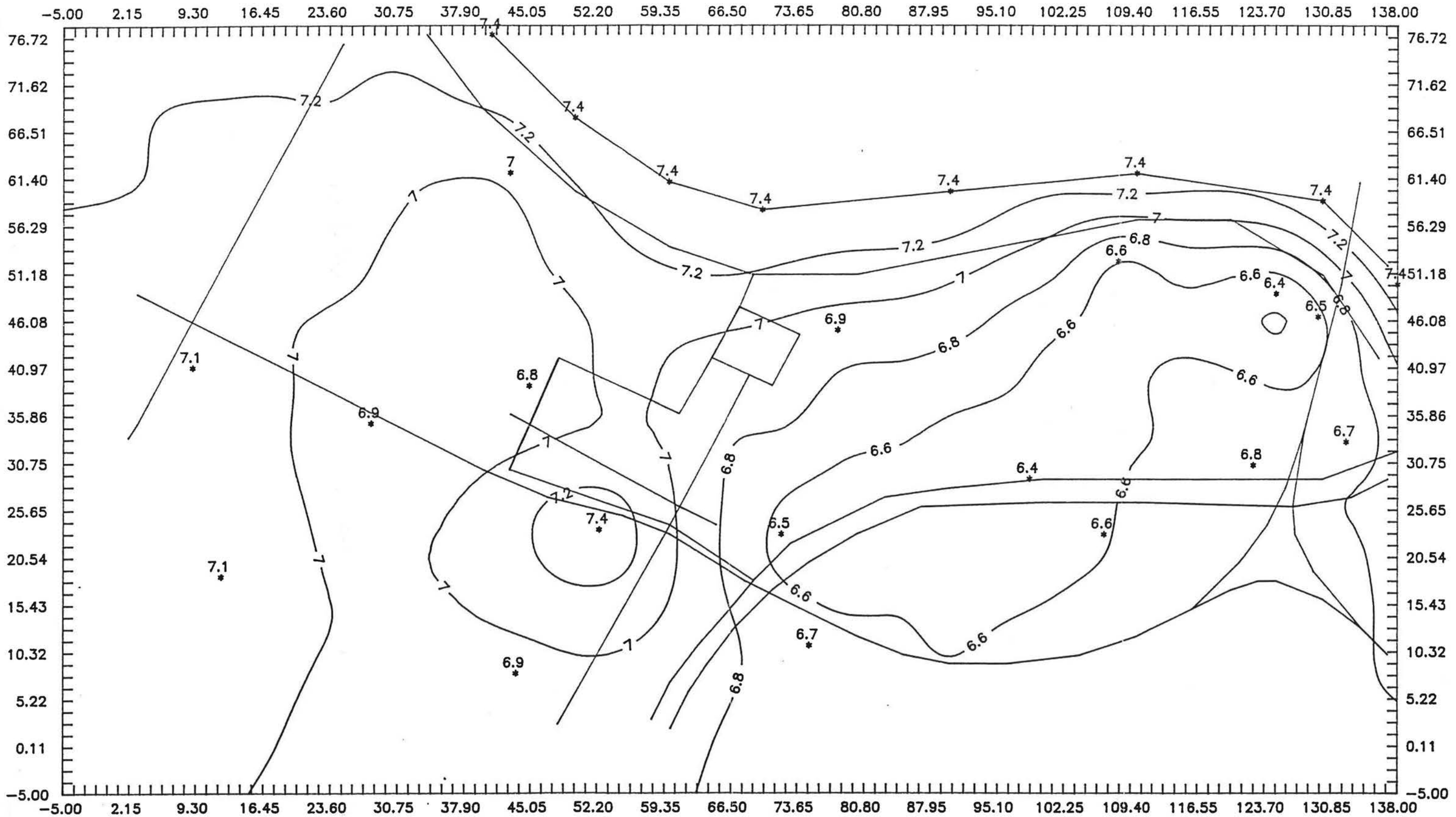


SCALE 1:10 **UNITS**

1"=600'

FIGURE 24

SECOND QUARTER 1990 PH DATA

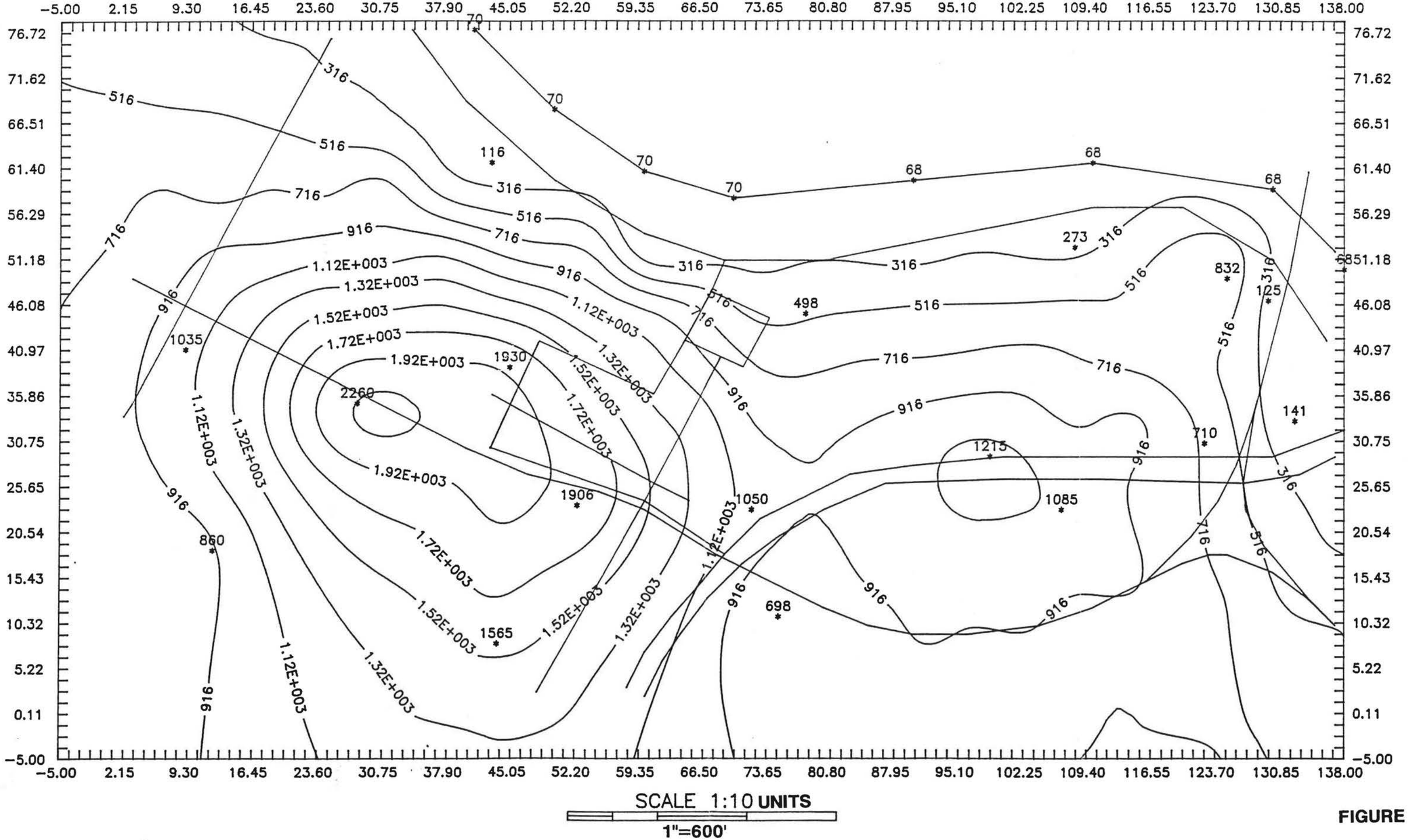


SCALE 1:10 **UNITS**

1"=600'

FIGURE 25

SECOND QUARTER 1990 EC DATA



SCALE 1:10 **UNITS**

1"=600'

FIGURE 26

SECOND QUARTER 1990 FE DATA

SCALE 1:10 **UNITS**

1"=600'

FIGURE 27

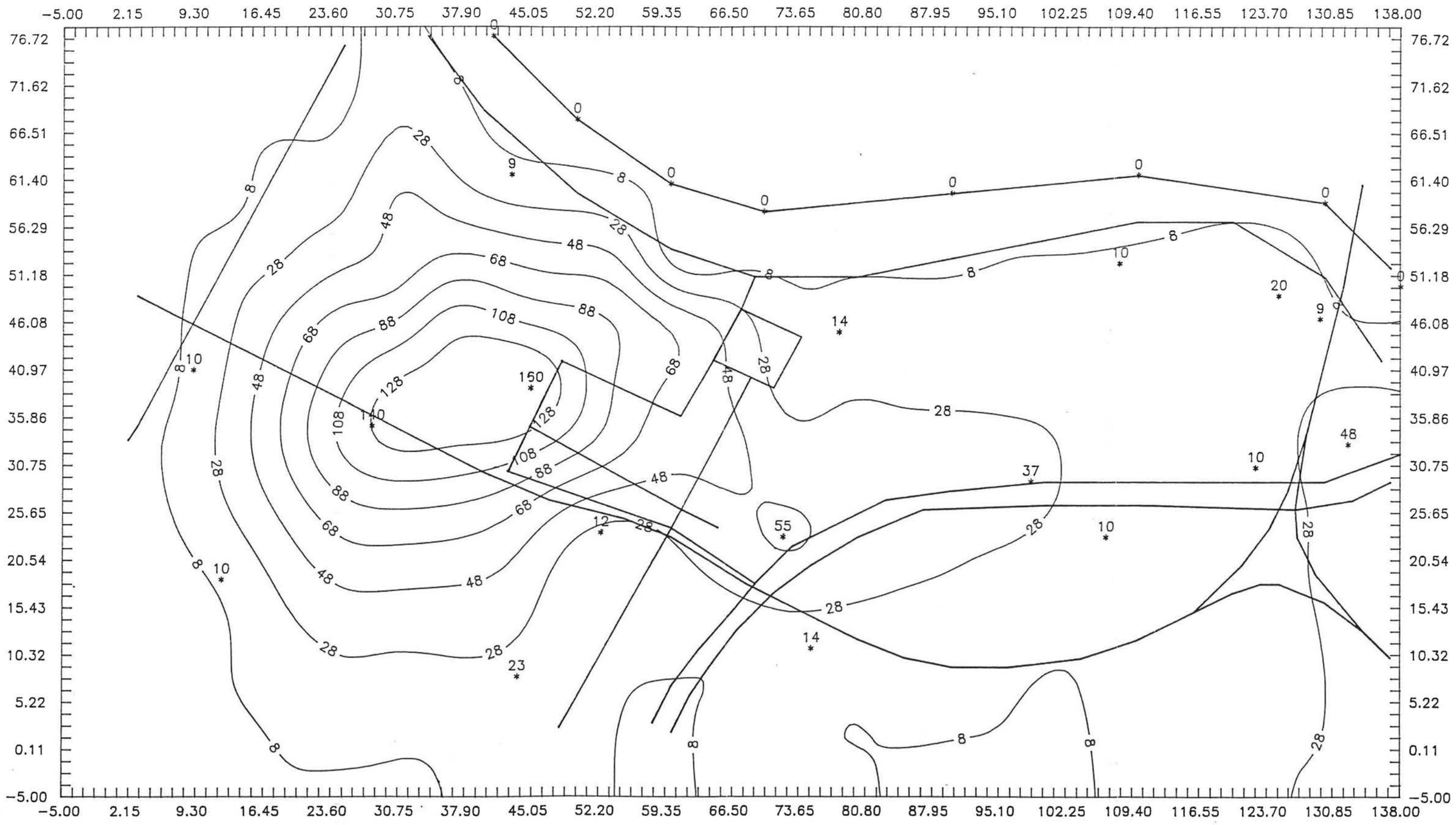
SECOND QUARTER 1990 CL DATA

SCALE 1:10 **UNITS**

1"=600'

FIGURE 28

SECOND QUARTER 1990 COD DATA

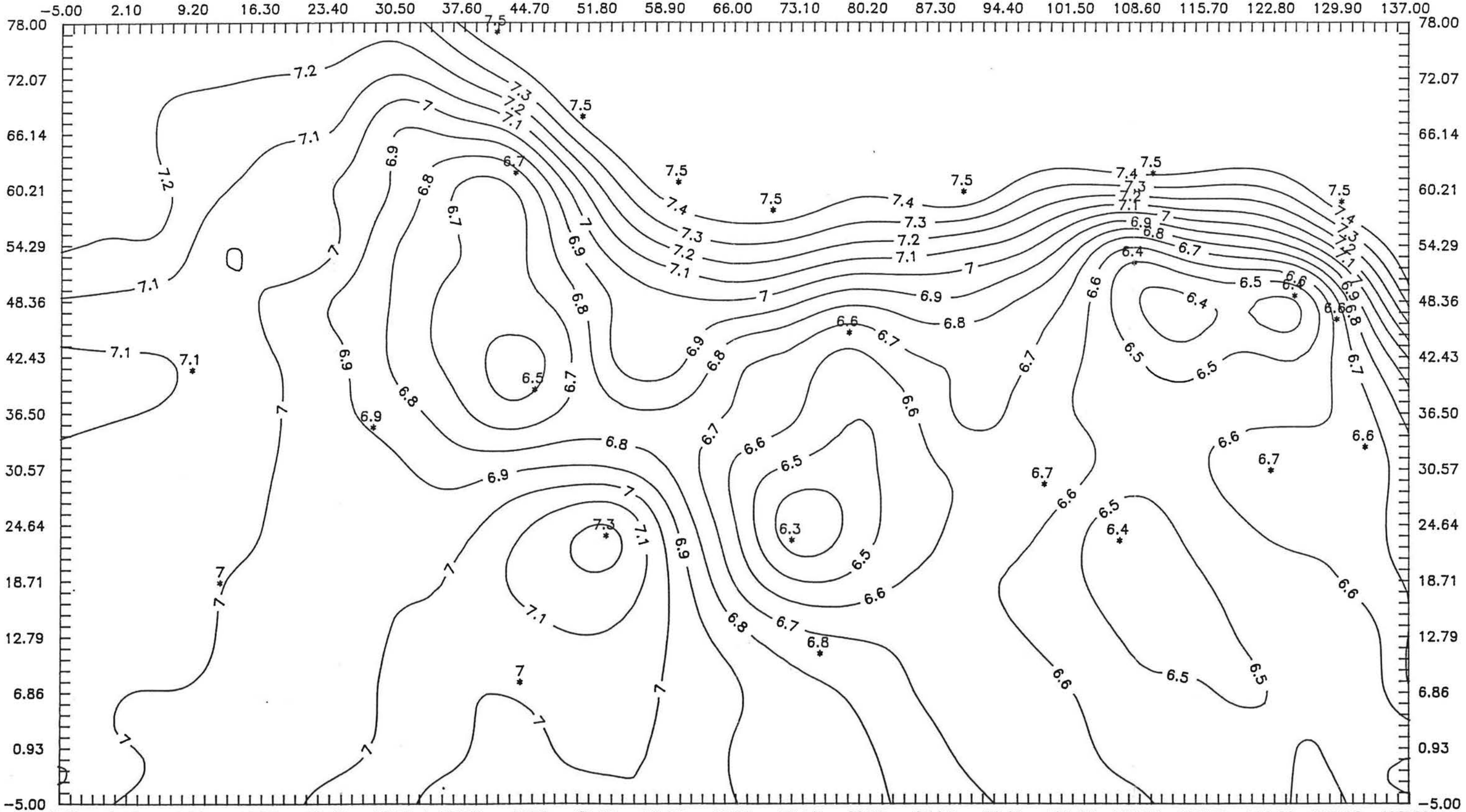


SCALE 1:10 **UNITS**

1"=600'

FIGURE 29

THIRD QUARTER 1990 PH DATA



SCALE 1:10 **UNITS**

1"=600'

FIGURE 30

THIRD QUARTER 1990 EC DATA

SCALE 1:10 **UNITS**

1"=600'

FIGURE 31

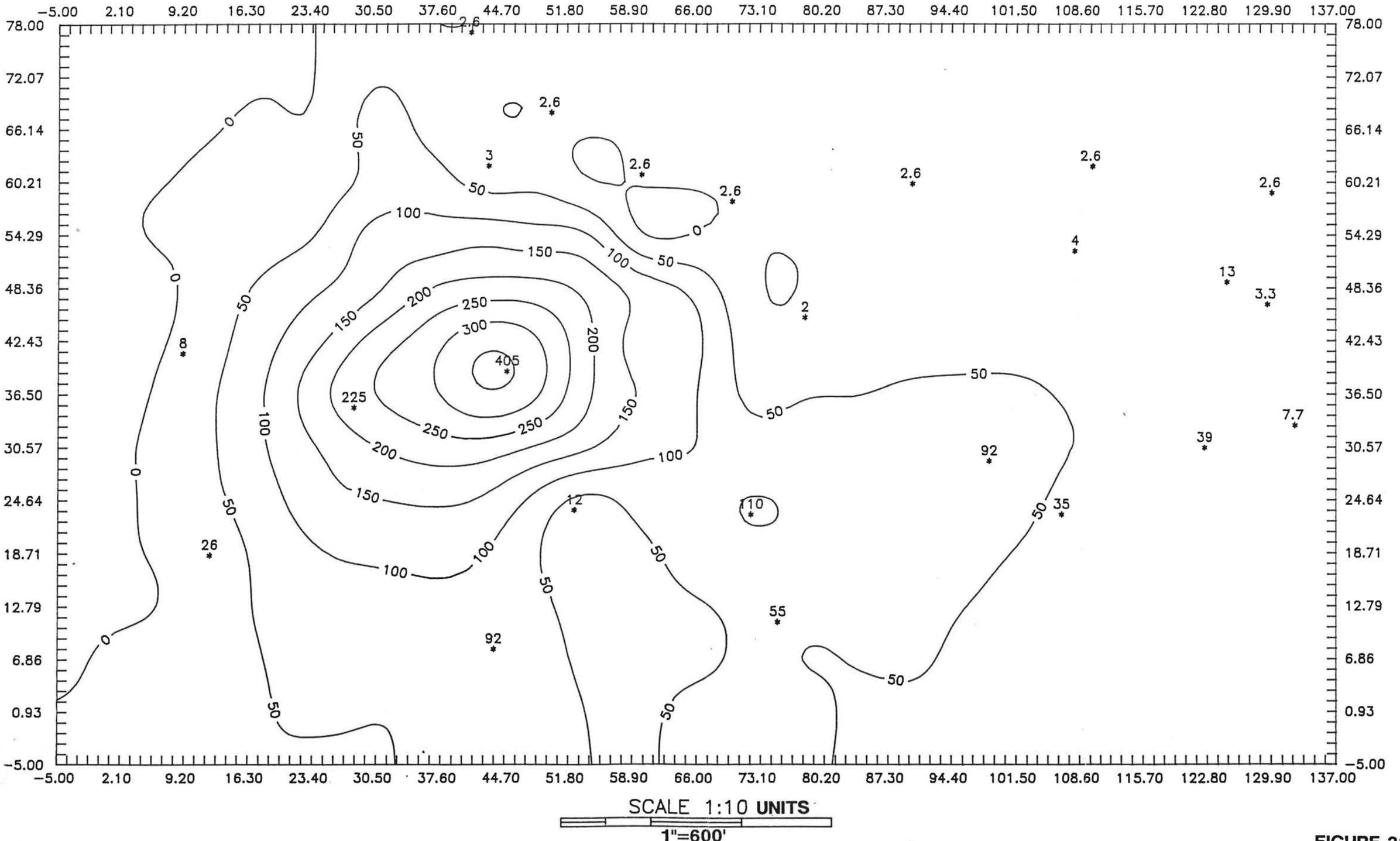
THIRD QUARTER 1990 FE DATA

SCALE 1:10 **UNITS**

1"=600'

FIGURE 32

THIRD QUARTER 1990 CL DATA



SCALE 1:10 **UNITS**

1"=600'

FIGURE 33

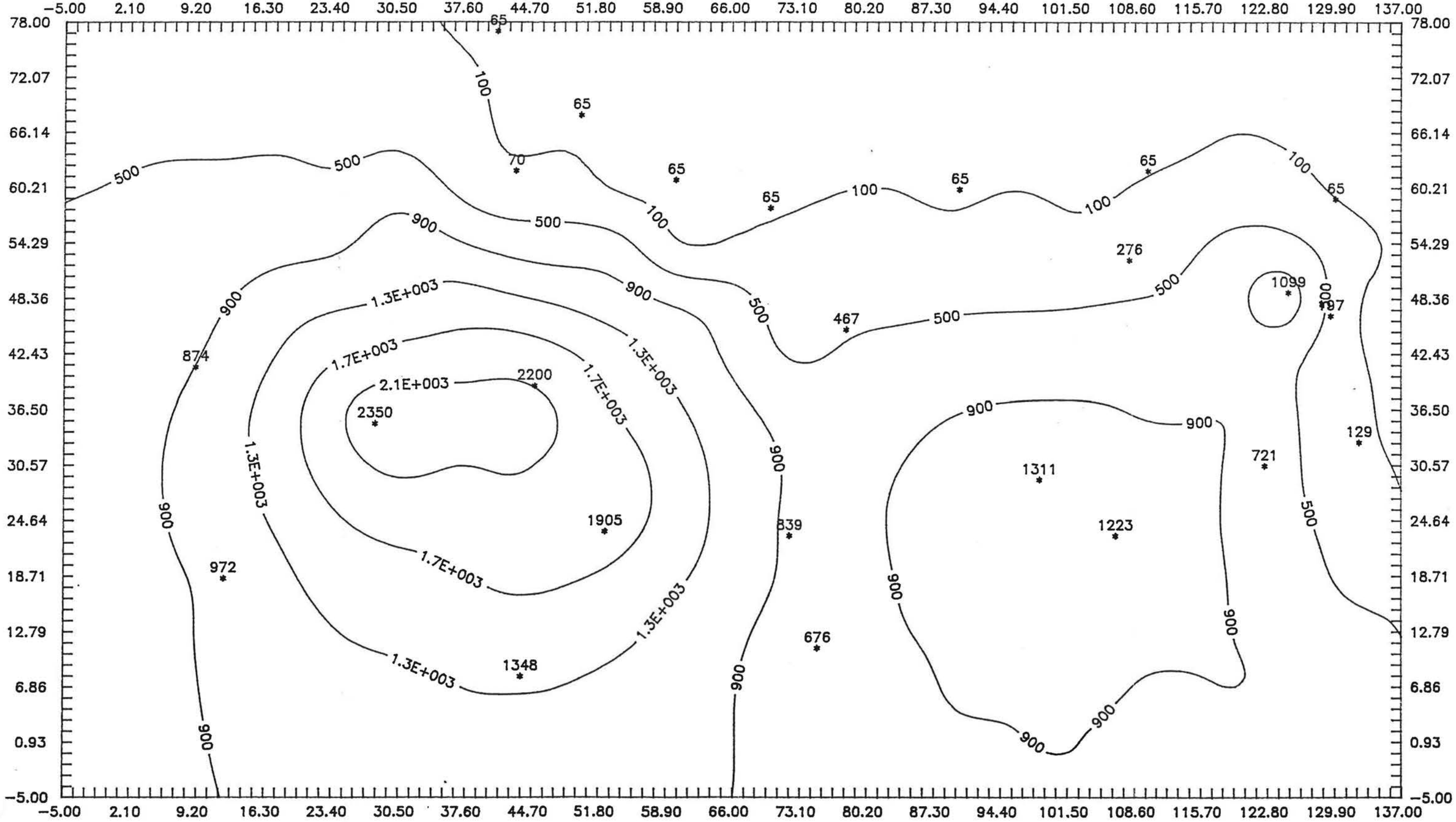
FOURTH QUARTER 1990 PH DATA

SCALE 1:10 **UNITS**

1"=600'

FIGURE 35

FOURTH QUARTER 1990 EC DATA

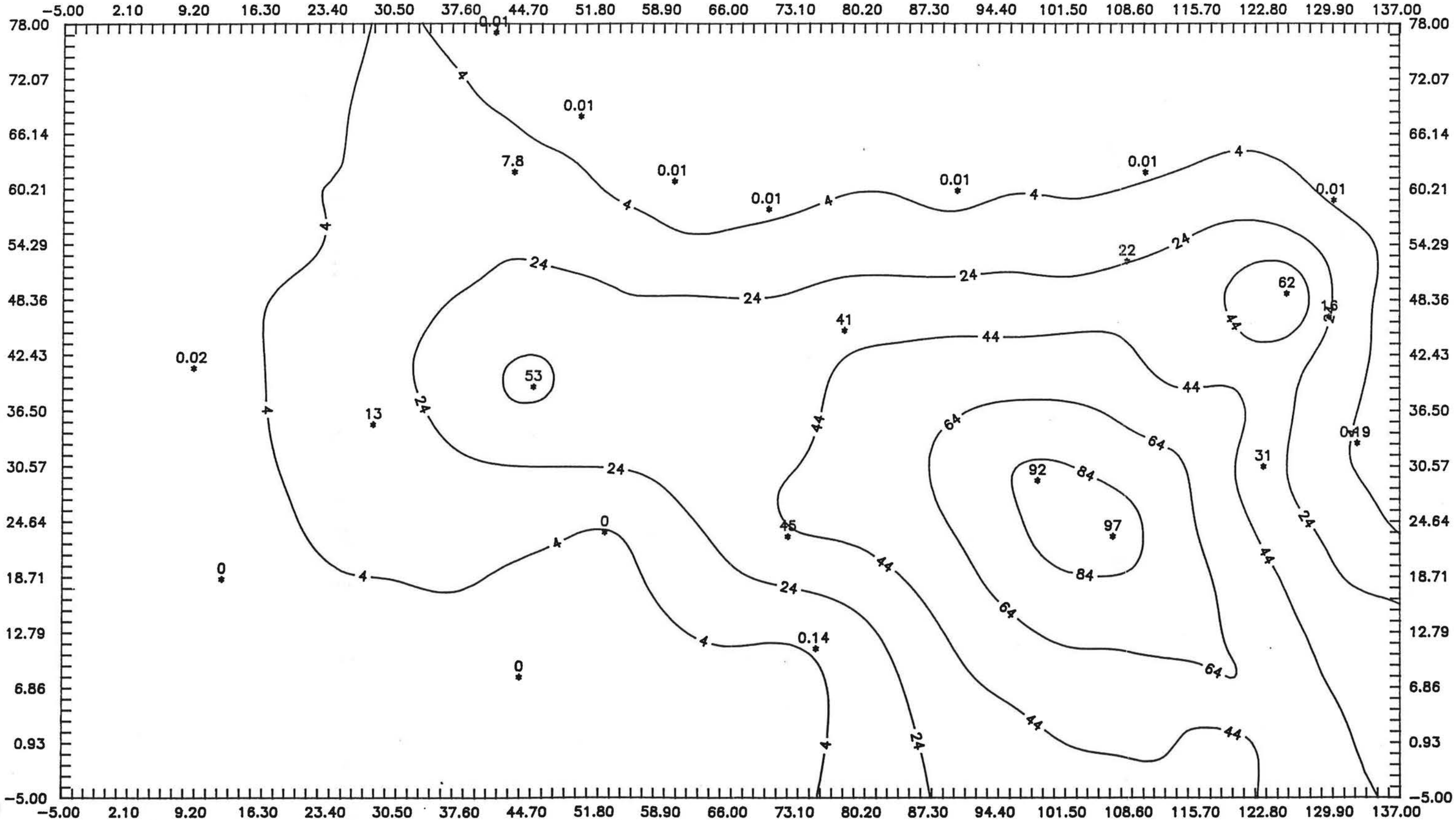


SCALE 1:10 **UNITS**

1"=600'

FIGURE 36

FOURTH QUARTER 1990 FE DATA

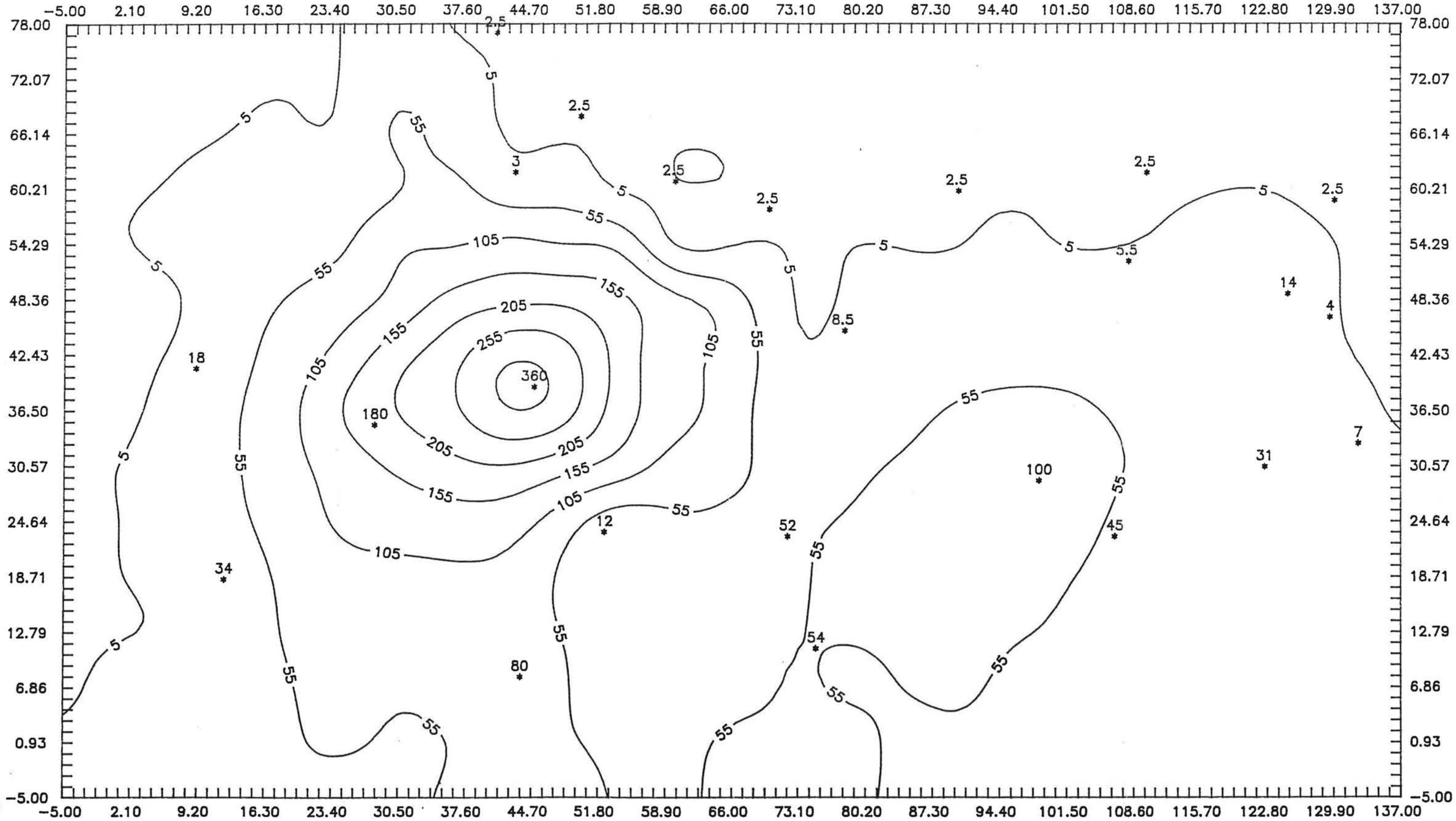


SCALE 1:10 UNITS

1"=600'

FIGURE 37

FOURTH QUARTER 1990 CL DATA

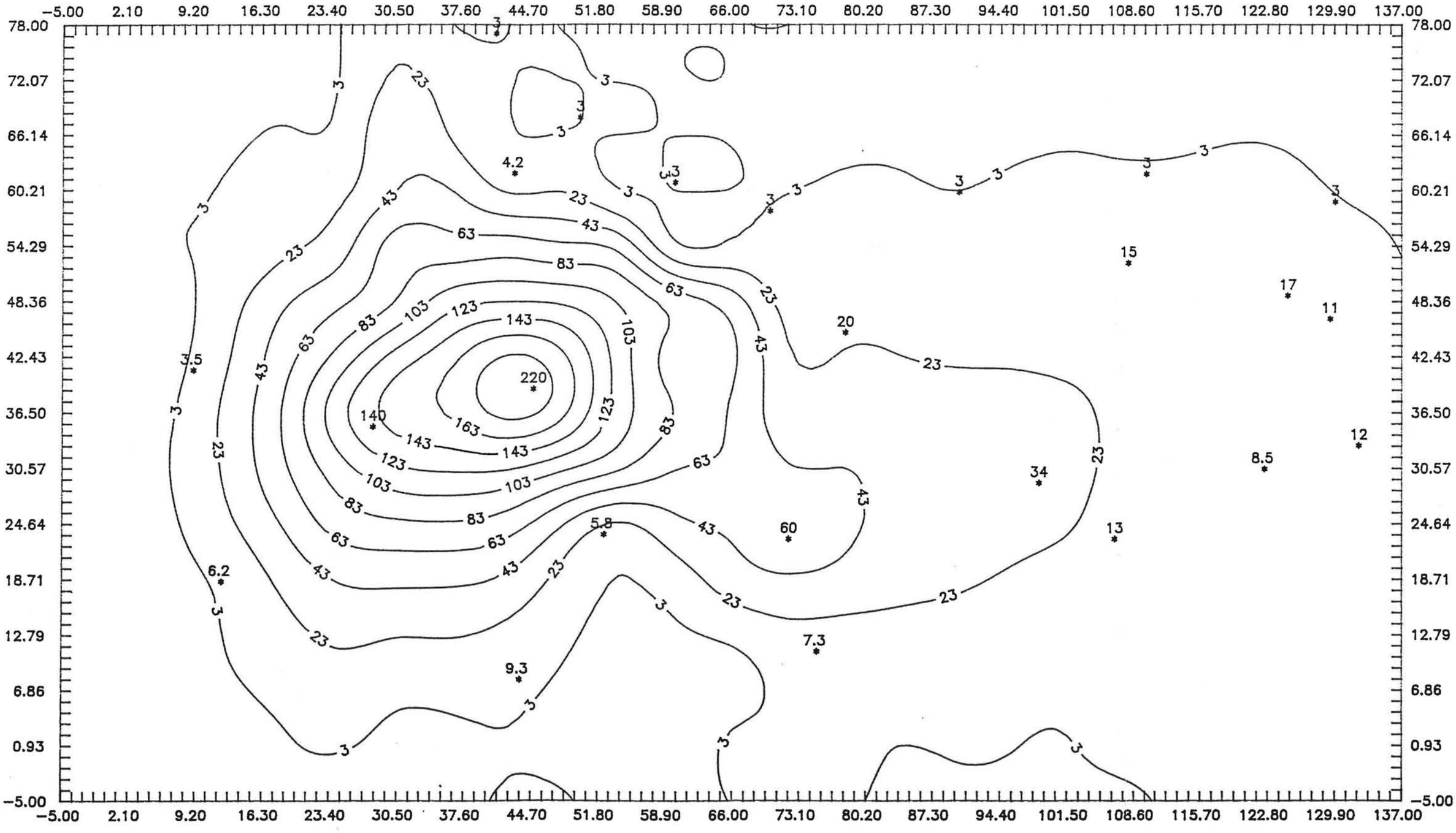


SCALE 1:10 **UNITS**

1"=600'

FIGURE 38

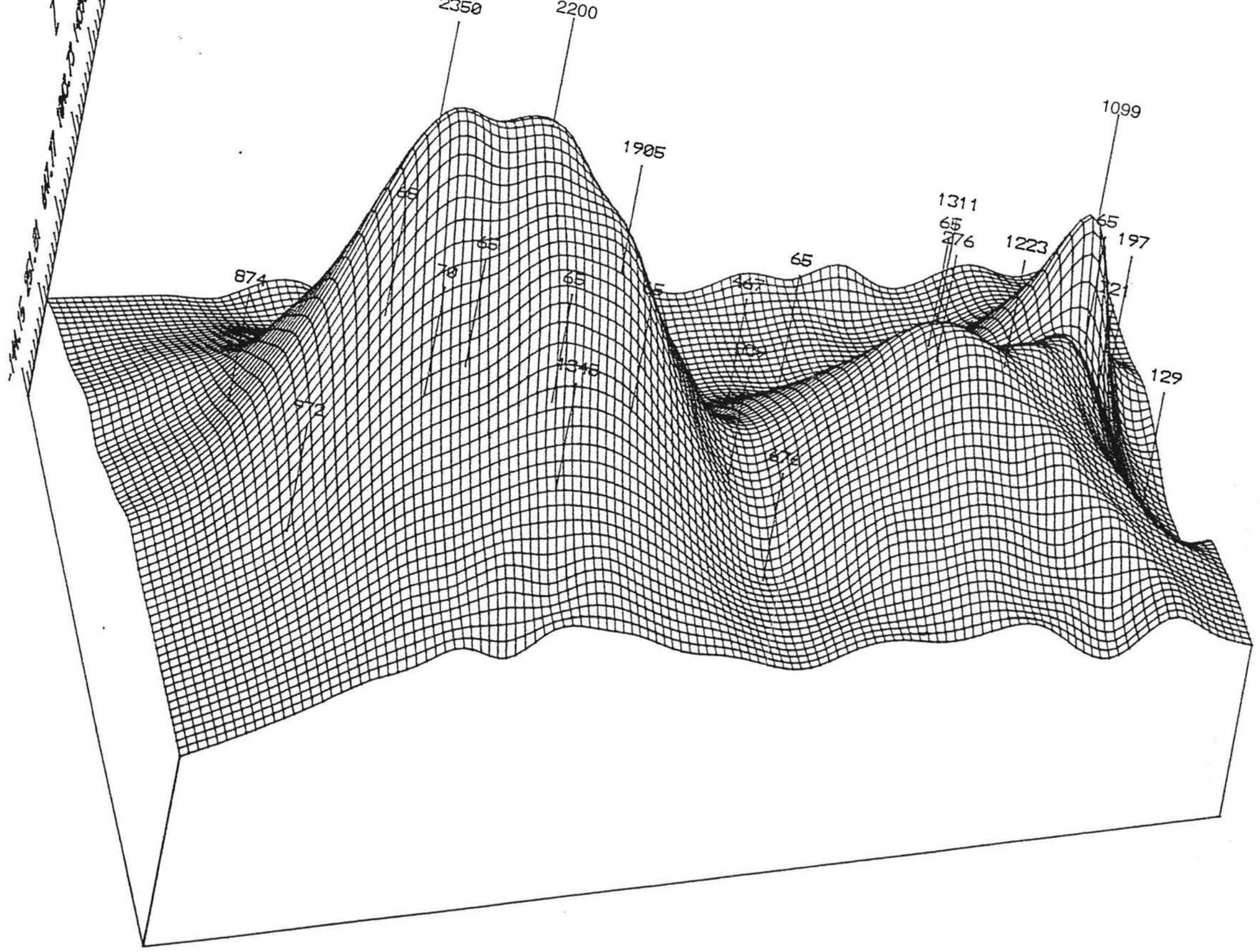
FOURTH QUARTER 1990 COD DATA



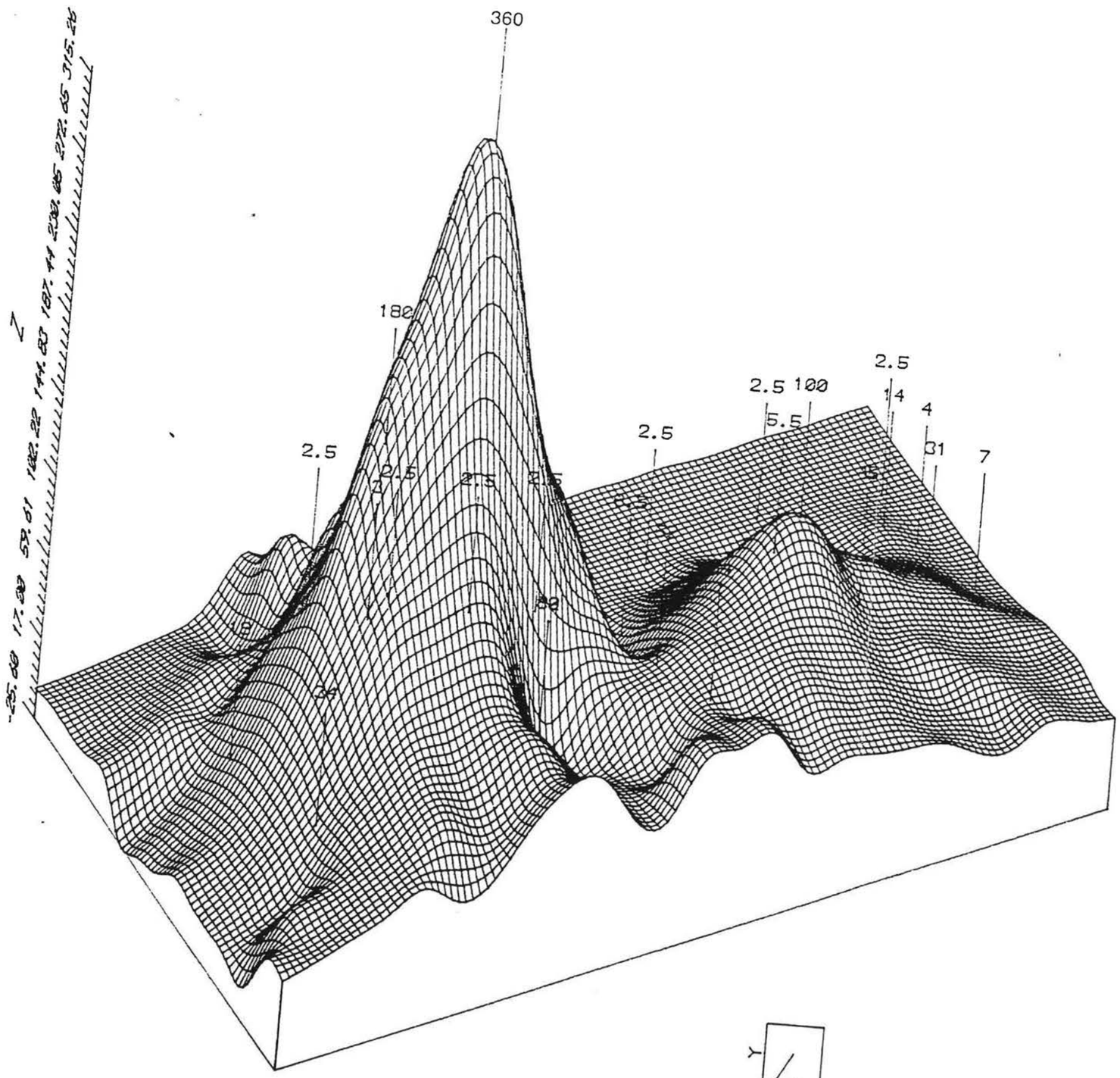
SCALE 1:10 **UNITS**

1"=600'

FIGURE 39

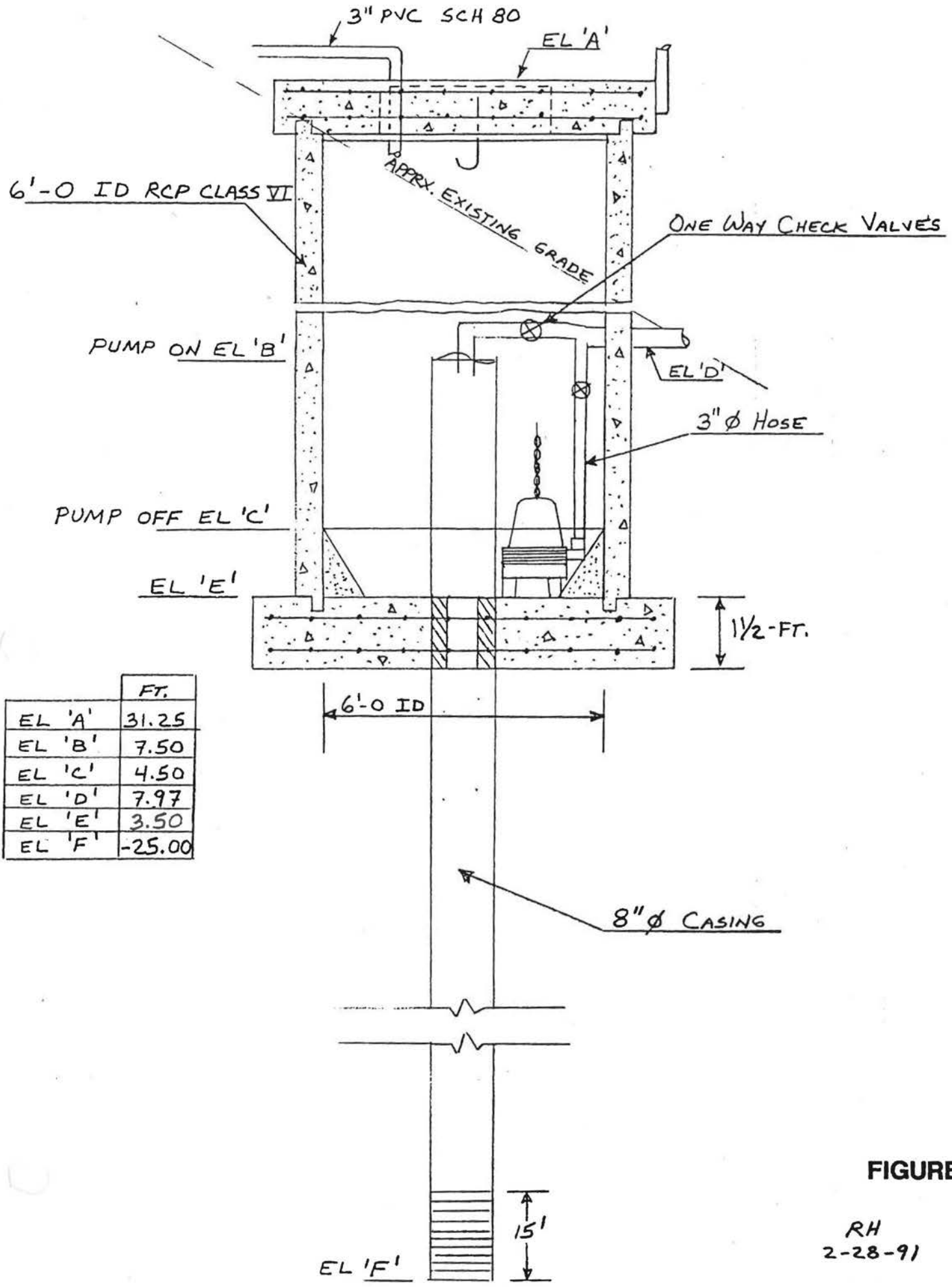


FOURTH QUARTER 1990 EC DATA



FOURTH QUARTER 1990 CL DATA

PUMP STATION No. 3



	FT.
EL 'A'	31.25
EL 'B'	7.50
EL 'C'	4.50
EL 'D'	7.97
EL 'E'	3.50
EL 'F'	-25.00

FIGURE 43

RH
2-28-91

28TH ST. LANDFILL SITE GEOLOGIC CROSS SECTION A-A'

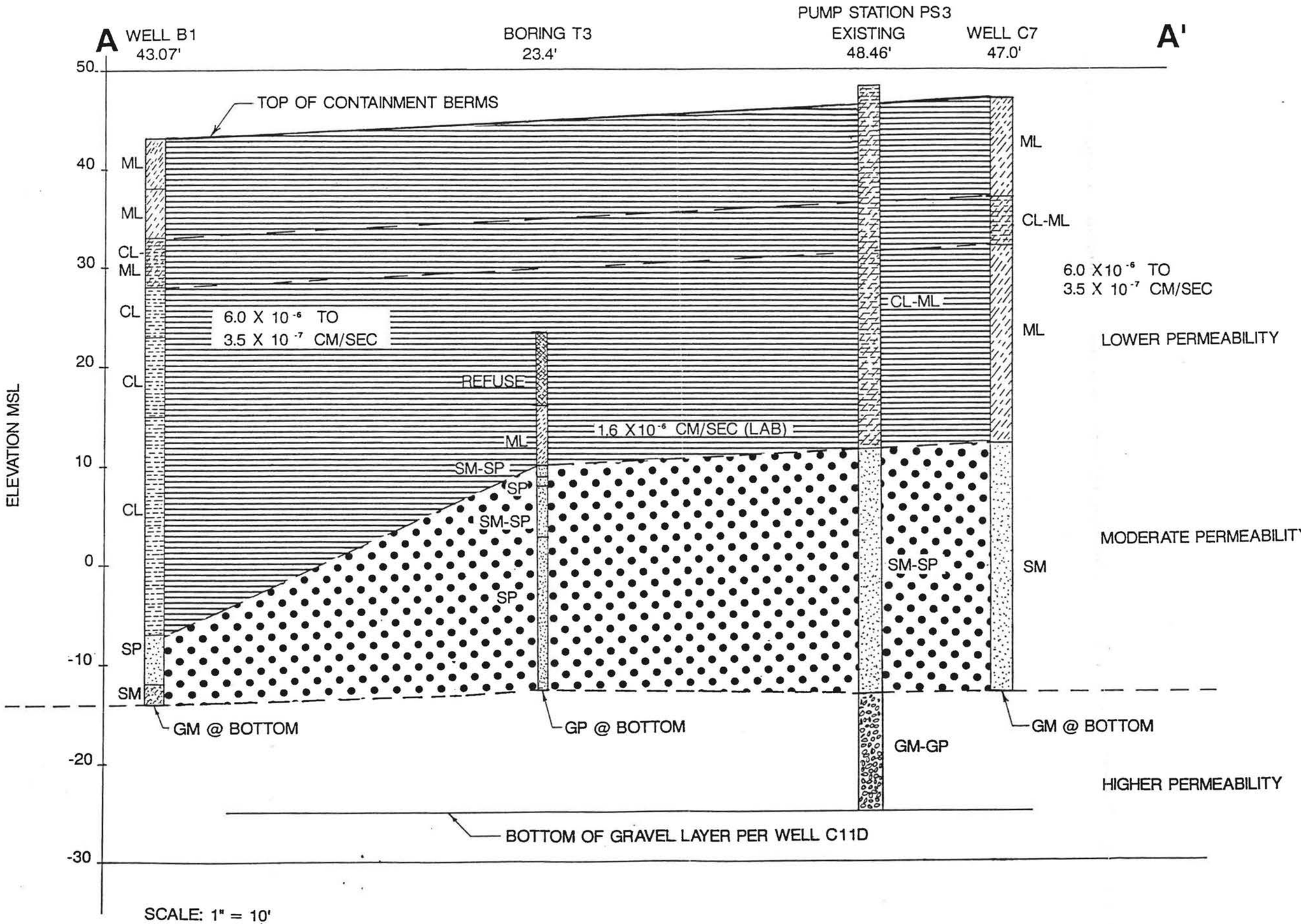
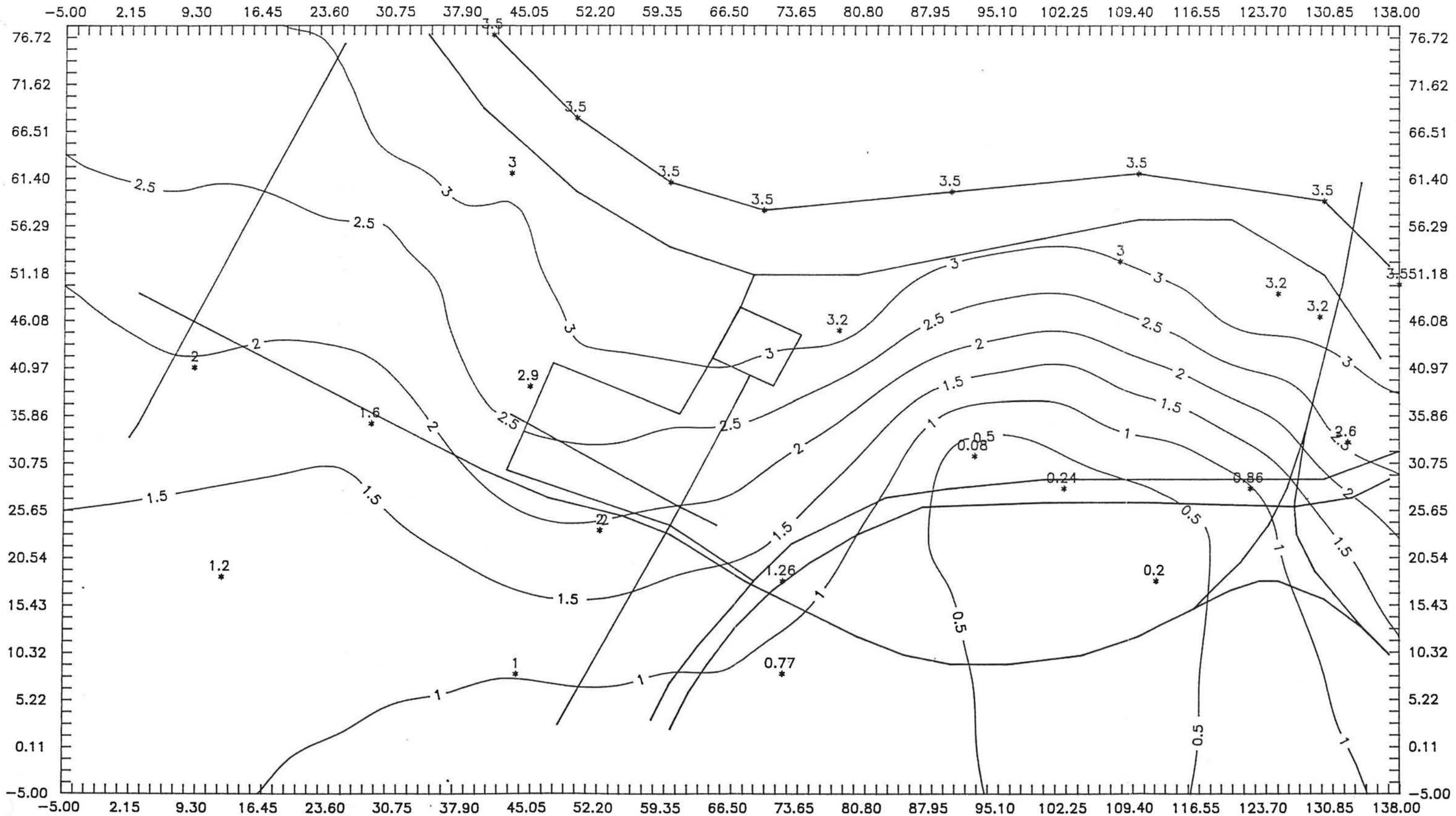


FIGURE 44

CITY OF SACRAMENTO LANDFILL WATER QUALITY MONITORING WELLS FEBRUARY 1991 25 GPM

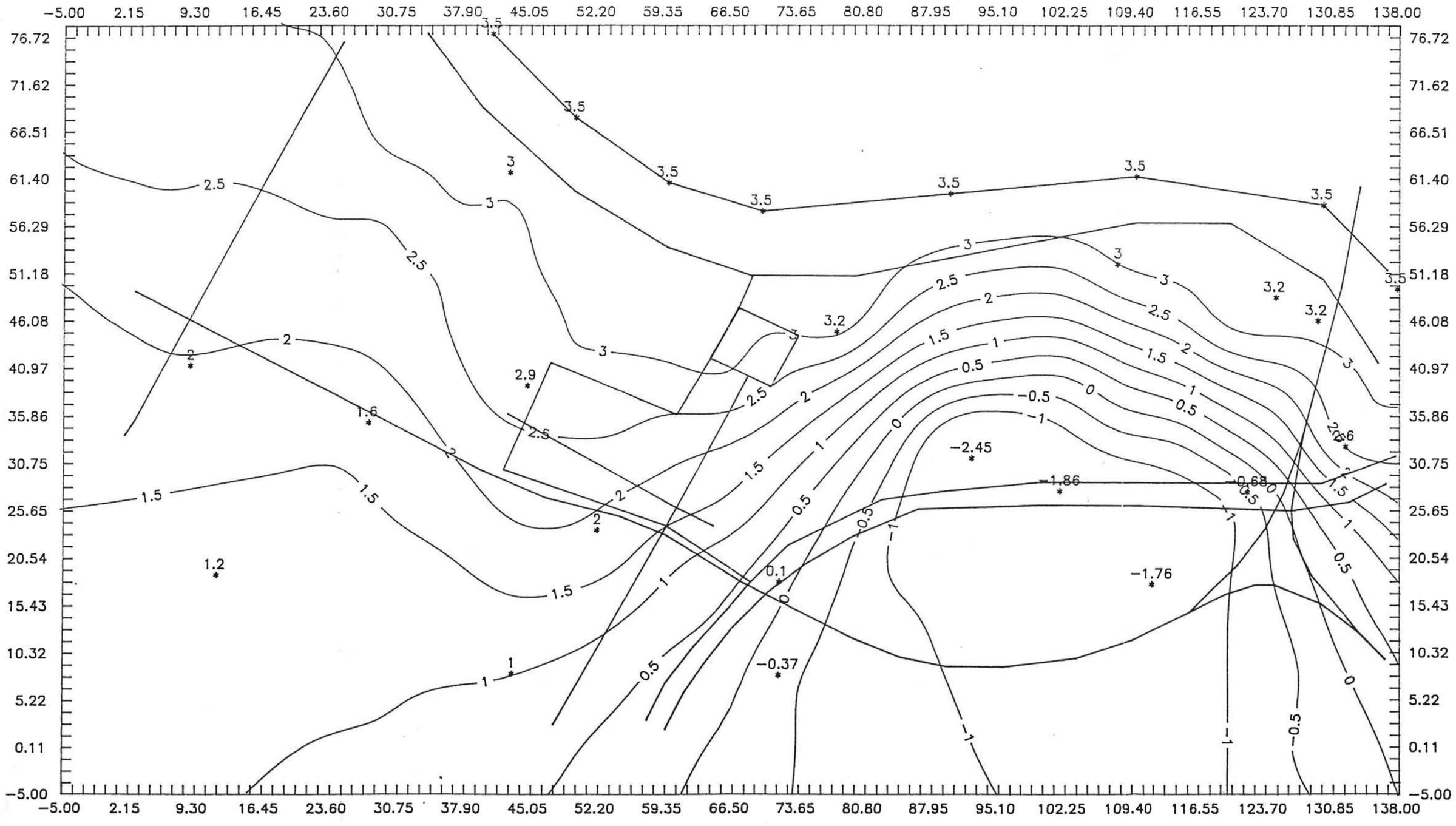


SCALE 1:10 **UNITS**

1"=600'

FIGURE 45

CITY OF SACRAMENTO LANDFILL WATER QUALITY MONITORING WELLS FEBRUARY 1991 50 GPM

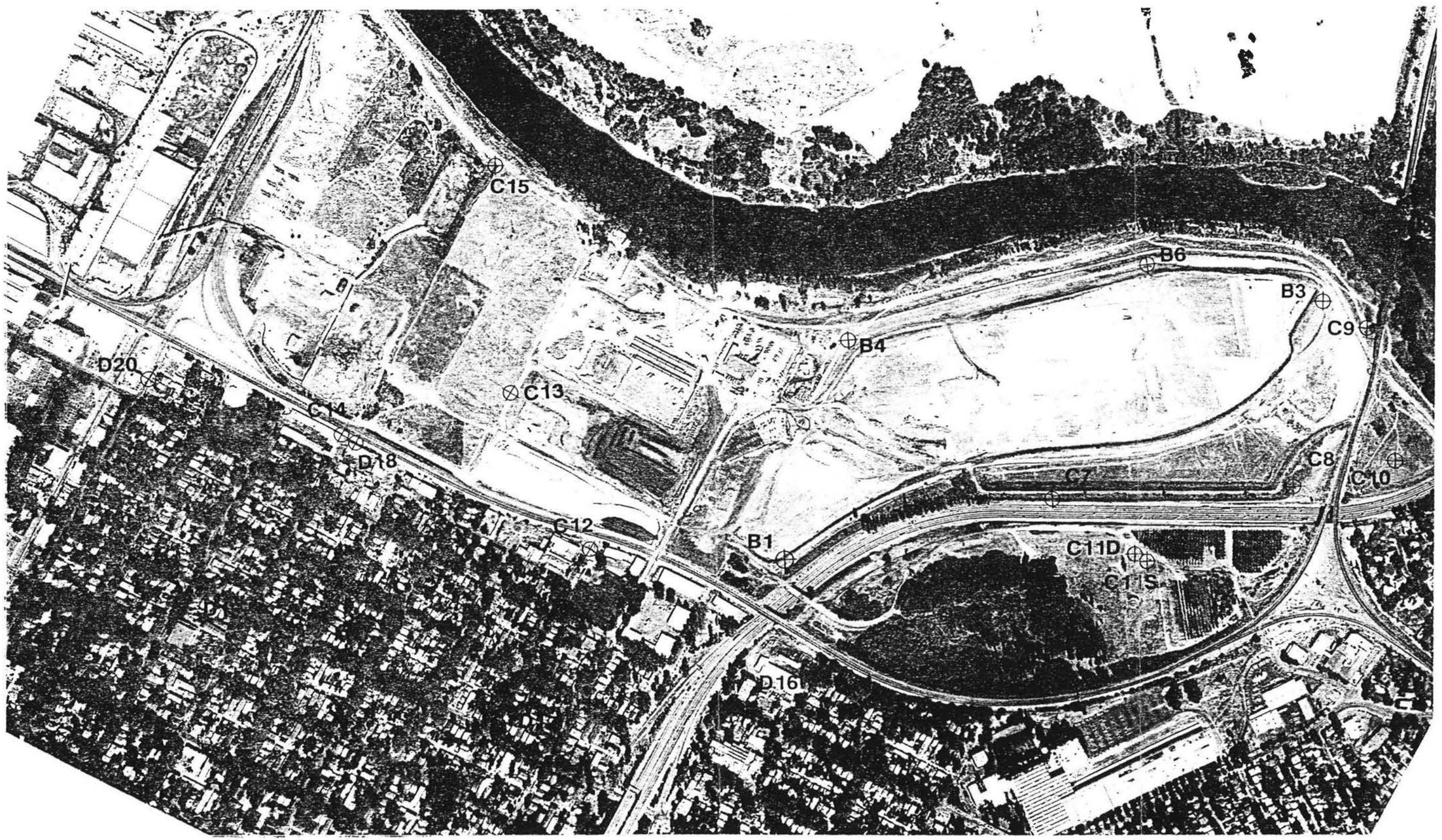


SCALE 1:10 **UNITS**

1"=600'

FIGURE 46

WATER QUALITY MONITORING WELLS OVERLAY



MONITORING WELL ⊕

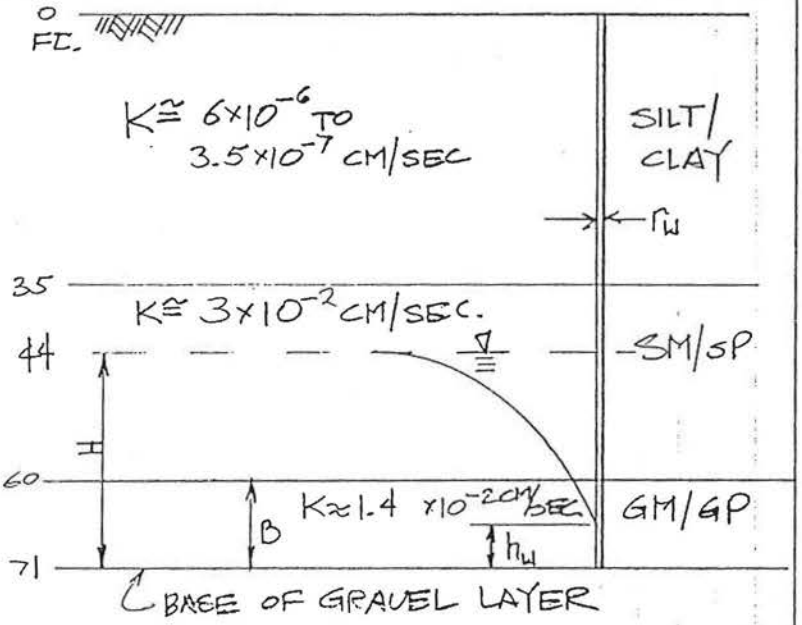
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

COMPUTATION SHEET

DATE	CALC. BY	SHEET ____ OF ____
DATE	CHK. BY	PROJ. NO.

SUBJECT

RADIAL FLOW MIXED AQUIFER



$$Q = \frac{K(2BH - B^2 - h_w^2)}{458 \ln R_o / r_w}$$

$Q = 25$ gpm

$H = 27$ FT.

$B = 11$ FT.

$R_o = ?$, $h_w = ?$

$r_w = .42$ FT.

$K = 297$ gpd/FT^2

APPROX. FORMULA FOR R_o, h_w $\quad R_o = 3(H - h_w)\sqrt{K}$

$$25 = \frac{297(594 - 121 - h_w^2)}{458 \ln \frac{51.7(27 - h_w)}{.42}}$$

SAY $h_w = 5$ FT $\rightarrow Q = 36.7$

$h_w = 8$ FT $\rightarrow Q = 34.2$

$h_w = 11$ FT $\rightarrow Q = 30.0$

$h_w = 20$ FT $\rightarrow Q = 7.0$

$h_w = 14$ FT $\rightarrow Q = 24.3$

$h_w = 13.8$ FT $\quad Q = 24.8$

$R_o = 3(27 - 13.8)\sqrt{297}$

$R_o = 682.4$ FT.

CHECK

$$Q = \frac{297(594 - 121 - 190)}{458 \ln (682.4/.42)} = \frac{84,051}{3,386}$$

$= 24.8 \approx 25$ OK

DRAWDOWN $= 27 - 13.8 = 13.2'$

FIGURE 47

VERTICAL GRADIENT FOR WELLS C14 & D18
1990

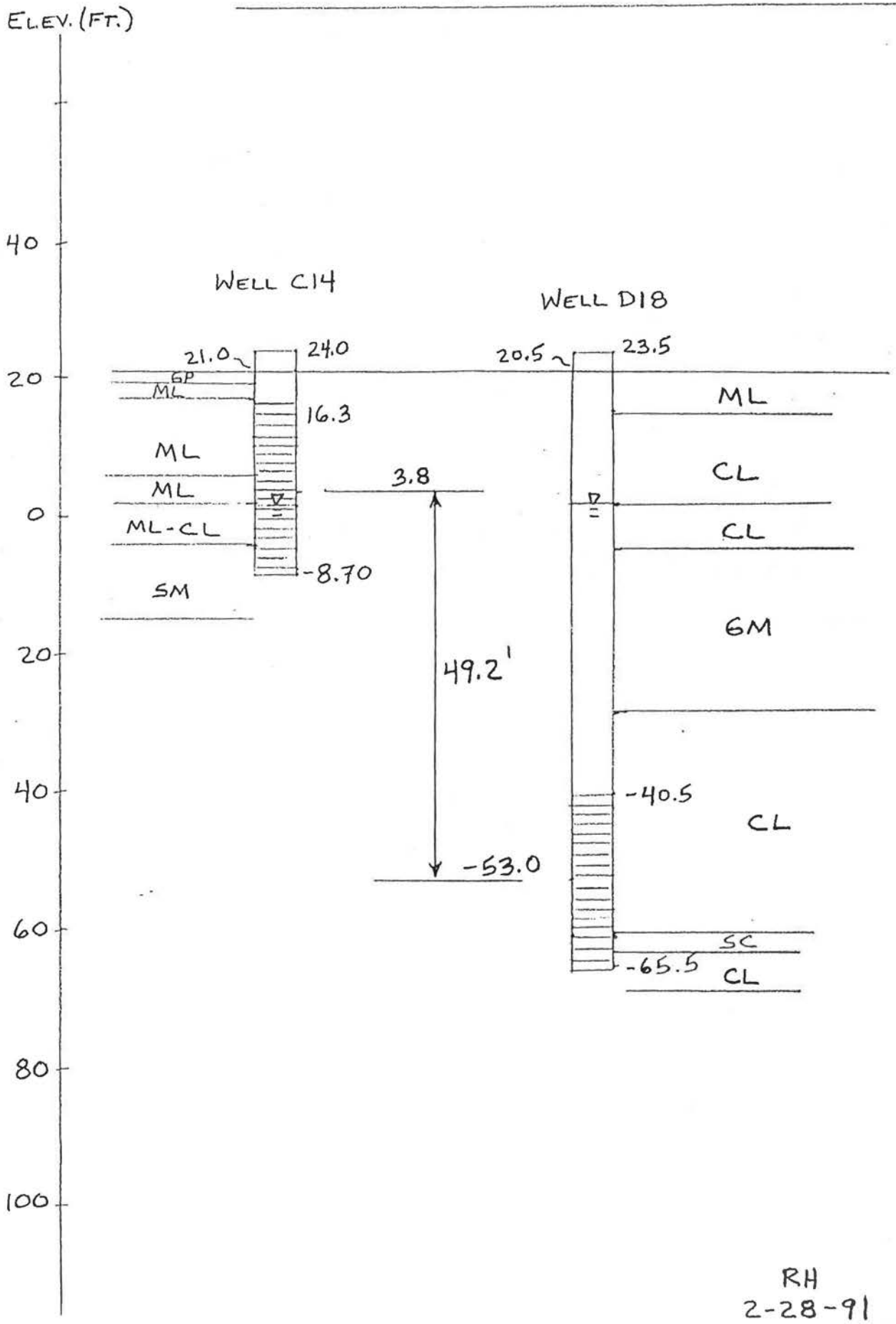
Date	C14	D18	Diff.	Hydraulic Gradient
1/18/90	3.4	3.5	-0.1	-.002
2/08/90	3.8	3.8	0.0	.000
3/08/90	4.2	4.3	-0.1	-.002
4/10/90	4.2	4.0	0.2	.004
5/03/90	4.0	4.0	0.0	.000
6/04/90	3.4	3.4	0.0	.000
7/03/90	2.8	2.8	0.0	.000
8/02/90	2.2	2.2	0.0	.000
9/10/90	1.6	1.5	0.1	.002
10/19/90	1.2	1.0	0.2	.004
11/19/90	1.0	1.0	0.0	.000
12/06/90	1.1	1.0	0.1	.002

D18 Screened from -40.5 to -65.5
C14 Screened from 16.3 to - 8.7
Distance between Screen Midpoint

Ave. Gradient = 0.0007 Downwards

TABLE 1

WELLS C14 AND D18 (VERT. GRADIENT)



RH
2-28-91

VERTICAL GRADIENT FOR WELLS CIIs & C11d
1990

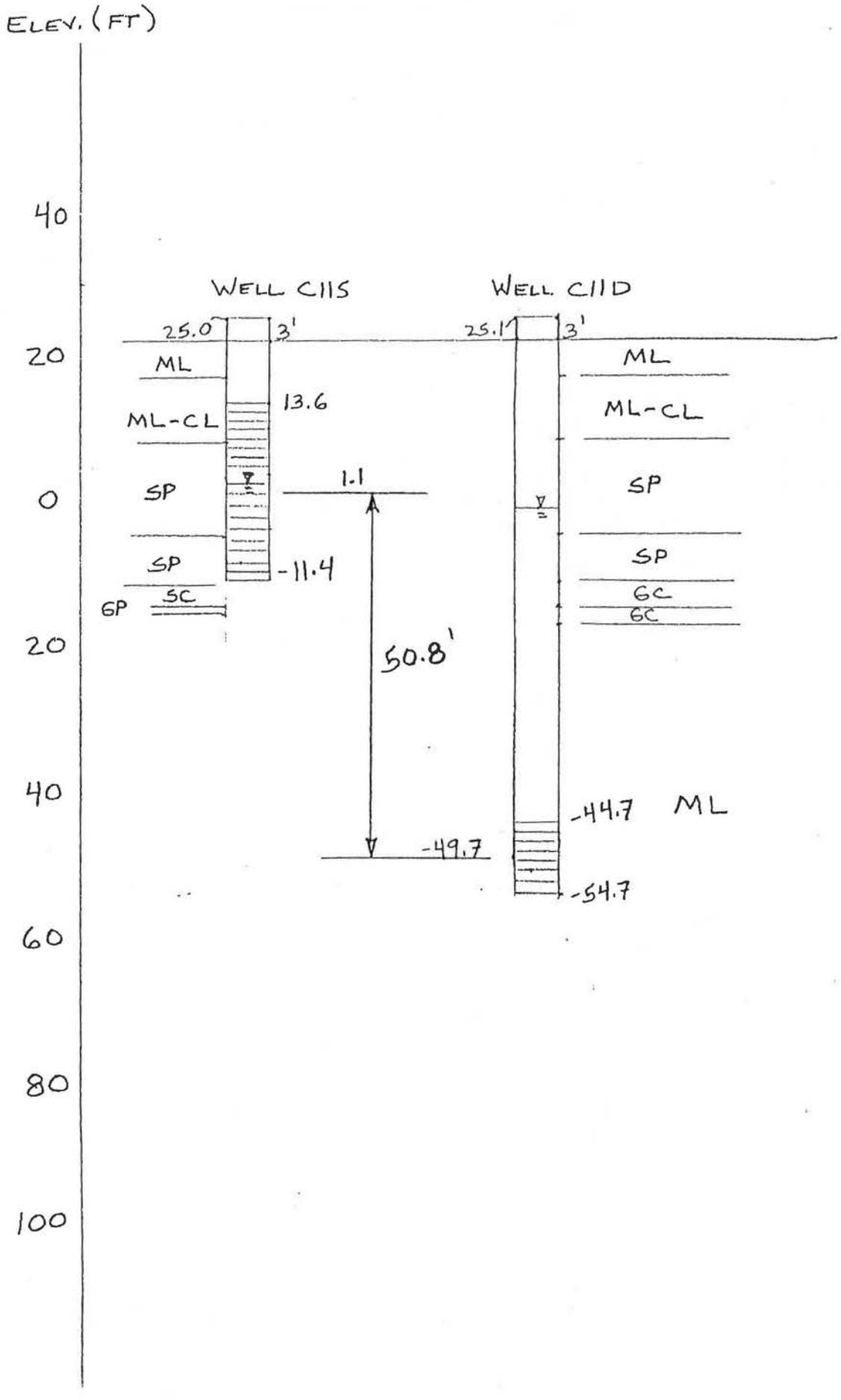
Date	C11s	C11d	Diff.	Hydraulic Gradient
1/18/90	3.9	1.2	2.7	.053
2/08/90	4.0	0.6	3.4	.067
3/08/90	3.8	0.7	3.1	.061
4/10/90	3.4	0.1	3.3	.065
5/03/90	3.6	-0.2	3.8	.075
6/04/90	3.2	-0.3	3.5	.069
7/03/90	2.9	-0.9	3.8	.075
8/02/90	3.3	-0.9	4.2	.083
9/10/90	3.0	-1.8	4.8	.094
10/19/90	2.4	-0.2	2.6	.051
11/19/90	2.0	-1/9	3.9	.077
12/06/90	2.0	-1.9	3.9	.077

C11d Screened from -44.7 to -54.7
C11s Screened from 13.6 to -11.4
Distance Between Screen Midpoints=50.8 feet

Ave. Gradient = 0.071 Downwards

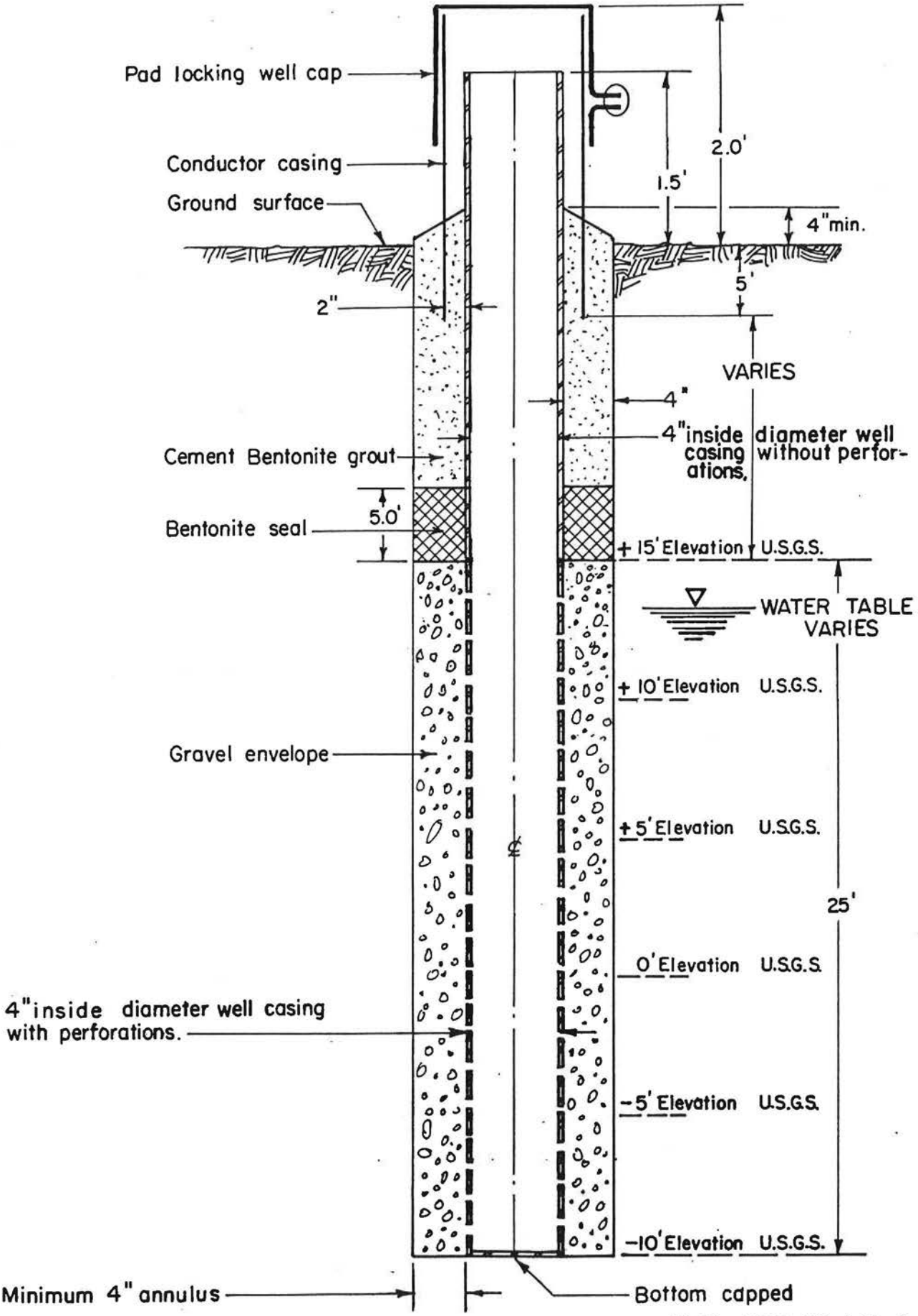
TABLE 2

WELLS C11S AND C11D (VERT. GRADIENT)



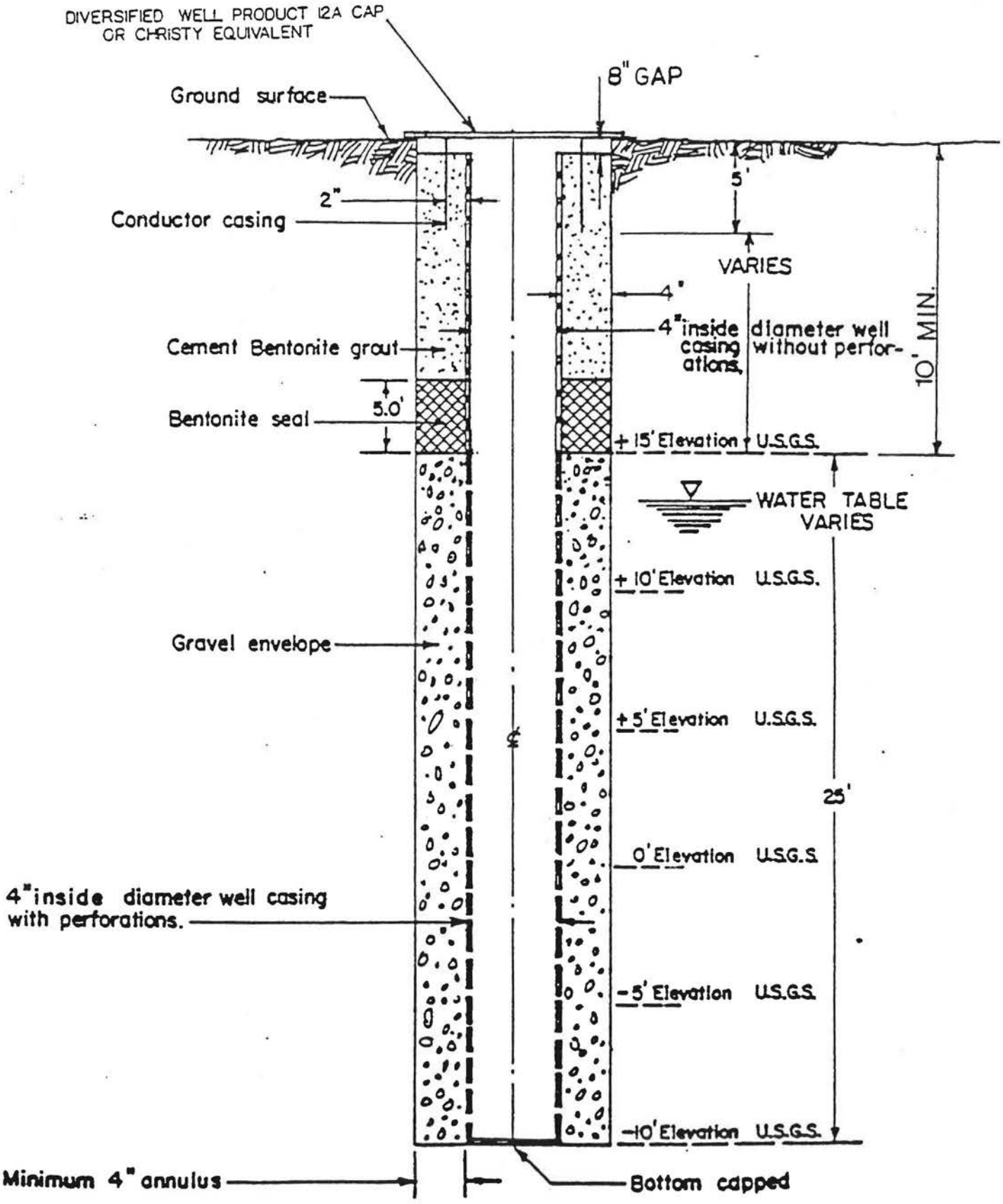
RH
2-28-91

TYPICAL WELL CONSTRUCTION - no scale



1985 – DWG. NO. 1.3-4

TYPICAL WELL CONSTRUCTION - no scale



LITHOLOGIC LOGS FOR MONITORING WELLS

INSTALLED IN 1986

WELLS B6, C11s, C11d, C12, C13, C14 AND C15

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill
No. 195881

Notice of Intent No. _____
Permit No. or Date 8499-11-14-86
State Well No. B-6
Other Well No. _____

(1) OWNER: Name City Of Sacramento
Address 915 "I" Street
City Sacramento, CA Zip _____

(2) LOCATION OF WELL (See instructions):
County _____ Owner's Well Number _____
Well address if different from above 27th "C" Street - Landfill
Township _____ Range _____ Section _____
Distance from cities, roads, railroads, fences, etc. _____

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☑ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☑

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air ☐
Other ☑ Bucket ☐

(6) GRAVEL PACK:
Yes ☑ No ☐ Size _____
Diameter of bore _____
Packed from _____ to _____ ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen _____

From ft.	To ft.	Dia. in.	Cage or Wall	From ft.	To ft.	Slot size

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☑ No ☐ If yes, to depth _____ ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval _____ ft.
Method of sealing _____

(10) WATER LEVELS:
Depth of first water, if known _____ ft.
Standing level after well completion _____ ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☑ If yes, by whom? _____
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test _____ ft. At end of test _____ ft
Disch[arge] _____ gal/min after _____ hours Water temperature _____
C[hemical] analysis made? Yes ☐ No ☑ If yes, by whom? _____
W[ater] log made? Yes ☐ No ☑ If yes, attach copy to this report

(12) WELL LOG: Total depth 56.8 ft. Depth of completed well _____

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	4.0	Gravel, gray, coarse, silty, sand, d- landfill (GM)
4.0	10.0	Silt, gray slightly clayey, soft damp (ML)
10.0	23.0	Silt, brown, very fine sandy, soft damp (ML)
23.0	25.0	Silt, rust brown, very fine sandy (
25.0	33.0	Silt, brownish-gray, slightly clay damp (ML)
33.0	40.0	Silt, gray, clayey, soft, moist (ML)
40.0	44.0	Sand, gray, very fine, moist (SP)
44.0	56.8	Sand, gray, very fine-fine, silty w (SM)
		Top hole elevation = 45.5 MSL
		Bottom hole elevation = -11.3 MSL

Work started Dec. 3 19 86 Completed Dec. 3 19 86

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
SIGNED _____ (Well Driller)
NAME _____ (Person, firm, or corporation) (Typed or printed)
Address _____
City _____ Zip _____
License No. _____ Date of this report _____

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

D-2

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STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fil

No. 19588(

Notice of Intent No.

Permit No. or Date [redacted] 11-14-86

State Well No. B-C11s

Other Well No.

(1) OWNER: Name City of Sacramento

Address 915 "I" Street

City Sacramento, CA Zip

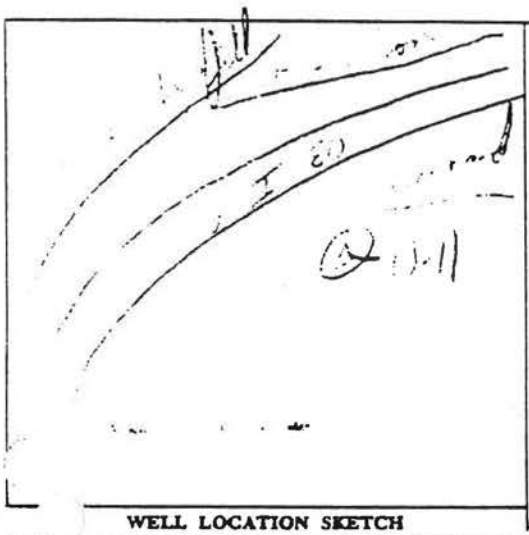
(2) LOCATION OF WELL (See instructions):

County Owner's Well Number

Well address if different from above 27th "C" Street - Landfill

Township Range Section

Distance from cities, roads, railroads, fences, etc.



WELL LOCATION SKETCH

(3) TYPE OF WORK:

- New Well ☑ Deepening ☐
- Reconstruction ☐
- Reconditioning ☐
- Horizontal Well ☐
- Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:

- Domestic ☐
- Irrigation ☐
- Industrial ☐
- Test Well ☐
- Stock ☐
- Municipal ☐
- Other ☑

(5) EQUIPMENT:

- Rotary ☐ Reverse ☐
- Cable ☐ Air ☐
- Other ☑ Bucket ☐

(6) GRAVEL PACK:

Yes ☑ No ☐ Size

Diameter of bore 11"

Packed from to ft.

(7) CASING INSTALLED:

Steel ☐ Plastic ☑ Concrete ☐

(8) PERFORATIONS:

Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
-1.7	10	6"		10		= 10

(9) WELL SEAL:

Was surface sanitary seal provided? Yes ☑ No ☐ If yes, to depth ft.

Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.

Method of sealing

(10) WATER LEVELS:

Depth of first water, if known ft.

Standing level after well completion ft.

(11) WELL TESTS:

Was well test made? Yes ☐ No ☑ If yes, by whom?

Type of test Pump ☐ Bailer ☐ Air lift ☐

Depth to water at start of test ft. At end of test ft

Dis[illegible] gal/min after hours Water temperature

analysis made? Yes ☐ No ☑ If yes, by whom?

[illegible]tric log made? Yes ☐ No ☑ If yes, attach copy to this report

(12) WELL LOG: Total depth 37.5 ft. Depth of completed well

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	5.0	Silt, light brown, loose, dry (M
5.0	14.0	Silt, brown, clayey, damp to moist (ML-CL)
14.0	27.0	Sand, brown, fine (SP)
27.0	34.0	Sand, gray, fine-medium, wet (SP)
34.0	37.0	Sand, brown, fine, clayey (SC)
37.0	37.5	Gravel, gray, coarse (GP)
		TOP HOLE ELEV. = 24.3 MSL
		BOTTOM HOLE ELEV. = -13.2 MSL

Work started Nov. 24, 1986 Completed Nov. 24, 1986

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED (Well Driller)

NAME (Person, firm, or corporation) (Typed or printed)

Address

City Zip

License No. Date of this report

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

OWNER: City of Sacramento LOCATION: 28 s et landfill

Total Depth: 37.5 Completion Depth: 35'

From	To		CONDITION
0	5.0		Silt, light brown, loose, dry (ml)
5.0	14.0		Silt, brown clayey, damp to moist (ML-CL)
14.0	27.0		Sand, brown, fine (SP)
27.0	34.0		Sand, gray, fine-meduim wet (SP)
34.0	37.0		Sand, brown, fine, clayey (SC)
37.0	37.5		Gravel, gray, coarse (GP)
			Top hole elevation 24.3 MSL
			Bottom hole elevation -13.2 MSL

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STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill
No. 195888

Notice of Intent No.
Permit No. or Date 8500 11-14-86
State Well No. B-C11d
Other Well No.

(1) OWNER: Name City of Sacramento
Address 915 "I" Street
City Sacramento, CA Zip

(2) LOCATION OF WELL (See instructions):
County Owner's Well Number
Well address if different from above 27th & "CS" Street-Landfill
Township Range Section
Distance from cities, roads, railroads, fences, etc.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☑ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☑

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air ☐
Other ☑ Bucket ☐

(6) GRAVEL PACK:
Yes ☑ No ☐ Size #3
Diameter of bore 11"
Packed from 26 to 80 ft.

(7) CASING INSTALLED:
Steel ☑ Plastic ☑ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen 4

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☑ No ☐ If yes, to depth 20 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☑ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
Dis[illegible] gal/min after hours Water temperature
C[illegible] analysis made? Yes ☐ No ☑ If yes, by whom?
W[illegible]ic log made? Yes ☐ No ☑ If yes, attach copy to this report

(12) WELL LOG: Total depth 80 ft. Depth of completed well

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	5.0	Silt, light brown, loose, dry (ML)
5.0	14.0	Silt, brown, clayey, damp to moist (ML-CL)
14.0	27.0	Sand, brown, fine (SP)
27.0	34.0	Sand, gray, fine-medium, wet (SP)
34.0	47.5	Gravel, clayey, gray-brown, with small cobbles (GC)
47.5	49.0	Gravelly clay/clayey gravel (GC)
49.0	80.0	Silt, brown, with very fine sand (

Top hole elevation = 24.3 MSL
Bottom hole elevation = -55.7 MSL

NOTE: well logged primarily on the basis of cuttings retained by the driller.

Work started Dec. 22, 19 86 Completed Dec. 30, 19 86

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
SIGNED (Well Driller)
NAME (Person, firm, or corporation) (Typed or printed)
Address
City Zip
License No. Date of this report

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

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STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fil

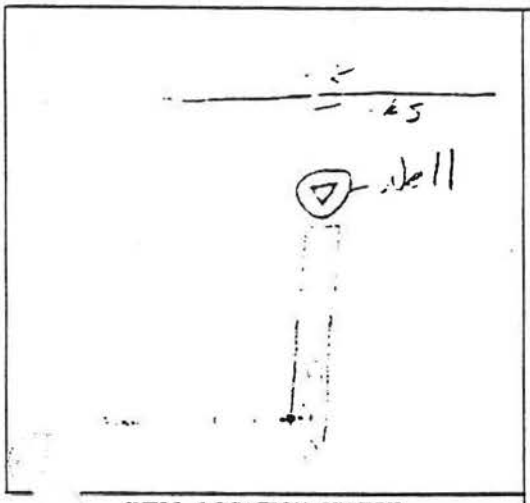
No. 195887

Notice of Intent No.
Permit No. or Date 8504 11-18-86

State Well No. B-C-12
Other Well No.

(1) OWNER: Name City of Sacramento
Address 915 "I" Street
City Sacramento, CA Zip

(2) LOCATION OF WELL (See instructions):
County Owner's Well Number
Well address if different from above 27th & C Street - Landfill
Township Range Section
Distance from cities, roads, railroads, fences, etc.



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☑ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☑

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air ☐
Other ☑ Bucket ☐

(6) GRAVEL PACK:
Yes ☑ No ☐ Size Monterey #3
Diameter of bore 11"
Packed from 14 to 40 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☑ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen 4"

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	15	4"	.040	15	40	#10

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☑ No ☐ If yes, to depth 14 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing Bentonite pellets + cement

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☑ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☑ If yes, by whom?
Electric log made? Yes ☐ No ☑ If yes, attach copy to this report

(12) WELL LOG: Total depth 41.8 ft. Depth of completed well

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	6.0	Gravel, light brown, coarse, sandy, silty, loose, scraps of metal and wood, fill (GM)
6.0	19.0	Silt, brown, very fine sandy, dar (ML-SM)
19.0	41.8	Silt, brown, slightly clayey, soft to very soft, wet (ML)
		Top hole elevation = 29.3 MS
		Bottom hole elevation = -12.5 MS

Work started Dec. 1, 1986 Completed Dec. 1, 19 86

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
SIGNED (Well Driller)
NAME (Person, firm, or corporation) (Typed or printed)
Address
City Zip
License No. Date of this report 12-17

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

WELL NO: B-C- 12

OWNER: City of Sacramento

LOCATION: 28th street landfill

Total Depth: 41 Completion Depth: 40'

From	To		CONDITION
0	6.0		gravel, light brown, coarse, sandy (gm) ~~silty, loose, scraps of metal and wood, fill.~~
6.0	19.0		Silt, brown, very fine sandy damp (ml-sm)
19.0	41.8		silt, brown, slightly clayey, soft to very soft, wet (ml)
			Top hole elevation 29.3 MSL
			Bottom hole elevation -12.5 MSL

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STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fil
No. 195883

Notice of Intent No.
Permit No. or Date 85DE 11-14-86
State Well No. B-C13
Other Well No.

(1) OWNER: Name City of Sacramento
Address 915 "I" Street
City Sacramento, CA Zip

(2) LOCATION OF WELL (See instructions):
County Owner's Well Number
Well address if different from above 27th & "C" St. - Landfill
Township Range Section
Distance from cities, roads, railroads, fences, etc.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☑ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☑

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air ☐
Other ☑ Bucket ☐

(6) GRAVEL PACK:
Yes ☑ No ☐ Size #3
Diameter of bore 11"
Packed from 22 to 56 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☑ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen 4"

From ft.	To ft.	Dia. in.	Cage or Wall	From ft.	To ft.	Slot size
1.3	30	4	Tele	30	56	#10

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☑ No ☐ If yes, to depth 22 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☑ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☑ If yes, by whom?
Electric log made? Yes ☐ No ☑ If yes, attach copy to this report

(12) WELL LOG: Total depth 56.3 ft. Depth of completed well

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	19.0	Sand, brown to dark gray, fine to medium, silty, abundant glass, met rags wood, damp, rotted garbage (SM)
19.0	56.3	Sand, gray, very fine, silty to cl damp (wet below 52') (SM-SP)
		Top hole elevation = 44.1 MS
		Bottom hole elevation = -12.2 MS

Work started Dec. 4, 19 86 Completed Dec. 4, 19 8

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
SIGNED (Well Driller)
NAME (Person, firm, or corporation) (Typed or printed)
Address
City Zip
License No. Date of this report

DWR 188 (REV. 7-78) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

WELL NO: B-C-13

WELL LOG REPORT

OWNER: City of Sacramento

LOCATION: 28th street landfill

Total Depth: 56.3 Completion Depth 55'

From	To		CONDITION
0	19.0		Sand, brown to dark gray, fine to medium, silty, abundant glass, metal rags wood, damp, rotted garbage ordor (sm)
19.0	56.3		Sand, gray, very fine, silty to clean dammp (wet below 52') (sm-sp)
			Top hole elevation 44.1 MSL
			Bottom hole elevation 12.1 MSL

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STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fi

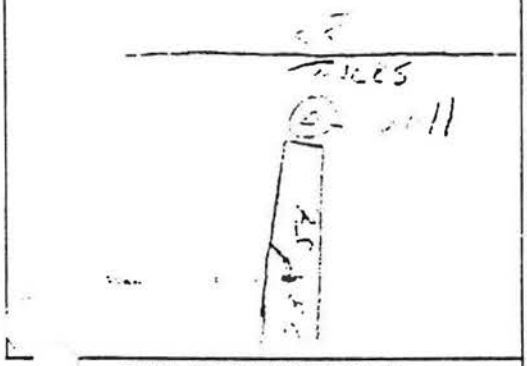
No. 19588/

Notice of Intent No.
Permit No. or Date 8582-11-14-86

State Well No. B-C14
Other Well No.

OWNER: Name City of Sacramento
Address 915 "I" Street
City Sacramento, CA Zip

(2) LOCATION OF WELL (See instructions):
County 11 Owner's Well Number
Well address if different from above 27th & "C" Street-Landfill
Township Range Section
Distance from cities, roads, railroads, fences, etc.



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☑ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☑

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air ☐
Other ☑ Bucket ☐

(6) GRAVEL PACK:
Yes ☑ No ☐ Size
Diameter of bore 11"
Packed from 3 to 35 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☑ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen 4"

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	8'	4"	Sch 80	8	33	#10

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☑ No ☐ If yes, to depth 3 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing Bentonite pellets + concrete

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☑ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☑ If yes, by whom?
Electric log made? Yes ☐ No ☑ If yes, attach copy to this report

(12) WELL LOG: Total depth 36.3 ft. Depth of completed well
from ft. to ft. Formation (Describe by color, character, size or material)

from ft.	to ft.	Formation (Describe by color, character, size or material)
0 -	1.5	Gravel, brown, coarse, loose, fill
1.5 -	4.0	Silt, light brown, very fine sand dry (ML)
4.0 -	15.0	Silt, dark to medium brown, damp
15.0 -	19.0	Silt, brown, slightly clayey, moi (ML)
19.0 -	25.0	Silt, gray, clayey, soft, wet (ML-
25.0 -	36.3	Sand, gray, very fine, silty, wet(
-		Top hole elevation = 23.8 M
-		Bottom hole elevation = -12.5 M

Work started Nov. 26, 19 86 Completed Nov. 26, 19 86

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED (Well Driller)
NAME (Person, firm, or corporation) (Typed or printed)
Address
City Zip
License No. Date of this report

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

WELL NO. B C-14

WELL LOG REPORT

OWNER: City of Sacramento

LOCATION: 28th Street Landfill

Total Depth 36.3' Completion Depth: 33'

From	To		CONDITION
0	1.5		gravel, brown coarse, loose, fill
1.5	4.0		silt, light brown, very fine sandy dry (ML)
4.0	15.0		silt, dark to medium brown, damp (ML)
15.0	19.0		silt, brown, slightly clayey, moist (ML)
25.0	36.3		sandy, gray, very fine, silty, wet (SM)
			Top hole elevation = 23.8 MSL
			Bottom hole elevation =-12.5 MSL

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THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fil

No. 195886

N[illegible]f Intent No.
[illegible]rmit No. or Date 8503 11-14-86

State Well No. B-C15
Other Well No.

(1) OWNER: Name City Of Sacramento
Address 915 "I" Street
City Sacramento, CA Zip

(2) LOCATION OF WELL (See instructions):
County Owner's Well Number
Well address if different from above 27th & "C" Street-Landfill
Township Range Section
Distance from cities, roads, railroads, fences, etc.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☑ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☑

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air ☐
Other ☑ Bucket ☐

(6) GRAVEL PACK:
Yes ☑ No ☐ Size #2-3
Diameter of bore 11"
Packed from 13 to 39 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☑ Concrete ☐

(8) PERFORATIONS: #5
Type of perforation or size of screen 4"

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
19	1[illegible]	4"	SCH 80	13	38	#10

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☑ No ☐ If yes, to depth ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing E. I. Le Pellet + Cement

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☑ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
D[illegible] gal/min after hours Water temperature
[illegible] analysis made? Yes ☐ No ☑ If yes, by whom?
Wa[illegible]tric log made? Yes ☐ No ☑ If yes, attach copy to this report

(12) WELL LOG: Total depth 39.8 ft. Depth of completed well

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	4.0	Sand,brown,loose,very fine,silt (SM-ML)
4.0	13.0	Silt,brown,slightly clayey,soft, damp (ML)
13.0	18.0	Silt,gray-brown,clayey,soft,moist to wet (ML)
18.0	27.0	Silt,brown,very fine sandy,moist to wet (ML-SM)
27.0	39.8	Sand,gray,fine,silty,wet (SM-SP
		Top hole elevation = 27.6 MS
		Bottom hole elevation = -12.2 MS

Work started Dec. 2, 19 86 Completed Dec. 2, 19 8

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
SIGNED (Well Driller)
NAME (Person, firm, or corporation) (Typed or printed)
Address
City Zip
License No. Date of this report

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

D-12

OWNER: City of Sacrament LOCATION: 28th reet landfill

Total Depth: 39.8 Completion Depth: 38'

From	To		CONDITION
0	4.0		Sand, brown, loose, very fine, silty (SM-ML)
4.0	13.0		Silt, brown, slightly clayey soft, moist to wet (ML)
13.0	18.0		Silt, gray-brown, clayey, soft, moist to wet (ML)
18.0	27.0		Silt, brown, very fine sandy, moist to wet (ML-SM)
27.0	39.8		Sand, gray, fine, silty, wet (SM-SP)
			Top hole elevation 27.6
			Bottom hole elevation 12.2

LITHOLOGIC LOGS FOR MONITORING WELLS

INSTALLED IN 1985

WELLS B1, B3, B4, C7, C8, C9 AND C10

CITY OF SACRAMENTO Well No. 13

Date: October 8, 1985
Time: 15:30 - 18:15
Well No. 13
Elevation 43.068 ft.
Depth: 54 ft. 11 inches
Water Level: 14 ft. from the bottom

0-5 ft. Light brown to tan silt man-made berm. No unusual characteristics, fairly dry.

5-10 ft. Change at around 6 ft. slightly darker brown and coarser silt.

10-15 ft. Brown silt, darker due to dampness, at 13 ft. "cohesiive" silt gray in color. Balls up at Auger. Some sand but only as indivudual grains (fine.)

15-20 ft. Brown to black brown silt could be called "clay". Silt wet and compacts easily

20-25 ft. Dark gray, black clay, no silt or sand present. at 23 ft. Mica flakes can be seen in hand sample.

25-30 ft. Still clay down to 28 ft. color remaining same, becoming wetter. Compacts well, clean of silt and sand. "True Clay", Mica and/or Pyrite flakes visable.

30-35 ft. At 34 ft. we have water in dark gray silty clay

35-40ft. Dark gray silty clay at 37 ft.

40-45 ft. Dary gray silty clay saturated with ground water at 43 ft.

45-50ft. Same as above, silty clay. Sticky and saturated with water.

50-55 ft. Small layer of sand no samples due to clay build up.

55-57 ft. At 57 ft. reached top of gravels. A little sand and silty sand. Gray in color. Gravel range in size of 1/2" to 4".

End End

CITY OF SACRAMENTO - Well No. 3B

Date: October 8, 1985
Time: 10:30 - 15:15
Well No. 3B
Elev. 44.093'
Depth 55 ft.
Water Level: 12 ft. from bottom

0 - 5 ft. Light brown silt to sandy silt. Fill dirt for berm. Darker brown at 5 ft. still silt to sandy silt.

5 - 10 ft. Light brown silt to sandy silt. Sand seems to have decreased and is finer grained, larger percentage of silt. Dampness increasing at 10 ft.

10 - 15 ft. At 13 ft. formation remaining the same. Dampness is increasing. Gray "cohesive" silt layer encountered at 14 ft.

15 - 20 ft. Dark gray (damp) silty sand found at about 18 ft. silt has decreased. Sand has increased; Pyrite and/or Mica flakes present. Sub-angular med-fine grained sand (turns gray to light gray when dry).

20 - 25 ft. At 22 ft. change to "cohesive" silt layer, very little sand. Only seen as individual grains in silt. Small flakes possibly mica present.

25 - 30 ft. Dark gray "cohesive" silt at 27 ft. balls up at auger. Small flake of mica and/or pyrite present. Grain size is decreasing and dampness is increasing.

30 - 35 ft. At 38 ft. change from silt clay to silty sand. Black to gray in color - Very fine grained and saturated with water. Possible pyrite and mica.

35 - 40 ft. Same as sample above, soupy mixture.

40 - 45 ft. Gray sand with silt about same as above. Slight increase in grain size of sand.

45 - 55 ft. Gravel at 48 ft. ranging 1/4" to 5" sub-rounded in coarse to to med. sand with silt. Gray to dark gray in color.

55 - 60 ft. Gravels decrease to about 5 ft. then increased at 57 ft.

End

CITY OF SACRAMENTO - Well No. 4B

Date: October 7, 1985
Time: 10:53 - 14:15
Well No. 4B
Elev. 43.005 ft.
Depth: 55 ft.
Water Level: 10 from bottom

0 - 5 ft. Light brown, brown silty sand. Sand fine grained with a few gravels. Gravels 1/4 to 3/4 dia. At 2 ft. color change to dark brown silty sand, has become damper. At 4 ft. drill chatter with red bricks and gravels appearing at auger. Possibly fill material.

5 -10 ft. Dary gray sand (black when damp) sand grains are angular to sub-rounded to rounded. Small flakes present, looks like Mica or Pyrite. Clean sand with little silt at about 9 ft.

10 - 15 ft. Dark gray sand (damp) with dark brown clay layer penetrated at 14 ft. approx. thickness, 1 ft. Clay has trace amounts of sand.

15 - 20 ft. Gray to gray brown silty sand. Sand is fine grained, no gravelis present.

20 - 25 ft. Gray to gray brown silty sand, becoming coarser with depth, and also more saturated.

25 - 30 ft. same as above, more saturated.

30 - 55 ft. Silty sand as above, saturated with water at about 40 ft.

End. . End

CITY OF SACRAMENTO - Well No. C7

Date: October 9, 1985

Time: 7:45 - 12:05

Well No. C-7

Elevation: 47.05

Depth: 56 ft. 7 inches

Water Level: 9 ft. from the bottom

0 - 5 ft. Brown to tan sandy silt, berm material, very fine grained sand.

5 - 10 ft. Darker brown silt, much wetter, less sand noticable, still in berm.

10 - 15. ft. Dark brown cohesive silt (slow drilling), less sand and damper

15 - 20 ft. Dark brown silt, damp, same as above. Wet with little sand.

20 - 25 ft. Dark brown silt as before/above. Silt is starting to ball up at the auger.

25 - 30 ft. At 28 ft. still in brown silt, dampness has increased.

30 - 35 ft. Brown silt, now with water, but still not saturated.

35 - 40 ft. Change has occurred at about 35 ft., brown gray silty sand fine grained.

40 - 45.ft. Brown sand with some silt, amount of sand is increasing along with grain size. Sand now fine to medium grained.

45 - 50 ft. Brown gray sand with silt (damp) but no good water yet. (Medium grained)

50 - 55 ft. Sand same as above, wetter at depth. Ground water was encountered somewhere around 43 ft.

55 - 60.ft. Sand now saturated with ground water. Gravels encountered at bottom of hole. Garvels about 1" in daimeter. Sand has increased to medium grained still gray in color.

CITY OF SACRAMENTO - Well No. C-8

Date: October 9, 1985

Time: 13:30 - 3:30

Well No. C-8

Elevation: 28.842

Depth: 39 ft. 7 inches

Water Level: 12 ft. from the bottom

0 - 5 ft. Light brown cover, silt with a little sand. Sand and silt become darker with depth

5 - 10 ft. At 7 ft. cohesive silt brown in color and damp

10 - 15.ft..Dark brown damp cohesive silt slightly sticky, occurs at 14 ft.

15 - 20 ft. Two colors of silty sand, light brown (18 ft.) and gray (20 ft.) both fairly fine grained.

20 - 25 ft. Dark gray (wet) silty sand starts to flow easy at 25 ft. possibly ground water at 24 ft.

25 - 30 ft. Dark gray (wet) silty sand appears to be getting coarser Saturated with water

30 - 35 ft. Gray sand now completely saturated with water and free-flowing. Gravel at about 35 ft. some cobble size

35 - 40 ft. Dark gray silty snad saturated with water, Few gravels below 35 ft., sand becoming coarser

40 - 45 ft. Dark gray sand much coarser, medium grained gravels at 43 ft. rangeing up to 3 inches in size

CITY OF SACRAMENTO - Well No. C-9

Date: October 7, 1985

Time: 16:21 to 18:32

Well No. C-9

Elevation: 30.931 ft.

Depth: 42 ft.

Water Level: 12 ft. from bottom

0 - 5 ft. Light brown silt with sand, and a few sub-rounded gravels. Upper few feet had traces of roots. Sand is very fine frained well sorted, and sub-rounded.

5 - 10 ft. Light brown to tank silt, very fine, almost might be called clay size. No gravels present (grain size and amount of sand decreasing.

10 - 15 ft. Light brown silty clay -Same as above. However, dampness is increasing.

15 - 20 ft. Same as above

20 - 25 ft. Dark brown "cohesive" silt layer at 18 ft. Much damper, some sand grains along with mica and (pyrite)? flakes associated with the silt.

25 - 30 ft. Dark brown "cohesive" silt (20' - 23'), Dark brown/black clay with little sand, clay is sticky and tar-like, some mica & pyrite flakes present.

30 - 35 ft. Dark gray black mica sands saturated with water at 30 ft.

35 - 40 ft. same as above - - free flowing with water.

40 - 45 ft. Gravel encountered at 40 ft. Gravels with a silty sand matrix saturated with ground water - Gravel ranges 3/4" to 3" in dia. at 43 ft.

End End End

CITY OF SACRAMENTO - Well No. C-10

Date: October 8, 1985

Time: 7:45 - 10:00

Well No. C-10

Elevation: 29. 329 ft.

Depth: 41 ft.

Water Level: 6 ft. from bottom

0 - 5 ft. Light brown to tan silt. No gravels encountered. Dry to mildly damp first 5 ft. At 5 ft. a change to finer silt occurs.

5 - 10 ft. Brown to tan silt increasing in dampness. Change to tan silty sand occurs at about 8 ft. San is very fine grained, but visable to naked eye. Doesn't appear to be micacess.

10 - 15 ft. Brown clay, silt with little sand at 12 ft. Sand seems to be decreasing.

15 - 20 ft. Brown (damp) clay-silt dampness is increasing, but samples not saturated flakes of mica present in sample.

20 - 25 ft. Gray to dark gray silty sand, medium to med-fine grained sand is now increasing, but samples not saturated flakes of mica, (increasing dampness).

25 - 30 ft. Gray to dark gray (dark when wet) silty sand. Fine to medium grained. Sand is med. to med-coarse grained with some silt. Gravels range from 3/4" to 3" and are rounded, pyrite and mica flakes present.

30 -35 ft. Dark gray-brown blackish silty sand saturated with water. Clay and silt also present. Water makes sampling difficult.

35 - 40 ft. Same as above, free flowing sands and silt also. Still saturated with water. At 38 ft. gravels were encountered - Gravels are large and mixed with silty sand.

40 - 45 ft. Dark gray silty sand with gravels. Sand has become coarser with depth. Sand is med. to med-coarse grained with some silt. Gravels range from 3/4" to 3" and are rounded with pyrite and mica flakes also present.

End . . . end ..

KLEINFELDER

GRADING ANALYSIS

LE NO. 24-1603-71A04 SAMPLE NO. P-1: 45'-46' DATE 10-28-92 TECHNICIAN MN

SAMPLE DESCRIPTION Grey Sand W/some Silt

TOTAL WT. OF SAMPLE 237,42 WT. COARSE (+) COARSE, %

WT. FINE GRADING WT. FINE (—) FINE, %

WT. WASHED

Sieve Size	WT. RETAINED		% RETAINED		Passing	Combined % passing	Specs.
	Ind.	Cumulative	Ind.	Cumulative			
3"							
2"							
1½"							
1"							
¾"							
½"							
#4							
#8							
#10	,40	.40	0,2	0,2		100	
#16	8.35	8.75	3.5	3,7		96	
#20	52.02	60.77	21,9	25,6		74	
#30	79,49	140,26	33,5	59,1		41	
#40	43,74	184,00	18,4	77,5		23	
#50							
#80							
#100	32,81	216,81	13,8	91,3		9	
#200	6,20	223,01	2,6	93,9		6,1	
PAN	0,39						
WASH							

Remarks

IHK&A Form 1-2

KLEINFELDER

GRADING ANALYSIS

FILE NO. 24-160371 A04 SAMPLE NO. P-1 55'-56.5 DATE 10-28-97 TECHNICIAN

SAMPLE DESCRIPTION Grey Sand w/some gravel and traces of silt

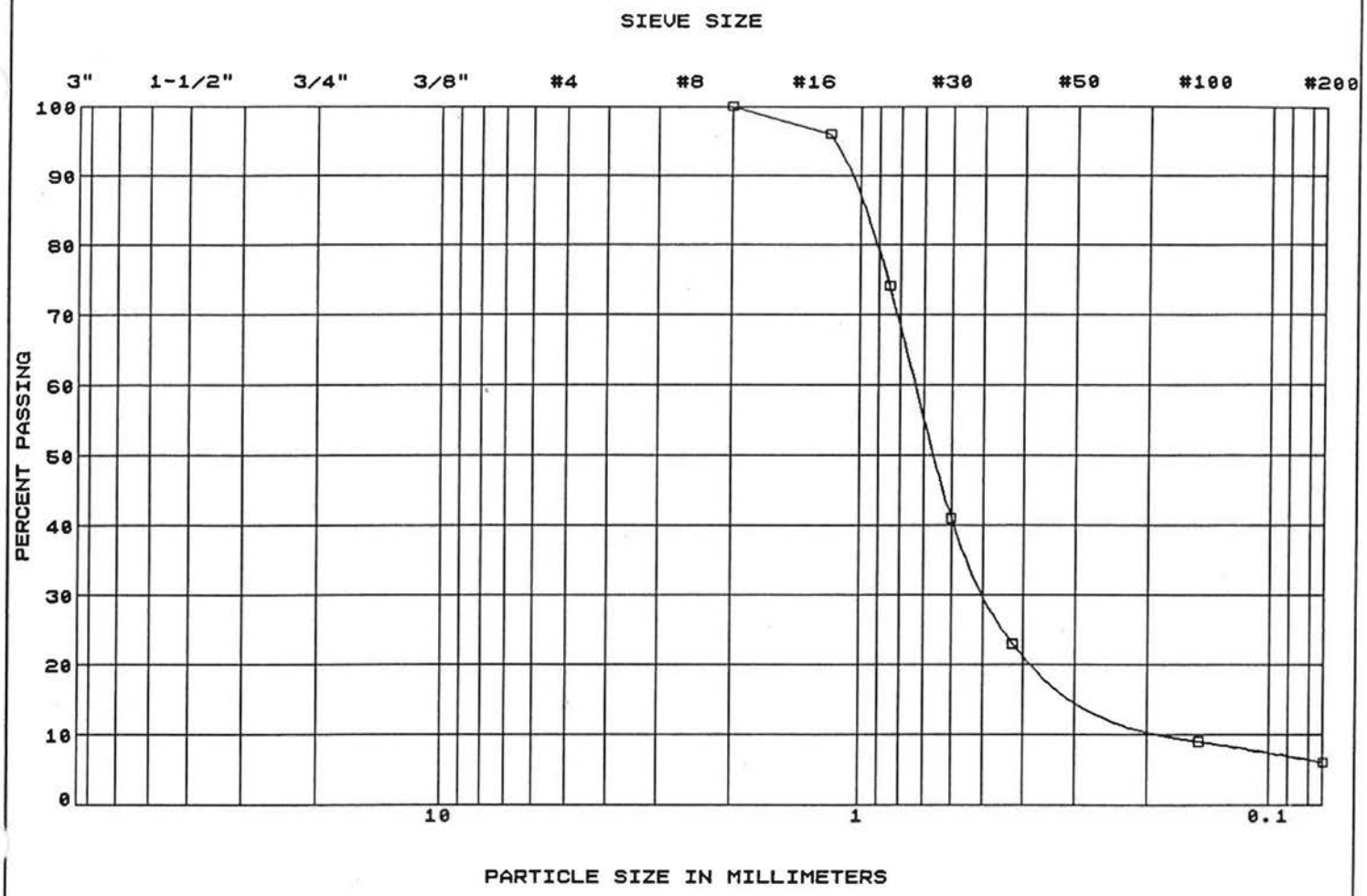
TOTAL WT. OF SAMPLE 212.57 WT. COARSE (+) COARSE, %

WT. FINE GRADING WT. FINE (—) FINE, %

WT. WASHED

Sieve Size	WT. RETAINED		% RETAINED		Passing	Combined % passing	Specs.
	Ind.	Cumulative	Ind.	Cumulative			
3"							
2"							
1½"							
1"							
¾"	20.07	20.07	9.4	9.4		91	
½"							
⅜"	3.33	23.40	1.6	11.0		89	
#4	0.59	23.99	0.3	11.3		89	
#8							
#10	2.38	26.37	1.1	12.4		88	
#16	5.26	31.63	2.5	14.9		85	
#20	22.18	53.81	10.4	25.3		75	
#30	56.97	110.78	26.8	52.1		48	
#40	59.88	170.66	28.2	80.3		20	
#50							
#80							
#100	28.82	199.48	13.6	93.8		6	
#200	4.72	204.20	2.2	96.1		3.9	
PAN	0.27						
ASH							

Remarks



GRAVEL		SAND		
coarse	fine	coarse	medium	fine

LEGEND:

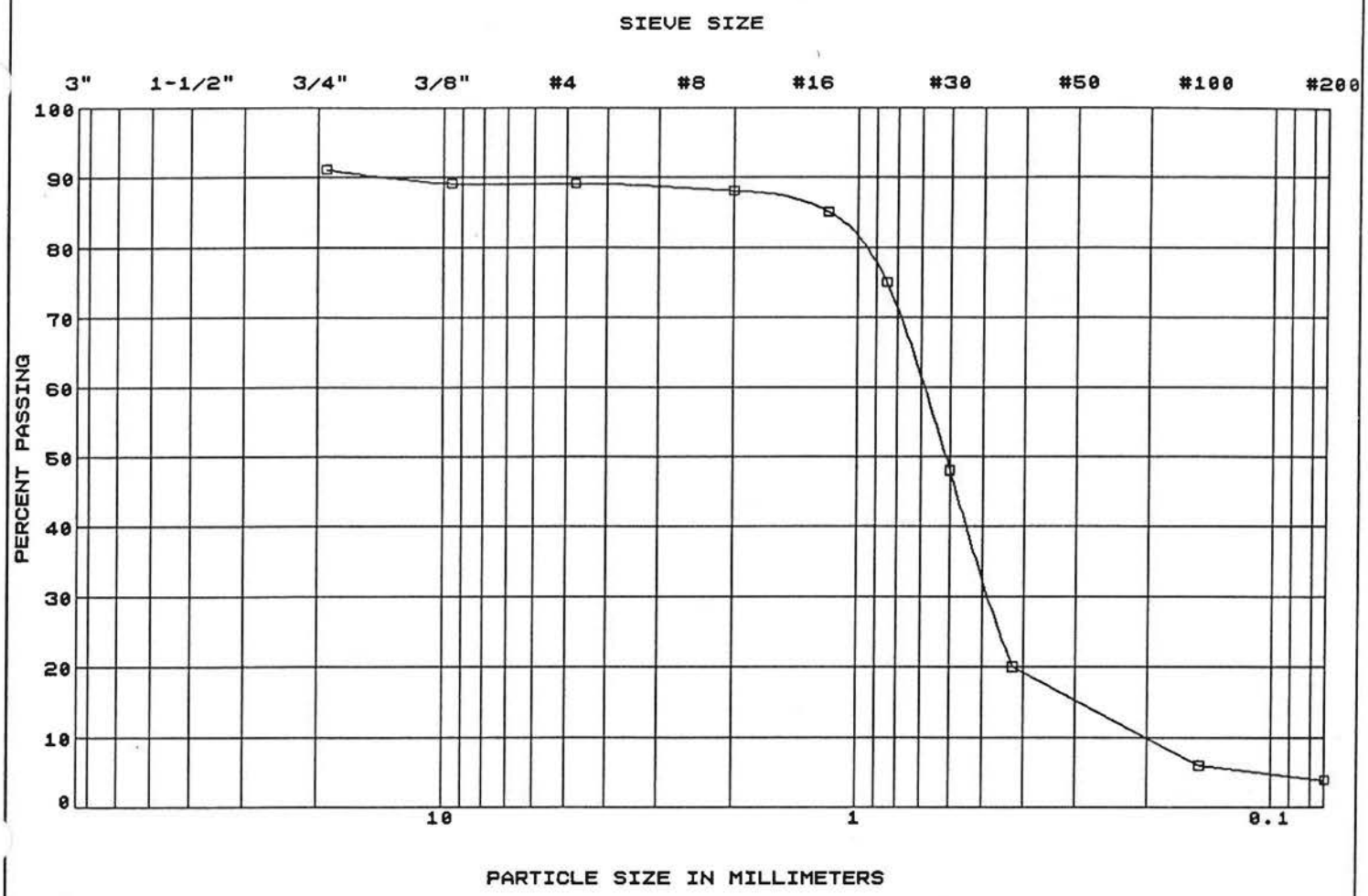
POINT ID	DEPTH (ft)
☐ P-1	45

KLEINFELDER

SIEVE ANALYSIS
CITY OF SACRAMENTO

PLATE

PROJECT NO. 24-160371 A04



GRAVEL		SAND		
coarse	fine	coarse	medium	fine

LEGEND:

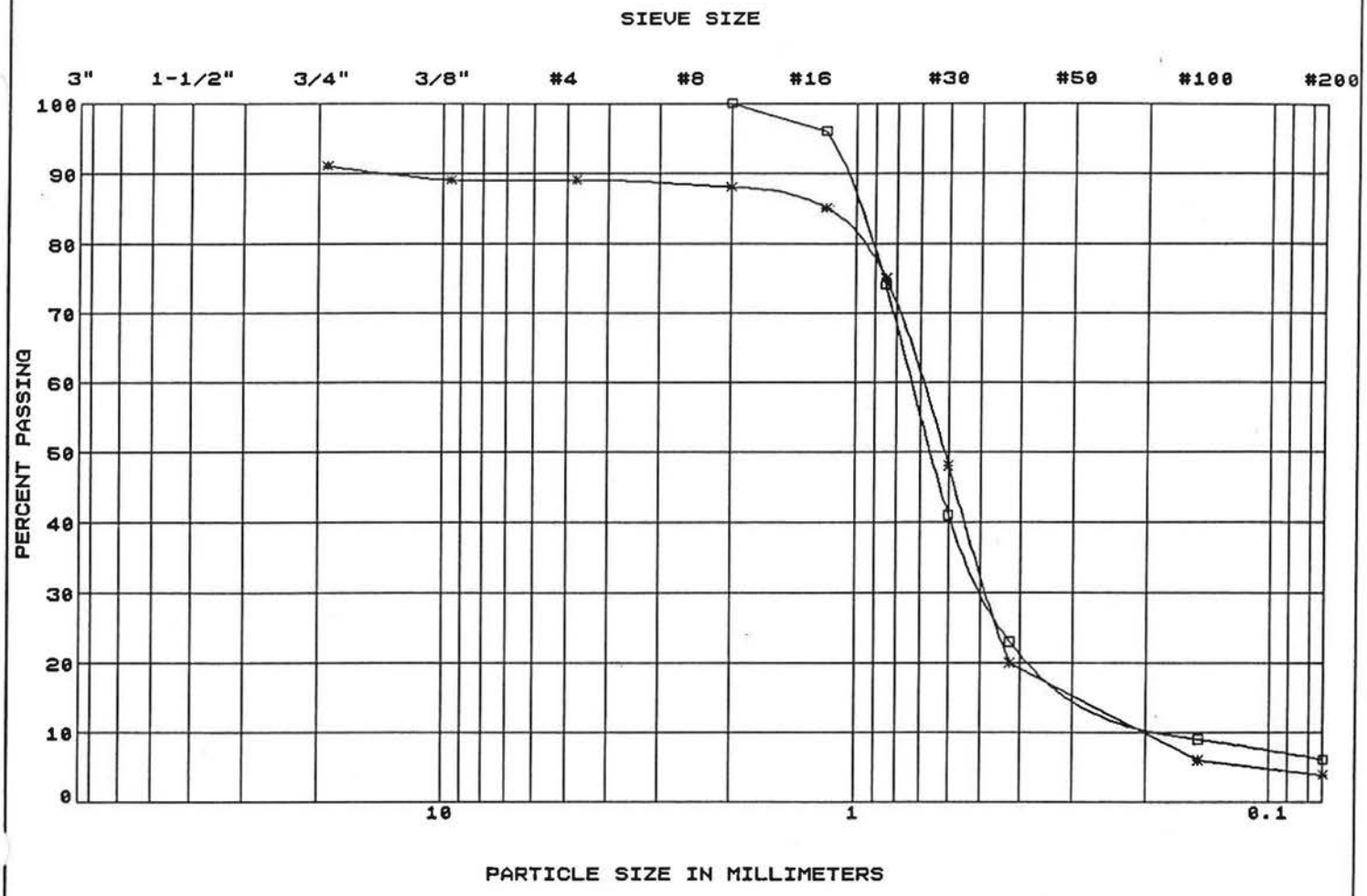
POINT ID	DEPTH (ft)
☐ P-1	55

KLEINFELDER

SIEVE ANALYSIS
CITY OF SACRAMENTO

PLATE

PROJECT NO. 24-160371 A04



GRAVEL		SAND		
coarse	fine	coarse	medium	fine

LEGEND:

POINT ID	DEPTH (ft)
□ P-1	45
✳ P-1	55

KLEINFELDER

SIEVE ANALYSIS
CITY OF SACRAMENTO

PLATE

PROJECT NO. 24-160371 A04

APPENDIX K

APPENDIX K

GROUNDWATER SAMPLING PROCEDURE
CITY OF SACRAMENTO 28TH STREET SANITARY LANDFILL

1. Prior to pumping, measure the depth to groundwater and the depth to the bottom of the well with the electronic water level indicator. Use the well wizard cap assembly as a reference point for measurement. (See Figure 14 for monitoring well location.)

2. Subtract the groundwater depth from the well depth to get the height of the water column in the well. Multiply the water column height by the number of gallons per foot of well casing to get the well volume (.6 gals/ft for 4" casing). Multiply the well volume by two to get the purge volume.

3. Pump the well for the time period required to purge the well. At least two well volumes should be purged (pH and EC parameters will stabilize). The battery powered controller pumps at a rate of .5 gal/min. The gas powered controller pumps at a rate of .875 gal/min. Always adjust the pumping rate for each well to maintain the maximum flow.

4. Extract samples from the well.

5. Values for pH and EC will be recorded at the time of sampling. Field pH and EC meters will be checked for accuracy at least once a year.

VOLATILE ORGANIC ANALYSIS (VOA)

- Bottles used for sampling for volatile organics are 40 ml glass vials with a cap assembly consisting of a cap and septum (seal). The septum is composed of silicon rubber with a teflon liner.

- When sampling a source for volatile organics, it is necessary to take 40 ml samples for each source to be analyzed. Depending on circumstances, a sealed blank sample should be transported with the samples.

- Keep sample bottle closed until it is to be filled. Fill the container completely to the top without rinsing. No air bubbles should pass through the sample as the bottle is filled, or be trapped in the sample when the bottle is sealed. The pH of both the sample and the sample duplicate must be adjusted to a pH of <2 by carefully adding one drop of 1:1 HCl for each 20ml of sample volume. If any air bubbles are trapped on sides of the bottle, tap bottle. Seal the bottle with the cap assembly so that the teflon (white side) is in contact with the water. After sealing, turn bottle upside

down, tap bottle, examine bottle for entrapped air. If air bubbles are present, open bottle, top off bottle, and reseal. Continue procedure until no air bubbles are present in sample bottle, then shake vigorously for 1 minute.

- Storage and transport--after sampling avoid exposing the sample to any sunlight. If samples cannot be delivered to laboratory within one (1) hour use an iced cooler for storage during transport to laboratory.

MINERAL ANALYSIS

- Containers for samples to be analyzed for minerals must be specially rinsed or plastic bottles prepared by laboratory. Non-laboratory supplied containers are not adequate for sample collection for these analyses.

- Keep sample bottle closed until it is to be filled. Remove cap do not touch the inner surface of the cap or do not lay the cap down. Fill the container without rinsing. Do not fill the bottle completely to the top. Leave a small amount of air space.

- Storage and transport--if samples cannot be delivered to laboratory within 1-2 hours use an iced cooler for storage during transport to laboratory.

Label each sample with the date, time well number, water temperature and any other observations that were made (such as color of water, foamy water, etc.).

Chain of Custody Record

To establish the documentation necessary to trace sample possession from time of collection, a chain-of-custody record should be filled out and should accompany every sample. The record should contain the following types of information:

- Sample number;

- Signature of collector;

- Date and time of collection;

- Media sampled (e.g., groundwater);

- Sample type (composite or grab);

- Identification of sampling location/well;

- Number of containers;

- Parameters requested for analysis;
- Signature of person involved in the chain of possession and times;
- Inclusive dates of possession with time in 24 hour notation.
- Internal temperature of shipping container when samples were sealed into the container for shipping;
- Internal temperature of container when opened at the laboratory; and
- Remarks section to identify potential hazards or to relay other information to the laboratory.

An adequate chain-of-custody program should allow for tracing the possession and for the handling of individual samples from the time of field collection through completion of laboratory analysis. An owner or operator's chain-of-custody program should include:

- Sample labels to prevent misidentification of samples;
- Sample seals to preserve the integrity of the sample from the time it is collected until it is opened in the laboratory;
- Field notes to record information about each sample collected during the groundwater monitoring program;
- Chain-of-custody record to establish the documented sample possessions from the time of collection to analysis;
- Laboratory storage and analysis records, that are maintained at the laboratory and which record pertinent information about the sample.

Sample Labels

Sample identification should be marked clearly in waterproof ink on each sample container. To aid in labeling, the information should be written on each container prior to filling with a sample.

To prevent misidentifying samples, legible labels should be affixed to each sample container. The labels should be sufficiently durable to remain legible even when wet and should contain the following types of information:

- Sample identification number;
- Name and signature of the sampler;

- Date and time of collection;
- Sample location; and
- Parameters requested.

Field Logbook

To provide a factual basis for evaluating the possibility of sample contamination during sampling activities, all sampling activities, measurements, and observations should be noted in a field log. Information should include visual appearance (e.g., color, turbidity, degassing, surface film), odor (type, strength) of samples and sample measurements and calibration results. Ambient conditions (temperature, humidity, wind, precipitation) and purging activities should also be recorded as an aid in evaluating sample analysis results. Sample of decontamination solutions and sampling equipment rinse water (sampling equipment blank) may be useful in documenting the effectiveness of sampling equipment decontamination procedures. Field notes generally document the following information:

- Identification of well;
- Well depth and other well measurements;
- Static water level and measurement technique;
- Presence and thickness of immiscible layers and detection method;

Preservation

During ground-water sampling, every attempt should be made to minimize changes in the chemistry of the samples. To assist in maintaining the natural chemistry of the samples, it is necessary to preserve the sample. Methods of sample preservation are relatively limited and are intended to retard chemical reactions such as hydrolysis or oxidation and to reduce the effects of sorption. Preservation methods are generally limited to pH control, chemical addition, refrigeration, and protection from light.

Holding times must be considered along with the preservation methods. Holding time refers to the period that begins when the sample is collected from the well and ends with its extraction or analysis. Data from samples not analyzed within the recommended holding times should be considered suspect.

The owner operators should identify the preservation methods, procedures, and techniques that will be used for transferring the samples to a laboratory. The owner or operator should refer to SW-846 (USEPA, 1986b) for the specific preservation method and holding times for each of the constituents in the samples.

Sample Storage and Shipment

Storage and transport conditions of ground-water samples are important elements of the sampling protocol to maintain sample quality. Samples should be collected to 4 °C as soon as possible after they are collected. These conditions should be maintained until samples are received at the laboratory. Sample containers are generally packed in picnic coolers or special containers for shipment. Polystyrene foam, vermiculite, and "bubble pack" are frequently used to pack sample bottles tightly so that no motion is possible, thereby preventing breakage. Ice is usually placed in double sealed plastic bags and added to the cooler. It should be noted that cold packs ("blue ice") also are acceptable. All related paperwork is sealed in a plastic bag and taped to the inside top of the cooler. The cooler top is then taped shut. Custody seals may be attached to the individual sample containers and are always attached on the outside of the cooler.

Transportation arrangements should be made that maintain proper storage conditions and provide for effective sample pick-up and receipt at the laboratory. Sampling plans should be coordinated with the laboratory so that sample receipt, storage, analysis, and custody arrangements can be provided.

Most analyses must be done within a specified period (holding time) from sample collection. Some holding times for Appendix I constituents are as short as 7 days. To provide the laboratory with operational flexibility in meeting these holding times, samples are usually shipped via overnight courier. Laboratory capacity or operating hours may influence sampling schedules. Coordination with laboratory staff during planning and sampling activities is important in maintaining sample and analysis quality.

Documentation that accompanies samples during shipment to the laboratory usually includes chain-of-custody (including a listing of all sample containers), analytical request schedule, and full identification of the origin of samples (including contact names, phone numbers, and addresses). Copies of all documents shipped with the samples should be retained by the sampler for confirmation that receipt of samples was complete. Such verification should occur upon receipt of samples at the laboratory and upon receipt of the report of analysis (ROA) from the laboratory. Documentation is described further in subsection 5.8.3.6.

Appendix L (Missing)

Appendix M (Missing)

APPENDIX N

9-7-93

Final Version

STATE OF CALIFORNIA - Environmental Protection Agency
PETE WILSON, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION
3443 Routier Road, Suite A
Sacramento, CA 95827-3098
PHONE: (916) 255-3000
(916) 255-3015

3 September 1993

To Owners and Operators
of Municipal Solid Waste Landfills,
and Interested Parties

PROPOSED ORDER AMENDING WASTE DISCHARGE REQUIREMENTS AND MONITORING AND REPORTING PROGRAMS FOR MUNICIPAL SOLID WASTE LANDFILLS IN THE CENTRAL VALLEY REGION

On 2 August 1993, this Regional Board mailed to you a Notice of Public Hearing for a Proposed Order Amending Waste Discharge Requirements and Monitoring and Reporting Programs for Municipal Solid Waste Landfills in the Central Valley Region, along with the tentative proposed order. On 12, 19, and 20 August 1993, staff workshops were held in Fresno, Redding, and Sacramento, respectively, to present and discuss the proposed order.

Based on the staff workshops and written comments, the tentative proposed order was revised, and a staff report has been prepared for presentation to the Board at its meeting scheduled for 17 September 1993 in Sacramento. Enclosed for your information is a copy of the agenda materials for that meeting.

Changes were made to the proposed order of 2 August 1993 as deemed appropriate by staff; deletions are shown by ~~strikeout~~, and additions by redline. Comments are discussed in the staff report. Certain requested changes could not be made due to constraints imposed either by the federal law (Subtitle D of RCRA) or by Resolution No. 93-62 of the State Water Resources Control Board.

Where site-specific circumstances warrant modifications to the waste discharge requirements and monitoring programs which regulate a site, and where such modifications are allowed by law, Board staff have been directed to work with dischargers to revise requirements and programs as appropriate in a timely manner. We understand that the proposed order imposes broad requirements which may need to be adjusted to accommodate individual site characteristics. The objective of the proposed order is to bring 81 dischargers regionwide under the same mandated requirements.

If your concerns have not been satisfied, you are welcome to attend the Board meeting of 17 September 1993 in Sacramento. The Board will hold a hearing on this agenda item and receive testimony from interested parties. However, due to the estimated length of of other items at that meeting, the Board Chair intends to limit oral testimony to 5 minutes.

If you have any questions or comments, please contact either of the following staff: Bill Marshall, Sacramento, (916) 255-3140; Dane Johnson, Fresno, (209) 445-5525; or Dennis Wilson, Redding, (916) 224-4848.

WILLIAM H. CROOKS
Executive Officer

Enclosure

cc: Board Members
Walt Pettit, Executive Director, SWRCB

Meeting Agenda

Central Valley Regional Water Quality Control Board

FRIDAY, 17 SEPTEMBER 1993 - 8:30 A.M.

Integrated Waste Management Board
8800 Cal Center Drive
Sacramento, California

We would appreciate your filling out an attendance card at the meeting. Filling out the card is voluntary.

Items showing times will begin no sooner than indicated. They may, however, be delayed by previous items.

Please note time limitations will be imposed on presentations.
The Regional Board requests that oral testimony be summarized.
Written comments should be submitted to ensure they will be included in the record before the Board.

INTRODUCTION

1. Approval of Minutes of the 374th Regular Meeting of 5 and 6 August 1993

WASTE DISCHARGE REQUIREMENTS (Land Disposal)

2. Municipal Solid Waste Landfills in the Central Valley Region - *Consideration of an order amending waste discharge requirements and monitoring and reporting programs for municipal solid waste landfills in the Central Valley Region to implement State Water Board Order No. 93-62* - **8:30 a.m.**

3. Tri Valley Growers (TVG), Oberti Olive Company, Madera County - *Request for Modification of Waste Discharge Requirements to Extend Cease Discharge Date* - **9:00 a.m.**

UNCONTESTED ITEMS

*4. Consideration of Uncontested Items - *Uncontested, starred items are expected to be routine and noncontroversial; recommendations will be acted on without discussion. If any interested party, Board or staff member requests discussion, the item will be considered separately.* - **9:00 a.m.**

ENFORCEMENT

5. FMC Corporation, Modesto Site, Stanislaus County - *Consideration of a Proposed Cleanup and Abatement Order to require the cleanup of ground water pollution* - **10:00 a.m.**

NOTES

1. Items are numbered for identification purposes only and may not be considered in order.
2. Persons wishing to introduce item exhibits (i.e., maps, charts, photographs) must leave them with the Board's Executive Assistant. Photographs or slides of large exhibits are acceptable.
3. Persons applying for, or actively supporting or opposing, waste discharge requirements before the Board must comply with legal requirements if they or their agents have or propose contributing $250 or more to a Board member for an election campaign. Contact the Board for details if you fall into this category.
4. The Regional Board may meet in closed session to discuss matters in litigation [Authority: Government Code Section 11126(q)] and to deliberate on a decision to be reached based upon evidence introduced in a hearing [Authority: Government Code Section 11126(d)].
5. All Board files, exhibits, and agenda material pertaining to items on this agenda are hereby made a part of the record.

6. Tidewater Oil Co., Texaco Inc., Phillips Petroleum Co., Victor E. Cristoni, Reproco Inc., Lion Oil Co., Tosco Corporation, Ace Oil Co., Angelo K. Tsakopoulos, Eppie Johnson, Danny Hayes, Gary Hayes, John S. Thompson, Donald W. James, 7825 Stockton Boulevard, Sacramento, Sacramento County - *Consideration of Cleanup and Abatement Order to require the cleanup of soil and ground water pollution* - **1:30 p.m.**

*7. City of Redding, Shasta County - Consideration of Rescinding Cease and Desist Order No. 91-085 (see Item 4)

WASTE DISCHARGE REQUIREMENTS (Land Disposal)

*8. Uncontested Waste Discharge Requirements (see Item 4)

a. Mr. Roger Green, dba Green Rock Quarry, Oroville, Butte County (new)
b. Calaveras Cement Company, A Subsidiary of CBR Cement Corporation, and Pacific Gas and Electric Company, Lake Britton Diatomaceous Earth Pit, Shasta County (new)
c. National Park Service, Whiskeytown Lake, National Environmental Education Camp, Shasta County (new)
d. City of Atwaer, Sludge Application to Land, Merced County (new)
e. Valley Sun Dried Products, Inc., and Raymond C. Benech, Stanislaus County (new)
f. Tri Valley Growers, Modesto Cannery, and Beard Land Improvement Company, Stanislaus County (revision)
g. Basic Vegetable Products, L.P., Modesto Facility, and Kraft General Foods, Inc., Stanislaus County (revision)
h. Dunnigan County Estates, Inc., Country Fair Estates, Yolo County (update)
i. George Reed, Inc., San Joaquin County (update)
j. Tri Valley Growers, Plant T, San Joaquin County (update)
k. Grant Amen, dba Amen Dairy, Shasta County (update)
l. Shasta Livestock Auction Yard, Incorporated, Shasta County (update)
m. Future-Tech Environmental Services, Joseph Jess, and Paul Marciel, Jess Ranch and Marciel Ranch Sludge Application to Land, Alameda County (revision)

Special Orders modifying waste discharge requirements to reflect name changes

n. City of Avenal, Solid Waste Disposal Site, Kings County
o. County of Kern, Resource Management Agency, Waste Management Department, Bakersfield Metropolitan (Bena) Landfill, Kern County
p. County of Kern, Resource Management Agency, Waste Management Department, Buttonwillow Sanitary Landfill, Kern County
q. County of Kern, Resource Management Agency, Waste Management Department, China Grade Sanitary Landfill, Kern County
r. County of Kern, Resource Management Agency, Waste Management Department, Lost Hills Sanitary Landfill, Kern County
s. County of Kern, Resource Management Agency, Waste Management Department, McFarland-Delano Sanitary Landfill, Kern County
t. County of Kern, Resource Management Agency, Waste Management Department, Shafter-Wasco Sanitary Landfill, Kern County
u. County of Kern, Resource Management Agency, Waste Management Department, Taft Sanitary Landfill, Kern County
v. Santa Fe Energy Resources, Inc., Solid Waste Disposal Site, San Luis Obispo County
w. Shell Western E & P Inc., North Belridge Landfill, Kern County
x. Britz Inc., Davenport Ranch Evaporation Basin, Fresno County

*9. Uncontested Waste Discharge Requirements Rescissions (see Item 4)

a. Cypress Beef Packing, Inc., and Hafam Properties, Sacramento County
b. Stockton Yacht Club, San Joaquin County
c. Weatherby Lake Resort, San Joaquin County
d. Windmill Cove, San Joaquin County

e. C. T. Alloy Sprockets, Inc., Yuba County
f. Snider Lumber Products Company, Calaveras County
g. Chevron Station (No. 9-5959), Vacaville, Solano County
h. P&M Cedar Products, Incorporated, Westwood, Lassen County
i. Louisiana-Pacific Corporation, Crescent Mills, Plumas County
j. Ruby J. Mining Company, Plumas County
k. Sierra Pacific Industries, Feather River Division, Sloat, Plumas County
l. Diamond Lands Corporation, Red Bluff Sawmill, Tehama County
m. Louisiana-Pacific Corporation, Sierra Division, Red Bluff Operations, Tehama County
n. Roseburg Lumber Company, Red Bluff Plywood Plant No. 8, Tehama County
o. Pacific Fruit Express Company, Fresno County
p. Kelbro Corporation Disposal Facility, Sacramento County

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMITS

*10. Uncontested NPDES Permits (see Item 4)

a. Northstate Asphalt, Incorporated, Shasta County (new)
b. University of California, Davis Campus, Cooling Tower Wastewater, Yolo and Solano Counties (new)
c. Hunt-Wesson, Inc., Conaway Conservancy Group, The Mary Jane Lillard Trust, The Fred C. Heidrick Family Trust, The Joe A. Heidrick Family Trust, Heidrick Farms, Inc., Joe Heidrick Enterprises, Yolo County (revision)
d. City of Alturas, Wastewater Treatment Plant, Modoc County (renewal)
e. Simpson Paper Company, Shasta Mill, Shasta County (renewal)
f. Rio Alto Water District, Lake California, Tehama County (renewal)

OTHER BUSINESS

11. Public Forum - *Any member of the public may address the Board on any matter within the Board's jurisdiction*

12. Status Report on the Dry Cleaning Industry Task Force, Proposed Legislation, and Continuing PCE Ground Water Problems

13. Executive Officer's Report

14. The Board will meet in closed session to discuss ongoing litigation in the case of *Committee to Save the Mokelumne River v. John S. Corkins, et al., U.S. District Court for the Eastern District of California, CIV. NO. S-91-1779-DFL/PAN* [authorized under Government Code Section 11126(q)(1)] (Note: The Board will take up this item at 11:30 a.m. or as close to that time as possible.)

15. Adjourn to the 22 October 1993 meeting in Sacramento

Questions regarding this agenda should be directed to Inge Clarke at (916) 255-3039. Anyone requiring reasonable accommodation to participate in the meeting is requested to contact Inge Clarke at least five days prior to the meeting.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

Board Members	City of Residence	Appointment Category
Karl E. Longley, Chair	Fresno	Undesignated
Hugh V. Johns, Vice Chair	Hanford	Irrigated Agriculture
Hank Abraham, Member	Fresno	Industrial Water Use
Ernie Pfanner, Member	Davis	Water Quality
W. Steve Tompkins, Member	Bakersfield	Water Supply
Clifford C. Wisdom, Member	Stockton	Water Quality
A. Vernon Conrad, Member	Reedley	County Government
Vacancy		Municipal Government
Vacancy		Recreation, Fish or Wildlife

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Inge C Clarke, *Executive Assistant*

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Paul E. Jepperson	Thomas R. Pinkos

Unit Chiefs

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Jerrold A. Bruns	Larry F. Nash
Wendy L. Cohen	Antonia K. J. Vorster
Kenneth D. Landau	Rudy J. Schnagl
William J. Marshall	Gregory K. Vaughn
F. Wayne Pierson	Dennis W. Westcot

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Unit Chiefs

Larry W. Beatty	John M. Noonan
F. Scott Nevins	Lonnie M. Wass
Shelton R. Gray	Dane S. Johnson

GENERAL STATEMENT

The primary duty of the Regional Board is to protect the quality of the waters within the Region for all beneficial uses. This duty is implemented by formulating and adopting water quality plans for specific ground or surface water basins and by prescribing and enforcing requirements on all domestic and industrial waste discharges. Specific responsibilities and procedures of the Regional Boards and the State Water Resources Control Board are contained in the Porter-Cologne Water Quality Control Act.

The purpose of this meeting is for the Board to obtain testimony and information from concerned and affected parties and to make decisions after considering the recommendations made by the Executive Officer.

Any person affected adversely by a decision of this Board may petition the State Water Resources Control Board to review the decision. The petition must be received by the State Board within 30 days of the Regional Board's meeting at which the adverse action or inaction occurred. Copies of the law and regulations applicable to filing petitions will be provided upon request.

The Board and staff welcome information on pertinent problems, but comments at the meeting should be brief and directed to specifics of the case to enable the Board to take appropriate action. Whenever possible, lengthy testimony should be presented in writing and only a summary of pertinent points presented verbally.

ITEM: 2

SUBJECT: Municipal Solid Waste Landfills in the Central Valley Region

REPORT: The federal Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA), authorizes development of nationwide minimum standards for disposal sites for municipal solid waste (MSW), including criteria for sanitary landfills (LF).

On 9 October 1991, the United States Environmental Protection Agency (USEPA) promulgated regulations that apply, in California, to dischargers who own or operate Class II or Class III landfill units at which municipal solid waste is discharged (MSWLF), regardless of whether or not a permit is issued (Title 40, Code of Federal Regulations, Parts 257 and 258, "federal MSW regulations"). The majority of the federal MSW regulations become effective on the "Federal Deadline", which currently is 9 October 1993.

Each state must "...adopt and implement a permit program or other system of prior approval and conditions to assure that each...[MSWLF]...within such state...will comply with the...[federal MSWLF regulations]." State regulations and policies promulgated to satisfy this requirement are subject to approval by USEPA.

On 17 June 1993, the State Water Resources Control Board adopted Resolution No. 93-62, titled *Policy for Regulation of Discharges of Municipal Solid Waste*, as State Policy For Water Quality Control, under Section 13140 et seq. of the California Water Code. The Office of Administrative Law has approved this policy. The Policy directs each Regional Water Quality Control Board (RWQCB) to revise the waste discharge requirements (WDRs) of each MSWLF in its respective region to comply with the federal MSW regulations.

All State agencies, including this Board, are required to comply with State Policy For Water Quality Control regarding any activities that could affect water quality. RWQCBs regulate discharges of waste that could affect the quality of waters of the state, including discharges of waste to land at MSWLFs, through the issuance and revision of waste discharge requirements.

The RWQCB can amend the waste discharge requirements of a group of similarly situated dischargers through a single Board action in cases where the amended requirements properly apply to each of the dischargers whose waste discharge requirements are so amended. The

order proposed for adoption today will amend the WDRs of all dischargers to MSWLFs in the Central Valley Region.

The proposed order is adapted from a model order provided by the State Water Board. The proposed order consists of three components, namely, the order amending existing waste discharge requirements, the amendment to existing monitoring and reporting programs, and new standard provisions and reporting requirements. The proposed order amends and, in certain areas, supersedes the existing waste discharge requirements which regulate the site, which remain in full force and effect.

The proposed order prohibits the discharge of municipal solid waste to new landfills, or to portions of existing landfills beyond the area covered by waste as of 9 October 1993, unless such landfills meet containment specifications. Those specifications include a composite liner system, consisting of synthetic liner overlying a compacted soil liner, and a leachate collection system. The proposed order also requires compliance with ground water monitoring requirements, which include monitoring for lists of monitoring parameters and constituents of concern and analysis of data either by statistical or non-statistical means.

RECOMMENDATION: Adopt the proposed Order Amending Waste Discharge Requirements

HEARING PROCEDURE

MUNICIPAL SOLID WASTE LANDFILLS IN THE CENTRAL VALLEY REGION

This is the time and place for a public hearing to consider issuance of an order amending waste discharge requirements for municipal solid waste landfills in the Central Valley Region.

This hearing will not be conducted according to the technical rules of evidence. The Board will accept any evidence or testimony which is reasonably relevant. Appropriate cross-examination of each witness will be allowed.

All persons expecting to testify, please stand at this time, raise your right hand and take the following oath:

> **"Do you swear the testimony you are about to give is the truth?"**
>
> **If so, answer "I do."**

Testimony will be received from staff, the discharger, and any others wishing to comment. Because comments have been previously received at staff workshops, and the proposed order and staff report respond to those comments, oral testimony from persons other than staff will be limited to 5 minutes. Lengthy testimony which has been submitted in writing should

be summarized. People with similar concerns are requested to have a spokesperson present those concerns on their behalf. Please state your name, address, affiliation, and whether you have taken the oath before testifying.

Order for conducting hearing:

-Testimony of staff
-Cross-examination of staff
(after all staff testimony is received)
-Testimony of dischargers
-Cross-examination of dischargers
(after dischargers' testimony is received)
-Testimony of interested persons
-Cross-examination of interested persons
(after testimony of each interested person)
-Call for final arguments by parties and recommendation by Executive Officer (as appropriate)
-Close hearing
-Deliberation and voting by Board

(voice vote)

# # # # #

STAFF REPORT

ORDER TO AMEND WASTE DISCHARGE REQUIREMENTS
FOR
MUNICIPAL SOLID WASTE LANDFILLS IN THE CENTRAL VALLEY REGION,
TO IMPLEMENT STATE WATER BOARD RESOLUTION NO. 93-62

INTRODUCTION

The federal Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA), authorizes development of nationwide minimum standards for disposal sites for municipal solid waste (MSW), including criteria for sanitary landfills (LF).

On 9 October 1991, the United States Environmental Protection Agency (USEPA) promulgated regulations that apply, in California, to dischargers who own or operate Class II or Class III landfill units at which municipal solid waste is discharged (MSWLF), regardless of whether or not a permit is issued (Title 40, Code of Federal Regulations, Parts 257 and 258, "federal MSW regulations"). The majority of the federal MSW regulations become effective on the "Federal Deadline", which currently is 9 October 1993.

Each state must "...adopt and implement a permit program or other system of prior approval and conditions to assure that each...[MSWLF]...within such state...will comply with the...[federal MSWLF regulations]." State regulations and policies promulgated to satisfy this requirement are subject to approval by USEPA.

On 17 June 1993, the State Water Resources Control Board adopted Resolution No. 93-62, titled *Policy for Regulation of Discharges of Municipal Solid Waste*, as State Policy For Water Quality Control, under Section 13140 et seq. of the California Water Code. The Office of Administrative Law has approved this policy. The Policy directs each Regional Water Quality Control Board (RWQCB) to revise the waste discharge requirements (WDRs) of each MSWLF in its respective region to comply with the federal MSW regulations.

All State agencies, including this Board, are required to comply with State Policy For Water Quality Control regarding any activities that could affect water quality. RWQCBs regulate discharges of waste that could affect the quality of waters of the state, including discharges of waste to land at MSWLFs, through the issuance and revision of waste discharge requirements.

The RWQCB can amend the waste discharge requirements of a group of similarly situated dischargers through a single Board action in cases where the amended requirements properly apply to each of the dischargers whose waste discharge requirements are so amended. The order proposed for adoption today will amend the WDRs of all dischargers to MSWLFs in the Central Valley Region.

PROPOSED ORDER

The proposed order is adapted from a model order provided by the State Water Board. The proposed order consists of three components, namely, the order amending existing waste discharge requirements, the amendment to existing monitoring and reporting programs, and new standard provisions and reporting requirements. The proposed order amends and, in certain areas, supersedes the existing waste discharge requirements which regulate the site, which remain in full force and effect.

The proposed order prohibits the discharge of municipal solid waste to new landfills, or to portions of existing landfills beyond the area covered by waste as of 9 October 1993, unless such landfills meet containment specifications. Those specifications include a composite liner system, consisting of synthetic liner overlying a compacted soil liner, and a leachate collection system. The proposed order also requires compliance with ground water monitoring requirements, which include monitoring for lists of monitoring parameters and constituents of concern and analysis of data either by statistical or non-statistical means.

PUBLIC COMMENT

Staff conducted three workshops, one in each Board office, to present the proposed order to dischargers, consultants, and interested parties. Written comments were received from the following parties:

University of California, Berkeley, Museum of Paleontology

Shell Western E&P Inc., Bakersfield

County of Kern

Contra Costa County

Emcon Associates, Sacramento

James C. Hanson, Consulting Civil Engineer

Waste Management Inc., Oakland

John M. Minney, Consulting Engineer

Santa Fe Energy Resources, Inc., Bakersfield

Based on the written comments and workshops, staff revised the tentative proposed order; changes are shown in the agenda material as ~~strikeout~~, for deleted language, and redline, for added language. Following is a summary of major comments received and staff responses:

Applicability, Extensions, Exemptions, or Waivers

Dischargers claimed either that the requirements were overly burdensome and so should not apply to their site, or that their disposal sites did not discharge MSW and were therefore not subject to the Subtitle D regulations. Request was made to allow exemptions or waivers to the proposed requirements.

> State Water Board Resolution No. 93-62 resolved that regional water boards "shall not rely upon any exemption or alternative allowed by Chapter 15 if such an exemption or alternative would not be allowed under the federal MSW regulations, nor shall the Regional Water Board waive waste discharge requirements for the discharge of municipal solid waste at landfills". Changes were made to Attachment 1 as appropriate, based on evidence available to date.

Request was made for an extension of the implementation date of State Water Board Resolution No. 93-62.

> The Regional Water Board cannot extend a date in a State Water Board resolution.

Flexibility

Request was made for flexibility on the part of the Board in applying prescriptive standards.

> State Water Board Resolution No. 93-62 allows Regional Water Boards discretion to prescribe requirements for containment systems and monitoring systems that are less stringent than those prescribed by the policy and applicable regulations **if** the Board finds that the performance standards are satisfied, **and** the prerequisites for an exemption from ground water monitoring are satisfied, **and** that **either** (1) there is no aquifer underlying the facility property **and** it is not "reasonably foreseeable" that fluids from the landfill could migrate to ground or surface waters, **or** (2) the ground water in the basin underlying the facility has no beneficial uses **and** migration of fluids to waters having beneficial uses is not reasonably foreseeable. No discharger requesting flexibility has yet demonstrated that these requirements have been met.
>
> As provided in State Water Board Resolution No. 93-62 and restated in the proposed order, alternative liner designs may be approved by the Regional Water Board where the

proposed alternative satisfies (1) the performance criteria of the Subtitle D regulations and (2) the criteria for an engineered alternative in the Chapter 15 regulations. No discharger requesting flexibility has yet demonstrated that these requirements have been met.

Findings

Comment was made to change certain findings in the proposed order.

Findings in the proposed order which commenters wanted changed either were adapted, usually verbatim, from State Water Board Resolution No. 93-62, or are standard findings for orders of the Regional Water Board. One finding was adjusted to more closely match the language of State Water Board Resolution No. 93-62.

Deed Notation

Comment was made that the deed notation requirement (Provision D. 6.) is redundant for public entities, in view of the requirements of General Plans and the unlikelihood of default by a public entity.

Staff finds that reliance on General Plans and the "unlikelihood" of default are inadequate substitutes for the deed notation requirement, especially since a MSWLF may, at some future date, cease to be under the control of the public entity.

Requirements of Subtitle D (Part 258) versus the Requirements of Chapter 15

Comment was made to use Chapter 15 requirements where such requirements are less stringent than those of Subtitle D (Part 258), or vice-versa. Several comments on specific requirements (e.g., Water Quality Protection Standard, Monitoring Parameters) stated that the proposed requirement was not allowed under Subtitle D.

Between Chapter 15 and Part 258, the more stringent requirement must be imposed in order to comply with both sets of regulations.

Containment Systems Specifications

Comment was made that because liners leak, lined landfills are not necessarily an improvement over unlined landfills and therefore should not be mandated simply "as a matter of bureaucratic expediency."

State Water Board Resolution No. 93-62 found that field testing has demonstrated that releases of leachate and gas from MSWLFs that are unlined are likely to degrade the quality of underlying ground water, that research on liner systems for landfills indicates that single clay liners will only delay, rather than preclude, the onset of leachate leakage, and that the use of composite liners represents the most effective approach for reliably containing leachate and landfill gas.

Monitoring Parameters

Comment was made that use of surrogate monitoring parameters (pH, TDS, EC, Cl, SO_4, NO_3-N) is inconsistent with the USEPA regulations.

State Water Board staff obtained agreement from USEPA to use surrogate parameters for metals in order to reduce analytical cost and reduce the likelihood of false positive statistical results.

Leachate Sampling Protocols

Comment was made that the Board should specify protocols for obtaining leachate samples.

Due to site-specific differences in the construction of leachate collection systems, it is not possible to specify a single protocol for obtaining leachate samples. Staff modified the order to require the discharger to propose leachate sampling protocols for review and concurrence by staff.

Filtration of Samples for Metals

The proposed order requires that ground water samples for metals be field-filtered prior to analysis. Filtration is necessary to avoid biasing the sample by metals contained in sediment from fine-grained formations. However, current USEPA Subtitle D regulations require that metals samples not be filtered. The comment was made that the filtration requirement in the proposed order may put Dischargers in a double bind, opening them up to citizen suits for non-compliance.

USEPA has been convinced of the value of filtration for metals samples from monitoring wells. USEPA has stated that they intend to amend the Subtitle D regulations to permit filtration. Since the Subtitle D monitoring requirements become effective, at the earliest, in October 1994, USEPA has sufficient time to make the regulatory change. Therefore, the requirement to field-filter monitoring well samples for metals has not been deleted from the order; however, the language has been modified to clarify that samples from

production wells are not to be filtered.

Analysis of Monitoring Data

Comment was made that the proposed order should be amended to allow alternative statistical methods other than those specified, particularly methods involving intra-well comparisons.

State Water Board staff have determined, in consultation with their contract statistician from UC Davis, that statistical methods other than those specified in the proposed order must be validated on a site-specific basis before they can be reliably used to detect a release. The monitoring provisions of the proposed order become effective on 9 October 1994, allowing staff to assess the validity of additional statistical methods on a case-by-case basis. The Standard Provisions and Reporting Requirements allow the Executive Officer to approve alternative statistical methods.

Comment was made that the definitions of analytical detection and quantitation limits in the proposed order inappropriately required analytical performance to be better than USEPA published values.

The definitions were changed to require analytical performance to "closely agree" with USEPA published values.

Evidence of a Release and the Point of Compliance

Comment was made that detection of waste constituents directly beneath a landfill liner should not constitute evidence of a release until the constituents are detected at the "point of compliance," a vertical surface at the down-gradient edge of the landfill unit.

Staff disagree. Detection of constituents of concern or monitoring parameters at or downgradient of the point of compliance in concentrations greater than background levels constitutes evidence of a release from the unit under Chapter 15, Article 5. However, other evidence can also be used by the Board to trigger evaluation monitoring and corrective action under Chapter 15, including detection of leachate seeps or waste constituents below the landfill liner upgradient of the point of compliance.

Unknown Peaks

The proposed order requires that peaks corresponding to unknown constituents encountered as part of analytical scans be reported. Comment was made that the detection of unknown constituents in samples should not be used as evidence of a release by the VOC_{water} parameter

and the non-statistical data analysis method.

Staff agree that the triggers of the non-statistical method are inappropriate for unknown analytical peaks. However, the repeated detection of unknown peaks suggests that a release from the landfill may be occurring. A preponderance of unknown peaks found in samples from the same points over multiple sampling periods may be used by staff as other evidence that a release has occurred.

Definition of Practical Quantitation Limit (PQL)

Comment was made that the proposed definition of the analytical PQL was overly restrictive and would result in the use of higher than normal PQLs by the analytical laboratories.

Staff agree. There appears to be no consensus at either the national or state level on the definition of PQL. ASTM, USEPA, and others are currently working to resolve this issue. The USEPA analytical methods manual SW-846 uses simple multipliers of detection limits to derive PQLs. After consultation with staff of the Department of Health Services, Hazardous Materials Laboratory (HML) in Berkeley, staff chose to replace the proposed PQL definition with that used by HML, namely that the PQL be set at the concentration of the lowest standard used to calibrate the analytical procedure. This seams reasonable, since standards are normally chosen so as to bracket quantifiable analytical results, to ensure the reliability of those results.

Laboratory Documentation Requirements

Comment was made that the order should not require the submittal of analytical QA/QC information.

Staff disagree. To be able to verify that proper procedures were followed by the analytical laboratory and to determine whether particular samples presented problems for analysis, staff must be able to review QA/QC information. In the absence of QA/QC information, analytical data cannot be confirmed and cannot withstand legal scrutiny. In 1990, USEPA Region 9 developed *Laboratory Documentation Requirements for Data Validation*, which specifies QA/QC documentation requirements. The proposed order references the procedures in this document.

Response to a Release

Comment was made that confirmation of a release of volatile organic constituents (VOCs) should be contingent on the initially detected individual VOCs also being detected in the retest.

Staff disagrees. Because the distribution of various wastes containing VOCs is not uniform within a landfill, individual VOCs are expected to be released as slugs from a breach in the landfill containment system. It is, therefore, expected that the particular mix of VOCs at a given monitoring point will vary with time. Requiring the same VOCs to be present in both the initial and retest samples would delay the detection of a release from the landfill unit. Chapter 15 requires that the detection monitoring program be designed to detect releases at the earliest possible opportunity.

State Water Board staff have developed a system for analyzing data for a large number of VOCs under a single non-statistical parameter (VOC_{water}). The use of this parameter and the non-statistical comparison method contained in the proposed order will reduce the number of individual comparisons being made, thereby reducing the number of false positive results. The proposed change would result in more false positives due to a significant increase in the number of individual data comparisons being made, since each VOC would become an individual analytical constituent.

Standard Conditions: Operations

Comment was made that recirculation of liquid to the landfill from which it originated should be allowed.

An objective of state regulations (Chapter 15) is to maintain landfills as dry as possible in order to minimize the formation of leachate and possible releases. The order was modified to allow, based on site-specific conditions, the return of gas condensate to the landfill and the use of good quality leachate for dust control; discharge of leachate to a landfill is still not allowed.

Overlap with Integrated Waste Management Board

Comment was made that appropriate reference was not made to the regulations of the Integrated Waste Management Board (Title 14, CCR), and that such omission would result in duplicative requirements.

Changes were made to reference Title 14 where appropriate in order to eliminate any unnecessary duplication.

Future Revision of Individual WDRs

Several dischargers were concerned that the proposed order does not provide a mechanism or deadline for the Board to revise the WDRs of individual dischargers to reflect site specific differences or to approve alternative requirements in order to avoid unnecessary expenditures.

> Staff are already working with dischargers to accommodate site specific concerns. Within the constraints of existing resources, staff plans to revise WDRs on a priority basis so that unnecessary requirements are not imposed.

Extension of Federal Deadline

Because USEPA may extend the Federal Deadline, which presently is 9 October 1993, the question was asked whether such an extension would be accommodated by the proposed order.

> The term "Federal Deadline" was used in the proposed order in order to accommodate any change to the actual federal deadline date. Wherever "federal deadline" is used, dischargers will be required to meet that deadline, whatever date it may be. However, where actual dates are specified, for example, in the monitoring program, no change or extension will occur because these dates relate to requirements in Chapter 15.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. _____

ORDER AMENDING
WASTE DISCHARGE REQUIREMENTS
FOR

MUNICIPAL SOLID WASTE LANDFILLS IN THE CENTRAL VALLEY REGION, TO IMPLEMENT STATE WATER BOARD RESOLUTION NO. 93-62, ADOPTED 17 JUNE 1993, AS STATE POLICY FOR WATER QUALITY CONTROL UNDER SECTION 13140 OF THE WATER CODE

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

1. The federal Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, authorizes development of nationwide minimum standards for disposal sites for municipal solid waste (MSW), including criteria for sanitary landfills (LF).

2. On 9 October 1991, the United States Environmental Protection Agency (USEPA) promulgated regulations that apply, in California, to dischargers who own or operate Class II or Class III landfill units at which municipal solid waste is discharged (MSWLF), regardless of whether or not a permit is issued (Title 40, Code of Federal Regulations, Parts 257 and 258, "federal MSW regulations"). The majority of the federal MSW regulations become effective on the "Federal Deadline", which currently is 9 October 1993.

3. Each state must "...adopt and implement a permit program or other system of prior approval and conditions to assure that each...[MSWLF]...within such state...will comply with the...[federal MSWLF regulations]." State regulations and policies promulgated to satisfy this requirement are subject to approval by USEPA.

4. On 17 June 1993, the State Water Resources Control Board adopted Resolution No. 93-62, titled *Policy for Regulation of Discharges of Municipal Solid Waste*, as State Policy For Water Quality Control, under Section 13140 et seq. of the California Water Code. The Policy directs each Regional Water Quality Control Board (RWQCB) to revise the waste discharge requirements (WDRs) of each MSWLF in its respective region to comply with the federal MSW regulations.

5. All State agencies, including this Board, are required to comply with State Policy For Water Quality Control regarding any activities that could affect water quality. RWQCBs regulate discharges of waste that could affect the quality of waters of the state, including discharges of waste to land at MSWLFs, through the issuance and revision of waste discharge requirements.

6. The RWQCB can amend the waste discharge requirements of a group of similarly situated dischargers through a single Board action in cases where the amended requirements properly apply to each of the dischargers whose waste discharge requirements are so amended.

7. ~~Virtually all MSWLFs produce several volatile organic constituents (VOCs). VOCs exist in detectable concentrations in the gas and leachate produced by the landfill, and are not easily attenuated after being released from such a landfill; therefore, the federal MSW regulations require the use of VOCs as monitoring parameters and the use of composite liners to control the migration of VOCs.~~

Field testing has demonstrated that releases of leachate and gas from MSWLFs that are unlined are likely to degrade the quality of underlying groundwater. Research on liner systems for landfills indicates that single clay liners will only delay, rather than preclude, the onset of leachate leakage, and that the use of composite liners represents the most effective approach for reliably containing leachate and landfill gas.

8. Statistical data-comparison methods typically used to detect the migration of wastes from a waste management unit cannot be used in cases where the constituent to be monitored has a background concentration which does not exceed the constituent's detection limit in at least ten percent of the background samples. In such cases, an alternative non-statistical testing methodology is necessary which is sensitive, reliable, and not prone to falsely identifying a release.

9. This action to amend WDRs is exempt from the provisions of the California Environmental Quality Act (Public Resources Code Section 21000, et seq.), in accordance with Title 14, California Code of Regulations (CCR), Section 15301.

10. This Order implements (1) the Water Quality Control Plan for the Sacramento River, Sacramento-San Joaquin Delta, and San Joaquin River Basins (5A, 5B, 5C), Second Edition, approved 22 March 1990; (2) the Water Quality Control Plan for the Tulare Lake Basin (5D), adopted 25 July 1975; (3) the prescriptive standards and performance goals of Chapter 15, Division 3, Title 23 of the California Code of Regulations, effective 27 November 1984, and subsequent revisions; (4) the prescriptive standards and performance criteria of Part 258, Title 40 of the Code of Federal Regulations (Subtitle D of the Resource Conservation and Recovery Act); and (5) State Water

Resources Control Board Resolution No. 93-62, Policy for Regulation of Discharges of Municipal Solid Waste, adopted 17 June 1993 .

11. This Order amends the existing waste discharge requirements of each discharger listed in Attachment 1 (hereafter Discharger). Those waste discharge requirements remain in full force and effect except as modified by this order.

12. The Board has notified each Discharger and interested agencies and persons of its intention to amend the waste discharge requirements listed in Attachment 1.

13. In a public hearing, the Board heard and considered all comments pertaining to these facilities and discharges.

IT IS HEREBY ORDERED that the Dischargers listed in Attachment 1, and their agents, assigns, and successors, in order to meet the provisions of Division 7 of the California Water Code, and the regulations adopted thereunder, shall comply with the following:

A. PROHIBITIONS

As of the Federal Deadline, discharges of waste to either an MSWLF that has not received wastes as of that date or to a lateral expansion of an MSWLF unit are prohibited, unless the discharge is to an area equipped with a containment system which meets requirements in **B. Specifications**, specified below.

B. SPECIFICATIONS

1. As of the Federal Deadline, municipal solid waste shall be discharged to either (1) that portion of a waste management unit which received wastes prior to the Federal Deadline (i.e., that active portion of the waste management unit which is within the boundaries of the Existing Footprint), or (2) to an area equipped with a containment system which meets the additional requirements for both liners and leachate collection systems specified below.

2. All containment systems installed after the Federal Deadline shall either: (1) include a composite liner which consists of an upper synthetic flexible membrane component (~~FML~~ SL) and a lower component of soil. The ~~FML~~ SL shall be at least 40-mils thick (or at least 60-mils thick if of high density polyethylene) and shall be installed in direct and uniform contact with the underlying compacted soil component. The lower component shall be compacted soil that is at least two feet thick and that has an hydraulic conductivity of no more than 1×10^{-7} cm/sec. (This specification is referred to as the Prescriptive Design); or (2) satisfy the performance criteria

contained in 40 CFR 258.40(a)(1) and (c) and the criteria for an engineered alternative as provided by 23 CCR 2510(b), where the performance of the alternative ~~composite liner's~~ containment system's components, in combination, equal or exceed the waste containment capability of the Prescriptive Design.

3. All containment systems installed prior to the Federal Deadline and which will accept wastes after the Federal Deadline shall include a composite liner which features as its uppermost component a synthetic liner (SL). The SL shall be at least 40-mils thick (or at least 60-mils thick if high density polyethylene) and shall be installed in direct and uniform contact with the underlying materials. The composite liner shall meet the performance criteria contained in 40 CFR 258.40(a)(1) and (c). For steep sideslopes (as defined in specification 4., below) the composite 40 mil (60 mil if HDPE) specification may be replaced by a non-composite 60 mil (80 mil if HDPE) specification.

4. Containment systems installed in those portions of an MSWLF where an engineering analysis shows that sideslopes are too steep to permit construction of a stable composite liner that meets the prescriptive standards contained in either B.2. or B.3., above shall include an alternative liner on the sideslopes that both meets the performance criteria contained in 40 CFR 258.40(a)(1) and (c) and either: (1) is a composite liner and includes as its uppermost component a synthetic liner at least 40-mils thick (or at least 60-mils if high density polyethylene) that is installed in direct and uniform contact with the underlying materials; or (2) is not a composite liner, but includes a synthetic liner at least 60-mils thick (or at least 80-mils if of high density polyethylene) that is installed in direct and uniform contact with the underlying materials.

5. All containment systems shall include a leachate collection and removal systems which shall convey to an appropriately lined sump or other appropriately lined collection area all leachate which reaches the liner. The LCRS shall not rely upon unlined or clay-lined areas for such conveyance.

6. New MSWLF units and lateral expansions shall not be located in wetlands unless the discharger has successfully completed, and the Board has approved, all demonstrations required for such discharge under 40 CFR 258.12(a).

7. If located in a 100-year floodplain, and if receiving waste on or after the Federal Deadline, MSWLF units shall not restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain, or result in washout of solid waste so as to pose a hazard to human health and the environment. (40 CFR 258.11). Units which cannot comply with this requirement shall close by 9 October 1996, unless otherwise extended by the Board. (40 CFR 258.16)

C. RECEIVING WATER LIMITATIONS

Water Quality Protection Standards

The concentrations of Constituents of Concern in waters passing through the Points of Compliance shall not exceed the Concentration Limits established pursuant to Monitoring and Reporting Program No. _____, which is attached to and made part of this Order.

D. PROVISIONS

1. The waste discharge requirements of each Discharger listed in Attachment 1 are hereby amended and remain in full force and effect except as modified by this Order. Each Discharger shall comply with the requirements of this Order in addition to the provisions of their respective waste discharge requirements listed in Attachment 1. This Order shall supercede any conflicting provisions in the waste discharge requirements listed in Attachment 1.

2. The Discharger shall receive approval from the Executive Officer before discharging waste to containment areas or waste management units constructed after the effective date of this Order. The Discharger shall submit to the Board all documentation (i.e., reports, plans, designs) required by this Order for review and approval by Board staff prior to implementation.

3. The Discharger shall comply with the Standard Provisions and Reporting Requirements, dated September 1993, which are hereby incorporated into this Order. The Standard Provisions and Reporting Requirements contain important provisions and requirements with which the Discharger must comply. A violation of any of the Standard Provisions and Reporting Requirements is a violation of these waste discharge requirements.

4. The Discharger shall comply with Monitoring and Reporting Program No._____, which is attached to and made part of this Order. A violation of Monitoring and Reporting Program No. _____ is a violation of these waste discharge requirements.

5. The Discharger owning or operating an MSWLF that will receive waste on or after the Federal Deadline, shall document the Existing Footprint of the waste that has been incorporated by standard landfill practices on the date of the Federal Deadline, and shall submit a copy of such documentation in the form of a report to the Board,

which shall be submitted prior to, or as part of, the first scheduled monitoring report following the Federal Deadline.

6. In accordance with the deadline provided below, the Discharger shall provide proof to the Board that the deed to the landfill facility property, or some other instrument that is normally examined during title search, has been modified to include, in perpetuity, a notation to any potential purchaser of the property stating that: (1) the parcel has been used as an MSWLF; (2) land use options for the parcel are restricted in accordance with the post-closure land uses set forth in the post-closure plan and in WDRs for the landfill; and (3) in the event that the Discharger defaults on carrying out either the post-closure maintenance plan or any corrective action needed to address a release, then the responsibility for carrying out such work falls to the property owner.

   Dischargers owning or operating an MSWLF that completed final closure prior to 9 October 1991, shall provide proof of compliance to the Regional Water Board **by 9 October 1995**; for all MSWLFs that completed final closure between the close of business on 8 October 1991, and 17 September 1993, the discharger shall comply with the requirements of this section D.6. and provide proof of such compliance to the Regional Water Board **by the Federal Deadline**; for all MSWLFs that are either operating or have not completed closure, as of 17 September 1993, the discharger shall comply with the requirements of this section D.6. and provide proof of such compliance to the Regional Water Board **within sixty days after completing final closure.**

7. The Discharger shall maintain waste containment facilities and precipitation and drainage controls, and shall continue to monitor ground water, leachate from the landfill units, the vadose zone, and surface waters per Monitoring and Reporting Program No. _____ throughout the active life of the waste management units and the post-closure maintenance period.

8. If the MSWLF is located in an unstable area, the Discharger shall demonstrate to the Board that engineering measures have been incorporated into the design of the waste management unit to ensure that the integrity of the structural components of the unit will not be disrupted. (40 CFR 258.15) Units which cannot comply with this requirement shall close by 9 October 1996, unless otherwise extended by the Board. (40 CFR 258.16)

9. Dischargers owning or operating an MSWLF which has not been reclassified under 23 CCR 2510(d,e), 2530(b), and 2591(c) shall operate as a Class III landfill during the interim period from 17 September 1993 until such date as the landfill is reclassified in accordance with Chapter 15.

10. The Discharger shall complete the tasks outlined in these WDRs and the attached Monitoring and Reporting Program No. _____ in accordance with the following time schedule:

Task	Compliance Date
Documentation of Existing Footprint	per D.5.
Demonstration of wetlands location	per B.6. and E.2.
Documentation of floodplain restrictions	per B.7.
Proof of deed notation	per D.6.
Demonstration of unstable area	per D.8.
Report of waste discharge for reclassification	per E.3.
Closure report	per E.4.
Report on Water Quality Protection Standard	1 Jan 94
Monitoring reports	per M&RP

11. The Discharger shall comply with all applicable provisions of 23 CCR Chapter 15 and 40 CFR Part 258 that are not specifically referred to in this Order. If there is a conflict either between Chapter 15 and Part 258, or between this Order and existing waste discharge requirements, the more stringent requirement shall apply.

E. REPORTING REQUIREMENTS

1. The Discharger shall comply with the reporting requirements specified in this Order, in Monitoring and Reporting Program Order No. ____, and in the Standard Provisions and Reporting Requirements which are attached hereto and made part of this Order.

2. If new MSWLF units and lateral expansions are to be located in wetlands, the Discharger shall submit a report containing (a) a copy of the material considered by the U.S. Army Corps of Engineers in granting a Section 404 Permit for such discharge, (b) a copy of each Army Corps response to those submittals, and (c) any additional materials requested by the Board.

3. Dischargers owning or operating an MSWLF which has not been reclassified under 23 CCR 2510(d,e), 2530(b), and 2591(c) shall submit a revised report of waste discharge by **9 October 1993**, that is in full compliance with Article 9 of Chapter 15 and that provides all information necessary for the Board to reclassify the landfill pursuant to 23 CCR 2510(d,e) and 2591(c). Dischargers who have submitted such a report prior to the effective date of this Order shall submit a letter to that effect, in place of resubmitting the report.

4. The Discharger who owns or operates an MSWLF that received waste on or after 9 October 1991, that will have stopped receiving waste by the Federal Deadline, and that will have completed final closure within six months after the last receipt of waste shall submit a report to the Board by the Federal Deadline. This report shall either (1) validate that the MSWLF's final cover meets the requirements of 40 CFR 258.60(a), or (2) include any necessary updates to the closure plan and propose changes to the final cover necessary to bring the landfill into compliance with 40 CFR 258.60(a). The Discharger who owns or operates an MSWLF that received waste on or after 9 October 1991, and that will not have initiated final closure as of the Federal Deadline, shall submit a closure and post-closure maintenance plan (or submit suitable modifications to a pre-existing plan) by the Federal Deadline, that complies with 40 CFR 258.60 and 258.61, ~~and~~ with Article 8 of Chapter 15, and with Title 14 of the CCR.

5. The Discharger shall notify the Board in writing of any proposed change in ownership or responsibility for construction or operation of the MSWLFs. The Discharger shall notify the succeeding owner or operator in writing of the existence of this Order. A copy of that notification shall be sent to the Board.

I, WILLIAM H. CROOKS, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Region Water Quality Control Board, Central Valley Region, on _____.

_____
WILLIAM H. CROOKS, Executive Officer

Attachments

ATTACHMENT I MUNICIPAL SOLID WASTE LANDFILL (SUBTITLE D)

	Order No.	DISCHARGER	FACILITY NAME
1	89-178	B & J DROP BOX CORPORATION	B & J DROP BOX SANITARY LANDFILL
2	92-212	BERRYESSA GARBAGE SERVICE INC. THOMAS AND MARILYN GOMEZ	BERRYESSA GARBAGE SERVICE INC.
3	90-232	CALAVERAS COUNTY DPW	ROCK CREEK LANDFILL
4	89-149	CITY OF FOLSOM	FOLSOM CORPORATION YARD LANDFILL
5	91-115	CITY OF RIO VISTA	RIO VISTA LANDFILL
6	88-207	CITY OF SACRAMENTO	28TH STREET LANDFILL FACILITY
7	90-122	CITY OF STOCKTON	AUSTIN ROAD LANDFILL FACILITY
8	92-225	CITY OF STOCKTON - DPW	FRENCH CAMP LANDFILL
9	91-228	COLUSA COUNTY DPW	EVANS ROAD LANDFILL
10	90-015	COLUSA COUNTY DPW	STONYFORD LANDFILL FACILITY
11	89-176	CONTRA COSTA WASTE SERVICE, INC.	GBF/PITTSBURG CLASS III LANDFILL (CONTRA COSTA SANITARY LANDFILL)
12	92-102	COUNTY OF AMADOR	BUENA VISTA LANDFILL
13	88-149	COUNTY OF EL DORADO	UNION MINE LANDFILL FACILITY
14	89-142	COUNTY OF LAKE	EASTLAKE SANITARY LANDFILL FACILITY
15	91-229	COUNTY OF NEVADA	McCOURTNEY ROAD LANDFILL
16	89-207	COUNTY OF SACRAMENTO, DPW	KIEFER BOULEVARD LANDFILL FACILITY
17	88-084	COUNTY OF TUOLUMNE	JAMESTOWN SANITARY LANDFILL
18	88-112	COUNTY OF TUOLUMNE AND UNITED STATES BUREAU OF LAND MANAGEMENT	GROVELAND SANITARY LANDFILL
19	89-148	FORWARD, INCORPORATED	FORWARD INCORPORATED WASTE MANAGEMENT FACILITY
20	93-122	GLENN COUNTY DPW	GLENN COUNTY SANITARY

ATTACHMENT I MUNICIPAL SOLID WASTE LANDFILL (SUBTITLE D)

	Order No.	DISCHARGER	FACILITY NAME
21	92-215	L AND D LANDFILL COMPANY	L AND D LANDFILL
22	88-102	OAKLAND SCAVENGER COMPANY	ALTAMONT SANITARY LANDFILL
23	90-270	PLACER COUNTY DPW	WESTERN REGIONAL SANITARY LANDFILL
24	89-046	SAN JOAQUIN COUNTY	CORRAL HOLLOW SANITARY LANDFILL
25	91-020	SAN JOAQUIN COUNTY	FOOTHILL SANITARY LANDFILL INCORPORATED
26	93-093	SAN JOAQUIN COUNTY	HARNEY LANE CLASS III LANDFILL
27	91-021	SAN JOAQUIN COUNTY	NORTH COUNTY SANITARY LANDFILL
28	90-143	SIERRA COUNTY	LOYALTON SANITARY LANDFILL
29	90-269	STANISLAUS COUNTY DPW	FINK ROAD SANITARY LANDFILL FACILITY
30	89-047	UNIVERSITY OF CALIFORNIA, DAVIS	CLASS III LANDFILL YOLO COUNTY
31	93-119	YOLO COUNTY	YOLO COUNTY CENTRAL LANDFILL FACILITY
32	93-080	YUBA -SUTTER DISPOSAL, INC.	OSTROM ROAD SANITARY LANDFILL
33	93-094	YUBA-SUTTER DISPOSAL AREA	YUBA SUTTER DISPOSAL AREA
34	89-091	YUBA-SUTTER DISPOSAL,INC.	YSDI SANITARY LANDFILL
35	87-196	ANDERSON SOLID WASTE INC.	CLASS III LANDFILLS AND CLASS II SURFACE IMPOUNDMENTS, SHASTA COUNTY
36	88-190	BUTTE COUNTY AND PARROT RANCH COMPANY	CLASS III LANDFILL AND CLASS II SURFACE IMPOUNDMENTS, BUTTE COUNTY
37	90-307	CITY OF PORTOLA	PORTOLA CLASS III LANDFILL, PLUMAS COUNTY
38	88-037	COUNTY OF MODOC	ALTURAS CLASS III LANDFILL, MODOC COUNTY
39	89-230	COUNTY OF SISKIYOU AND US FOREST SERVICE	BLACK BUTTE CLASS III LANDFILL, SISKIYOU COUNTY
40	88-036	COUNTY OF TEHAMA AND CITY OF RED BLUFF	CLASS III LANDFILL, TEHAMA COUNTY
41	90-229	INTERMOUNTAIN LANDFILL, INC.	CLASS III LANDFILL, SHASTA COUNTY

ATTACHMENT I MUNICIPAL SOLID WASTE LANDFILL (SUBTITLE D)

	Order No.	DISCHARGER	FACILITY NAME
42	74-462	LASSEN COUNTY	BIEBER SOLID WASTE DISPOSAL SITE
43	90-308	LASSEN COUNTY, WALKER et. al TRUST	WESTWOOD CLASS III LANDFILL, LASSEN COUNTY
44	89-203	MCCLOUD COMMUNITY SERVICES DISTRICT	MCCLOUD CLASS III LANDFILL, SISKIYOU COUNTY
45	90-309	PLUMAS COUNTY	CHESTER CLASS III LANDFILL, PLUMAS COUNTY
46	90-311	PLUMAS COUNTY AND US DEPARTMENT OF AGRICULTURE	GOPHER HILL CLASS III LANDFILL, PLUMAS COUNTY
47	90-190	SHASTA COUNTY	WEST CENTRAL CLASS III LANDFILL AND CLASS II SURFACE IMPOUNDMENT, SHASTA COUNTY
48	92-100	BROWNING-FERRIS INDUSTRIES OF CALIFORNIA, INC.	CHATEAU FRESNO FACILITY
49	91-226	CHEVRON USA INC., CITY OF COALINGA, COUNTY OF FRESNO	COALINGA SOLID WASTE SITE
50	74-061	CITY OF ATWATER	CITY OF ATWATER SWDS
51	76-023	CITY OF AVENAL	CITY OF AVENAL SWDS
52	71-192	CITY OF CLOVIS	CITY OF CLOVIS SWDS
53	89-232	CITY OF LOS BANOS	CITY OF LOS BANOS SWDS
54	90-182	COUNTY OF FRESNO	AMERICAN AVENUE LANDFILL
55	92-163	COUNTY OF KERN	ARVIN SANITARY LANDFILL
56	90-171	COUNTY OF KERN	BAKERSFIELD METROPOLITAN LANDFILL(BENA)
57	70-229	COUNTY OF KERN	BUTTONWILLOW SANITARY LANDFILL
58	91-227	COUNTY OF KERN	CHINA GRADE SANITARY LANDFILL
59	92-162	COUNTY OF KERN	KERN VALLEY SANITARY LANDFILL
60	73-057	COUNTY OF KERN	LOST HILLS SANITARY LANDFILL
61	70-221	COUNTY OF KERN	MCFARLAND-DELANO SANITARY LANDFILL
62	72-245	COUNTY OF KERN	SHAFTER-WASCO SANITARY LANDFILL

ATTACHMENT I MUNICIPAL SOLID WASTE LANDFILL (SUBTITLE D)

	Order No.	DISCHARGER	FACILITY NAME
63	72-244	COUNTY OF KERN	TAFT SANITARY LANDFILL
64	93-028	COUNTY OF MADERA AND MADERA DISPOSAL SYSTEM INC.	FAIRMEAD SWDS
65	81-120	GENTZ CONSTRUCTION COMPANY AND JOHN GENTZ	JEFFERSON AVE. SWDS
66	92-213	KINGS COUNTY WASTE MANAGEMENT AUTHORITY	HANFORD SWDS
67	91-018	MARIPOSA COUNTY DEPARTMENT OF PUBLIC WORKS	MARIPOSA COUNTY SWDS
68	90-185	MERCED COUNTY DEPARTMENT OF PUBLIC WORKS	BILLIE WRIGHT LANDFILL
69	93-120	MERCED COUNTY DEPARTMENT OF PUBLIC WORKS	HIGHWAY 59 CLASS III LANDFILL
70	90-221	ORANGE AVENUE DISPOSAL COMPANY	ORANGE AVENUE LANDFILL
71	71-263	SHELL WESTERN E & P INC.	NORTH BELRIDGE LANDFILL
72	71-133	TULARE COUNTY PUBLIC WORKS DEPARTMENT	BALANCE ROCK LANDFILL
73	73-237	TULARE COUNTY PUBLIC WORKS DEPARTMENT	EARLIMART LANDFILL
74	71-196	TULARE COUNTY PUBLIC WORKS DEPARTMENT	EXETER LANDFILL
75	78-173	TULARE COUNTY PUBLIC WORKS DEPARTMENT	KENNEDY MEADOWS LANDFILL
76	71-327	TULARE COUNTY PUBLIC WORKS DEPARTMENT	OROSI LANDFILL
77	92-214	TULARE COUNTY PUBLIC WORKS DEPARTMENT	TEAPOT DOME LANDFILL
78	90-222	TULARE COUNTY PUBLIC WORKS DEPARTMENT	VISALIA LANDFILL
79	93-116	TULARE COUNTY PUBLIC WORKS DEPARTMENT	WOODVILLE LANDFILL
80	79-099	US NAVAL AIR STATION LEMOORE	US NAVAL AIR STATION LEMOORE SWDS
81	90-237	WILLIAM SHUBIN, MARTHA SHUBIN AND BROWNING-FERRIS INDUSTRIES OF CALIFORNIA, INC.	CHESTNUT AVENUE LANDFILL

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

AMENDMENT TO
MONITORING AND REPORTING PROGRAM NO. _____
FOR

MUNICIPAL SOLID WASTE LANDFILLS IN THE CENTRAL VALLEY REGION, TO IMPLEMENT STATE WATER BOARD RESOLUTION NO. 93-62, ADOPTED 17 JUNE 1993, AS STATE POLICY FOR WATER QUALITY CONTROL UNDER SECTION 13140 OF THE WATER CODE

The monitoring and reporting program of each of the dischargers listed in Attachment 1 is amended. Each discharger shall comply with the provisions of this amendment, in addition to the provisions of the Monitoring and Reporting Program which is incorporated in existing waste discharge requirements. The provisions of this Amendment supercede any conflicting provisions in the existing monitoring and reporting program.

Compliance with this Amendment to Monitoring and Reporting Program, and with the companion Standard Provisions and Reporting Requirements, is ordered by the Amendment to Waste Discharge Requirements, Order No. _____. Failure to comply with this Program, or with the Standard Provisions and Reporting Requirements, constitutes noncompliance with the WDRs, its amendment, and Division 7 of the Water Code, and can result in the imposition of civil monetary liability.

A. REPORTING

The Discharger shall report monitoring data and information as required in the Monitoring and Reporting Program (both original and amended) and as required in the Standard Provisions and Reporting Requirements.

Reports which do not comply with the required format will be REJECTED and the Discharger shall be deemed to be in noncompliance with the WDRs.

B. REQUIRED MONITORING REPORTS

1. **Water Quality Protection Standard Report**
   The Discharger shall submit a report **by 1 January 1994** which defines the Water Quality Protection Standard. If such a report has been previously submitted, the Discharger shall so notify the Board and identify the report, ~~The report may be combined with the report which addresses the location of the MSWLF with respect to drinking water intakes~~ but shall also modify the report to add any new Constituents of Concern as required by 40 CFR 258.

The report shall:

(1) Identify all distinct bodies of ground water that could be affected in the event of a release from the MSWLF. This list shall include at least the uppermost aquifer underlying the MSWLF and any permanent or ephemeral zones of perched water underlying the MSWLF;

(2) Demonstrate that the MSWLF's existing and proposed monitoring systems meet:

  (a) the requirements of 40 CFR 258.51(a,c, and d) and 23 CCR 2550.7(b); and

  (b) the requirements of 23 CCR 2550.7(c), if the MSWLF is in close proximity to any affectable surface water body [only for dischargers whose waste discharge requirements, as of the effective date of this Order, have not been revised to incorporate the July 1, 1991, revisions to Article 5 of Chapter 15]; and

  (c) the requirements of 23 CCR 2550.7(d), if the MSWLF is overlying an unsaturated zone that can be monitored feasibly [only for dischargers whose waste discharge requirements, as of the effective date of this Order, have not been revised to incorporate the July 1, 1991, revisions to Article 5 of Chapter 15];

(3) Include a map showing the Monitoring Points and Background Monitoring Points and showing the Point of Compliance under 23 CCR 2550.5 (i.e., the downgradient boundary of the unit, with respect to the flow direction of ground water in the uppermost aquifer);

(4) Estimate the Compliance Period under 23 CCR 2550.6; and

(5) Include a list of all Constituents of Concern (COC).

(6) Identify locations and methods of leachate sampling for detection of COCs.

2. Detection Monitoring Report

The Discharger shall submit reports of the results of detection monitoring in accordance with the schedule specified in the existing Monitoring and Reporting Program, or, alternatively, in accordance with the Fall/Winter and Spring/Summer Reporting Periods which end 31 March and 30 September, respectively.

3. Annual Monitoring Summary Report

The Discharger shall submit the Annual Monitoring Summary Report as specified in the Standard Provisions and Reporting Requirements.

4. Constituents-of-Concern (COC) 5 Year Report

The Discharger shall submit reports of the results of the monitoring for the Constituents of Concern every 5 years, or more frequently if required by the existing Monitoring and Reporting Program. The COC Report may be combined

with a Detection Monitoring Report or an Annual Summary Report having a Reporting Period that ends at the same time.

5. **Constituents-of-Concern (COC) Leachate Detection Report**
The discharger shall report to the Board by no later than 31 January of a given year the analytical results of the leachate sample taken the previous ~~October~~ Fall, including an identification of all detected COCs in Attachment 3 that are not on the MSWLF's Constituent of Concern list (non-COCs).

During any year in which an ~~April~~ Spring leachate retest is performed, the discharger shall submit a report to the Board, by no later than ~~1 August~~ 31 July of that year, identifying all constituents which must be added to the MSWLF's COC list as a result of having been detected in both the (previous calendar year's) ~~October~~ Fall sample and in the ~~April~~ Spring retest sample.

C. REQUIRED MONITORING PROGRAMS

1. **Detection Monitoring Program (DMP) under revised Article 5.**
Each Discharger shall comply with the following detection monitoring program by 9 October 1994, unless and until the Board revises the waste discharge requirements for the MSWLF to include an alternative detection monitoring program that complies both with the federal MSW regulations and with the most recent revisions to Article 5 of Chapter 15.

For each monitored medium, all Monitoring Points assigned to detection monitoring, and all Background Monitoring Points shall be monitored once each Fall/Winter and Spring/Summer (Fall/Winter and Spring/Summer Reporting Periods end on 31 March and 30 September, respectively) for the Monitoring Parameters listed in this Program.

For any given monitored medium, a sufficient number of samples shall be taken from all Monitoring Points and Background Monitoring Points to satisfy the data analysis requirements for a given Reporting Period, and shall be taken in a manner that ensures sample independence to the greatest extent feasible.

Ground water sampling shall also include an accurate determination of the ground water surface elevation and field parameters (pH, temperature, electrical conductivity, turbidity) for that Monitoring Point or Background Monitoring Point. Ground water elevations taken prior to purging the well and sampling for Monitoring Parameters shall be used to fulfill the Spring and Fall ground water flow

rate/direction analyses required. For each monitored ground water body, the discharger shall measure the water level in each well and determine ground water flow rate and direction at least quarterly, including the times of expected highest and lowest elevations of the water level for the respective ground water body. Ground water elevations for all background and downgradient wells for a given ground water body shall be measured within a period of time short enough to avoid temporal variations in ground water flow which could preclude accurate determination of ground water flow rate and direction. This information shall be included in the twice-yearly monitoring reports.

Statistical or non-statistical analysis shall be performed as soon as the monitoring data are available.

2. Constituents-of-Concern 5 Year Monitoring Program

In the absence of evidence of a release being indicated, the discharger shall monitor all Constituents of Concern as follows:

The discharger shall sample all Monitoring Points and Background Monitoring Points for each monitored medium for all COCs every fifth year (or more frequently if required by the existing Monitoring and Reporting Program), beginning with the Spring of 1996 (first Reporting Period ends 31 March 1996), with subsequent COC monitoring efforts being carried out every fifth year thereafter alternately in the Fall (Reporting Period ends 30 September) and Spring (Reporting Period ends 31 March).

D. WATER QUALITY PROTECTION STANDARD

The Water Quality Protection Standard (Standard) shall consist of the following elements:

(1) Constituents of Concern;
(2) Concentration Limits;
(3) Monitoring Points;
(4) Points of Compliance;
(5) Compliance Period.

In addition to these elements, Monitoring Parameters shall also be established.

1. Constituents of Concern

For MSWLFs lacking a functioning LCRS:

Beginning on 9 October 1994, for any MSWLF that does ***not*** have both a liner and a leachate collection and removal system (LCRS) that produces leachate:

(1) The "COC list" (list of Constituents of Concern required under 23 CCR 2550.3) shall include all constituents listed in the existing waste discharge requirements as of the effective date of this Order, all constituents listed in Attachment 3, and the following additional COCs: dissolved or total organic carbon, dissolved iron, carbonate, bicarbonate, alkalinity, dissolved aluminum, dissolved chromium VI, and dissolved manganese. The discharger shall monitor all COCs every five years (or more frequently if required by the existing Monitoring and Reporting Program).

(2) For each Attachment 3 constituent that is newly added to the MSWLF's COC list due to this order, the discharger shall establish a reference background value by analyzing at least one sample each quarter from each Background Monitoring Point for a period of at least one year, beginning with the date of this Program. Once this reference set of background data is collected, the discharger shall include it as a separate, identified item in the next monitoring report submittal.

For MSWLFs having a functioning LCRS:

Beginning on 9 October 1994, for any MSWLF equipped with both a liner and a leachate collection and removal system (LCRS) that produces leachate:

(1) The COC list shall include:
   (a) all waste constituents listed in the waste discharge requirements as of the effective date of this Order; and
   (b) each Attachment 3 constituent that is not already a COC for the MSWLF, and that both:
      (i) is detected in a sample of the MSWLF's leachate which the discharger shall collect during ~~September~~ Fall of each year; and
      (ii) is also detected in a retest leachate sample collected the following ~~March~~ Spring. The discharger need take and analyze this retest sample only in cases where the annual leachate sample, taken the previous ~~September~~ Fall under this section, identifies new-COCs. The retest sample shall be analyzed only for the new-COCs detected in the ~~September~~ Fall sample; and
   (c) the following additional COCs: dissolved or total organic carbon, dissolved iron, carbonate, bicarbonate, alkalinity, dissolved aluminum, dissolved chromium VI, and dissolved manganese.

(2) For each Attachment 3 constituent that is newly added to the MSWLF's COC list, the discharger shall establish a reference background value in each monitored medium by analyzing at least one sample each quarter from each Background Monitoring Point for a period of at least one year following the

date the constituent is submitted to the Board as a new COC. Once this reference set of background data is collected, the discharger shall include it as a separate, identified item in the next monitoring report submittal.

For sites which have multi-unit detection monitoring systems, if any MSWLF unit lacks a functioning LCRS, COCs shall be determined as above under *For MSWLFs lacking a functioning LCRS.*

The discharger shall monitor all COCs every five years (or more frequently if required by the existing Monitoring and Reporting Program).

2. Concentration Limits.

Beginning 9 October 1994, the Concentration Limit for any given Constituent of Concern or Monitoring Parameter in a given monitored medium (e.g., the uppermost aquifer) at a MSWLF shall be as follows, and shall be used as the basis of comparison with data from the Monitoring Points in that monitored medium:

(1) The background value established in the WDRs by the Board for that constituent and medium;

(2) The constituent's background value, established anew during each Reporting Period using only data from all samples collected during that Reporting Period from the Background Monitoring Points for that monitored medium. Either:

  (a) The mean (or median, as appropriate) and standard deviation (or other measure of central tendency, as appropriate) of the constituent's background data; or

  (b) The constituent's MDL, in cases where less than 10% of the background samples exceed the constituent's MDL; or

(3) A concentration limit greater than background, as approved by the Board for use during or after corrective action.

3. Monitoring Points

Monitoring Points (including background) for detection monitoring shall be those listed in the Monitoring and Reporting Program which is incorporated in the existing waste discharge requirements.

4. Points of Compliance

The Points of Compliance, for each MSWLF, either shall be those listed in the Monitoring and Reporting Program which is incorporated in the existing waste discharge requirements, or shall be established as required by Chapter 15.

5. Compliance Period

The Compliance Period for the MSWLF shall be the number of years equal to the active life of the MSWLF plus the closure period. Each time the Standard is exceeded (i.e., a release is discovered), the MSWLF begins a Compliance Period on the date the Board directs the Discharger to begin an Evaluation Monitoring Program. If the Discharger's Corrective Action Program (CAP) has not achieved compliance with the Standard by the scheduled end of the Compliance Period, the Compliance Period is automatically extended until the MSWLF has been in continuous compliance for at least three consecutive years.

6. Monitoring Parameters

Beginning on ~~the applicable date (~~9 October ~~of either~~ 1994 ~~or 1995)~~, the Discharger shall analyze water samples from each water-bearing medium separately for the following Monitoring Parameters, and shall test the resulting data using either the statistical or non-statistical methods listed in the Standard Provisions (or alternative methods the Board finds meets the requirements of 23 CCR 2550.7(e)(6-10) and 40 CFR 258.53):

(1) Parameters that use statistical methods:
   (a) pH, total dissolved solids, specific conductivity, chloride, sulfate, and nitrate nitrogen;
   (b) Each VOC (listed in Attachment 2) that equals or exceeds its respective MDL in at least ten percent of the samples taken from the Background Monitoring Points for a monitored water-bearing medium (i.e., surface water body, aquifer, perched zone, or soil-pore liquid) during a given Reporting Period; and

(2) Parameter that uses non-statistical method:
the composite monitoring parameter "VOC_{water}", consisting of all VOCs listed in Attachment 2.

Ordered by _____

WILLIAM H. CROOKS, Executive Officer

Date _____

ATTACHMENT 2

MONITORING PARAMETERS FOR DETECTION MONITORING

Surrogates for Metallic Constituents:

- pH
- Total Dissolved Solids
- Specific Conductivity
- Chloride
- Sulfate
- Nitrate nitrogen

Constituents included in VOC_{water} (by USEPA Method 8260):

- Acetone
- Acrylonitrile
- Benzene
- Bromochloromethane
- Bromodichloromethane
- Bromoform (Tribromomethane)
- Carbon disulfide
- Carbon tetrachloride
- Chlorobenzene
- Chloroethane (Ethyl chloride)
- Chloroform (Trichloromethane)
- Dibromochloromethane (Chlorodibromomethane)
- 1,2-Dibromo-3-chloropropane (DBCP)
- 1,2-Dibromoethane (Ethylene dibromide; EDB)
- o-Dichlorobenzene (1,2-Dichlorobenzene)
- p-Dichlorobenzene (1,4-Dichlorobenzene)
- trans-1,4-Dichloro-2-butene
- 1,1-Dichloroethane (Ethylidene chloride)
- 1,2-Dichloroethane (Ethylene dichloride)
- 1,1-Dichloroethylene (1,1-Dichloroethene; Vinylidene chloride)
- cis-1,2-Dichloroethylene (cis-1,2-Dichloroethene)
- trans-1,2-Dichloroethylene (trans-l,2-Dichloroethene)
- 1,2-Dichloropropane (Propylene dichloride)
- cis-1,3-Dichloropropene
- trans-1,3-Dichloropropene
- Ethylbenzene
- 2-Hexanone (Methyl butyl ketone)

ATTACHMENT 2 (Continued)

Methyl bromide (Bromomethene)
Methyl chloride (Chloromethane)
Methylene bromide (Dibromomethane)
Methylene chloride (Dichloromethane)
Methyl ethyl ketone (MEK; 2-Butanone)
Methyl iodide (Iodomethane)
4-Methyl-2-pentanone (Methyl isobutylketone)
Styrene
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
Tetrachloroethylene (Tetrachloroethene; Perchloroethylene)
Toluene
1,1,1-Trichloethane (Methylchloroform)
1,1,2-Trichloroethane
Trichloroethylene (Trichloroethene)
Trichlorofluoromethane (CFC-11)
1,2,3-Trichloropropane
Vinyl acetate
Vinyl chloride
Xylenes

Attachment 3: Constituents of Concern & Approved USEPA Analytical Methods

Inorganics (by USEPA Method):

Antimony	6010
Barium	6010
Beryllium	6010
Cadmium	6010
Chromium	6010
Cobalt	6010
Copper	6010
Silver	6010
Tin	6010
Vanadium	6010
Zinc	6010
Arsenic	7061
Lead	7421
Mercury	7470
Nickel	7520
Selenium	7741
Thallium	7841
Cyanide	9010
Sulfide	9030

Volatile Organics (USEPA Method 8260):

Acetone
Acetonitrile (Methyl cyanide)
Acrolein
Acrylonitrile
Allyl chloride (3-Chloropropene)
Benzene
Bis(2-ethylhexyl) phthalate
Bromochloromethane (Chlorobromomethane)
Bromodichloromethane (Dibromochloromethane)
Bromoform (Tribromomethane)
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chloroethane (Ethyl chloride)
Chloroform (Trichloromethane)
Chloroprene
Dibromochloromethane (Chlorodibromomethane)

1,2-Dibromo-3-chloropropane (DBCP)
1,2-Dibromoethane (Ethylene dribromide; EDB)
o-Dichlorobenzene (1,2-Dichlorobenzene)
m-Dichlorobenzene (1,3-Dichlorobenzene)
p-Dichlorobenzene (1,4-Dichlorobenzene)
trans-1,4-Dichloro-2-butene
Dichlorodifluoromethane (CFC 12)
1,1-Dichloroethane (Ethylidene chloride)
1,2-Dichloroethane (Ethylene dichloride)
1,1-Dichloroethylene (1,1-Dichloroethene; Vinylidene chloride)
cis-1,2-Dichloroethylene (cis-1,2-Dichloroethene)
trans-1,2-Dichloroethylene (trans-1,2-Dichloroethene)
1,2-Dichloropropane (Propylene dichloride)
1,3-Dichloropropane (Trimethylene dichloride)
2,2-Dichloropropane (Isopropylidene chloride)
1,1-Dichloropropene
cis-1,3-Dichloropropene
trans-1,3-Dichloropropene
Ethylbenzene
Hexachlorobutadiene
2-Hexanone (Methyl butyl ketone)
Isobutyl alcohol
Isodrin
Methacrylonitrile
Methyl bromide (Bromomethane)
Methyl chloride (Chloromethane)
Methyl ethyl ketone (MEK; 2-Butanone)
Methyl iodide (Iodomethane)
Methyl methacrylate
4-Methyl-2-pentanone (Methyl isobutyl ketone)
Methylene bromide (Dibromomethane)
Methylene chloride (Dichloromethane)
Naphthalene
Propionitrile (Ethyl cyanide)
Styrene
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
Tetrachloroethylene (Tetrachloroethene; Perchloroethylene; PCE)
Toluene
1,2,4-Trichlorobenzene
1,1,1-Trichloroethane, Methylchloroform

1,1,2-Trichloroethane
Trichloroethylene (Trichloroethene; TCE)
Trichlorofluoromethane (CFC-11)
1,2,3-Trichloropropane
Vinyl acetate
Vinyl chloride (Chloroethene)
Xylene (total)

Semivolatile Organics (USEPA Method 8270 - base, neutral, & acid extractables):
Acenaphthene
Acenaphthylene
Acetophenone
2-Acetylaminofluorene (2-AAF)
Aldrin
4-Aminobiphenyl
Anthracene
Benzo[a]anthracene (Benzanthracene)
Benzo[b]fluoranthene
Benzo[k]fluoranthene
Benzo[g,h,i]perylene
Benzo[a]pyrene
Benzyl alcohol
alpha-BHC
beta-BHC
delta-BHC
gamma-BHC (Lindane)
Bis(2-chloroethoxy)methane
Bis(2-chloroethyl) ether (Dichloroethyl ether)
Bis(2-chloro-1-methyethyl) ether (Bis(2-chloroisopropyl) ether; DCIP)
4-Bromophenyl phenyl ether
Butyl benzyl phthalate (Benzyl butyl phthalate)
Chlordane
p-Chloroaniline
Chlorobenzilate
p-Chloro-m-cresol (4-Chloro-3-methylphenol)
2-Chloronaphthalene
2-Chlorophenol
4-Chlorophenyl phenyl ether
Chrysene
o-Cresol (2-methylphenol)
m-Cresol (3-methylphenol)

p-Cresol (4-methylphenol)
4,4'-DDD
4,4'-DDE
4,4'-DDT
Diallate
Dibenz[a,h]anthracene
Dibenzofuran
Di-n-butyl phthalate
o-Dichlorobenzene (1,2-Dichlorobenzene)
m-Dichlorobenzene (1,3-Dichlorobenzene)
p-Dichlorobenzene (1,4-Dichlorobenzene)
3,3'-Dichlorobenzidine
2,4-Dichlorophenol
2,6-Dichlorophenol
Dieldrin
Diethyl phthalate
p-(Dimethylamino)azobenzene
7,12-Dimethylbenz[a]anthracene
3,3'-Dimethylbenzidine
2,4-Dimehtylphenol (m-Xylenol)
Dimethyl phthalate
m-Dinitrobenzene
4,6-Dinitro-o-cresol (4,6-Dinitro-2-methylphenol)
2,4-Dinitrophenol
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Di-n-octyl phthalate
Diphenylamine
Endosulfan I
Endosulfan II
Endosulfan sulfate
Endrin
Endrin aldehyde
Ethyl methacrylate
Ethyl methanesulfonate
Famphur
Fluoranthene
Fluorene
Heptachlor
Heptachlor epoxide
Hexachlorobenzene

Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachloroethane
Hexachloropropene
Indeno(1,2,3-c,d)pyrene
Isophorone
Isosafrole
Kepone
Methapyrilene
Methoxychlor
3-Methylcholanthrene
Methyl methanesulfonate
2-Methylnaphthalene
Naphthalene
1,4-Naphthoquinone
1-Naphthylamine
2-Naphthylamine
o-Nitroaniline (2-Nitroaniline)
m-Nitroaniline (3-Nitroaniline)
p-Nitroaniline (4-Nitroaniline)
Nitrobenzene
o-Nitrophenol (2-Nitrophenol)
p-Nitrophenol (4-Nitrophenol)
N-Nitrosodi-n-butylamine (Di-n-butylnitrosamine)
N-Nitrosodiethylamine (Diethylnitrosamine)
N-Nitrosodimethylamine (Dimethylnitrosamine)
N-Nitrosodiphenylamine (Diphenylnitrosamine)
N-Nitrosodipropylamine (N-Nitroso-N-dipropylamine; Di-n-propylnitrosamine)
N-Nitrosomethylethylamine (Methylethylnitrosamine)
N-Nitrosopiperidine
N-Nitrosospyrrolidine
5-Nitro-o-toluidine
Pentachlorobenzene
Pentachloronitrobenzene (PCNB)
Pentachlorophenol
Phenacetin
Phenanthrene
Phenol
p-Phenylenediamine
Polychlorinated biphenyls (PCBs; Aroclors)
Pronamide

Pyrene
Safrole
1,2,4,5-Tetrachlorobenzene
2,3,4,6-Tetrachlorophenol
o-Toluidine
Toxaphene
1,2,4-Trichlorobenzene
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
0,0,0-Triethyl phosphorothioate
sym-Trinitrobenzene

Organophosphorus Compounds (USEPA Method 8141):
0,0-Diethyl 0-2-pyrazinyl phosphorothioate (Thionazin)
Dimethoate
Disulfoton
Methyl parathion (Parathion methyl)
Parathion
Phorate

Chlorinated Herbicides (USEPA Method 8150):
2,4-D (2,4-Dichlorophenoxyacetic acid)
Dinoseb (DNBP; 2-sec-Butyl-4,6-dinitrophenol)
Silvex (2,4,5-Trichlorophenoxypropionic acid; 2,4,5-TP)
2,4,5-T (2,4,5-Trichlorophenoxyacetic acid)

PARTIAL INDEX
STANDARD PROVISIONS AND REPORTING REQUIREMENTS
for Chapter 15 (23 CCR 2510) and Part 258 (40 CFR 258)

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

STANDARD PROVISIONS AND REPORTING REQUIREMENTS FOR WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES REGULATED BY CHAPTER 15 AND/OR PART 258 (23 CCR 2510 et.seq. and 40 CFR 258 et. seq.)

SEPTEMBER 1993

GENERAL PROVISIONS

1. The discharge shall neither cause nor contribute to the contamination, degradation, or **pollution of ground water** via the release of waste constituents in either liquid or gaseous phase.

2. The discharge shall neither cause nor contribute to any **surface water pollution**, contamination, or nuisance, including, but not limited to:
   a. floating, suspended, or deposited macroscopic particulate matter or foam;
   b. increases in bottom deposits or aquatic growth;
   c. an adverse change in temperature, turbidity, or apparent color beyond natural background levels;
   d. the creation or contribution of visible, floating, suspended, or deposited oil or other products of petroleum origin;
   e. the introduction or increase in concentration of toxic or other pollutants/contaminants resulting in unreasonable impairment of beneficial uses of waters of the State.

3. The discharge shall not cause any increase in the concentration of waste constituents in soil-pore gas, soil-pore liquid, soil, or other geologic materials outside of the waste management unit if such waste constituents could migrate to waters of the State -- in either the liquid or the gaseous phase -- and cause **a condition of contamination, pollution, degradation, or nuisance.**

4. The discharge shall not cause the release of pollutants, or waste constituents in a manner which could cause a condition of contamination, pollution, degradation, or nuisance to occur, as indicated by the most appropriate statistical or non-statistical data analysis method and retest method listed in the Monitoring and Reporting Program.

5. The discharger shall take **all reasonable steps to minimize any adverse impact** to the waters of the state resulting from noncompliance with this Order. ("Order", as used throughout this document, means the Waste Discharge Requirements). Such steps shall include accelerated

or additional monitoring as necessary to determine the nature, extent, and impact of the noncompliance.

6. The requirements prescribed herein do not authorize the commission of any act causing injury to the property of another, and do not protect the discharger from **liabilities** under federal, state, or local laws. This Order does not convey any property rights or exclusive privileges.

7. The provisions of this Order are **severable**. If any provision of this Order is held invalid, the remainder of this Order shall not be affected.

8. If there is any conflicting or contradictory language between the Waste Discharge Requirements (WDRs), the Monitoring and Reporting Program (MRP), or the Standard Provisions and Reporting Requirements (SPRR), then language in the WDRs shall govern over either the MRP or the SPRR, and language in the MRP shall govern over the SPRR.

9. After notice and opportunity for a hearing, this Order may be **terminated or modified** for cause, including, but not limited to:

a. Violation of any term or condition contained in this Order;
b. Obtaining this Order by misrepresentation, or failure to disclose fully all relevant facts;
c. A change in any condition that results in either a temporary or permanent need to reduce or eliminate the authorized discharge;
d. A material change in the character, location, or volume of discharge.

10. Before making a **material change** in the character, location, or volume of discharge, the discharger shall file a new Report of Waste Discharge with the Regional Water Quality Control Board (hereafter Board). A material change includes, but is not limited to, the following:

a. An increase in area or depth to be used for solid waste disposal beyond that specified in waste discharge requirements;
b. A significant change in disposal method, location or volume (e.g., change from land disposal to land treatment);
c. A change in the type of waste being accepted for disposal; or
d. The addition of a major industrial waste discharge to a discharge of essentially domestic waste, or the addition of a new process or product by an industrial facility resulting in a change in the character or type of waste being discharged.

11. The discharger shall, in a timely manner, **remove and relocate** any wastes discharged at this facility in violation of this Order.

12. The discharger shall maintain a **copy of this Order** at the facility and make it available at all times to facility operating personnel, who shall be familiar with its contents, and to regulatory agency personnel.

13. The discharger shall permit representatives of the Board and the State Water Resources Control Board, upon presentation of credentials, to have **access** during reasonable hours, to:

a. Enter premises where wastes are treated, stored, or disposed of and facilities in which any records are kept,
b. Copy any records required to be kept under terms and conditions of this Order,
c. Inspect, monitoring equipment required by this Order, and
d. Sample, photograph and video tape any discharge, waste, waste management unit or monitoring device.

14. Except for material determined to be **confidential** in accordance with California law and regulations, all reports prepared in accordance with terms of this Order shall be available for public inspection at the offices of the Board. Data on waste discharges, water quality, geology, and hydrogeology shall not be considered confidential.

REPORTING REQUIREMENTS

General Requirements

1. In the event the discharger does not comply or will be unable to comply with any prohibition or limitation of this Order for any reason, the discharger shall **notify the Board by telephone** at (916) 255-3000 as soon as it or its agents have knowledge of such noncompliance or potential for noncompliance, and shall confirm this notification in writing within two weeks. The written notification shall state the nature, time and cause of **noncompliance**, and shall describe the measures being taken to prevent recurrences and shall include a timetable for corrective actions.

2. The Discharger shall **immediately notify the Board** of any **evidence of a release**, or of any flooding, equipment failure, slope failure, or other **change in site conditions** which could impair the integrity of waste or leachate containment facilities or of precipitation and drainage control structures.

3. The discharger shall **mail a copy of each** monitoring **report** and any other reports required by this Order to:

California Regional Water Quality Control Board
Central Valley Region
3443 Routier Road, Suite A
Sacramento, CA 95827-3098
(or the current address if the office relocates)

4. The discharger shall **retain records of all monitoring information**, including all calibration and maintenance records, all original strip chart recordings of continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order. Records shall be maintained for a minimum of five years from the date of the sample, measurement, report, or application. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Board Executive Officer.

Such records shall show the following for each sample:

a. Identity of sample and of the Monitoring Point or Background Monitoring Point from which it was taken, along with the identity of the individual who obtained the sample;
b. Date, time, and manner of sampling;
c. Date and time that analyses were started and completed, and the name of the personnel and laboratory performing each analysis;
d. Complete procedure used, including method of preserving the sample, and the identity and volumes of reagents used;
e. Calculation of results; and
f. Results of analyses, and the MDL and PQL for each analysis.

Such records shall also include legible records of the volume and type of each waste discharged at each WMU and the manner and location of discharge. These waste discharge records shall be maintained at the facility until the beginning of the post-closure maintenance period, at which time copies of these records shall be sent to the Board.

5. **All reports and transmittal letters shall be signed** by persons identified below:

a. *For a corporation:* by a principal executive officer of at least the level of senior vice-president.
b. *For a partnership or sole proprietorship:* by a general partner or the proprietor.
c. *For a municipality, state, federal or other public agency:* by either a principal executive officer or ranking elected or appointed official.
d. A duly authorized representative of a person designated in a, b or c above if;
   (1) the authorization is made in writing by a person described in a, b, or c of this provision;

(2) the authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a waste management unit, superintendent, or position of equivalent responsibility. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and

(3) the written authorization is submitted to the Board.

Any person signing a document under this Section shall make the following certification:

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

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

7. Unless otherwise required in the Monitoring and Reporting Program, monthly **monitoring reports shall be submitted** to the Board by the 15th day of the month following the month in which the samples were taken or observations made, and quarterly, semiannual, and annual monitoring reports shall be submitted to the Board by the 15th day of the month following the calendar quarter in which the samples were taken or observations made.

8. The results of any monitoring done more frequently than required at the locations specified herein shall be reported to the Board.

Reports to be Filed with the Board

1. A **transmittal letter** explaining the essential points in each report shall accompany each report. Such a letter shall include a discussion of any violations found since the last such report was submitted, and shall describe actions taken or planned for correcting those violations. If the Discharger has previously submitted a detailed time schedule for correcting the violations, a reference to the correspondence transmitting such schedule will be satisfactory. If no violations have occurred since the last submittal, this shall be stated in the letter of transmittal.

2. Each monitoring report (e.g., Detection Monitoring Report, Constituents of Concern 5-Year Report) shall include a **compliance evaluation summary**. The summary shall contain at least:

a. For each monitored ground water body, a description and graphical presentation of the ~~velocity~~ gradient and direction of **ground water flow** under/around the waste management unit, based upon water level elevations taken during the collection of the water quality data submitted in the report.

b. For each monitoring well addressed by the report, a description of the method and time of water level measurement, of the type of pump used for **purging** and the placement of the pump in the well, and of the method of purging (the pumping rate, the equipment and methods used to monitor field pH, temperature, and conductivity during purging, the calibration of the field equipment, results of the pH, temperature, conductivity, and turbidity testing, the well recovery time, and the method of disposing of the purge water).

c. For each Monitoring Point and Background Monitoring Point addressed by the report, a description of the type of pump -- or other device -- used and its placement for **sampling**, and a detailed description of the sampling procedure (number and description of the samples, field blanks, travel blanks, and duplicate samples taken, the type of containers and preservatives used, the date and time of sampling, the name and qualifications of the person actually taking the samples, and any other observations).

d. For each monitoring well addressed by the report, a description of how the well was **purged to remove** all portions of the water that was in the well bore while the sample was being taken.

e. A **map or aerial photograph** showing the locations of observation stations, Monitoring Points, and Background Monitoring Points.

f. Laboratory statements of results of all analyses evaluating compliance with requirements.

g. An evaluation of the effectiveness of the leachate monitoring and control facilities, and of the run-off/run-on control facilities.

h. A summary and certification of completion of all Standard Observations for the waste management unit, for the perimeter of the WMU, and for the receiving waters.

i. The quantity and types of wastes discharged and the locations in the WMU where waste has been placed since submittal of the last such report.

3. The Discharger shall report by telephone concerning any **seepage from the disposal area** immediately after it is discovered. A written report shall be filed with the Board within seven days, containing at least the following information:

a. A map showing the location(s) of seepage;
b. An estimate of the flow rate;
c. A description of the nature of the discharge (e.g., all pertinent observations and analyses); and
d. corrective measures underway or proposed, and corresponding time schedule.

See **RESPONSE TO A RELEASE** below.

4. The Discharger shall submit an **Annual Monitoring Summary Report** to the Board covering the reporting period previous monitoring year. This report shall contain:

a. For each Monitoring Point and Background Monitoring Point, submit in **graphical format** the laboratory analytical data for all samples taken within at least the previous five calendar years. Each such graph shall plot the concentration of one or more constituents for the period of record for a given Monitoring Point or Background Monitoring Point, at a scale appropriate to show trends or variations in water quality. The graphs shall plot each datum, rather than plotting mean values. For any given constituent or parameter, the scale for background plots shall be the same as that used to plot downgradient data. Graphical analysis of monitoring data may be used to provide significant evidence of a release.

b. Unless otherwise exempted by the Executive Officer, all monitoring analytical data obtained during the previous two six-month Reporting Periods, presented in tabular form as well as on 3.50" **computer diskettes**, either in MS-DOS/ASCII format or in another file format acceptable to the Executive Officer. Data sets too large to fit on a single 2 MB diskette may be submitted on disk in a commonly available compressed format (e.g., PKZIP or NORTON BACKUP). The Board regards the submittal of data in hard copy and on diskette as "...the form necessary for..." statistical analysis (2550.8(h)), in that this facilitates periodic review by the Board's statistical consultant.

c. A **comprehensive discussion of the compliance record**, and the result of any corrective actions taken or planned which may be needed to bring the Discharger into full compliance with the waste discharge requirements.

d. A **map** showing the area and elevations in which filling has been completed during the previous calendar year.

e. A **written summary** of the monitoring results, indicating any changes made or observed since the previous annual report.

f. An **evaluation** of the effectiveness of the leachate monitoring/control facilities.

PROVISIONS FOR MONITORING

General

1. The discharger shall maintain a **written sampling and analysis plan** sufficient to assure compliance with the terms of this Order. Anyone performing sampling on behalf of the discharger shall be familiar with the sampling and analysis plan.

2. All monitoring instruments and devices used by the discharger to fulfill the prescribed monitoring program shall be properly maintained and regularly **calibrated** to ensure their continued accuracy.

3. The discharger shall construct or abandon all **monitoring wells** to meet or exceed the standards stated in the State Department of Water Resources Bulletin 74-81 and subsequent revisions, and shall comply with the reporting provisions for wells required by Water Code Sections 13750 through 13755.22.

4. All sample analyses shall be conducted at a **laboratory accredited** for such analyses by the State Department of Health Services. The **Quality Assurance-Quality Control Program** must conform to EPA guidelines (e.g., "Laboratory Documentation Requirements for Data Validation", January 1990, USEPA Region 9) or to procedures approved by the Board.

5. The **director of the laboratory** whose name appears on the certification shall supervise all analytical work in his/her laboratory and shall sign all reports of such work submitted to the Regional Board.

6. Unless samples are from water supply wells or unless otherwise specified by the Executive Officer, all ground water samples to be analyzed for **metals** shall be field-filtered. Filtration methods shall minimize the entrainment of air into the sample (by using, for example, in-line pressure filtration).

Sampling and Analytical Methods

1. For any given monitored medium, the **samples taken** from all Monitoring Points and Background Monitoring Points to satisfy the data analysis requirements for a given Reporting Period shall all be taken **within a span not exceeding 30 days**, unless the Executive Officer

approves a longer time period, and shall be taken in a manner that ensures sample independence to the greatest extent feasible.

2. Specific **methods of collection and analysis** must be identified. Sample collection, storage, and analysis shall be performed according to the most recent version of USEPA Methods, such as the latest editions, as applicable, of: (1) "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater" (EPA 600 Series), (2) "Test Methods for Evaluating Solid Waste" (SW 846-latest edition), and (3) "Methods for Chemical Analysis of Water and Wastes", and in accordance with an approved sampling and analysis plan.

If methods other than USEPA-approved methods or Standard Methods are used, the exact methodology must be submitted for review and must be approved by the Executive Officer prior to use.

3. The **methods of analysis and the detection limits** used must be appropriate for the expected concentrations. For detection monitoring of any constituent or parameter that is found in concentrations which produce more than 90% non-numerical determinations (i.e., "trace" or "ND") in data from Background Monitoring Points for that medium, the analytical method having the lowest method detection limit (MDL) shall be selected from among those methods which would provide valid results in light of any matrix effects or interferences.

4. **"Trace" results** -- results falling between the MDL and the practical quantitation limit (PQL) -- shall be reported as such, and shall be accompanied both by the estimated MDL and PQL values for that analytical run.

5. **MDLs and PQLs** shall be derived by the laboratory for each analytical procedure, according to State of California laboratory accreditation procedures. These MDLs and PQLs shall reflect the detection and quantitation capabilities of the specific analytical procedure and equipment used by the lab, rather than simply being quoted from USEPA analytical method manuals. In relatively interference-free water, laboratory-derived MDLs and PQLs are expected to ~~be not greater than~~ closely agree with published USEPA MDLs and PQLs.

If the lab suspects that, due to a change in matrix or other effects, the true detection limit or quantitation limit for a particular analytical run differs significantly from the laboratory-derived MDL/PQL values, the results shall be flagged accordingly, along with estimates of the detection limit and quantitation limit actually achieved. The MDL shall always be calculated such that it represents a concentration associated with a 99% reliability of a non-zero result. The PQL shall always be calculated such that it represents the lowest constituent concentration at which a numerical value can be assigned with ~~a 99%~~ reasonable certainty that it ~~is within ± 10% of~~ represents the constituent's actual concentration in the sample. Normally, PQLs should be set equal to the concentration of the lowest standard used to calibrate the analytical procedure.

6. All **QA/QC data** shall be reported, along with the sample results to which they apply, including the method, equipment, and analytical detection and quantitation limits, the percent recovery ~~rates~~, an explanation for any recovery ~~rate~~ that is less than 80%, the results of equipment and method blanks, the results of spiked and surrogate samples, the frequency of quality control analysis, and the name and qualifications of the person(s) performing the analyses. Sample results shall be reported unadjusted for blank results or spike recoveries. In cases where contaminants are detected in QA/QC samples (i.e., field, trip, or lab blanks), the accompanying sample results shall be appropriately flagged.

7. **Unknown chromatographic peaks** shall be reported, along with an estimate of the concentration of the unknown analyte. When unknown peaks are encountered, second column or second method confirmation procedures shall be performed to attempt to identify and more accurately quantify the unknown analyte.

Analysis of Monitoring Data

Unless an alternate method has been approved by the Executive Officer, the Discharger shall use one of the following methods, according to the method selection procedure below -

One-Way Parametric Analysis of Variance (ANOVA),
One-Way Non-Parametric ANOVA (Kruskal-Wallis Test),
Method of Proportions, or
non-statistical method

- to compare the downgradient concentration of each monitored constituent or parameter with its respective background concentration to determine if there has been a release from the WMU.

Upon receiving written approval from the Executive Officer, alternate statistical procedures may be used for determining the significance of analytical results for **common laboratory contaminants** (i.e., methylene chloride, acetone, diethylhexyl phthalate, and di-n-octyl phthalate). Nevertheless, analytical results involving detection of these analytes in any background or downgradient sample shall be reported and flagged for easy reference by Board staff.

For any given data set, the Discharger should proceed sequentially down the list below of statistical analysis methods, followed by the non-statistical method, and use the first method for which the data qualify. If that analysis tentatively indicates the detection of a release, then the Discharger shall implement the retest procedure under Discrete Retest.

1. The Discharger shall use one of the following **statistical methods** to analyze Constituents of Concern or Monitoring Parameters which exhibit concentrations equal to or exceeding their respective MDL in at least ten percent of the background samples taken during the Reporting Period. Except for pH, which uses a two-tailed approach, the statistical analysis for all

constituents and parameters shall be one-tailed (i.e. testing only for statistically significant increase relative to background). If the data are log-normally distributed, then the data shall be transformed, by replacing each data point with the natural log (ln) of the data point, prior to performing the statistical test.

a. The **One-Way Parametric Analysis of Variance (ANOVA)**, followed by multiple comparisons, shall be used when the pooled background data for the parameter or constituent, obtained during a given sampling period, have not more than 15% of the data below the PQL.

This test requires at least four independent samples from each Monitoring Point and Background Monitoring Point during each sampling episode. Prior to analysis, replace all "trace" analytical results with a value halfway between the PQL and the MDL values reported for that sample run, and replace all "non-detect" results with a value equal to half the MDL value reported for that sample run. The ANOVA shall be carried out at the 95% confidence level. Following the ANOVA, the data from each downgradient Monitoring Point shall be tested at a 99% confidence level against the pooled background data. If these multiple comparisons cause the Null Hypothesis (i.e., that there is no release) to be rejected at any Monitoring Point, the Discharger shall conclude that a release is tentatively indicated for that parameter or constituent.

b. The **One-Way Non-Parametric ANOVA (Kruskal-Wallis Test)**, followed by multiple comparisons, shall be used when the pooled background data for the parameter or constituent, obtained within a given sampling period, have not more than 50% of the data below the PQL.

This method requires at least nine independent samples from each Monitoring Point and Background Monitoring Point; therefore, the Discharger shall anticipate the need for taking more than four samples per Monitoring Point, based upon past monitoring results. The ANOVA shall be carried out at the 95% confidence level. Following the ANOVA, the data from each downgradient Monitoring Point shall be tested at a 99% confidence level against the pooled background data. If these multiple comparisons cause the Null Hypothesis (i.e., that there is no release) to be rejected at any Monitoring Point, the Discharger shall conclude that a release is tentatively indicated for that parameter or constituent.

c. The **Method of Proportions** shall be used if the "combined data set" -- the data from a given Monitoring Point in combination with the data from the Background Monitoring Points -- has between 50% and 90% of the data below the MDL for the constituent or parameter in question.

This method requires
(1) at least nine downgradient data points per Monitoring Point per Reporting Period,

(2) at least thirty data points in the combined data set, and
(3) that n * P > 5 [where n is the number of data points in the combined data set and P is the proportion of the combined set that equals or exceeds the MDL].

Therefore, the Discharger shall anticipate the number of samples required, based upon past monitoring results. The test shall be carried out at the 99% confidence level. If the analysis results in rejection of the Null Hypothesis [i.e., that there is no release], the Discharger shall conclude that a release is tentatively indicated for that constituent or parameter.

2. The Discharger shall use the following **non-statistical method** for the VOCwater and VOCspg Monitoring Parameters and for all Constituents of Concern which are not amenable to the statistical tests above (i.e., less than 10% of the data from background samples equal or exceed their respective MDL).

Each qualifying constituent at a Monitoring Point shall be determined based on either
(1) the data from a single sample for that constituent, taken during that Reporting Period from that Monitoring Point, or
(2) (where several independent samples have been analyzed for that constituent at a given Monitoring Point) the data from the sample which contains the largest number of qualifying constituents.

Background shall be represented by the data from all samples taken from Background Monitoring Points during that Reporting Period (at least one sample from each Background Monitoring Point).

The method shall be implemented as follows:

a. *For the Volatile Organics Monitoring Parameter For Water Samples [VOCwater]*:
For any given Monitoring Point, the VOCwater Monitoring Parameter is a composite parameter addressing all detectable VOCs ~~[including any unidentified peaks]~~.

The Discharger shall conclude that a release is tentatively indicated for the VOCwater Monitoring Parameter if the data for any Monitoring Point contain either
(1) two or more qualifying VOCs that equal or exceed their respective MDLs, or
(2) one qualifying VOC that equals or exceeds its PQL.

b. *For the Volatile Organics Monitoring Parameter For Soil Pore Gas Samples [VOCspg]*:
The VOCspg Monitoring Parameter is a composite parameter for soil pore gas addressing all VOCs detectable using either GC or GC/MS analysis of at least a ten liter sample of soil pore

gas (e.g., collected in a vacuum canister)~~, including any unidentified peaks~~. It involves the same scope of VOCs as does the VOCwater Monitoring Parameter.

The Discharger shall conclude that a release is tentatively indicated for the VOCspg Monitoring Parameter if the data for any Monitoring Point contain either
(1) two or more qualifying VOCs that equal or exceed their respective MDLs, or
(2) one qualifying VOC that equals or exceeds its PQL.

c. *For Constituents of Concern*:
The Discharger shall conclude that a release is tentatively indicated if the data for any Monitoring Point contain either
(1) two or more qualifying constituents that equal or exceed their respective MDLs, or
(2) one qualifying constituent which exceeds its PQL.

RESPONSE TO A RELEASE

General

1. If the Discharger determines that there is significant **statistical evidence of a release** (i.e. the initial statistical comparison or non-statistical comparison indicates, for any Constituent of Concern or Monitoring Parameter, that a release is tentatively identified), the Discharger shall immediately notify the Board verbally as to the Monitoring Point(s) and constituent(s) or parameter(s) involved, shall provide written notification by certified mail within seven days of such determination [2550.80(1)], and shall carry out a **discrete retest** *(see below)*.

If the retest confirms the existence of a release, the Discharger shall carry out the requirements of **3. below**. In any case, the Discharger shall inform the Board of the outcome of the retest as soon as the results are available, following up with written results submitted by certified mail within seven days of completing the retest.

2. If the Discharger determines that there is significant **physical evidence of a release**, the Discharger shall notify the Board of this fact by telephone within 24 hours and by certified mail within 7 days, and shall carry out the requirements of **3. below** for all potentially-affected monitored media.

3. If the Discharger concludes that a release has been discovered:
a. If this conclusion is not based upon "direct monitoring" of the Constituents of Concern, then the Discharger shall, within thirty days, sample for all Constituents of Concern at all Monitoring Points in the affected medium for the waste management unit and submit them for laboratory analysis. Within seven days of receiving the laboratory analytical results, the

Discharger shall notify the Regional Board, by certified mail, of the concentration of all Constituents of Concern at each Monitoring Point in the affected medium. Because this scan is not to be statistically tested against background, only a single datum is required for each Constituent of Concern at each Monitoring Point [2550 8(k)(1)].

b. The Discharger shall, within 90 days of discovering the release, submit a Revised Report of Waste Discharge proposing an Evaluation Monitoring Program meeting the requirements of 2550.8(k)(5) and 2550.9 of Article 5, and, if Part 258 is applicable to the site, satisfying the requirements of 40 CFR 258.55 .

c. The Discharger shall, within 180 days of discovering the release, submit to the Board a preliminary engineering feasibility study meeting the requirements of 2550.8(k)(6) of Article 5.

Discrete Retest

In the event that the Discharger concludes that a release has been tentatively indicated (under the statistical or nonstatistical methods above), the Discharger shall, within 30 days of this indication, collect two new suites of samples for the indicated Constituent(s) of Concern or Monitoring Parameter(s) at each indicating Monitoring Point, collecting at least as many samples per suite as were used for the initial test. Resampling of the Background Monitoring Points is optional. Samples shall be analyzed using the same analytical methods which produced the original data which showed tentative evidence of a release. Sample data shall be analyzed using the same statistical procedure or non-statistical procedure which provided the tentative evidence of a release.

As soon as the data are available, the Discharger shall rerun the statistical method (or non-statistical comparison) separately upon each suite of retest data. For any indicated Monitoring Parameter or Constituent of Concern at an affected Monitoring Point, if the test results of either (or both) of the retest data suites confirm the original indication, the Discharger shall conclude that a release has been discovered.

All retests shall be carried out only for the Monitoring Point(s) for which a release is tentatively indicated, and only for the Constituents of Concern or Monitoring Parameters which triggered the indication there, as follows:

a. If an ANOVA method was used for the original data, the retest shall involve only a repeat of the multiple comparison procedure, carried out separately on each of the two new suites of samples taken from the indicating Monitoring Point;

b. If the Method of Proportions statistical test was used for the original data, the retest shall consist of a full repeat of the statistical test for the indicated constituent or parameter, performed separately on each of the new sample suites from the indicating Monitoring Point;

c. If the non-statistical method was used for the original data:

(1) Because the VOC Monitoring Parameters [VOCwater or VOCspg] each address, as a single parameter, an entire family of constituents which are likely to be present in any landfill release, the scope of the laboratory analysis for each retest sample shall include all VOCs detectable in that retest sample. Therefore, a confirming retest for either parameter shall have validated the original indication even if the suite of constituents in the confirming retest sample(s) differs from that in the sample which initiated the retest;

(2) Because all Constituents of Concern that are jointly addressed in the non-statistical testing remain as individual Constituents of Concern, the scope of the laboratory analysis for the nonstatistical retest samples shall be narrowed to involve only those constituents detected in the sample which initiated the retest.

Response to Detection in Background of VOCs

(or any other constituent which is expected to be "zero" in background and thus not amenable to statistical analysis)

1. Except as provided in 3. below, any time the laboratory analysis of a sample from a Background Monitoring Point, sampled for VOCs, shows either
(1) two or more VOCs at or above their respective MDL, or
(2) one VOC at or above its respective PQL,
then the Discharger shall

a. immediately notify the Board by phone,
b. follow up with written notification by certified mail within seven days,
c. obtain two new independent VOC samples from that Background Monitoring Point
d. and send such samples for laboratory analysis of all detectable VOCs within thirty days.

2. If either or both the new samples validates the presence of VOC(s), using the above procedure, the Discharger shall:

a. immediately notify the Regional Board about the VOC(s) verified to be present at that Background Monitoring Point, and follow up with written notification submitted by certified mail within seven days of validation; and

b. within 180 days of validation, submit a report -- acceptable to the Executive Officer -- which examines the possibility that the detected VOC(s) originated from the Unit and proposing appropriate changes to the monitoring program.

3. If the Executive Officer determines, after reviewing the report submitted under 2.b. above, that the VOC(s) detected originated from a source other than the WMU, the Executive Officer will make appropriate changes to the monitoring program.

4. If the Executive Officer determines, after reviewing the report submitted under 2.b. above, that the detected VOC(s) most likely originated from the WMU, the Discharger shall assume that a release has been detected and shall immediately begin carrying out the applicable General requirements for Response to a Release, above.

Release beyond facility boundary

1. Any time the discharger concludes that a release from the waste management unit has proceeded beyond the facility boundary, the discharger shall so notify all persons who either own or reside upon the land that directly overlies any part of the plume (Affected Persons).

2. Initial notification to Affected Persons shall be accomplished within 14 days of making this conclusion and shall include a description of the discharger's current knowledge of the nature and extent of the release.

3. Subsequent to initial notification, the discharger shall provide updates to all Affected Persons, including any persons newly affected by a change in the boundary of the release, within 14 days of concluding there has been any material change in the nature or extent of the release.

4. Each time the discharger sends a notification to Affected Persons, the discharger shall provide the Board, within seven days of sending such notification, with both a copy of the notification and a current mailing list of Affected Persons.

STANDARD CONDITIONS

Supervision and Certification

1. All waste management units shall be **designed and constructed** under the direct supervision of a California registered civil engineer or a certified engineering geologist and shall be certified by that individual as meeting the prescriptive standards, or approved engineered alternative design, and performance goals of Chapter 15 prior to waste discharge.

2. All ground water monitoring and corrective action required for MSWLF units pursuant to 40 CFR Part 258 shall be implemented and certified, as appropriate, by a qualified ground water scientist as specified in 40 CFR 258.50(f).

3. Designs of waste management units shall include a **Construction Quality Assurance Plan**, which shall:

a. be submitted for review and approval by the Board prior to construction;

b. demonstrate that the waste management unit has been constructed according to the specifications and plans as approved by the Board; and

c. provide quality control on the materials and construction practices used to construct the waste management unit and prevent the use of inferior products and/or materials which do not meet the approved design plans or specifications.

4. **Closure** of each waste management unit shall be performed under the direct supervision of a California registered civil engineer or California certified engineering geologist.

Construction

1. Materials used to construct **liners** shall have appropriate physical and chemical properties to ensure containment of discharged wastes over the operating life, closure, and post-closure maintenance period of the waste management units.

2. Materials used to construct **leachate collection and removal systems** (LCRSs) shall have appropriate physical and chemical properties to ensure the required transmission of leachate over the life of the WMUs and the post-closure maintenance period.

3. Hydraulic conductivities determined through laboratory methods shall be confirmed by appropriate **field testing**, and the results shall be submitted to the Board prior to construction.

Operations

1. The discharger shall maintain in **good working order** and operate as efficiently as possible any facility, control system, or monitoring device installed to achieve compliance with the waste discharge requirements.

2. For any **electrically** operated equipment at the site, the **failure** of which could cause loss of control or containment of waste materials, or violation of this Order, the discharger shall employ safeguards to prevent loss of control over wastes. Such safeguards may include alternate power sources, standby generators, retention capacity, operating procedures, or other means.

3. The fact that it would have been necessary to halt or reduce the permitted activity in Order to maintain compliance with this Order shall not be regarded as a defense for the discharger's violations of the Order.

4. The discharge shall remain within the designated disposal area at all times.

5. By the effective date of waste discharge requirements, the discharger shall have a plan for preventing and controlling **accidental discharges**, and for minimizing the effect of such events. This plan shall:

a. Identify the possible sources of accidental loss or leakage of wastes from each waste storage, treatment, or disposal unit.

b. Evaluate the effectiveness of present waste management units and operational procedures, and identify needed changes or contingency plans.

c. Predict the effectiveness of the proposed changes in waste management facilities and procedures and provide an implementation schedule containing interim and final dates when changes will be implemented.

The Board, after review of the plan, may establish conditions that it deems necessary to control leakage and minimize its effects.

6. Methane and other **landfill gases** shall be adequately vented, removed from landfill units, or otherwise controlled to prevent the danger of explosion, adverse health effects, nuisance conditions, or the impairment of beneficial uses of water due to migration through the vadose (unsaturated) zone.

7. During the rainy season a minimum one-foot thickness of low permeability **soil or alternative cover**, approved by the Board and by the California Integrated Waste Management Board, shall be maintained over all but the active disposal area of the landfill units. The active disposal area shall be confined to the smallest area practicable based on the anticipated quantity of waste discharge and other waste management facility operations.

8. Any direct-line discharge to a surface impoundment shall have fail-safe equipment or operating procedures to prevent overfilling.

9. Surface impoundments shall be designed, constructed and maintained to prevent scouring and/or erosion of the liners and other containment features at points of discharge to the impoundments and by wave action at the waterline.

10. Leachate removed from a surface impoundment LCRS shall be discharged to the impoundment from which it originated. Leachate ~~and gas condensate~~ removed from a landfill shall not be discharged to any landfill.~~, but rather to an appropriate waste management unit.~~

11. Solids which accumulate in a surface impoundment shall be periodically removed to maintain minimum freeboard requirements and to maintain sufficient capacity for landfill and surface impoundment leachate and for the discharge of wastes. Prior to removal of these solids, sufficient samples shall be taken for their characterization and classification pursuant to Article 2 of Chapter 15. The rationale for the sampling protocol used, the results of this sampling, and a rationale for classification of the solids shall be submitted to the Board for review. The solids may be discharged to the Class III landfill units only if the Board determines that they qualify for classification as "nonhazardous solid waste" or "inert waste".

12. Water used for facility maintenance shall be limited to the minimum amount necessary for dust control.

Siting

1. Waste management units shall be designed, constructed, and operated to prevent inundation or washout due to floods with a 100-year return period.

Class II surface impoundments and related containment structures shall be constructed and maintained to prevent, to the greatest extent possible, inundation, erosion, slope failure, washout, and overtopping under 1000-year, 24-hour precipitation conditions, and shall be designed to contain the 100-year wet season precipitation without using the required two feet of freeboard.

Class III landfill units and related containment structures shall be constructed and maintained to prevent, to the greatest extent possible, ponding, infiltration, inundation, erosion, slope failure, washout, and overtopping under 100-year, 24-hour precipitation conditions.

2. Surface drainage from tributary areas and internal site drainage from surface or subsurface sources shall not contact or percolate through wastes, and shall either be contained onsite or be discharged in accordance with applicable storm water regulations.

Closure

1. Closed WMUs shall be provided with at least two **permanent monuments**, installed by a licensed land surveyor or by a registered civil engineer authorized to perform land surveying, from which the location and elevation of all wastes, containment structures, and monitoring facilities can be determined throughout the post-closure maintenance period.

2. Areas with **slopes greater than ten percent**, surface drainage courses, and areas subject to erosion by wind or water shall be designed and constructed to prevent such erosion.

Post-Closure

1. The post-closure maintenance period shall continue until the Board determines that remaining wastes in all WMUs will not threaten water quality.

2. The owner of the waste management facility shall have the continuing responsibility to assure protection of usable waters from discharged wastes and from gases and leachate generated by discharged waste during the active life, closure, and post-closure maintenance period of the WMUs and during subsequent use of the property for other purposes.

DEFINITIONS

Unless otherwise stated, all terms are as defined in Chapter 2, Division 7, of the California Water Code (Section 13050 et.seq.), in Article 10, Chapter 15, Division 3, Title 23 of the California Code of Regulations (23 CCR 2600 et.seq.), and in Section 258.2, and elsewhere in Part 258, Title 40 of the Code of Federal Regulations.

The following additional definitions apply to the Order:

1. **"Affected Persons"** means all individuals who either own or occupy land outside the boundaries of the parcel upon which the landfill is located that has been or may be affected by the release of leachate or waste constituents (in gas or liquid phase) from an MSW landfill.

2. **"Background Monitoring Point"** means a device (e.g., well) or location (e.g., a specific point along a lakeshore), upgradient or sidegradient from the waste management unit, or as otherwise approved by the Executive Officer, where water quality samples are taken that are not affected by any release from the waste management unit and that are used as a basis of comparison against samples taken from downgradient Monitoring Points.

3. **"Composite liner"** means a liner that consists of two or more components, which include a Synthetic Liner in direct and uniform contact with an underlying layer of prepared, low-permeability soil such that the net permeability of the resulting combination is significantly less than would be expected by reference to the permeability of the individual components layers.

4. Unless otherwise specified, **"composite sample"** means a combination of individual samples either collected over a specified sampling period or collected over an area at one time (synoptically):

   (1) at equal time intervals,

   (2) at varying time intervals so that each sample represents an equal portion of the media to be sampled.

The duration of the sampling period shall be specified in the Monitoring and Reporting Program. The method of compositing shall be reported with the results.

5. **"Constituents of Concern (COC)"** means those constituents which are likely to be in the waste in the WMU or which are likely to be derived from waste constituents in the event of a release.

6. **"Daily maximum concentration"** means the highest measurement made on any single discrete sample or composite sample.

7. **"Existing Footprint"** means the portion of land covered by waste discharged to an MSWLF as of midnight on the day before the Federal Deadline. The term includes the area under the active face of the landfill as well as all portions of the landfill unit containing waste that is obscured from view by daily, intermediate, or permanent cover. The term includes only areas covered with waste that is discharged in a manner that is consistent either with past operating practices or with modifications thereof that ensure good management of the waste. The term has the same meaning as the area enclosed by the "waste boundaries of an existing MSWLF unit", as used in the definition of the federal term of art "lateral expansion" in 40 CFR 258.2.

8. **"Federal Deadline"** means the date listed in 40 CFR 258(j) — currently October 9, 1993 — when the majority of the provisions in the federal MSW regulations become effective.

9. **"Federal MSW regulations"** means the regulations promulgated by the United States Environmental Protection Agency on October 9, 1991 (Title 40, Code of Federal Regulations, Parts 257 and 258).

10. **"Grab sample"** means a discrete sample collected in less than 15 minutes.

11. **"Matrix effect"** means any change in the method detection limit or practical quantitation limit for a given analyte as a result of the presence of other constituents - either of natural origin or introduced by humans as a result of a release or spill - that are present in the sample of water or soil-pore gas being analyzed.

12. **"Method detection limit (MDL)"** means the lowest constituent concentration associated with a 99% reliability of a "non-zero" analytical result. The MDL shall reflect the detection capabilities of the specific analytical procedure and equipment used by the laboratory. MDLs reported by the laboratory shall not simply be restated from USEPA analytical method manuals. In relatively interference-free water, laboratory-derived MDLs are expected to ~~be not greater than~~ closely agree with published USEPA MDLs. If the lab suspects that, due to matrix or other effects, the detection limit for a particular analytical run differs significantly from the laboratory-derived MDL, the results should be flagged accordingly, along with an estimate of the detection limit achieved.

13. **"Monitoring Parameters"** means the short list of constituents and parameters used for the majority of monitoring activity at a given WMU. Monitoring for the short list of Monitoring Parameters constitutes "indirect monitoring", in that the results are used to indicate indirectly the success or failure of adequate containment for the longer list of Constituents of Concern.

14. **"Monitored Media"** means those water-, solid-, or gas-bearing media that are monitored pursuant to the Monitoring and Reporting Program. The Monitored Media may include:

(1) ground water in the uppermost aquifer, in any other portion of the zone of saturation in which it would be reasonable to anticipate that waste constituents migrating from the WMU could be detected, and in any perched zones underlying the WMU,

(2) any bodies of surface water that could be measurably affected by a release,

(3) soil pore liquid beneath and/or adjacent to the WMU, and

(4) soil pore gas beneath and/or adjacent to the Unit.

15. **"Monitoring Point"** means a device (e.g., well) or location (e.g., a specific point along a lakeshore), downgradient from the landfill and that is assigned in this Order, at which samples are collected for the purpose of detecting a release by comparison with samples collected at Background Monitoring Points.

16. **"Monthly average concentration"** means the arithmetic mean of measurements made during the month.

17. **"Monthly average discharge"** means the total discharge by volume during a calendar month divided by the number of days in the month that the facility was discharging (e.g. gallons per day, cubic feet per day).
Where less than daily sampling is required by this Order, the monthly average shall be determined by the summation of all the measured discharges divided by the number of days during the month when the measurements were made.

18. **"MSWLF, or MSW landfill"** means a Class II or Class III landfill unit in this region that accepts, or has accepted, municipal solid wastes, and that is subject to regulation under either or both Chapter 15 and the federal MSW regulations.

19. **"Order"**, as used throughout this document, means the Waste Discharge Requirements. The Monitoring and Reporting Program and Standard Provisions and Reporting Requirements are incorporated by reference into the Waste Discharge Requirements.

20. **"Practical quantitation limit (PQL)"** means the lowest constituent concentration at which a numerical concentration can be assigned with ~~a 99%~~ reasonable certainty that its value ~~is within ± 10% of~~ represents the constituent's actual concentration in the sample. Normally PQLs should be set equal to the concentration of the lowest standard used to calibrate the analytical procedure. The PQL shall reflect the quantitation capabilities of the specific analytical procedure and equipment used by the laboratory. PQLs reported by the laboratory shall not simply be restated from U.S. EPA analytical method manuals. In relatively interference-free water, laboratory-derived PQLs are expected to ~~be not greater than~~ closely agree with published U. S. EPA PQLs. If the lab suspects that, due to matrix or other effects, the quantitation limit

for a particular analytical run differs significantly from the laboratory-derived PQL, the results should be flagged accordingly, along with an estimate of the quantitation limit achieved.

21. **Reporting Period** means the time interval during which samples are collected and analyzed, and the results then reported to the Board, to comply with a specified monitoring and reporting frequency. The maximum reporting period for analysis of all Constituents of Concern is five years; for Monitoring Parameters it is six months (generally, Spring/Summer = April 1 to September 30, and Fall/Winter = October 1 to March 31). The Reporting Period for the Annual Summary Report extends from April 1 of the previous year to March 31 of the current year. The due date for the submittal of any given report will be 15 days after the end of its Reporting Period, unless otherwise stated.

22. **Receiving Waters** refers to any surface or ground water which actually or potentially receives waste constituents, leachate, or surface or ground waters which come in contact with waste materials or contaminated soils.

23. **"Sample size"**:

(a) For Monitoring Points, means the number of data points obtained from a given Monitoring Point during a given Reporting Period used for carrying out the statistical or non-statistical analysis of a given analyte during a given Reporting Period; or

(b) For Background Monitoring Points, means the number of new and existing data points collected under 2550.7(e)(11 and 12) from all applicable Background Monitoring Points in a given monitored medium–used to collectively represent the background concentration and variability of a given analyte in carrying out statistical or non-statistical analysis of that analyte during a given Reporting Period.

24. **Standard Observations** means:

For Receiving Waters:

a) Floating and suspended materials of waste origin: presence or absence, source, and size of affected area;

b) Discoloration and turbidity: description of color, source, and size of affected area;

c) Evidence of odors: presence or absence, characterization, source, and distance of travel from source;

d) Evidence of water uses: presence of water-associated wildlife;

e) Flow rate; and

f) Weather conditions: wind direction and estimated velocity, total precipitation during recent days and on the day of observation;

Along the perimeter of the WMU:

a) Evidence of liquid leaving or entering the Unit, estimated size of affected area, and flow rate (show affected area on map);

b) Evidence of odors: presence or absence, characterization, source, and distance of travel from source; and

c) Evidence of erosion and/or of daylighted refuse.

For the WMU:

a) Evidence of ponded water at any point on the waste management facility [show affected area on map];

b) Evidence of odors: presence or absence, characterization, source, and distance of travel from source;

c) Evidence of erosion and/or of daylighted refuse; and

25. **Standard Analysis and Measurements**, means:

a) Turbidity, in NTU;

b) Water elevation to the nearest 1/100th foot above mean sea level; and

c) Sampling and statistical/non-statistical analysis of the Monitoring Parameters.

26. **"Synthetic Liner"** means a layer of flexible, man-made material that is installed in accordance with the standard of the industry over an area of land prior to the discharge of waste there.

27. **"VOCwater"** (Volatile Organics Monitoring Parameter for Water) means the composite monitoring parameter encompassing all VOCs that are detectable in less than ten percent of applicable background samples from a monitored water-bearing medium (e.g., the unsaturated zone, the uppermost aquifer, a zone of perched ground water, or a surface water body). This parameter is analyzed via the non-statistical analytical method described elsewhere in this Order to identify a release to waters of the state of VOCs whose presence in background water is detected too infrequently to allow statistical analysis.

28. **VOCspg**, (Volatile Organics Monitoring Parameter for Soil Pore Gas) means Monitoring Parameters addressing all volatile organic constituents detectable in a sample of soil pore gas.

29. **"Volatile organic constituents (VOCs)"** means the suite of organic constituents having a high vapor pressure. The term includes at least the 47 organic constituents listed in Appendix I to 40 CFR Part 258.

Museum of Paleontology
University of California
Berkeley, CA 94720
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8/8/93

Mr. William H. Crooks, Executive Director
California RWQCB, Central Valley Region
3443 Routier Road, Suite A
Sacramento, CA 95827-3098

RE: Fossil recovery at Fairmead Landfill

Dear Mr. Crooks:

I am writing to ask for an extension of the implementation date of State Water Resources Control Board Resolution No. 93-62, and Subtitle D at the Fairmead Landfill. As you may know, fossil vertebrate of middle Ice Age (middle Pleistocene) were unexpectedly found while excavating for the landfill. The site contains the largest assemblage of middle Pleistocene vertebrates yet known from the Great Valley. A contract was let to the University of California Museum of Paleontology to salvage this scientifically important fossil site to order to satisfy the intent of SEQUA. In order to keep costs down a minimum paid crew was used (one site supervisor) while attempting to make maximum use of local and out-of-county volunteers. Since the onset of the work, several thousand people have visited the site and over a hundred volunteers have participated in the work. Some of the specimens are already being used in an exhibit at the Fresno Metropolitan Museum. The site has received considerable local interest and news coverage and also reached the state and national press. While all the original bones found at the site have been removed, continuing excavation has continued to expose new bone concentrations in some parts of the pit. The combination of the these new finds and the very hot weather has reduced the supply of qualified volunteers and inhibited the speed at which fossils can be removed so that the required liner can be installed.

By granting the extension of the State Water Resources Control Board Resolution No. 93-62, and Subtitle D at the Fairmead Landfill, the remaining fossils can be removed in an orderly and scientifically appropriate way. I hope you will see fit to support such an extension.

Sincerely,

Howard Hutchison

J. Howard Hutchison
Research Paleontologist, Museum of Paleontology
Adjunct Associate Professor, Dept. of Integrative Biology

cc: Michael Kirn, Madera County Engineering and General Services
Marc Del Piero, State Water Resources Control Board
James Giannopoulos, State Water Resources Control Board
Ralph E. Chandler, California Integrated Waste Management Board
Michael Frost, California Integrated Waste Management Board
U. S. Environmental Protection Agency

Shell Western E&P Inc.
An affiliate of Shell Oil Company

PO Box 11164
Bakersfield CA 93389 1164

August 19, 1993

Mr. Thomas Pinkos
Central Valley Regional Water Quality Control Board
3443 Routier Road
Sacramento, CA 95827-3098

Dear Mr. Pinkos:

SUBJECT: COMMENTS REGARDING PROPOSED WASTE DISCHARGE REQUIREMENTS FOR MUNICIPAL SOLID WASTE LANDFILLS

After reviewing the waste discharge requirements, monitoring and reporting programs proposed by the Central Valley Regional Water Quality Control Board, we have prepared the following comments:

Part B (SPECIFICATIONS) #2

In the last sentence the reference to the "[alternative composite liner's components]" appears to preclude a facility from operating without a composite liner, even if the facility is shown to meet the exemption criteria identified in Part 1, Section C (Applicability in the absence of useable waters) contained in the State Board's Resolution #93-62. By removing the words "composite liner's," the proposed order would be consistent with all of the alternatives described in the resolution.

Our final comment relates to consistency with the Subtitle D requirements. At the Fresno workshop, several participants voiced concerns regarding sampling and analytical methods that were not consistent with explicit requirements in Subtitle D. Either those inconsistencies must be eliminated or the Regional Board staff should clearly identify and justify the duplicative samples and tests that an operator will have to perform in order to satisfy both the state and federal requirements. Failure to modify the proposed requirements or to mandate both the state and corresponding federal requirement in the monitoring program could leave the facility operator unprotected from federal enforcement actions or civil suits.

93 AUG 23 PM 2:19

GM322902.WPD

Please contact Mr. Ron Chambers of my staff at (805) 326-5641 if you have any questions regarding this correspondence.

Very truly yours,

M. R. Steube
Technical Manager
Remediations & Waste Management
Health, Safety & Environment
California Division

RLC:gem

GM322902.WPD

WASTE MANAGEMENT DEPARTMENT
DAPHNE H. WASHINGTON, Director
2700 "M" STREET, SUITE 500
BAKERSFIELD, CA 93301
Phone: (805) 861-2158
FAX: (805) 325-0982

RESOURCE MANAGEMENT AGENCY
JOEL HEINRICHS, AGENCY DIRECTOR
Air Pollution Control District
Engineering & Survey Services Department
Planning & Development Services Department
Transportation Management Department
Waste Management Department

TRF

August 20, 1993

File: 20020

Mr. Thomas Pinkos
California Regional Water Quality
Control Board
Central Valley Region
3443 Routier Road
Sacramento, California 95827-3098

Dear Mr. Pinkos:

COMMENTS REGARDING PROPOSED ORDER AMENDING
WASTE DISCHARGE REQUIREMENTS
AND
MONITORING AND REPORTING PROGRAMS
FOR
MUNICIPAL SOLID WASTE LANDFILLS IN THE CENTRAL VALLEY REGION

The Kern County Waste Management Department appreciates the opportunity to comment on the proposed order amending waste discharge requirements and monitoring and reporting programs for municipal solid waste landfills in the central valley region. Kern County has 11 active and inactive sanitary landfills within the central valley region and 15 landfills overall.

Specific comments/requested modifications are listed below:

Order Amending WDR's

Page 3, B. Specifications, 2.

Comment: Omit the phrase "composite liner's" from the sentence "...where the performance of the alternative composite liner's components, in combination, equal or exceed the waste containment capability of the Prescriptive Design."

Page 4, B. Specifications, 3.

Comment: The last sentence refers to "steep". For clarity, it is requested that steep be defined specifically within the order.

Contra Costa County

Health Services Department
ENVIRONMENTAL HEALTH DIVISION
1111 Ward Street
Martinez, California 94553-1352
(510) 646-2521

August 20, 1993

Thomas Pinkos
California Regional Water Quality Control Board
Central Valley Region
3443 Routier Road
Sacramento, California 95827-3098

RE: Proposed Order Amending Waste Discharge Requirements

Dear Mr. Pinkos:

The tentative order for amending the waste discharge requirements and monitoring and reporting programs for municipal solid waste landfills has been reviewed by Contra Costa County Environmental Health staff. The requirement No. 5 in the Specifications section should include that the sump be appropriately lined. Our concern for this requirement is based upon an existing sump at Acme Landfill in Martinez, California which consists only as a deep pit in the soil with a corrugated standpipe placed at the bottom. Leachate has overfilled the standpipe by as much as 3-4 feet causing soil discoloration and concern exists that the leachate has contaminated the unlined sump and surrounding area.

If you have any questions, please call Connie Stavros at (510) 646-4233.

Sincerely,

Charles S. Nicholson
Supervising Environmental Health Specialist

CSN:slt

A373A (10/82)

August 20, 1993

Mr. Thomas Pinkos
Central Valley Regional Water Quality Control Board
3443 Routier Road
Sacramento, California 95827

Re: Comments on Blanket WDRs

Dear Mr. Pinkos:

Attached are my comments regarding the blanket WDRs for the Central Valley Region. Attachment 1 is in regard to the statistical requirements of the WDRs. Attachment 2 is in regard to the chemical analysis requirements of the WDRs. Although the letter in Attachment 2 was prepared for the San Francisco Bay Region, the comments are also applicable to the Central Valley Region WDRs. Thank you for your consideration. The RWQCB and SWRCB workshop today was very helpful.

Sincerely,

EMCON Associates

Amy M. Dietz
Senior Project Chemist

Attachment: Attachment 1
Attachment 2

ATTACHMENT 1

COMMENTS REGARDING THE STANDARD PROVISIONS AND REPORTING REQUIREMENTS IN THE BLANKET WDRS

ANALYSIS OF MONITORING DATA

Intrawell Comparisons. The statistical methods described in the blanket WDRs apply only to interwell comparisons of water quality; intrawell comparisons are not addressed. Intrawell methods can be very effective for comparing the background water quality in hydraulically upgradient wells with the water quality in downgradient compliance wells. Application of these interwell statistical methods for many landfill sites, however, is only valid if the fundamental assumptions of the methods are met. Assumptions for interwell background to compliance well comparisons include:

- spatial homogeneity of background water quality exists throughout the site
- hydraulically upgradient monitoring wells exist at the site
- background water quality is represented by water quality hydraulically upgradient from the WMU

Monitoring networks at many landfills do not allow these assumptions. At some sites, upgradient monitoring locations do not exist, for example, where there is radial flow from the waste management unit or where the site configuration and location preclude the installation of upgradient wells. In addition, natural spatial variations in water quality can occur within a particular water-bearing zone due to variabilities in secondary mineralization. Such natural spatial variation is commonplace and necessitates the use of intrawell comparisons due to the heterogeneity of sample populations. Furthermore, using intrawell comparisons is recognized by the U.S. EPA in its statistics guidance document entitled *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities - Interim Final Guidance* (U.S. EPA, 1989).

Although the blanket WDRs provide for alternate statistical methods, it is inappropriate to exclude from the stated statistical methods an approach that recognizes the potential for natural variations inherent in hydrogeological and geochemical systems, is statistically valid and oftentimes necessary, and potentially applies to a substantial number of landfill

sites. Therefore, the blanket WDR should be revised to specifically allow the use of intrawell comparisons.

Tolerance Interval, Prediction Interval, and Control Charts. Together with the ANOVA procedures, these three statistical methods are currently included as statistical alternatives in both Subtitle D and Article 5. The U.S. EPA has evaluated these methods and has found them to be valid statistical tools in identifying releases from waste management units (U.S. EPA, 1989). Excluding these methods from the stated statistical methods in the blanket WDRs, after their inclusion in federal and state monitoring regulations, is inappropriate.

Although the blanket WDR provides for alternate statistical methods, the tolerance interval, prediction interval, and control chart methods are valid statistical methods cited in current federal and state regulations. For these reasons, the blanket WDR should be revised to specifically allow the use of these methods.

Pooling Historical Data for ANOVAs. In the description of the parametric ANOVA procedures in the blanket WDRs, at least four independent samples from each monitoring point are to be collected each sampling event. It is assumed that sampling events occur semiannually. The four data points from each monitoring point would then be subjected to the ANOVA and multiple comparison procedures. An alternative to this is sampling scheme is to collect a single independent sample from each monitoring point on a quarterly basis and pooling this data point with with the previous three data points (from the prevous three quarterly events), then applying the ANOVA and multiple comparison procedures. This is particularly important at sites where collecting four independent samples in a single monitoring event is difficult because the monitoring wells are slow to recharge. Additionaly, by using this approach, the ANOVA can be applied in a more cost-effective manner, as four, rather than eight, samples are collected each year. A similar sampling scheme approach could be applied to the Kruskal-Wallis test. This pooled-data approach is also statistically valid, as determined by the U.S. EPA (U.S. EPA, 1989).

Additionally, in regards to the Kruskal-Wallis test, according to current literature, the minimum required number of observations for the test ranges from four to five, rather than the none specified in the blanket WDRs (Helsel, D.R., et al. 1992, *Statistical Methods in Water Resources*, Elsevier Publishers; Lehmann, E.L., 1975, *Nonparametrics. Statistical Methods Based on Ranks*, Holden-Day, Oakland, California; U.S. EPA, 1989, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities - Interim Final Guidance*).

Although the blanket WDRs provide for alternate statistical methods, pooling historical data for use in the ANOVAs should be explicitly allowed for in the blanket WDRs because it is a statistically valid approach, it accomodates sites with slow recharging wells, and is more cost effective. Also, four data points should be allowed for in the nonparametric ANOVA.

ATTACHMENT 2

Columbia Analytical Services inc.

August 13, 1993

Mr. Curtis Scott
California Regional Water Quality Control Board
San Francisco Bay Region
2101 Webster Street, Ste. 500
Oakland, CA 94612

Re: Comments About The Tentative Order

Dear Mr. Scott,

This letter contains my comments about the Tentative Order-Amendment of Waste Discharge Requirements to comply with Federal Subtitle D Requirements. Because Columbia Analytical Services, Inc. (CAS) is a California Certified Laboratory, my comments will be directed to the sections of the order that pertain to laboratory testing and reporting.

Overall, the attempt to define many of the analytical terms falls short of definitive. Specifically, acceptable MDLs and PQLs should not be described as less than or equal to any MDL or PQL published by EPA. Article 2 says that the PQL is based on 10% precision yet is not "expected to be greater than published USEPA limit." A state approved laboratory will probably have to be above the USEPA published PQL to comply with the restrictive 10% precision limit. In fact, this 10% precision limit may drive landfill owner/opdrators to utilize poor quality laboratories whose precision is not as good as better laboratories, including CAS. Poor precision by a laboratory will lead to higher MDLs which will provide higher PQLs.

Article 13, #3 states that "PQLs shall be derived by the laboratory according to State of California laboratory accreditation procedures." The DTSC Environmental Laboratory Accreditation Program (ELAP) does not mention PQLs. EPA publishes their PQLs but does not give the relationship between MDL and PQL. Please provide to me the relationship between MDL and PQL that the RWQCB expects laboratories to operate with. In my opinion, what is proposed is not practical nor functional.

Article 13, #4 requires many items for reporting that will not assist the consultant or owner/operator in assessing data quality. Please explain the relationship between method, equipment, and analytical detection limits. What recovery rates are you referring to? Please explain. Many surrogate recoveries, as well as matrix spike

recoveries, are acceptable if the recovery is less than 80%. A brief review of USEPA methods will demonstrate this. Your requirements that these recoveries be explained should be reconsidered. In addition, providing the names of the analysts does not assess data quality. That information is available in the laboratory records. However, reporting that will be of little value. If you are looking for an extended data package, that can be provided. Laboratories, including CAS, often provide clients with data for validation purposes. What you are proposing will not provide better data but only more work. An extended data package may not provide any more useful data for monitoring purposes, but it will cost the owner/operator more.

Article 13, #6 requires the reporting of unknown peaks. By definition, they are unknown. If the peaks can not be successfully identified by GC/MS, the unknown peaks will remain unknown. Quantification based on the nearest standard is acceptable, but the identification may not be accomplished. You should reconsider if you want to base verification monitoring and ultimately remediation based on an unknown peak.

Please review and consider my comments. I would greatly appreciate your response. If I can be of any help to you, please call me at (408) 437-2400.

Respectfully submitted,

Debra Terrao for

Keoni A. Murphy, Laboratory Manager
Columbia Analytical Services, Inc.

cc: Tom Vercoutere

KAM/drf

JAMES C. HANSON

August 19, 1993

Mr. Thomas Pinkos
Central Valley Regional Water Quality Control Board
3443 Routier Road
Sacramento, CA 95827-3098

Re: Berryessa Garbage Service, Inc. (Board Order No. 92-212) - Steele Canyon Landfill

Dear Mr. Pinkos:

On behalf of Berryessa Garbage Service, Inc., this is to comment on implementation of State Board Order No. 93-62 relative to the referenced solid waste disposal site. We received copies of the proposed regulations with your Notice of Public Hearing and Workshops dated August 2, 1993. For background on this particular site I suggest you speak with Mr. Steve Rosenbaum of the Board staff.

We have spent the last five years assisting the operator with obtaining new permits for this relatively small existing solid waste disposal site in compliance with a seemingly never ending array of new regulations. A Napa County Use Permit was obtained in the Summer of 1990 and updated Waste Discharge Requirements were issued in the Fall of 1992. This effort and related expense have largely been a waste of time and money. The operator concluded in the Spring of 1993 that it did not have the financial resources available to ensure compliance with the liner requirements set forth in the new WDR's. In addition, a new State facility permit was unobtainable because the operator did not have the financial means to comply with third party liability fund requirements set forth in recent California Integrated Waste Management Board regulations. (The third party liability regulations were enacted while the operator's facility permit application was under CIWMB review. Enactment of these regulations effectively killed any chance of a new facility permit being issued for this site.) The operator has since ceased receiving waste at this site and has opted to haul waste to Solano County for disposal. The operator does not have sufficient funding for closing this site in accordance with State requirements and is presently looking at creative ways in which to obtain such funding. The success of these efforts is by no means assured at this point.

The monitoring and reporting requirements contained in the new proposed regulations appear to add another layer of regulatory and financial burden to a site that can not support its present level of compliance requirements. These proposed regulations join the growing list of

requirements which are apparently imposed with little or no thought as to how the operators of existing sites will obtain the funds necessary for compliance.

It is our belief that Berryessa Garbage Service, Inc.'s financial resources would best be directed toward closing this site. Any additional financial burden which causes funds to be directed away from the closure effort is, in our opinion, counterproductive to the preparation and implementation of a closure plan. Unless the proposed regulations can be dramatically changed prior to the Board's consideration we request that Berryessa Garbage Service, Inc., and the Steele Canyon Landfill be exempt from these regulations.

Please contact me if you have any questions.

Very truly yours,

JAMES C. HANSON
CONSULTING CIVIL ENGINEER

By: Nicholas F. Bonsignore, P.E.

cc: Doug Gomez
Matt Bishop, Attorney at Law
Steve Rosenbaum, Central Valley RWQCB
Cary Fergus, Napa County Dept. of Env. Mgmt.

Waste Management, Inc.-West
Northern California Region
172 98th Avenue
Oakland, California 94603
510/430-8500 • FAX 510/[illegible]

August 19, 1993

Mr. Thomas Pinko, Supervising Engineer
California Regional Water Quality Control Board
Central Valley Region
3443 Routier Road
Sacramento, CA 95827-3098

Re: Proposed Order Amending Waste Discharge Requirements

Dear Mr. Pinkos:

On behalf of Waste Management, Inc., we are happy to submit the attached comments to the Proposed Order issued by the Central Valley Region of the California Regional Water Quality Control Board (RWQCB). We have reviewed the tentative order carefully as it would amend the Waste Discharge Requirements for our solid waste landfill in your region.

In the comments, we have addressed our concerns with the statistical approach, the monitoring parameter list, and the monitoring program included in the Order. As you know, Waste Management submitted a proposed program in June, 1992, for the Altamont facility.

We would welcome an opportunity to meet with you to discuss our comments. Please contact Dave Chase at 510-449-6349 or myself at 510-613-0223 if you have any questions.

Sincerely,

Richard P. Thompson
Environmental Manager

/rpt

cc: Dave Chase
Mike Crosetti
Mike McKee
Neil Mohr
Chuck White

COMMENTS ON
PROPOSED ORDER AMENDING WASTE DISCHARGE REQUIREMENTS
AND
MONITORING AND REPORTING PROGRAMS
FOR
CRWQCB - CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM

D. WATER QUALITY PROTECTION STANDARD

1. Constituents of Concern

For MSWLFs lacking a functioning LCRS:

The Board outlines proposed procedures for determining COCs for MSWLFs lacking a functioning LCRS. In July 1992, WMI submitted a "Revised Chapter 15 Monitoring and Reporting Plan" for its MSWLF in the Central Region (Altamont Landfill), which contained site-specific COCs. The proposed site-specific COCs contained in the plan were developed using available site-specific leachate data, one of the world's largest MSWLF leachate and groundwater databases, and available published sources; and fully meets the intent of 23CCR Section 2550.3.

WMI urges the Board to review the COC list included in the above referenced WMI submittal as soon as possible.

Paragraph 2 outlines procedures for newly added constituents to the COC list. For MSWLFs without LCRSs, there would be no newly added constituents since the Board proposes that the COC list would include the entire Attachment 3 list as well as constituents listed in the existing WDRs and the additional COCs identified in the preceding paragraph of the Monitoring and Reporting Program. Therefore, the entire subsection 2 should be omitted.

For MSWLFs having a functioning LCRS:

Subsections (1)(i) & (ii) identify the months of September and March for initial and retest leachate sampling respectively. However, in Section 5 under the heading "B. REQUIRED MONITORING REPORTS", October and April are noted as the sampling dates for initial and retest leachate sampling. Corrections should be made to provide consistency in the Monitoring and Reporting Program.

The Board does not outline means for obtaining representative leachate samples. Should the leachate be collected from the sump, wells screened immediately above the liner, or through other means? How does one minimize volatilization from sumps and is purging at sample points necessary before sample collection? Since volatile organic compounds represent a key component of the COC list, it is critical that appropriate sample points and sampling techniques are employed to collect representative leachate samples. Design/Construction specifications should be given for leachate sample points.

Which COC list would be used at background and compliance monitoring points for those sites with cells having functioning LCRS's yet also having cells without LCRS's. Is the response to the above the same regardless of whether, or not the site has a multi-unit detection monitoring system? The tentative order should address this issue to avoid confusion upon initiation of the detection monitoring programs.

6. Monitoring Parameters

The Regional Board proposes that pH, TDS, specific conductivity, chloride, sulfate, and nitrate-nitrogen be used as alternative inorganic monitoring parameters (in lieu of the Appendix I metals) in accordance with 40CFR 258.54(a)(2). WMI feels that the use of any "standard" list of inorganic detection monitoring parameters is technically inappropriate, as well as, fully contrary to the intent of 40CFR 258.54, Subsections (a)(2)(i) through (v), which specify several "site-specific" factors that must be considered by the Director when selecting alternative inorganic detection monitoring parameters.

WMI understands from the wording in the tentative order, that the Board will approve alternative lists of inorganic monitoring parameters on a facility by facility basis. However, WMI is deeply concerned that the tentative order does not provide a mechanism, such as a schedule or deadline, by which MSWLF units can ensure prompt review and approval of alternative detection monitoring parameters by the Board. Such a mechanism is necessary to ensure that MSWLFs will not be required to use inappropriate detection monitoring parameters.

STANDARD PROVISIONS AND REPORTING REQUIREMENTS

PROVISIONS FOR MONITORING

Sampling and Analytical Methods

Section 1 contains requirements for the timing of sampling activities within each reporting period. WMI agrees that normal detection groundwater monitoring samples should be collected over as short a period as possible. However, given the number of independent samples that are required for some of the statistical tests proposed in the tentative order and the possibility unanticipated delays in field activities, WMI feels that a strict 30 day requirement is unworkable. WMI strongly suggests that "30-days be changed to either: "60-days" or "as short a period as feasible".

Section 6 indicates that QA/QC recovery rates need to be reported and that any recovery rates less than 80% need to be explained. It is presumed that the 80% recovery limit actual refers to the recovery of check standards as opposed to a rate of recovery. Several organic analytical methods establish 80% recovery of standards as a performance criteria (e.g. EPA 601). GC/MS methods have useful qualitative attributes, but this influences instrument sensitivity to some extent, which reduces their performance in terms of consistently meeting strict recovery limits. This section should be re-written to consider analytical instrument performance criteria for both GC and GC/MS methods.

Analysis of Monitoring Data

The Board provides three statistical methods for the analysis of monitoring data. These three statistical options are all based on upgradient to downgradient comparisons. There are many MSWLFs in California, including Altamont Landfill for which such comparisons will not be possible. Our extensive studies of the geology and hydrogeology at Altamont Landfill have shown complex flow paths and variable water quality distributions at this site, which does not lend itself to background to downgradient comparisons. WMI strongly suggests that an additional option(s) be added to the order which covers these types of facilities in the event that an alternative statistical method has not been approved in time.

Secondly, there are also many MSWLFs in California for which upgradient to downgradient comparisons are the method of choice. However, given the complex nature of groundwater systems and the various statistical methods available for use in upgradient to downgradient comparisons, WMI feels that it is totally inappropriate to assume that one of the three "options" presented in Section 13(d)(1) will represent the most appropriate method for a particular site. WMI, therefore, strongly suggests that the statistical options in this section be either: 1) expanded to better reflect the various statistical methods available, or 2) delete the three options and replace them with a general performance standard.

WMI is deeply concerned about the Board's schedule for completing the review of Altamont landfill's Chapter 15 Monitoring Plan submittal. WMI is concerned about the possibility of being required to perform inappropriate statistical procedures on an interim basis until the appropriate revisions to the WDRs are made.

RESPONSE TO A RELEASE

Discrete Retest

Subsection c(1) indicates that confirmation of initial VOC detection(s) could be made even if the compound(s) detected in the retest are different to those observed in the initial sample. This defies the logic of verification sampling. The purpose of resampling is to determine whether, or not the initial result(s) is an anomaly. The absence of the compound(s) in the resample would suggest that initial result(s) was an anomaly. It is well understood that the chance of observing a non-zero result for a given VOC is high due to a whole host of factors. Thus, the probability of being required to undertake confirmation sampling as a result of anomalous results is relatively high. To then stipulate that the initial results would be confirmed even if the compounds did not appear in the retest clearly places an unreasonable risk of entering Evaluation Monitoring when there is no landfill release.

It is strongly suggested that confirmation of a release would be contingent on the initially detected VOCs being detected in the retest at levels such that either,

1) two or more VOCs are at, or above their respective MDL, or
2) one or more VOCs are at, or above their respective PQL.

STANDARD CONDITIONS

Operations

Paragraph 4 should be re-worded to permit any proper onsite, or offsite treatment and, or disposal of the discharge.
Paragraph 10 is confusing and should be re-stated to indicate that liquid recirculation is permitted provided that the collected liquids are returned to the same waste management unit (WMU) that generated the liquids, and the WMU must have the following specifications.....

DEFINITIONS

"Background Monitoring Point." This definition requires that all background monitoring points be either upgradient of sidegradient of the MSWLF and as such is total inappropriate for MSWLFs which must use intra-well statistical comparisons. Such a definition would obviously cause insurmountable problems where hydrogeologic conditions preclude the placement of an appropriate background well upgradient or sidegradient from the MSWLF (e.g., situations where the actual groundwater gradient direction can not be accurately determined or where the groundwater gradient direction is not constant.)

WMI strongly suggests that the phrase ", upgradient or sidegradient from the landfill" be removed or that the definition be somehow otherwise altered to account for the use of intra-well statistical comparisons.

"Method Detection Limit." - WMI suggests that the statement: "In relatively interference-free water, laboratory derived MDLs are expected to be not greater than published USEPA MDLs" be deleted from the definition of Method Detection Limit (MDL.) WMI feels that the remaining portion of the text adequately defines MDL.

"Practical Quantitation Limit." - WMI suggests that the statement: "In relatively interference-free water, laboratory derived PQLs are expected to be not greater than published USEPA PQLs" be deleted from the definition of PQL. WMI feels that the remaining portion of the text adequately defines PQL.

Various MDL and PQL definitions - The text of the tentative order includes several references to MDLs and PQLs with slightly different modifiers. The following terms are found within the tentative order:

1) Method detection limit (MDL)
2) Practical Quantitation (PQL)
3) Published USEPA MDLs and PQLs
4) Facility-specific MDLs and PQLs
5) Nominal MDLs and PQLs
6) Estimated MDLs and PQLs

To avoid confusion WMI suggests that concise definitions for each of these terms in Section 2 of the tentative order.

John M. Minney, Consulting Engineer

11976 Road 37
JMM Madera Ranchos, CA 93638
(209) 645-1437 • (209) 275-5937

August 13, 1993

Thomas Pinkos
Central Valley Regional Water Quality Control Board
3443 Routier Rd.
Sacramento CA 95827-3098

Dear Sir:

I am an engineering consultant and licensed contractor who is involved with landfill design and construction. I have recently appeared before the Board in regards the Madera County Landfill. I attended the hearing held in Fresno on August 12, 1993. Pursuant to your request for written comments on the Order Amending Waste Discharge Requirements for Municipal Solid Waste Landfills (MSWLFs) in the Central Valley Region, I offer the following comments:

Finding No. 3:"State regulations promulgated to satisfy this requirement are subject to approval by USEPA."

> The Subtitle D requirements are intended to be self implementing by the owners and operators. The State standing is basically limited to Approved States. Because it will not likely be feasible for the State to obtain approval from the EPA by the deadline in Subtitle D, the finding should also state that, until such time as the State receives approval from the USEPA, the Subtitle D regulations are provided for self-implementation by the owner/operators of MSWLF sites.

Finding No. 4:"the federal MSW regulations require the use of composite liners to control the migration of VOCs."

> This statement is false. The design criteria are clearly called out in Subtitle D, Figure 4 (attached) and include the composite liner as one of two options. Subtitle D further acknowledges that VOCs are common to all landfill environments. It is therefore false to state that federal regulations require composite liners to control migration of VOCs.
>
> There are areas within California and other parts of the United States where there is either no groundwater or no groundwater with any beneficial use. Subtitle D clearly would not require a liner in those instances merely because there are VOCs in the landfill.
>
> The EPA goes on to emphasize this point in their discussion on the rules and regulations. "EPA is concerned that certain owner/operators of new units or lateral expansions may be forced

> to use the design standard in 258.40(a)(2)[1] in situations where the composite liner is not necessary to protect human health and the environment if their State does not have program approval. In these cases the performance standard under 258.40(a)(1)[2] may be more appropriate since it would avoid an unnecessarily stringent design."[3]
>
> "States need not adopt the EPA comprehensive design but may choose any design or mix of designs that will secure compliance with the rule's performance standards."[4]

Finding No. 10:This includes reference to various Water Quality Control Plans and Policies previously adopted.

> The Subtitle D regulations specifically prohibit the owner/operators from adopting groundwater protection standards other than the federal MCLs or their equivalent for constituents in which the MCLs have been established. Otherwise, the listed constituents have groundwater protection standards equal to background. To the extent that Finding No. 10 directly or indirectly adopts groundwater protection standards other than the MCLs, this finding is in violation of Subtitle D.
>
> "(h) <u>The owner or operator must establish a groundwater protection standard</u> for each appendix II constituent detected in groundwater. The groundwater protection standard shall be:
>
> (1) For constituents for which a maximum contaminant level (MCL) has been promulgated under Section 1412 of the Safe Drinking Water Act (codified) under 40 CFR part 141, <u>the MCL for that constituent</u>.

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[1] The composite liner.

[2] maintenance of the MCL in the uppermost aquifer at the facility boundary.

[3] Federal Register, Vol. 56, No. 196, p. 51060, Rule and REgulations.

[4] Federal Register, Vol. 56, No. 196, p. 50993, Rule and Regulations.

[5] Emphasis added

(2) For constituents for which MCLs have not been promulgated, the background concentration for the constituent established from wells in accordance with 258.51(a)(1)..."[6]

"The Director of an approved[7] State may establish an alternative groundwater protection standard for constituents for which MCLs have not been established."[8]

"These (approved State alternative) groundwater protection standards shall be appropriate health based levels that satisfy the following criteria:

(1) The level is derived in a manner consistent with Agency guidelines for assessing the health risk of environmental pollutants;

(2) The level is based upon scientifically valid studies conducted in accordance with the Toxic Substances Control Act Good Laboratory Practice Standards (40 CFR part 792) or equivalent;

(3) For carcinogens, the level represents a concentration associated with an excess lifetime cancer risk level (due to continuous lifetime exposure) with the 1 x 10E-4 to 1 x 10E-6 range; and

(4) For systemic toxins, the level represents a concentration to which the human population (including sensitive subgroups) could be exposed to a daily basis that is likely to be without appreciable risk of deleterious effects during a lifetime. For purposes of this subpart, systemic toxicants are chemicals that cause effects other than cancer or mutation."[9]

Finding No. 11:This Finding lists a number of MSWLFs in the Central Valley and proposes that the existing WDRs remain in full force and effect except as modified by this order.

Under Chapter, your agency is delegated the responsibility of updating the WDRs for each of these facilities every 5 years.

[6] 40 CFR 258.55

[7] Emphasis added

[8] 40 CFR 258.55

[9] 40 CFR 258.55

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"Waste Management Units classifications and waste discharge requirements for existing units shall be fully reviewed in accordance with schedules established by Regional Boards. In no instance shall the review be beyond 5 years from the effective date of this section (10-18-84)."[10]

Based upon the apparent dates of issuance of the latest WDRs for the listed MSWLFs, about one-fourth of the MSWLFs on the list are not current with Chapter 15 in the first place. There are a number of WDRs which date from the 1970's. Having failed to update the WDRs as your agency was previously required to do for the latest Chapter 15, I fail to see how one document, such as this, can possibly bring all these sites and their associated WDRs in any semblance of a uniform program.

Specification 2: "All containment systems installed after the Federal Deadline shall either: (1)include a composite liner ... or (2) satisfy the performance criteria contained in 40 CFR 258.40(a)(1) and (c) and the criteria for engineered alternative as provided by 23 CCR 2510(b), where performance of the alternative composite liner's components, in combination, equal or exceed the waste containment capability of the Prescriptive Design."

The Board staff, at the hearing if Fresno on August 12, 1993, stated that it was the original position to require a double composite liner and that this was subsequently reduced to a single composite liner on the basis of perceived opposition by the industry.

The Regional Board staff further stated that the results of the SWAT program for landfills had shown that about 163 of 193 MSWLFs in California were releasing constituents. This was deemed unacceptable. Furthermore, it was deemed to be adequate proof that there was no geologic profile in California which could satisfactorily contain MSWLF constituents. The geologic evidence alone were deemed adequate to require the artificial liner. Therefore, artificial containment would be required.

Staff acknowledged that they had no information on the leakage rates of the artificial containment which has been specified by staff. Staff acknowledged that some of the new liners would invariably leak but to a lesser extent than the existing landfills. Staff acknowledged that they had no quantitative estimate of these various leakages.

I point out these items not because I necessarily disagree with them but because they do not constitute the procedure required

[10] Chapter 15, Section 2591(c).

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for a State to develop an approved, EPA-equivalent program. Subtitle D requires that a detailed assessment be performed by the State which is derived from the risk-based standard, not simply a matter of bureaucratic expediency.

As additional evidence to be considered in this regard, I submit "Detecting Leaks in Geomembranes" from the August, 1993 Civil Engineering magazine, attached. The authors cite case histories of leaks from liners at 169 different sites, which is a virtually identically sized sample as the SWAT program. Only 15 sites had no leaks, which means that the leakage rate for lined sites is actually higher than unlined sites. The average leak density was determined to be 2.9 leaks per 10,000 square feet of liner. For a typical landfill which is 120 acres in size, this corresponds to 1500 leaks.

The staff position that lined landfills are an improvement over unlined landfills is therefore not adequately supported by the evidence. The evidence indicates that the leaks may be similar.

"Approved States must consider three factors in determining whether the design meets the performance standard of 258.40(a)(1). These factors include: (1) the hydrogeologic characteristics of the facility and the surrounding land; (2) the climate of the area; and (3) the volume and physical and chemical characteristics of the leachate."[1]

The Board staff statement was that essentially 85% of existing unlined landfills leak. The State cannot, under Subtitle D, therefore deem that 100% of all landfills must be lined as a matter of bureaucratic expediency. To be an Approved State for Subtitle D, the State must comply with the Subtitle D procedures.

4. "where an engineering analysis shows that the sideslopes are too steep to permit the construction of a stable composite liner"

One of the most difficult engineering problems associated with composite liners is the slope construction. To a large extent, what is being done violates every principle of slope stability engineering.

[1] Federal Register, Vol. 56, No. 196, p 51060.

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In slope stability engineering, one should never construct a smooth face in the downslope direction. Yet, the construction of the sloped liner is always directly downslope. Further, in slope stability engineering, one would never direct water to run down a smooth face in the downslope direction. Yet, the construction of the sloped liner always directs the water to run down the smooth face.

It is common for landfills to regulate gross slope movement on top of a liner by building the trash mound in flat stages so that there is effectively a buttress against downslope movement. However, this does not address the issue of liner tearing on the slope under normal compression and decomposition of solid waste material. If a hypothetical case is considered where the liner is lashed to the top of the slope (say 3H:1V) and the total thickness of trash is 100 feet, the liner will be stretched about 3% of its initial length. This would likely result in some tearing of the liner.

As a common reference, consider a deep highway embankment fill. Several years after construction, the surface paving is almost invariably cracked due to distortions and compression of the compacted fill and foundation. In the landfill case, the distortions are greater because the landfill is mainly trash, instead of high quality embankment fill. The same general types of movement which will crack pavement will tear liners.

Going back to the original statement in the draft Order, engineering analysis for a stable composite liner is required. The state should clarify this statement as to whether stable is defined as a slope slide or a liner tear. I believe that a slope slide is avoidable.

GROUNDWATER PROTECTION STANDARD

There are numerous references throughout the draft Order, Monitoring and Reporting Program, and Standard Provisions and Reporting Index to the "Water Quality Protection Standard". In Subtitle D, the term used is "Groundwater Protection Standard." I shall restrict my comments to groundwater issues, so the "Groundwater Protection Standard" (GPS) is more applicable.

The draft Order goes through a relatively complicated procedure for asking the owner/operator to develop the GPS. This is a virtual contradiction of Subtitle D, which states that the owner/operator must use the MCL where available. It is a certain contradiction if the owner/operator develops a GPS other than the MCL. Therefore, the draft Order could simply be rectified by quoting verbatim 40 CFR 258.55(h).

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Subtitle D recognizes that an Approved State may wish to promulgate alternative GPS. However, 10 CFR 255.55(i,j) lists what the Approved State must do to get EPA concurrence. At this time, the Water Quality Protection Plans and Board policies cited in the draft Order do not meet the criteria for health based risk assessment required by the EPA. Therefore, the State has no alternative GPS to promulgate at this time.

POINTS OF COMPLIANCE

Subtitle D is quite specific about the point of compliance -it is the uppermost aquifer at the downgradient side of the facility boundary, no more than 150 meters from the edge of the waste management unit.

The draft Order does not specifically address the point of compliance. Staff stated at the August 12, 1993 hearing if Fresno that the compliance point may in fact be just outside the prescriptive liner and the detection of any detectable amount (for instance, above background for vadose zone) at that point could be construed as a violation, resulting in a cleanup and abatement order and/or a corrective action program for the landfill.

In my reading of Subtitle D, I note that an approved state is allowed to require monitoring of non-saturated (e.g. vadose) and saturated zones (e.g. perched water) in addition to the uppermost aquifer required by Subtitle D. The results of the unsaturated and saturated zones may be used to characterize releases but they may not be used to determine the compliance status.

"A groundwater monitoring system must be installed that consists of a number of wells, installed at locations and depths, to yield groundwater samples from the uppermost aquifer that:

> (2) Represent the quality of groundwater passing through the relevant point of compliance[12] specified by the director of an approved State under 258.40(d) or at the waste management unit boundary in unapproved States."[13]

I reiterate that, if the text of Subtitle D is inserted verbatim in the draft Order, then the Board staff will not mistakenly set the point of compliance in a non-saturated or saturated zone. The point of compliance must be the uppermost aquifer.

[12] Emphasis added.

[13] 10 CFR 258.51

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ATTACHMENT 2: SURROGATES FOR METALLIC CONSTITUENTS

The Monitoring and Reporting program lists various common laboratory test parameters (pH, TDS, Ec, Chloride, Sulfate and Nitrate). Subtitle D does not allow for the state to include these constituents in landfill monitoring requirements except on a site-specific basis. There is no specific site listed in the draft Order, only a list of all the MSWLFs in the Regional Board jurisdiction. These constituents must be deleted from Attachment 2 according to Subtitle D. The state may elect to consider them when a specific landfill WDR is brought up.

"EPA has decided against requiring the use of geochemical parameters (i.e. chloride, sulfate, nitrate) in detection monitoring (Appendix I) for several reasons. Eleven of the proposed constituents are naturally occurring in soils and groundwater. The remaining four parameters (COD, TDS, TOC and pH) are not specific to any one element or class of man-made chemicals. Moreover, the Agency notes that the natural variability (both temporal and spatial) of the geochemical parameters is extremely difficult to characterize, especially in heterogeneous hydrogeologic settings. This could lead to an excessive number of false positives and negatives during detection monitoring... the Agency is allowing approved States the flexibility to use the geochemical parameters in lieu of some or all of the heavy metals on a site specific basis."[11]

Standard Provisions and Reporting Requirements

4. "Trace" Results

The difficulty in this process is that uniformity of results by different laboratories becomes non-existent. The labs are certified by the State (albeit a different agency) and are certified to report certain constituents via certain procedures to certain levels. Requiring the labs to use different criteria will result in an inevitable inability to confirm the results with a second lab. The existing program is adequate and staff has presented no information that the lab certification procedure is inadequate. There is therefore no reason to include another agency in the lab loop.

5. MDLs and PQLs

See comments on "Trace" Results above.

6. All QA/QC results shall be reported...

[11] Federal Register, Vol. 56, No. 196.

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I am not quite sure that the State understands how much paper is involved here. It will be far more expeditious to require the labs to hold the QA/QC data for a specified time frame to be released to the State upon request.

7. Unknown chromatographic peaks

See comments on "Trace" results above.

If you have any questions or comments in this regard, please do not hesitate to contact me.

Respectfully submitted,
John Minney, Consulting Engineer

John Minney

JMM/bf

Enclosure: "Detecting Leaks in Geomembranes" CE Magazine, August 1993

cc: Regional Water Quality Control Board, Mr. Cliff Raley
Madera County, Mr. Michael Kirn

JMM

DETECTING LEAKS IN GEOMEMBRANES

DARLYN L. LAINE
GLENN T. DARILEK

An electrical method can detect and locate leaks in geomembrane liners at new landfills and surface impoundments, even though the leaks may be pin-sized holes.

A field-tested leak-location survey, now commercially available, can provide construction quality assurance or solve a leakage problem in lined landfills, impoundments or tanks. A liner leak in a waste containment facility can be costly. The facility owner may face environmental cleanup costs and a loss of revenue while the leakage problem is being solved. Also, a new facility that exceeds the allowable leak rate, as defined in the design/operating permit, may not be accepted by the facility owner until the leakage problem is solved. This start-up delay may cause additional expenses or penalties for the general contractor, liner installer, and design engineering firm.

This leak-location method involves connecting an electrical power supply to electrodes placed above and below a geomembrane to detect areas of localized electrical-current flow through leaks in the liner (Fig. 1). If there are no leaks in the geomembrane, a very low current will flow across the liner producing relatively uniform voltage distribution in the material above the liner. If the liner has a leak, the current flows through the leak, causing an anomaly in the electrical distribution. Leaks are located by searching for these areas.

This method, developed at Southwest Research Institute, San Antonio, and now offered through Leak Location Services, Inc., San Antonio, has been used at 169 sites totaling 11,044,510 sq ft of liner material (Fig. 2). The method has been used to test such geomembrane lined facilities as: Landfills, concrete vaults used for solid waste storage, wastewater storage ponds at sewage treatment facilities, aboveground steel tanks that store hazardous materials, brine storage impoundments, descaling ponds, and cooling-water ponds, and for preservice inspection of solid-waste landfills with soil covers.

For surface impoundments, between 12 in. and 30 in. of conducting liquid (preferably freshwater) must cover the liner during the leak location survey. The water is lowered in stages as the side slopes of the impoundment are electrically tested. After the water has been lowered to a 30 in. depth, the bottom floor area is surveyed. Testing the liner after hydrostatically loading the geomembrane is a valid way to determine whether it will perform satisfactorily under the intended operating conditions.

To conduct the survey, a worker wades into the conducting liquid using a lightweight, portable electronic detector with scanning probe and associated instrumentation. In deeper-liquid applications the detector can be connected to an extension and used from a floating platform. For geomembranes with protective soil covers, the sand/soil must be damp in order to conduct the survey. The survey is then conducted on protective sand material.

This method is most effectively and economically applied if the impoundment or landfill is designed so that electrical conduction paths between the liquid and the earth are eliminated or can be electrically insulated. Possible electrical conductors, such as steel piping piers, fasteners and battens, must be electrically isolated for best leak-location results. Certain preparations, such as placing rubber packers in inlet and discharge pipes, will prepare most geomembrane lined impoundments for a successful leak-location survey. At a double-liner impoundment the material between the geomembrane liners must provide electrical conduction to a return electrode placed in the leak collection zone. The stainless steel return electrode and the connecting wire should be placed in the leak zone prior to the installation of the primary liner. The return electrode also can be temporarily placed in the leak collection drain pipe if access is available. In both cases, the return electrode must be covered with water.

Air vents should be provided along the perimeter edges of the primary liner near the top of the berm to vent air trapped between the liners. This procedure prevents damage to the liner caused by trapped air floating the liner during the flooding of the leak-collection system. With impoundments that have a drainage layer made of sand it usually isn't necessary to flood the leak-collection zone. The sand will hold enough residual moisture to conduct electrical currents. A permanent stainless steel electrode, however, placed in the sand drainage layer prior to the placement of the primary liner, does help.

We recently tested two wastewater storage basins located in the northeastern part of the U.S. The basins were 12 ft deep with 1:15 side slopes with an area of about

TO CONDUCT A LEAK-LOCATION SURVEY, A WORKER WADES INTO A CONDUCTING LIQUID WITH A LIGHTWEIGHT PORTABLE ELECTRONIC DETECTOR AND SCANNING PROBE.

FIG. 1. LEAK-LOCATION METHOD

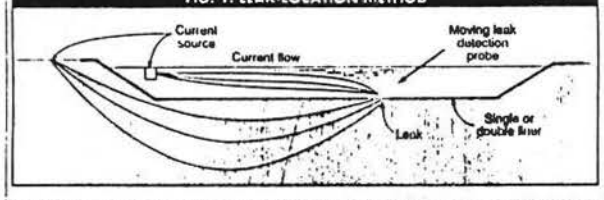
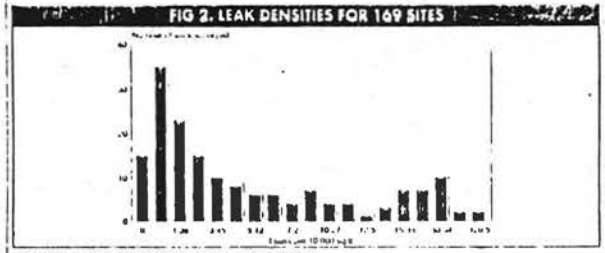


FIG 2. LEAK DENSITIES FOR 169 SITES



THE AVERAGE LEAK DENSITY IS 2.9 PER 10,000 SQ FT.

80,000 sq ft. They were double-lined with 60 mil high-density polyethylene (HDPE). Crews placed a geonet between the two liners to form the leak-detection zone. A nonwoven geotextile was placed over the primary geomembrane to protect the liner from damage.

Prior to acceptance of the two basins by the facility owners, a hydrostatic test was performed on each of the basins to test for leakage. The basins, however, exceeded the acceptable leakage rate of 3 gal/acre/day. Several conventional tests were performed in an attempt to locate the leaks in the geomembrane material. These test methods included dye-tracer tests, visual inspection, spark tests, and the use of vacuum boxes. These tests were not effective in locating the leaks.

The electrical leak-location test found several leaks in the primary geomembrane. The leaks were detected through the geotextile covering the liner with an accuracy of less than 0.5 m. Leaks ranged from pin-sized hole leaks in the seams to several large holes located in the parent material. The leaks were repaired and a second hydrostatic test conducted. The basins passed the second hydrostatic test.

Spotting soil coverings

We have adapted the leak-location method in order to make surface soil measurements for locating leaks in geomembranes covered by a protective cap soil layer. A protective soil cover often is placed over the primary geomembrane liner of landfills to protect it from mechanical damage. Usually sand forms the drainage layer in the leak-detector zone of double-liner installations. The liner can be damaged by the equipment that places the soil cover, the tools used to spread the material or by sharp rocks in the soil. Often the mechanical damage to the liner goes undetected since it is covered by the protective soil cover.

A protective soil or sludge cover over a geomembrane decreases the effectiveness of a leak survey because the strength of the electrical signal is reduced and the scanning probe cannot be scanned close to the geomembrane liner. We resolved these problems by systematically conducting the survey on an established survey grid of specially designed electrodes that eliminate electrode polarization.

First, the soil is dampened with water that percolates through leaks in the geomembrane liner making electrical contact with the material located below the geomembrane. Water may be sprayed on the soil using a water truck or sprinkler hoses. In some cases, the natural moisture and rain may be sufficient for the survey.

Surveys are conducted by making point-by-point measurements along predetermined survey lines with a fixed-measurement electrode separation. The data are stored on a portable digital data acquisition system that downloads to a portable computer for storage, analysis and plotting, then analyzed in the field to identify leak signatures. Manual measurements are made on suspect areas to further isolate the leak.

Typically, the method allows us to find leaks with a diameter greater than 0.12 in. in a geomembrane covered with up to 2 ft of soil. Accuracy depends on how close the point by point measurements are and on the homogeneity of the soil cover.

Surveys are conducted on the sand filtration layer or on the soil placed above the filtration layer. They can also be conducted when a geotextile separates the soil layers. We recommend testing with only a portion of the soil cover in place if the thickness of the soil cover will be greater than 1 ft. Damage to the liner will most likely occur during the placement of this first layer of soil.

Recently, we conducted an electrical leak-location test as the final inspection for leaks in a municipal solid waste landfill cell in Belfast, Northern Ireland. The owners of the landfill had discovered that an adjacent landfill cell, constructed five years earlier, had developed a leakage problem. They wanted a test method that could locate leaks in the liner after final construction of the landfill cell.

The 162,450 sq ft landfill cell had a 100 mil HDPE liner that had been seamed with a double-wedge welder. All seams tested had been tested with the air-pressure test or vacuum-box method. A third-party engineering firm had conducted quality control and inspection.

The 197 survey lines, spaced 3 ft apart and running north and south varied from 100 ft to 260 ft long. Data were collected on 20 in. centers along each survey line. We plotted the survey data in the field and analyzed it for quality and completeness (Fig. 3).

Ten leaks were detected in the liner. Eight leaks were located in the extrusion fillet welds and two were located in the liner material. The seam leaks were between 0.031 in. and 0.25 in. in diameter. One panel leak was $\frac{1}{2}$ in. long, the other was 6 in. long. All leaks were repaired.

A reconnaissance survey for soil-covered geomembranes also can be successful, particularly when an electrical leak-location survey is conducted before the liner is covered with soil. Unlike a systematic survey on closely spaced survey lines that locates smaller leaks, the reconnaissance survey isolates a few large leaks. Measurements are taken in a perimeter. The leak-detector

A LEAK-DETECTING LINER

Another method of leak detection, a liner system with a built-in electrically conductive leak-detection layer has been developed by Gundle Lining Systems, Inc., Houston. In its first commercial application, the system recently was installed at a Western U.S. copper mine to line a reservoir that will hold storm water and snowmelt runoff at the site.

The liner consists of a 60 mil secondary liner, a high-density polyethylene (HDPE) drainage net, and an 80 mil primary liner. Both the liners incorporate an underside layer of high-purity carbon-black stabilized polyethylene. This coextruded layer is electrically conductive, allowing the entire geomembrane, Gundline HDC, to be spark-tested for leaks after installation.

At the copper-mine installation, Gundle Lining Construction Co. used a 750 lb, all-terrain vehicle (ATV) to pull a spark-testing unit that consisted of a 30,000 v battery (that charges a sliding neoprene contact pad) and a brass brush. The unit tested a 5.9 ft wide strip of liner at a time as the ATV moved forward at 2–3 mph.

The charged neoprene pad contacted the liner directly ahead of the brass brush. It then induced an electrical charge in the conductive underside of the liner through electromagnetic induction.

As the brass brush moved over a leak or penetration, the charge transmitted from the conductive underside to the brush created a spark and set off an alarm. The charged neoprene pad slid along the membrane as the vehicle moved forward, so that it was always in close proximity to the brass brush.

For heavy wrinkles, hand-held units were used at the installation site since the stiff bristles on the vehicular brass brush lacked sufficient flexibility. Gundle says neoprene wands and more flexible brass brushes improve the performance of the testing over heavily wrinkled sections of a liner. Gaps no more than 1 in. between wand and sheet are necessary to ensure sparking.

The personnel at the coal mine purposely created small holes in the liner system and a third-party inspection firm, S.H. & B. Agra, Reno, Nev., recorded their location in order to test reliability of the system. According to the inspection team, all of the intentional leaks were detected and repaired.

"At the request of the owner, we introduced perforations to the liner. The system detected all of them. I think it really is a technological breakthrough," says S.H. & B. Agra engineer Marc Okeson. "It worked well on the panels and the extrusion welded patches. It picked up on the leaks missed by a vacuum box. The only minor drawback is that the system doesn't allow testing in the 1–2 in. area next to a wedge-welded seam."

Gundle says hot-wedge seams still require air-pressure testing and visual inspection because the spark tester can't run over the exposed edge of the sheet in a hot-wedge seam without sparking. The company is currently developing a nonconductive edge to allow spark-testing of hot-wedge seams.—*TA*

posed, insulated, and then the power-supply output current is measured. This sequence is repeated until the output current level shows that all of the major leaks have been found.

A look at leaks

At facilities where the side slopes have been tested we have found that leaks on the side slopes accounted for approximately 20% of the total leaks located at that site. The majority of side-slope leaks occur on the seams.

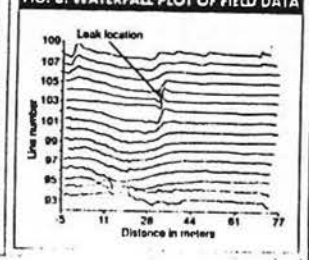
Leaks on the bottom of liquid impoundments are often found in the field seams (87%) and in the parent material (13%). The leaks in the parent material generally can be attributed to accidental damage from equipment or tools, such as crescent-shaped cracks due to equipment being dropped, slits from razor-edged tools that cut the liner, or burns from cigarettes.

The ratio of parent-material leaks to seam leaks may be misleading because seams are double checked during the leak-location survey process. When rechecking the seams the search probe tip is scanned within 1 in. from the leaks in the seams. The parent material, however, is swept at 12 in. intervals placing the electrical probe as much as 6 in. from a potential leak point.

Inadequate field seaming appears to be the primary cause of leaks in geomembrane impoundments. Many of the leaks occur at T-joints, patches and at seams in highly stressed areas such as at the base of the side slope. Leaks may not develop in the seams until a hydrostatic load is placed on the liner.

At some facilities in otherwise excellent field installations we have found numerous leaks around penetrations or structures. Many designs incorporate complex seam requirements in an attempt to isolate drainage cribs, separation walls, concrete sumps, concrete pads and other structures. Where such structures are necessary, the electrical method may be the only way to test for leaks.

FIG. 3. WATERFALL PLOT OF FIELD DATA



Generally, we have found that the density of leaks decreases as the liner size increases. Possible explanations for this are that smaller installations have proportionally more complex features (such as corners, sumps and penetrations) and tend to have higher proportions of hand seaming. Larger installations tend to be watched through better quality control programs and generally receive proportionally less traffic than at smaller installations.

From our experience, in order to avoid leaks in geomembrane liners these factors are most important: the professionalism and skill of the seaming-machine operator; environmental factors such as moisture, temperature and wind; the simplicity of the liner design; the thickness and weldability of the liner material; and the liner care and handling procedure.

Once waste is placed into a solid-waste landfill cell, it must be removed should leaks occur. An electrical leak location survey conducted after final construction, but prior to placing waste in the cell, is a cost-effective way for testing and locating leaks. U

Daren L. Laine is president and Glenn T. Darilek is principal engineer at Leak Location Services, Inc., San Antonio.

Santa Fe Energy Resources, Inc.

August 16, 1993

Mr. Dane Johnson
CALIFORNIA REGIONAL WATER QUALITY
CONTROL BOARD, CENTRAL VALLEY REGION
3614 East Ashlan Avenue
Fresno, California 93276

RE: Request for Site Reclassification

Dear Mr. Johnson:

Santa Fe Energy Resources, Inc. (SFER) is in receipt of correspondence dated 2 August 1993 in which the landfill it operates, the Santa Fe Energy Resources Solid Waste Disposal Site, is listed as being a municipal solid waste landfill (MSWLF). This designation implies that the facility is therefore subject to the requirements of RCRA Subtitle D as implemented by the proposed Regional Water Quality Control Board (RWQCB) Resolution 93-62. SFER strongly disagrees with this classification, and requests that its facility be removed from the list of sites covered by the new Board Order. Arguments in support of this action are summarized below.

1. The U. S. Environmental Protection Agency (EPA) published the final rule for municipal solid waste disposal on October 9, 1991. This rule defines a municipal solid waste landfill unit as "... *a discrete area of land or an excavation that receives household waste*...(emphasis added)" The rule also provides a specific definition of household waste as "...*any solid waste (including garbage, trash, and sanitary waste in septic tanks) derived from households (including single and multiple residences, hotels and motels, bunkhouses, ranger stations, crew quarters, campgrounds, picnic grounds, and day-use recreation areas)*."

The SFER solid waste site does not currently receive, and has never historically received, household waste as defined by the EPA, and therefore it fails to meet the definition of a MSWLF unit.

2. EPA has established definitions for a variety of solid wastes other than municipal waste, including industrial and construction/demolition. Industrial solid waste is defined as "...*waste generated by manufacturing or industrial processes that is not a hazardous waste regulated under Subtitle C of RCRA.*" (Note that, although the definition specifically excludes mining and oil and gas wastes, SFER does not and has not historically disposed of "oil and gas wastes" at its solid waste site. Such wastes would include drilling and workover fluids, produced sand, and tank/sump bottoms, which are

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classified as designated wastes under California law.) EPA defines construction/demolition wastes as "...*waste building materials, packaging, and rubble resulting from construction, repair, and demolition operations on pavements, houses, commercial buildings, and other structures. Such wastes include, but are not limited to, bricks, concrete, other masonry materials, soil, rock, lumber, road spoils, rebar, paving materials, and tree stumps.*"

The SFER solid waste site meets the definition of a construction/demolition debris landfill, although some industrial wastes from the field office and the shipping/receiving warehouse are also disposed of there from time to time. More importantly, the site clearly does not meet the definition of a MSWLF per 40 CFR 258.2, as it accepts no household waste.

3. On August 30, 1988, the EPA published a proposed rule entitled "Solid Waste Disposal Facility Criteria" that sought to modify 40 CFR Parts 257 and 258. The preamble clearly suggests that EPA intended to exclude construction/demolition debris, industrial, and commercial landfills from the definition of MSWLF units: "*A municipal solid waste landfill is defined as any new or existing landfill or landfill unit that receives household waste. ...MSWLFs also may accept other types of Subtitle D wastes, such as commercial waste, ...construction/demolition waste, and industrial solid waste. (Units that accept only these wastes will be addressed in a future rulemaking.)*" At that time, EPA proposed to enact a notification and exposure information reporting requirement for owners/operators of industrial and construction/demolition landfills that would enable the Agency to promulgate regulations establishing design and operations criteria for such facilities. EPA has since decided, as detailed in the October 9, 1991 final rule, to pursue an alternate data gathering strategy for such facilities to accelerate the rulemaking process. Here, EPA identifies industrial landfills, surface impoundments, land application units, and construction/demolition debris landfills as the types of Subtitle D units that may require additional rulemaking addressing health and environmental protection concerns. SFER anticipates that its facility will be subject to these new regulations once they are promulgated. However, until such time, we believe that we remain subject to only the federal requirements of Part 257 and the state requirements of Chapter 15.

Although the State of California has not adopted clear definitions for municipal, industrial, commercial, and construction/demolition wastes, substantial changes have been made to existing regulations in order to comply with the new federal MSWLF requirements. By this action, the State appears to have implicitly adopted the federal definition of municipal waste, which suggests a *de facto* concurrence with EPA's definitions for the other types of waste as

well. SFER urges the State to eliminate the ambiguity that currently exists by formally adopting the federal definitions for municipal, commercial, industrial and construction/demolition wastes. This action would prevent owners/operators of non-municipal facilities from being subject to MSWLF requirements, then finding themselves in the costly position of being subject to a different set of requirements once EPA adopts new standards for the other types of waste management units.

Because the California Integrated Waste Management Board (CIWMB) retains jurisdictional authority over certain aspects of landfill operations, the federal changes to Subtitle D have necessitated changes to this agency's solid waste regulations as well. These changes include the adoption of a working definition of "MSWLF" in order to determine of the applicability of the rule changes to facilities under their purview. At the suggestion of Mr. John Scholtes of our Local Enforcement Agency - the San Luis Obispo County Division of Environmental Health - SFER contacted Mr. David Otsubo of the CIWMB to verify that the SFER solid waste site was not considered a MSWLF by definition under their proposed regulations. Mr. Otsubo confirmed that our landfill would not be classified as municipal because it receives no household wastes.

In summary, SFER believes that the proposed regulations for MSNLF units are <u>not</u> applicable to its operation. The site does not receive household wastes, and is therefore clearly excluded from Subtitle D, Part 258 requirements. SFER has received a concurring opinion regarding its classification from the CIWMB, which shares authority over landfills with the State and Regional Water Boards. Accordingly, SFER requests that the Santa Fe Energy Resources, Inc. Solid Waste Disposal Site (formerly known as the Chanslor-Western Oil and Development Company, Chanslor-Canfield Midway Division, Solid Waste Disposal Site) be removed from the list of sites covered by proposed RWQCB Resolution 93-62.

If questions arise or further discussion is desired, please contact the undersigned at (805) 633-3133. Thank you for your consideration in this matter.

Sincerely,

K. A. Braun-Fishman
Environmental Specialist

KBF:amm
cc: Mr. Thomas Pinkos
Central Valley Regional Water Quality
Control Board
3443 Routier Road
Sacramento, California 95827-3098

STATE OF CALIFORNIA - Environmental Protection Agency PETE WILSON, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION
3443 Routier Road, Suite A
Sacramento, CA 95827-3098
PHONE: (916) 255-3000
FAX: (916) 255-3015

2 August 1993

NOTICE OF PUBLIC HEARING AND WORKSHOPS
FOR
PROPOSED ORDER AMENDING
WASTE DISCHARGE REQUIREMENTS
AND
MONITORING AND REPORTING PROGRAMS
FOR

MUNICIPAL SOLID WASTE LANDFILLS IN THE CENTRAL VALLEY REGION, TO IMPLEMENT STATE WATER BOARD ORDER NO. 93-62, ADOPTED 17 JUNE 1993, AS STATE POLICY FOR WATER QUALITY CONTROL UNDER SECTION 13140 OF THE WATER CODE

TO OWNERS AND OPERATORS OF MUNCIPAL SOLID WASTE LANDFILLS (MSWLF) AND INTERESTED PARTIES

State Water Resources Control Board Resolution 93-62 directs Regional Water Quality Control Boards to implement the federal Municipal Solid Waste Landfill regulations known as RCRA Subtitle D. Central Valley Regional Water Quality Control Board staff drafted a tentative order to amend existing waste discharge requirements and monitoring and reporting programs for MSWLFS. These amendments will be considered for approval by the Regional Board at a hearing on 17 September 1993. The meeting will be held at 8800 Cal Center Drive in Sacramento. You will receive a complete hearing agenda about two weeks prior to the meeting.

Enclosed is a copy of the tentative order amending waste discharge requirements and monitoring and reporting programs. Attachment I lists all of the orders which will be amended by the proposed order. Also enclosed are new Standard Provisions and Reporting Requirements. Please review the tentative order and send any comments to:

Thomas Pinkos
Central Valley Regional Water Quality Control Board
3443 Routier Rd.
Sacramento, CA 95827-3098

Comments should be submitted by **20 August 1993** so they may be considered by Regional Board staff in preparation of agenda materials for the Regional Board.

In order to explain the proposed amendments, Regional Board staff have scheduled three workshops. On **12 August, at 9 am**, a workshop will be held at the Regional Board office at 3614 East Ashlan Ave, Fresno. On **19 August at**

10 am, a workshop will be held at the Regional Board office at 415 Knollcrest Drive, Redding. On 20 August at 10 am, a workshop will be held at the Regional Board office at 3443 Routier Road, Sacramento.

If you have any questions please call Bill Marshall at (916) 255-3140 in Sacramento, Dane Johnson at (209) 445-5525 in Fresno or Dennis Wilson in Redding at (916) 224-4848.

Thomas R Pinkos

THOMAS R. PINKOS, Supervising Engineer

2 August 1993:WJM