N00221_000136
MARE ISLAND
SSIC NO. 5090.3.A

PROPOSAL, REPORT OF WASTE DISCHARGE

INDUSTRIAL WASTEWATER TREATMENT PLAN
MARE ISLAND NAVAL SHIPYARD

Prepared for:

WESTERN DIVISION NAVAL FACILITIES:
ENGINEERING COMMAND

Prepared by:

ERM-WEST
1777 Botelho Drive, Suite 260
Walnut Creek, California 94596

(415) 946-0455

April 1, 1988

At the request of Western Division Naval Facilities, Engineering Command, a proposed Work Plan is presented for the preparation of a Report of Waste Discharge for the Mare Island, Industrial Wastewater Treatment Plant. The plan is submitted specifically addressing Order No. 87-170, Waste Discharge Requirement For: United States Navy, Mare Island Naval Shipyard, Solid Waste Management Units, Mare Island, Solano County, Item 3C., dated December 21, 1987. The proposal is submitted under Tentative Delivery Order No. 0066.

The Work Plan will cover the following items derived from Title 23 of the California Administrative Code, Subchapter 15: Waste Characteristics, Waste Management Unit Characteristics, Geology, Hydrology, Land and Water Use, Topography, Climatology, Design Report, Operation Plan, and Closure and Post-Closure Maintenance Plan. Specific items have been described in previous reports and as appropriate will be incorporated whole or in part into the proposed work. New work proposed by ERM-West will be presented in a generalized format pending review and comment from various governing agencies. Item by item breakdown of the proposed work follows.

Waste Characteristics

Information will be collected from the Mare Island RCRA Part B Application.

Waste Management Unit Characteristics

Information will be collected from the Hydrogeologic Assessment Report (HAR), Sludge Ponds, Industrial Wastewater Treatment Plant, Mare Island Naval Shipyard by ERM-West

(February 29, 1988) that describes the installed monitoring system. New work will tentatively consist of the installation of additional monitoring wells in and around the IWTP. Approximately six wells will be placed in fill soils, three wells will be placed into the dredge spoils known to lie under the fill, and one well will be placed into the uppermost portion of the deepest identified aquifer. It is anticipated the wells will be constructed of Schedule 40 PVC, flush threaded well casing, Type 316 stainless steel wire wrap well screen, and utilize Lonestar or equivalent filter pack material. The wells will be grouted from the top of the filter pack to the ground surface. Some of the wells will be sampled for water quality, others will be for the determination of water levels.

Geology

A geologic map, if appropriate, will be prepared for the IWTP area. Cross sections previously prepared for the HAR will be used and tentatively an additional north-south oriented cross section will be prepared through the IWTP area. The description of the map and cross-section units will be prepared and the geologic structure will be described and discussed.

A determination of the maximum credible earthquake will be made following the collection and review of published reports, geologic maps and aerial photographs. The estimate will be used to assess the affect of the peak acceleration value on the natural and man placed soils. It is anticipated the work will be completed by a subconsultant.

The search for Holocene age faulting within 200 feet of the IWTP perimeter will probably be performed by laterally extending a structural contour map of an unconformity that underlies the site.

The unconformity separates two units termed the Younger and Older Bay Mud that may be Pleistocene and Holocene age respectively. The field work may consist of acquiring additional depth (or elevation) data on the unconformity by advancing borings, formation sampling, and gamma logging four deep borings.

Hydrology

The delineation of the water bearing zones under the IWTP have been defined from work performed for the HAR. It is anticipated additional information on the shallow water bearing unit will be collected by construction of additional wells into the fill and dredge spoils, as previously discussed. It is anticipated selected samples collected by advancing shelby tubes will be subjected to laboratory permeability tests. It is anticipated, inplace permeability tests on the units screened will be completed by pump tests and/or bail tests. All work will be documented and the results presented in tabular form.

The perennial direction of groundwater movement in the three identified water bearing units will be determined by monthly monitoring of water levels. The water levels within one mile radius of the IWTP will be monitored if existing wells can be located. Similarly, water quality within one mile of the site will be determined from available records. Water quality assessment under the site will be part of a formal quarterly sampling program. Samples for analysis will also be collected from wells used for background water quality.

Land and Water Use

The location of all seeps, springs, water wells, oil wells, etc. within one mile of the IWTP will be extracted from the Hydrogeological Assessment Report and if necessary by additional background data search. Current land use will be by referral to current topographic maps and contact with Mare Island personnel. Current and future groundwater use will be by referral to the HAR study and contact with Mare Island personnel.

Topography

Topographic maps of the terrain within one mile of the IWTP will be determined by acquiring the appropriate USGS quadrangle map. Additional mapping may be available from Mare Island Public Works and inquiries will be made.

The identification of the 100-year flood plain was discussed in the HAR study. The information will be extracted from the previous study and incorporated into the Waste Discharge Report.

Climatology

Climatology data was previously discussed in the HAR study. The information will be abstracted from the study and amended by calculation of the maximum probable runoff. Wind data will be collected and incorporated into the report.

Design Report

Detailed plans of the impoundments will be collected from Mare Island RCRA Part B Application and from the HAR study. Additional information will be researched in Mare Island Public Works. Information on the installed groundwater monitoring system will be abstracted from the HAR study.

Operation Plan

The operation plan for the IWTP will be abstracted from the Mare Island RCRA Part B Application. Contingency plans data, and inspection and maintenance programs in use will be gathered from personnel operating the IWTP.

Closure and Post-Closure Maintenance Plan

Earth Science Associates and James M. Montgomery, Consulting Engineers, are preparing the conceptual plan for closure of the impoundments and their replacement with above-ground tanks. The plan should be completed by May 15, 1988. Further information on the schedule for closure and retrofitting activities of the IWTP impoundments is not complete at this time. Information on the Closure and Post-Closure Maintenance Plan will be incorporated into the Report of Waste Discharge to the extent it is available to ERM-West.

PROPOSAL, REPORT OF WASTE DISCHARGE
ADDENDUM
INDUSTRIAL WASTEWATER TREATMENT PLAN
MARE ISLAND NAVAL SHIPYARD

Prepared for:

WESTERN DIVISION NAVAL FACILITIES:
ENGINEERING COMMAND

Prepared by:

ERM-WEST
1777 Botelho Drive, Suite 260
Walnut Creek, California 94596

(415) 946-0455

June 7, 1988

INTRODUCTION

This proposal is an addendum to a Report of Waste Discharge Proposal submitted April 1, 1988 to Western Division Naval Facilities, San Bruno, California. The changes contained herein pertain to the geological and hydrological portions of the original submittal. Specifically, the seismic study will address the areas of the Industrial Wastewater Treatment Plant (IWTP) and the Sanitary Landfill. Second, the geologic and hydrologic studies of the IWTP impoundment area will be performed in greater detail than presented in the Hydrogeologic Assessment Report (ERM-West, February 29, 1988). Last, the geologic and hydrologic studies of the IWTP and Sanitary Landfill will be expanded approximately 1,000 feet beyond the perimeter of both sites.

SEISMICITY

Maximum Credible Earthquake

The seismic study will address the maximum credible earthquake (MCE) and the associated strong ground motion that the sites could be subject to. The determination of the MCE will consider the significant faults within 100 kilometers of Mare Island. The distance of the faults from Mare Island, the length of the faults, the type of faults, historic seismicity, and the regional tectonic setting will be considered. The study will include the Franklin fault which has been mapped by URS(1985) as being immediately east and west of Mare Island.

Peak Acceleration

Response of the soil profile to seismically induced motion of the underlying bedrock will be modeled using a one dimensional analytical model, SHAKE, developed for horizontally layered sites by Schnabel ,et al., (1972). Model soil profiles will be produced for the sites from existing information, new information from well construction proposed herein, and assumptions on the type and nature of the unconsolidated materials overlying bedrock. Dynamic properties of the soils will be based on laboratory tests for shear strength, density, and grain size on samples collected during well construction to derive estimates for each soil profile unit of shear strength, shear moduli, shear wave velocity, and density. The seismically induced strong ground motion of the bedrock will be addressed using empirically derived relationships from Seed and Idriss (1983) and strong motion records from similar site settings. The resulting surface, peak ground accelerations from the modeling will be contoured and a strong ground motion map produced. Amplification effects, estimated to be 0.2 to 0.4g, from the 1898 Mare Island Earthquake, noted from a a preliminary study of historic information on damaged buildings located on fill soils and bedrock respectively, will be used as a comparison between computed bedrock and surface peak ground acceleration of the soils.

Liquefaction

Accounts of the "Mare Island Earthquake" in March 1898 and accounts of the affects of the San Francisco Earthquake in April, 1906 describe the failure of "made land" at Mare Island. (Youd and Boose, 1978). The failures described may have been the result of liquefaction induced by the earthquakes. It is proposed that the potential for liquefaction of the fill soils and shallow underlying natural soils be addressed as part of the seismic

study. Soil samples collected during well construction will provide some basic data necessary for liquefaction susceptibility, particularly through laboratory analysis for particle size distribution, in-place density, and percent moisture content of representative samples from each identified soil unit. This data will be combined with water table elevations, acceleration data from SHAKE, and estimates of duration of shaking as input into a model. It is proposed that a computer code, CUMLIQ (Donovan, 1974) will be used to analyze liquefaction potential.

Slope Stability

Slope stability of the Sanitary Landfill will be addressed for the Report of Waste Discharge study. Values of strength and density of the Landfill will be assumed and combined with similar values obtained from laboratory tests of dredge spoils and possible underlying natural soils. Modeling will be completed through the use of a program that will analyze potential slope stability under static and dynamic conditions.

Local Faulting

The search for Holocene age faulting within 3,000 feet of the sites will be conducted using several approaches; the collection and review of available literature, the study of aerial photographs, site reconnaissance of outcrops on the southern portion of Mare Island, and obtaining and plotting of earthquake epicenters. Another approach to locating and identifying faulting will be through the planned construction of a series of monitoring wells located approximately 1000 feet outside the site perimeters. It is anticipated that the deep wells will penetrate an unconformity identified during previous work (ERM-West, February,

1988). The unconformity will be structurally contoured and will be evaluated for abrupt dislocations potentially associated with faulting.

HYDROGEOLOGY

Installation Landfill Piezometers

ERM-West from previous work (July, 1987; February 29, 1988) has identified three saturated zones beneath both sites. It is proposed to refine the known extent and nature of the aquifers and subsurface geology by constructing additional piezometers and wells in three discrete areas, See Figure 1. Area one consists of seven sites, located approximately 1000 feet beyond the perimeters of the Wastewater Treatment Plant and Sanitary Landfill. Two piezometers will be installed at each site, one will penetrate the upper most portion of the deep aquifer, the other will penetrate the full thickness of the intermediate aquifer. The piezometers proposed will be constructed of 2-inch schedule 40 PVC casing with type 316 stainless steel wire wrap screen. The purpose of the piezometers will be to determine the hydraulic gradient of the two lower aquifers and map the extent of the Older Bay Mud - Younger Bay Mud unconformity beyond the site perimeters.

Sanitary Landfill Piezometers

We propose to construct four piezometers at locations within approximately 100 feet of existing Sanitary Landfill monitoring wells constructed by ERM-West (January, 1988). During construction, samples will be collected for (Vertical) permeability tests of units of low hydraulic conductivity; density, percent saturation size distribution and shear tests for liquefaction susceptibility, slope stability and strong motion

studies. We anticipate the piezometers will be constructed utilizing 2-inch Schedule 40 PVC casing with type 316 stainless steel wire wrap well screen. Screens in the piezometers will be placed at the same depth interval as the adjacent monitoring well.

During pumping tests of selected monitoring wells water levels will be measured in the pumped well, piezometers, and other nearby monitoring wells with a transducer - data logging system. Water from the pumped well will be discharged to the ground surface at an appropriate distance from the well, and will be monitored for temperature, pH, and conductivity. It is anticipated seven pumping tests will be run, four in the deep aquifer and three in the intermediate aquifer.

We propose to conduct slug test (bail tests) in the shallow monitoring wells, and selected wells penetrating the intermediate aquifer. Unless previous sampling dictates otherwise, water from the shallow wells will be discharged to the ground surface, on the Sanitary Landfill side of the dikes. It is anticipated that approximately 12 bail tests will be run. The drawdown and recovery of the water levels will be monitored with a transducer-data logging system.

Industrial Wastewater Treatment Plant Monitoring Wells

We propose to construct additional monitoring wells in the vicinity of the Industrial Wastewater Treatment Plant impoundments. Three monitoring wells are proposed for the shallow water table. One well will be located hydraulically upgradient, adjacent to the Sanitary Landfill. The remaining two wells will be located east and west of the impoundments. The shallow wells will be constructed of 4-inch Schedule 40 PVC casing and type 316 stainless steel wire wrap well screen. The purpose of the shallow wells is to further define the groundwater mound around the

impoundments and to compare the water chemistry of the well adjacent to the Landfill with the hydraulically upgradient well adjacent to the impoundments.

A total of four additional wells are proposed in the vicinity of the impoundments, two in the intermediate aquifer and two in the deep aquifer. The wells in each aquifer would be located hydraulically up and down gradient from the impoundments. Due to the high concentrations of organic and inorganic compounds in the soils above the TTLC (ERM-West, February, 1988), we propose to double case the wells. An 8-inch diameter casing will be placed to a depth of approximately 30 feet and the annular space grouted. Further advancement of the drilling will be inside the 8-inch casing. The wells will be constructed of 2-inch Schedule 40 PVC with type 316 stainless steel wire wrap well screen. It is proposed to use smaller diameter casing for the monitoring wells due to past experience of the difficulty of advancing borings through the debris laden fill soils in the vicinity of the impoundments.

During drilling of one well into the deep aquifer, samples will be collected for permeability tests; density, percent moisture, and size distribution for liquefaction susceptibility. Cuttings from the drilling will be placed in drums, sealed and labeled for proper disposal. The U.S. Navy will be responsible for manifesting the drums that are removed and disposed of off site.

Slug test and pump tests will be conducted utilizing a transducer - data logging system. Pumping tests will be conducted using a nearby existing Sanitary Landfill monitoring well with the proposed 2-inch wells used as observation wells. Discharge from the slug tests will be disposed of into the impoundments.

Sampling

We propose that the hydraulically up gradient monitoring wells around the impoundments be sampled on a quarterly basis for the same constituents as the adjacent Sanitary Landfill sampling program. Identical procedures for well purging, sample collecting, quality control, etc., will be followed. Samples from the landfill monitoring wells will be analyzed for: the parameters listed on Table 1.

TABLE 1. QUARTERLY SAMPLING

	EPA Test Method
Volatile Organics	624
Purgeable Organics	625
Base/Neutral Extractable	
Acid Extractable	
Priority Pollutant Metals	6010
Antimony	
Arsenic	
Beryllium	
Cadmium	
Chromium	
Copper	
Lead	
Mercury	
Nickel	
Selenium	
Silver	
Thallium	
Zinc	
Chlorinated Pesticides & PCBs	608
Chlorinated Herbicides	615
Cations	6010
Calcium, Magnesium, Potassium, Sodium, Iron	
Anions	300
Nitrate, Chloride, Sulfate	

REFERENCES CITED

Donovan, N.C., 1974, CUMLIQ... Evaluation of Potential for Liquefaction of a Soil Deposit Using Random Vibration Procedures:; Dames & Moore, San Francisco, California.

ERM-West, February 29, 1988, Hydrogeological Assessment Report, Sludge Ponds, Industrial Wastewater Treatment Plant, Mare Island Naval Shipyard: Contract No. N-62474-85-D-5627.

ERM-West, January, 1988, Monitoring Well Completion Report for the Sanitary Landfill and Industrial Wastewater Treatment Plant, Mare Island Naval Shipyard: Contract No. N-62474-85-D-5627.

ERM-West, July 1987, Volume I Draft Report, Mare Island Landfill Site Investigation: Contract No. N-62474-85-D-5627.

Schnabel, P.B., Lysmer, J. and Seed, H.B., 1972, SHAKE... Earthquake Response Analysis of Horizontally Layered Sites: Department Civil Engineering, University of California at Berkeley, California.

Seed, H.B., and Idriss, I.M., 1983, Ground Motions and Soil Liquefaction During Earthquakes: EERI, Monograph 5, 140p.

URS, 1985, Investigation to Insure No Faults Exist Within 200 Feet of the Mare Island Landfill: Contract No. N62472-85-C-0102.

Youd, T.L., and Hoose, S. N., 1978, Historic Ground Failures in Northern California Triggered by Earthquakes: U. S. Geol. Surv., P.P. 993.

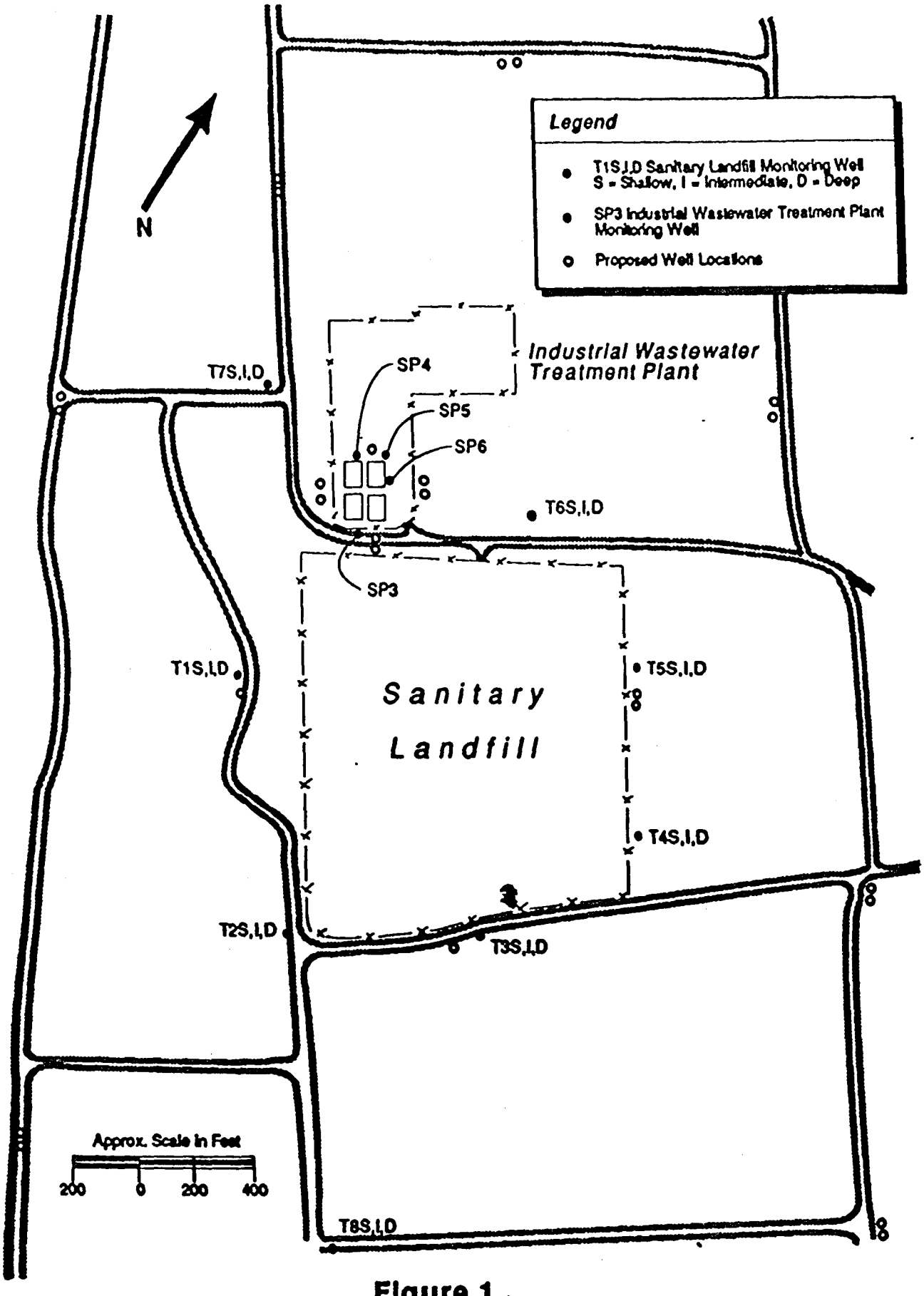

Figure 1
Proposed Well Locations
Mare Island Naval Shipyards

ERM-West 6/88
400.88/JPTS.12.88

N00221_000136
MARE ISLAND

PROPOSED SCOPE OF FIELDWORK

DATED 21 JUNE 1988

ERM-West

Suite 260 • 1777 Botelho Drive • Walnut Creek, California 94596-5042 • (415) 946-0455 • Fax 415-946-9968

June 21, 1988

Mr. Jim Kleinfelder
Spectrum Exploration
2825 East Myrtle Street
Stockton, CA 95205

Dear Jim:

The proposed scope of fieldwork at Mare Island will include four phases of drilling for the purpose of well construction and subsurface exploration. Phases 1 to 3 will consist of monitoring well construction in the Waste Water Treatment Plant area, observation well construction adjacent to the Sanitary Landfill and piezometer well construction in the landfill area peripheral to the Wastewater Treatment Plant and Sanitary Landfill (see enclosed figure for proposed well locations). A breakdown of the number of wells, etc., per general area is attached on Table 1.

Within and adjacent to the Wastewater Treatment Plant, we propose to use 2-inch casing for the deeper monitoring wells because of past experience of advancing borings through the debris-laden fill soils. These 2-inch wells will be double cased. We are planning to use 8-inch nominal steel or PVC pipe for the outer casing set to a depth of 30 feet and the annulus grouted. The Water Quality Control Board has not, as of this date, commented on our proposed use of 2-inch casing for the monitoring wells. If approval is not forthcoming we will use 4-inch well casing and a corresponding larger diameter conductor casing.

All wells will be constructed of 2 or 4-inch diameter flush threaded, schedule 40 PVC well casing and 2 or 4-inch type 316 stainless steel, wire wrap screen. The screen will be sand packed to at least 2 feet above the top of the screen followed by a layer of bentonite. The remainder of the annulus will be grouted to the ground surface. The well casing will extend at least 2-3 feet above grade and will be covered by a steel riser.

We anticipate the majority of the borings for well construction will be advanced utilizing 8-inch hollow stem auger. Selected borings will be continuously sampled using 2-inch diameter Shelby tubes, see Table 1. In addition, samples will be collected at

selected intervals with a California sampler. Exact depths for the latter will be determined during drilling (Table 1 depicts the borings in which it is anticipated the sampler will be used). The borings for the conductor casing will be drilled utilizing 12-inch hollow stem auger.

At a location to be determined, we proposed to advance a boring to a depth of 200 feet. We will continuously sample the boring as it is advanced. At depth intervals to be selected at the time of drilling, select samples will be collected utilizing a standard penetration sampler. The boring will be abandoned by grouting with a sand-cement mix.

It is anticipated the field work will take place over a time period of approximately two months. However, we do not anticipate completing all of the proposed wells and deep boring in one continuous operation.

If you have any comments, criticisms or if additional information is needed, please do not hesitate to contact the undersigned or Cheryl Seath.

Sincerely,

ERM-WEST

John R. Prall
Geologist

Enclosure: Noted

JRP/js/466.52

TABLE 1

Wastewater Treatment Plant - Monitoring Wells

No. of wells	Casing dia.	Depth	Continuous Sampling	Calif. Sampler
3	4"	12'	Yes	Yes
2	2"	42'	No	
2	2"	60'	Yes	Yes

Approx. total footage 240'

Sanitary Landfill - Observation Wells

No. of wells	Casing dia.	Depth	Continuous Sampling	Calif. Sampler
4	2"	34 to 68'	Yes	Yes

Approx. total footage 208'

Landfill - Piezometers*

No. of wells	Casing dia.	Depth	Continuous Sampling	Calif. Sampler
7	2"	40 to 55'	No	No
7	2"	44 to 72'	Yes	No

Approx. total footage 720'

* Note wells will be constructed in pairs.

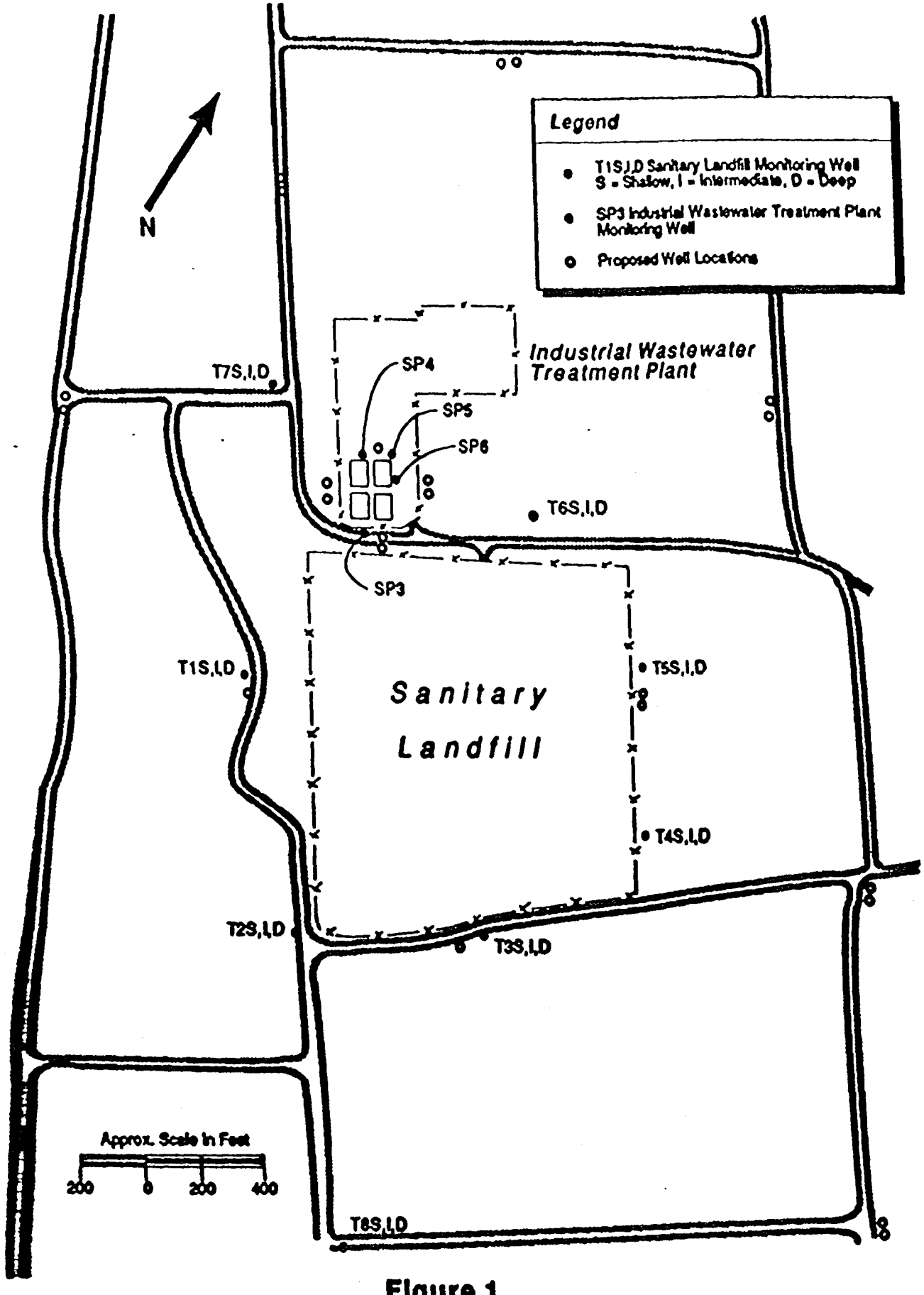

Figure 1
Proposed Well Locations
Mare Island Naval Shipyards

ERM-West 6/88

TABLE 1-2: Report of Waste Discharge Organization

	TITLE 23 REGULATORY CITATION	REPORT SECTION ADDRESSING CITATION
WASTE CHARACTERISTICS	SC15-259	X.1
1. A list of the types, quantities, and concentrations of wastes proposed to be discharged at each unit. Wastes and known waste constituents shall be specifically identified according to the most descriptive nomenclature.	SC15-2594(a)(1)	X.1.1
2. A description of proposed treatment, storage, and disposal methods.	SC15-2594(a)(2)	X.1.2
3. An analysis of projected waste decomposition processes for each waste management unit indicating intermediate and final decomposition products and the period during which decomposition will continue following discharge.	SC15-2594(a)(3)	X.1.3
WASTE MANAGEMENT UNIT CHARACTERISTICS	SC15-2595	X.2
1. Dischargers shall provide in the report of waste discharge an analysis describing how the ground and surface water may affect the waste management unit and how the unit may affect ground and surface water. This information is used to determine the suitability of the unit with respect to ground water protection and avoidance of geologic hazards. It will also be used to demonstrate that the unit meets the classification criteria set forth in Article 3 of this subchapter.	SC15-2595(a)(1)	X.2.7, X.2.8, and X.2.4
2. Dischargers shall provide the following data on the physical characteristics of the waste management unit and the surrounding region in order to demonstrate suitability for the appropriate classification.	SC15-2595(a)(2)	X.2
3. The groundwater monitoring system shall be designed and certified by a registered geologist or a registered civil engineer and shall consist of a sufficient number of wells, installed at appropriate locations and depths to yield groundwater samples that represent: - the background water quality; - the quality of groundwater passing the points of compliance.		

TABLE 1-2: Report of Waste Discharge Organization (cont'd)

	TITLE 23 REGULATORY CITATION	REPORT SECTION ADDRESSING CITATION
GEOLOGY	SC15-2595(f)	X.2.5
1. A geologic map and geologic cross-sections of the waste management unit showing lithology and structural features. Cross-sections shall be indexed to the geologic map and shall be located to best portray geologic features relevant to discharge operations.	SC15-2595(f)	X.2.5 DRAWINGS X-12, and 20
2. A description of natural geologic materials in the waste management unit and its surroundings, including identification of rock types, nature of alteration depth and nature of weathering, and all other pertinent lithologic data.	SC15-2595(f)(2)	X.2.5.3 X.2.5.4
3. A description of the geologic structure of the waste management unit.	SC15-2595(f)(3)	X.2.5.2
4. The results of a testing program for determination of physical and chemical properties of soils needed to formulate detailed site design criteria.	SC15-2595(f)(4)	NOT APPLICABLE
5. A determination of the maximum probable earthquake (for Class III landfills). The methodology used shall consider regional and local seismic conditions and faulting. Data and procedures shall be consistent with current practice and shall be based on an identified procedure or publication. The analyses shall include modifications to allow for site-specific surface and subsurface conditions. The peak ground acceleration so determined shall be used to determine the stability and factors of safety for all embankments, cut slopes, and associated fills during the design life of the unit. The analysis shall include: - the method used to calculate the factors of safety (e.g., Bishop's modified method of slices, Fellinius circle method, etc.). - the name of any computer program used to determine the factors of safety; and - a description of the various assumptions used in the stability analyses (height of fill, slope-and-bench configuration, etc.)	SC15-2595(f)(5)	X.2.5.5

TABLE 1-2: Report of Waste Discharge Organization (cont'd)

	TITLE 23 REGULATORY CITATION	REPORT SECTION ADDRESSING CITATION
6. Dischargers who own or operate new Class II waste management units and expansions of existing units shall identify any known Holocene fault within 200 feet of the facility according to a procedure approved by the regional board. Dischargers who own or operate new Class III landfills and expansions of existing landfills shall identify any known Holocene fault underlying the landfill according to a procedure approved by the regional board.	SC15-2595(f)(7)	X.2.5.6
HYDROLOGY	SC15-2595(g)	X.2.6
1. An evaluation of the water-bearing characteristics of the natural geologic materials identified in the Geology section, including determination of permeability, delineation of all groundwater zones and basic data used to determine the above.	SC15-2595(g)(1)	
2. An evaluation of the in-place permeability of soils immediately underlying the waste management unit. This evaluation shall include:	SC15-2595(g)(2)	
- permeability data, in tabular form, for selected locations within the unit;		TABLE X-7
- a map of the unit showing test locations where these permeability data were obtained; and		DRAWING X-15
- an evaluation for the test procedures and rationale used to obtain these permeability data.		5.3
3. An evaluation of the perennial direction(s) of groundwater movement within the uppermost groundwater zone(s) within one mile of the waste management facility perimeter.	SC15-2595(g)(3)	X.2.6.2 X.2.6.4 DRAWINGS X-21

TABLE 1-2: Report of Waste Discharge Organization (cont'd)

	TITLE 23 REGULATORY CITATION	REPORT SECTION ADDRESSING CITATION
4. Estimates of the height to which water rises due to capillary forces above the uppermost groundwater zone(s) beneath and within one mile of the waste management facility perimeter. These estimates shall include an evaluation of the methods and rationale used in their development.	SC15-2595(g)(4)	X.2.6.4
5. A map showing the location of all springs in the waste management facility and within one mile of its perimeter. The map shall be accompanied by tabular data indicating the flow and mineral quality of the water from each spring.	SC15-2595(g)(5)	X.2.6.1 DRAWINGS X-8
6. An evaluation, supported by water quality analyses, of the quality of water known to exist under or within one mile of the waste management facility perimeter including all data necessary to establish water quality protection standards.	SC15-2595(g)(6)	X.2.6.5
7. A tabulation of background water quality for all applicable indicator parameters and waste constituents.	SC15-2595(g)(7)	X.2.6.5 TABLES X-24

- Background water quality for an indicator parameter or a waste constituent in groundwater shall be based on data from quarterly sampling of wells upgradient from the waste management unit for one year. These analyses shall:

  (1) account for measurement errors in sampling and analysis; and
  (2) account for seasonal fluctuations in background water quality, if such fluctuations are expected to affect the concentration of the waste constituent.

- In a verification monitoring program (suspected problem), background water quality may be based on appropriate water quality data that are available before waste discharge requirements are issued in lieu of a one-year monitoring program.

TABLE 1-2: Report of Waste Discharge Organization (cont'd)

	TITLE 23 REGULATORY CITATION	REPORT SECTION ADDRESSING CITATION
- Background water quality of groundwater may be based on sampling of wells that are not upgradient from the waste management unit where: (1) hydrogeologic conditions do not allow the determination of the upgradient direction; or (2) sampling at other wells will provide a representative indication of background water quality.		
- In developing the data base used to determine a background value for each indicator parameter or waste constituent in groundwater, the discharger shall take a minimum of one sample from each well used to determine background. A minimum of four samples shall be taken from the entire system used to determine background water quality, each time the system is sampled. Should there be only one background well, the four measurements per quarter shall be obtained by splitting the sample from the one well into four aliquots and conducting separate analyses for each aliquot.		
LAND AND WATER USE	SC15-2595(h)	X.2.2 X.2.3
1. A map showing the locations of all water wells, oil wells, and geothermal wells in the waste management facility or within one mile of its perimeter.	SC15-2595(h)(1)-)	DRAWING X-8
Name and address of the owner of each well shall be indicated and well information, where available, shall be supplied for each water well indicated, including, but not limited to:		TABLE X-4
- total depth of well; - diameter of casing at ground surface and at total depth; - type of well construction (cable-tool, rotary, etc.); - depth and type of perforations; - name and address of well driller; - year of well construction; - use of well (agricultural, domestic, stock watering, etc.); - depth and type of seals; - lithologic, geophysical, and other types of well logs, if available; - water levels, pump tests, water quality, and other well data, if available.		TABLE X-5

TABLE 1-2: Report of Waste Discharge Organization (cont'd)

	TITLE 23 REGULATORY CITATION	REPORT SECTION ADDRESSING CITATI(
2. Current land use within one mile of the perimeter of the waste managament unit, including: - types of land use (e.g., residential, commercial, industrial, agricultural, recreational, etc.); - types of crops; - types of livestock; and - number and location of dwelling units.	SC15-2595(h)(4)	X.2.2 DRAWING X-7
3. Current and estimated future use of groundwater within one mile of the perimeter of the waste management unit.	SC15-2595(h)(5)	
TOPOGRAPHY	SC15-2595(d)	X.2.1
1. A map of the waste management unit and its surrounding region within one mile of the unit, showing elevation contours, natural ground slopes, drainage patterns, and other topographic features.	SC15-2595(d)(1)	DRAWING X-4
2. Identification of whether the facility is located within a 100-year floodplain. This identification must indicate the source of data for such determination and include a copy of the relevant Federal Insurance Administration (FIA) flood map, if used, or the calculations and maps used where an FIA map is not available. Information shall also be provided identifying the 100-year floodplain and any other special flooding factors (e.g., wave action) which must be considered in designing, constructing, operating or maintaining the facility to withstand washout from a 100-year flood. Owners and operators of facilities located in the 100-year floodplain shall provide the following information:	SC15-2595(d)(2)	DRAWING X-5

TABLE 1-2: Report of Waste Discharge Organization (cont'd)

	TITLE 23 REGULATORY CITATION	REPORT SECTION ADDRESSING CITATION
(1) engineering analysis to indicate the various hydrodynamic and hydrostatic forces expected to result at the site as the consequence of a 100-year flood;		X.2.1.3
(2) Structural or other engineering studies showing the design of waste management units and flood protection devices (e.g., floodwalls, dikes) at the facility and how these well prevent washout.		X.2.1.3
CLIMATOLOGY		X.2.4
1. Dischargers shall calculate required climatologic values for waste management units from measurements made at a nearby climatologically similar station. In addition to the required calculations for each unit, dischargers shall provide the source data from which such values were calculated, together with the name, location, and period of record of the measuring station.	SC15-2595(e)	
2. A map showing isohyetal contours for the proposed waste management unit and its surrounding region within ten miles, based on data provided by the National Weather Service or other recognized federal, state, local or private agencies.	SC15-2595(e)(1)	DRAWING X-9
3. Estimated maximum and minimum annual precipitation at the proposed waste management unit.	SC15-2595(e)(2)	X.2.4.1
4. Maximum expected 24-hour precipitation for storm conditions specified as design criteria for the particular class of waste management unit prescribed in Table 4.1, Article 4, Subchapter 15.	SC15-2595(e)(3)	X.2.4.1
5. Estimated mean, minimum, and maximum evaporation, with the months of occurrence of maximum and minimum evaporation, for the proposed waste management unit.	SC15-2595(e)(4)	X.2.4.2

TABLE 1-2: Report of Waste Discharge Organization (cont'd)

	TITLE 23 REGULATORY CITATION	REPORT SECTION ADDRESSING CITATION
6. Projected volume and pattern of runoff for the proposed waste management unit including peak stream discharges associated with the storm conditions specified as design criteria for the particular class of unit prescribed in Table 4.1, Article 4, Subchapter 15.	SC15-2595(e)(5)	X.2.4.3
7. An estimated wind rose for the proposed waste management unit showing wind direction, velocity, and percentage of time for the indicated direction.	SC15-2595(e)(6)	DRAWING X-11
DESIGN REPORT	SC15-2595(a)	X.3.1
1. Dischargers who own or operate classified waste management units shall submit detailed preliminary and as-built plans, specifications, and descriptions for all liners, containment structures, leachate collection and removal system components, leak detection system components, precipitation and drainage control facilitities, and interim covers which will be installed or used at each unit. Dischargers shall submit a description of and location data for ancillary facilities including roads, waste handling areas, buildings, and equipment cleaning facilities.	SC15-2596(a)(1)	X.3.1
2. Dischargers shall submit detailed plans and equipment specifications for compliance with the groundwater and unsaturated zone monitoring requirements of Article 5 of this subchapter. Dischargers shall provide a technical report which includes rationale for the spatial distribution of groundwater and unsaturated zone monitoring facilities, for the design of monitoring points, and for the selection of other monitoring equipment. This report shall be accompanied by:	SC15-2596(a)(3)	X.3.1.3

TABLE 1-2: Report of Waste Discharge Organization (cont'd)

	TITLE 23 REGULATORY CITATION	REPORT SECTION ADDRESSING CITATION
A) a map showing the locations of proposed monitoring facilities; and,		DRAWING X-15
B) drawings and data showing construction details of proposed monitoring facilities. These data shall include:		
(i) casing and test hole diameter;		
(ii) casing materials (PVC, stainless steel, etc.);		
(iii) depth of each test hole;		
(iv) size and position of perfortions;		
(v) method of joining sections of casing;		
(vi) nature of filter material;		
(vii) depth and composition of seals;		
(viii) method and length of time of development;		
C) specifications, drawings, and data for location and installation of unsaturated zone monitoring equipment.		
4. Dischargers shall submit proposed construction and inspection procedures to the regional board for approval.	SC15-2596(a)(4)	X.3.1.4
OPERATION PLANS	SC15-2595(b)	X.3.2
1. Dischargers shall submit operation plans describing the waste management unit operation which shall include:	SC15-2596(b)(1)	
A) a description of proposed treatment, storage, and disposal methods;		X.3.2.1
B) contingency plans for the failure or breakdown of waste handling facilities or containment systems, including notice of any such failure, or any detection of waste or leachate in monitoring facilities, to the regional board, local governments, and water users downgradient of waste management units; and		X.3.2.1 X.3.2.23
C) description of inspection and maintenance programs which will be undertaken regularly during disposal operations and the post-closure maintenance period.		X.3.2.3

TABLE 1-2: Report of Waste Discharge Organization (cont'd)

	TITLE 23 REGULATORY CITATION	REPORT SECTION ADDRESSING CITATION
PERIODIC SITE REVIEW	Section 17751	X.3.3

- X = 8 for Earlimart Landfill Site Compliance
  9 for Woodville Landfill Site Compliance
  10 for Teapot Dome Landfill Site Compliance
  11 for Exeter Landfill Site Compliance