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UNITED STATES ENVIRONMENTAL PROTECTIO

REGION IV

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ATLANTA. GEORGIA 30365

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NAS PENSACOLA
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MAY 2 1994

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CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Commanding Officer
Attn: Mr. Bill Hill - Code 1851
Southern Division
NAVFACENGCOM
P.O. Box 190010
North Charleston, South Carolina 29419-9010

Subj: Draft Feasibility Study Report for Operable Unit 10;
NAS Pensacola, Florida
EPA Site ID No.: FL 9170024567

Dear Mr. Hill:

The Environmental Protection Agency (EPA) has completed its review of the Draft Feasibility Study (FS) Report for Operable Unit (OU) 10. Our comments are enclosed. In order to comply with the terms of the Federal Facilities Agreement (FFA), the FS for OU 10 must be resubmitted in Draft format.

Numerous comments (e.g. General Comment 2, Specific Comments 1, 3A, 5B, 8 through 12, 18, 20A and 40) reflect the dependence of the FS on the information and conclusions presented in the Remedial Investigation (RI) and associated Baseline Risk Assessment (BRA) Reports. As expressed in these comments, it is not possible to develop and adequately justify appropriate Remedial Action Alternatives until the necessary information has been adequately compiled, presented, and evaluated in the RI/BRA Report.

To date, EPA has been unable to perform a complete review of the RI/BRA Report for OU 10 due to significant problems with the BRA and a lack of analytical results for surface soil samples. As a result, EPA has invoked informal dispute over this document (see correspondence from EPA to the Navy dated January 13, 1994 and February 7, 1994). Therefore, given the incomplete status of the RI/BRA Report and the dependence of the FS Report on the RI/BRA Report, EPA must regard the current FS Report as incomplete for purposes of satisfying the requirement to submit a Primary Document under the terms of the FFA (Section IX.B).

EPA understands that the Navy is awaiting receipt of analytical results for the remaining surface soil samples. EPA

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offered to collect and analyze these samples in order to expedite the data collection process and the Navy accepted EPA's offer. EPA anticipates forwarding these results to the Navy no later than May 31, 1994. Upon receipt of this information, the Navy should have adequate information to complete the revised Draft RI/BRA and FS Reports for OU 10. In order to rectify the serious schedule delays which have occurred, both revised Draft Reports must be received in this office no later than sixty (60) calendar days from the Navy's receipt of the above-referenced information from EPA. If the Navy finds that this time schedule is not attainable, a written request for an extension may be submitted in accordance with Section XXIV (Extensions) of the FFA.

Although the revised Draft FS Report again shall be reviewed as a draft Primary Document upon resubmittal, EPA's enclosed comments should be taken into consideration in preparing this revised draft document. Such consideration will serve to shorten the review, revision, and finalization process for this Primary Document.

Please contact me at (404) 347-3016 if you have any questions or wish to discuss these issues further.

Sincerely Yours,

Allison W. Drew
Remedial Project Manager
Department of Defense Remedial Section
Federal Facilities Branch

Enclosure

cc: Ron Joyner, NAS, Pensacola
Eric Nuzie, FDEP
Paul Stoddard, Ensafe/Allen & Hoshall

TECHNICAL REVIEW AND COMMENTS
DRAFT FEASIBILITY STUDY FOR OPERABLE UNIT 10
NAVAL AIR STATION (NAS) PENSACOLA
PENSACOLA, FLORIDA

GENERAL COMMENTS:

1. The Draft FS contains a very general evaluation of potential remedial alternatives which may be appropriate for the treatment of soils and groundwater at OU 10. This approach defeats the purpose of a feasibility study, which is to develop, screen and provide a detailed evaluation of alternative remedial actions. This broad approach seems to be due in part, to a lack of appropriate data collection efforts during the FS. For instance, the FS states that significant amounts of treatability testing will have to be done in order to fully evaluate the feasibility and cost of implementing some of the proposed soil treatment technologies. A full scale aquifer test, along with a more thorough evaluation of the existing recovery system, is also needed in order to fully assess the effectiveness of current or proposed groundwater extraction remedies. While it is certainly not feasible or practical to complete all such testing prior to issuance of the FS, a minimal amount of such work must be performed in order to assure that the proposed remedial alternatives can be successfully presented in the degree of detail necessary to ensure successful implementation and make a responsible final remedy selection.

2. The FS does not appear to include any risk assessment information for metals which would necessitate remediation (e.g. hazard index > 1), nor does it include remediation goals for metals (Tables 2-1 & 2-2 on p. 2-10). Yet the text in Section 1 lists metals as contaminants of concern, and metals were found in the groundwater and in some of the areas of contaminated soil. This seeming discrepancy must be clarified prior to assessing which remedial alternatives are appropriate for OU 10. Also, any available information on the current mobility of inorganic contaminants (e.g. TCLP, leaching tests) should be provided as well. Mobility is indicated by the presence of metals in groundwater, but has not been quantified.

3. A thorough evaluation of the existing recovery well system operation should be included in the design for a new or supplemental system. A sufficient number of wells have been constructed, and have continuously operated for time frames that would cause perturbations in the groundwater flow conditions. These disturbances should be carefully reviewed with regard to well construction, well yield, area of influence, water quality and change of water quality prior to design of a supplemental system. These parameters will help in providing estimates of the volume of water to be treated and disposed, water quality treatment levels, and other design parameters.

4. The FS must be revised to include much more specific information. The following is a listing of some of the specific information which must be included:

- an approximate volume of groundwater to be treated
- calculations showing how the volumes of soil and groundwater were determined
- a specific treatment facility to which contaminated soil or groundwater will be sent, including approximate distance to the facility
- approximate time frame for achieving remediation goals ("tens of years" (Table 5-1) is not acceptable

5. The FS fails to provide an indepth description of how all wastes will be remediated or how residuals will be treated or disposed. The objective of the FS, and of Section 4.0 in particular, is to assemble a list of very specific alternatives for screening and evaluation. However, several of the presented alternatives have different options, or unspecified options, included within the alternative. Following are two specific instances where further information is needed:

A. Alternative S2 mentions the construction of either a single or multilayer cap over areas A and B and disposal of contaminated soil from areas C and D to an offsite RCRA-approved facility and/or landfilling as required. A specific type of cap should be selected and a specific means of contaminated soil disposal should be selected for each alternative. If two different disposal methods are listed, then these must be listed as two different remediation alternatives.

B. On page 5-32 the FS states that following treatment by thermal desorption, soils that are contaminated with F006 waste <u>may</u> require further treatment to meet LDR. Therefore, the method of further treatment for F006 waste should be specified. Heavy metals will not be destroyed by LTTD and the method for treating metals after desorption (for treatment of organics) needs to be presented.

6. Section 5.0 assesses remedial alternatives against the 9 evaluation criteria. These criteria address effectiveness and compliance with regulations for each of the alternatives assuming successful implementation of each alternative. However, little information is presented about the potential for each alternative to succeed under conditions presented at the site. Adequate information to this end must be provided in order to complete the FS.

7. The costs presented in the Draft FS are too broad to allow for an effective comparison of costs between the various alternatives.

This problem arises in part from the failure of the "Assembly of Alternatives" to specify particular remedial/treatment techniques in the proposed remedial alternatives. For example, the costs for Alternative S2 are presented as ranging from $200 to $1,400 per cubic yard for excavation and disposal with incineration. Since the approximate quantities of soil for each area of concern are listed in Table 2-11 (page 2-43), these quantities should be used with a specific dollar amount per volume (i.e. specific remedial/ treatment technique) to arrive at a specific cost for each alternative. It is understood that there is some degree of uncertainty associated with the cost estimate. The degree of uncertainty should be included in the text. (e.g. +50%, -30%).

8. EPA wishes to recommend the following additional remedial technologies for the Navy's consideration:

A. Extremely high temperature systems have been designed to treat soils contaminated with organic compounds and metals. With sufficiently high temperatures, the organic compounds are destroyed, and the remaining soil is melted into a non-leachable slag, similar to volcanic glass. The technology is similar to the in-situ vitrification process, which was eliminated from consideration, but its use for excavated soils may render it more applicable to the site. The cyclone furnace is one such technology (see Attachment A).

B. The reinjection of groundwater was eliminated from consideration for the groundwater alternatives because of possible objections from the state of Florida. It was unclear if the reinjection, and consequently the state's possible objection, applied to treated or untreated groundwater. Reinjection of treated water may be reconsidered, and may be especially useful in aiding the hydraulic control of the groundwater beneath the site.

9. Please include page numbers on all figures and tables.

SPECIFIC COMMENTS:

1. Page iii, Remedial Goals:
The remedial goals must also address ecological concerns for this OU.

2. Page iv, Paragraph 5:
"Onsite bioremediation of organics is presented as ' a sub-alternative." This option must either be presented as a separate alternative or eliminated from consideration. Please address this comment here and throughout the FS where applicable. See General Comment 5.

3. Page 1-1, Paragraph 2:
A. "The FS is based upon the findings of the Remedial Investigation (RI) conducted and reported upon in the Final RI." Since the Final RI has not been released, it is not possible to fully determine if the goals of the RI have been achieved (e.g. adequate and accurate site characterization). EPA submitted extensive comments on the draft RI which will require major revision of this document. Also, a final determination as to whether contamination associated with the bilge water spill will be handled under the UST or CERCLA programs remains to be made. A decision to include this spill area under the CERCLA program could significantly impact the planned remedial actions for OU 10.

B. "Decisions regarding remedial actions will be presented by the United States Environmental Protection Agency (USEPA) in a Record of Decision (ROD)...". As the lead agency, it is the Navy's responsibility to prepare the ROD and present it to the public. Provided EPA finds the proposed remedy acceptable, they will concur with the final ROD.

4. Page 1-4, Figure 1-2:
The following features, described in the text, must be clearly located and identified in this, or some other, figure:

- the boundaries of OU 10 and each individual site included in OU 10, particularly site 35
- the Imhoff tank and sludge drying beds (p. 1-5)
- the "relict drainage swale" (p. 1-20)
- the "sludge digester units" and the "Number 2 flocculator" (p. 1-21)

5. Page 1-5, Paragraph 1:
A. A more complete description of site 35 must be included in this section.

B. "These SWMUs are considered potential sources for ... contamination at OU 10." The objective of the RI is to characterize <u>all</u> potential source areas for the OU. Until this objective is completed, the RI, and consequently the FS, will be incomplete.

6. Page 1-6, Paragraph 1:
Is the "sanitary landfill" referred to here site 13 Please clarify.

7. Page 1-15, Paragraph 2:
"This zone has a high permeability and the groundwater velocity is generally high." Provide actual numerical values for these qualitative, descriptive terms.

8. Page 1-20, Paragraph 1:
It is unclear what is meant by "relatively high levels" and "relatively high concentrations" of various contaminants. It is not atypical for contaminant concentrations in the ppb-to-low-ppm to be considered relatively low, or even very low, in magnitude. Provide numerical values or ranges of concentrations for clarification.

9. Pages 1-20 through 1-22, Section 1.3.1:
This section must include a specific listing of the contaminants of concern identified for each site, preferably in tabular form. Maximum, minimum and average concentrations, and the frequency with which regulatory concentrations were exceeded, should also be provided.

10. Page 1-23, Paragraph 1:
A. Identify the types of contamination identified at each area of soil contamination. The information provided should be similar to that requested in comment 9.

B. Regarding "Area B", since the extent of contamination is unknown, the Draft FS must state how the extent of contamination is going to be determined. Justification must also be provided for assuming an area of 4,300 ft^2 of contamination. Also, a volume of soil is required for remedial costing.

11. Page 1-26, Paragraph 2:
For risk assessment purposes, "receptors" refers to humans, animals, plants etc., not to environmental media or areas. Please revise the text as needed.

12. Page 1-28, Section 1.4:
The ecological assessment must also be summarized in this section.

13. Page 1-28, Paragraph 2:
Please correct the grammar of the final sentence in this paragraph.

14. Page 1-28, Paragraph 3:
"Upper confidence level" should be "upper confidence limit".

15. Page 1-29, Paragraph 1:
Replace the term "worst case" with "reasonable maximum".

16. Page 1-29, Paragraph 3:
Use of the term "preliminary remediation goals" is inappropriate at the feasibility stage. Remediation goals must be developed upon completion of the Baseline Risk Assessment.

17. Pages 2-1 through 2-2, Program Management Principles:
This subsection, and use of the term "site" within this subsection in particular, is confusing. In general, "Site" should be used to refer to the entire facility placed on the NPL (e.g. NAS

Pensacola). "site" should be used to refer to individual "Potential Sources of Contamination" identified within Site boundaries (e.g. sites 32, 33, 35). In general, the Site is broken up into individual OUs, or sites, when such division or "phasing" of the CERCLA response process will facilitate a more timely remediation of each portion of the Site, based on prioritization of threat to human health and the environment, etc.

18. Page 2-8, Section 2.2.1:
In addition to the human health contaminants of concern (COCs), any additional ecological COCs must also be included, and specified, in this section.

19. Page 2-9, Paragraph 3:
Additional information is needed regarding the "additional compounds" which may need to be considered. This statement appears to be referring to secondary waste generated during treatment. Please clarify.

20. Page 2-10:
A. If the ecological risk assessment indicates an ecological risk from contaminated soils, this factor must also be considered with respect to soil remediation goals.

B. See comment 16.

21. Page 2-12, Table 2-4:
The MCL for 1,3-dichlorobenzene has not been established. The level assigned to 1,3-dichlorobenzene should be the same as the dichlorobenzene isomer with the lowest MCL. The cleanup goal for 1,3-dichlorobenzene should be 75 ug/l which is the MCL for 1,4-dichlorobenzene.

22. Page 2-20, Paragraph 5:
Replace the term "Maximum Concentration Limits" with "Maximum Contaminant Levels".

23. Page 2-23, Paragraph 6:
The Florida Department of Environmental Protection should be consulted to ensure appropriate use of the referenced "clean" Florida soil values. Are these values to be used as action levels, remediation standards, or in some other way?

24. Page 2-29, Paragraph :
Based on the preceding descriptions, the groundwater beneath OU 10 may also be classified as Class I (ecologically vital sources of drinking water), since the groundwater at OU 10 may be discharging to the surrounding sensitive ecological areas.

25. Page 2-42, Table 2-10:
Please include the volume for area D3 in this table.

26. Page 2-43, Table 2-11:
Calculations must be presented showing how the volume of contaminated soil for each area was determined.

27. Pages 3-3 through 3-7, Table 3-1:
Descriptions of the following technologies, which were listed in the table, must be provided in the FS text:

- sheet piling
- waste pile vapor extraction
- RCRA containment cells

28. Page 3-9, Paragraph 6:
"This technology will be retained for further evaluation." Specify the technology being referred to (i.e. capping, slurry walls or sheet piling).

29. Page 3-15, Paragraph 4:
"...the effectiveness of bioremediation depends on the characteristics of the contaminated soil." Specify what is known of soil characteristics for the areas identified at OU 10 as requiring remediation. If further information on these characteristics is needed, specify the plans and timeframe for obtaining this information. Based on the information currently available regarding soil characteristics, is bioremediation an effective remedial option? Please explain.

30. Page 3-29, Paragraph 3:
Section 3.3.6 should be titled "In-Situ Soil Treatment", not "Ex-Situ Soil Treatment".

31. Page 3-31, Paragraph 2:
"Shaded entries are dropped from consideration." None of the entries in Table 3-3 appear shaded. Please clarify.

32. Page 4-4, Paragraph 1:
Alternative S5 presents two options for low temperature thermal desorption: onsite or offsite. However, only one of these options is appropriate for this alternative. Therefore, rather than being presented as a choice, the appropriate option should have been selected for the alternative and presented in the text.

33. Page 4-4, Paragraph 2:
Alternative G3 lists two different treatment options for the extracted groundwater. These two treatment options must be listed as two separate alternatives.

34. Pages 4-6 through 4-13, Section 4.1.3:
"Although WHPA is primarily a preliminary modeling tool and does not have the sophistication or versatility of other, more recent groundwater flow models, it is clear that the present groundwater recovery system is not capturing groundwater east of the former

Industrial Sludge Drying Beds." (p. 4-8) There are major limitations inherent in using the WHPA model which make it impossible to accurately represent ground water flow conditions at OU 10 with this model. These limitations, and the certainty of the resultant conclusions, should be clearly specified in the text. Alternatively, a ground water flow and transport model which is capable of more closely approximating flow conditions at OUlO should be used.

It is possible that the existing recovery system (assuming the integrity of these wells is good) may capture and/or contain contaminated ground water at OUlO. Modeling results are probably skewed because calibrated water levels do not match site conditions. The WHPA model allows the ground water flow direction to be simulated in only one direction and the types and configuration of boundary conditions are limited. In contrast, 1987 water level data indicate that the center of the peninsula acts as a ground water divide and ground water flows to the west, north, and east (Attachment B: Figure 1). Part of OU 10 is located in the vicinity of the ground water divide, and ground water flows toward the bay and the bayou from the site. The 1987 steady state data indicates that the surficial aquifer exhibits a convoluted water level surface and the hydraulic gradient increases near the shore.

The capture zones which have been determined based on the assumptions made during the modeling process (e.g. aquifer properties, direction of ground water flow) appear to be unrepresentative of flow conditions at the site. Figures 2 and 3 (Attachment B) illustrate the capture zones created during the months of April and October of 1988 under recovery well pumping conditions. The configuration of these capture zones is much larger and more radial than those simulated by WHPA. Indeed, the concern with the 1988 pumping rates is whether or not the total pumpage of the system promotes seawater intrusion to the surficial aquifer. During the month of April, the 7 recovery wells pumped at a total rate of 1,687,830 gallons. Recovery wells 1, 2, and 3 pumped at an average of 6.8 gpm; recovery wells 4, 5, and 6 pumped at an average of 3.8 gpm; and recovery well 7 pumped at 3.0 gpm. This amount of pumping appears to create a capture zone that will recover or contain a majority of the area affected by the contaminated ground water plume. Figure 3 illustrates the potentiometric surface during October 1988. During this time the total pumping rate was 2,606,360 gpm for the entire well system, approximately 1.5 times greater than the April pumping rate. October water levels are not significantly lower than the April water levels which may, in part, be due to seasonal variations of precipitation. Again, capture zones are created that will recover a majority of the contaminated ground water plume.

It is understood that more involved modeling will be performed during Remedial Design, and that a constant rate aquifer test will

be conducted to determine representative aquifer properties of the surficial aquifer. Once aquifer test data are obtained, model results may be refined to determine optimal pumping rates to remediate the ground water plume without causing seawater encroachment.

AQUIFER SIMULATION MODEL:

It is important that the pumping rates selected for the remediation system be great enoughto recover contaminated groundwater without promoting seawater encroachment. With this goal in mind, EPA used the Aquifer Simulation Model to estimate optimal pumping rates at OUlO. The results of this modeling effort are provided to the Navy for informational purposes.

BACKGROUND INFORMATION / GRID SET UP:

The Aquifer Simulation Model allows simulation of heterogeneous, anisotropic flow conditions with varying flow directions. It is a two dimensional numerical ground water flow and transport model. The grid type is finite difference where the aquifer is discretized in rectangular cells or elements. The grid set up for OUlO consists of 11 elements in the x direction and 31 elements in the y direction. Each element is 218 feet by 218 feet. The grid area covers the entire peninsula and south to Chevalier Field.

ASSUMPTIONS:

Parameters:

The assumptions used for the model are based on values provided in the RI Work Plan and the Interim Data Report for Group O. Many of the variables provided by the Navy were estimates. Some values were estimated by the user where values were not present in the text. For this reason, optimal pumping rates calculated are only a 'best guess'. Once constant rate aquifer test data are obtained and leakage rates between zones, the data may be utilized to refine modeling results.

Before pumpage was simulated, the model was calibrated to match flow in the surficial aquifer during steady state conditions. Calculated heads were matched to the potentiometric surface of February 1987 (Attachment B: Figure 1). The following parameters were selected from the text for the surficial aquifer:

- hvdraulic conductivitv (K): 16 ft/d (p. 7-5 of the Group O Work Plan)
- saturated thickness (b): approximately 41 feet (p. 7-5 of the Work Plan)
- transmissivity (T): 656 ft2/d

- storage value: assumed/estimated at 0.01, since the aquifer is unconfined

- recharue: 8 in/yr, obtained during calibration of the model for steady state conditions. The amount of precipitation per year is approximately 60 inches (Work Plan, page 4-1). The amount of recharge to the surficial aquifer was initially estimated based on the aquifer permeability and evapotranspiration rate to be approximately 5 in/yr.

- leakaqe rate from the underlvina main producing zone: 7.083-4 ft/day, obtained during calibration of the model. Calculated based on estimates of hydraulic conductivities (Work Plan, page 7-3) and head differences between the surficial zone and the main producing zone (Work Plan, page 7-7).

Boundary Conditions:

The east and west boundaries of the peninsula that represent the Bay and Bayou were modeled as constant head boundaries. A value of 0.2 feet was assumed for these nodes (see Attachment B: Figure 4, for locations). This value was selected to take into account the effects of fluctuating tides and seawater density. Specified flux or constant flux boundaries are necessary for simulating regional recharge and discharge along the north and south boundaries. However, specified flux boundaries are not included in the model code. If a constant head boundary is designated at a distance that will not directly impact system flow in the area of concern, the boundary will serve as specified flux and regional recharge/discharge may be simulated. The northern, southern, and southwestern boundaries were input as constant head boundaries at distances that will allow the boundaries to serve as specified flux. Sensitivity analyses were conducted on these boundaries. The values were changed as much as two orders of magnitude. The results indicated that these boundaries are sufficiently far enough away from OU 10 to not have a direct impact on system flow in the area of concern.

RESULTS:

Figure 5 presents the generated potentiometric surface of the surficial zone aquifer under steady state conditions. The model generated heads match closely to the observed heads of February 1987.

Once the model was calibrated to observed water levels, the surficial aquifer was stressed with varying pumping scenarios. The extraction well pumping rates should be selected so that the hydraulic gradient is not reversed to the extent that allows seawater intrusion to the surficial aquifer.

During the first pumping scenario (Attachment B: Figure 6) each

recovery well was pumped at 10 gpm for one year. Model results indicate that the water levels drop as much as 1.6 feet below sea level near the recovery wells. This amount of pumping will likely cause seawater intrusion to the aquifer. By pumping at a lower rate of 5 gpm (Attachment B: Figure 7), water levels drop below sea level after 6 months of pumping, but not as dramatically as pumping 10 gpm. Figure 8 (Attachment B) shows the potentiometric surface of the surficial aquifer after pumping 2.5 gpm for a period of 6 months. The water levels remain above sea level at OU 10 and near the shoreline. Pumping at this rate does not guarantee that seawater will not intrude to the surficial aquifer. Even though water levels in the aquifer remain above sea level during pumping, seawater may be recharging system flow, preventing water levels from dropping to lower levels.

RECOMMENDATIONS:

Based on modeling results, it appears that the maximum rate the recovery system should be pumped for an extended period is about 21 gpm (approximately 3 gpm per well). However, pumping at this rate does not guarantee that seawater will not intrude to the surficial aquifer. Varying pumping rates should be used to prevent seawater intrusion, such as alternatingpumping rates for eachwell, pumping half the wells for a given time period, or shutting down all the wells for a certain period of time to allow the aquifer to recharge. The key to preventing seawater intrusion is to periodically monitor the sodium chloride content and specific conductance in ground water from these surrounding observation wells. If concentrations of these constituents increase, the pumping rates should be decreased or stopped until the concentrations return to original levels. During wet seasons pumping can be maintained at a slightly higher rate. It may be necessary to cease pumping temporarily during dry seasons. The estimated pumping rates can be refined once hydraulic properties are obtained from the constant rate aquifer test data.

35. Page 4-8,
The text states that the direction of shallow groundwater flow at OU 10 is N-NE. Based on this information, modeling results indicate that the capture zones of the current extraction wells should not influence the primary zone of groundwater contamination (i.e. north and east of the former Industrial Sludge Drying Beds) Please reconcile these results with the available data indicating that only minimal shallow groundwater contamination been detected in this portion of the OU.

36. Page 4-13:
"However, these data were obtained during short-term aquifer tests and may not adequately represent aquifer conditions in the long-term. Long-term, high-volume aquifer tests should be used to evaluate the aquifer for design purposes." Based on this conclusion, it appears difficult to justify final selection of any

specific pump and treat system design at this point in the process (e.g. current extraction system vs. a supplemental extraction system). The results of more extensive pumping tests must be obtained and evaluated in order to fully evaluate the effectiveness of the current system and determine whether additional extraction wells are needed. EPA wishes to offer the Navy its assistance in designing and/or conducting the necessary pumping tests. The necessary work could probably be completed within the next several months and at considerable cost savings to the Navy.

37. Page 4-14, Paragraph 2:
The alternative described here is not a true "no action" alternative, since it includes the implementation of both institutional controls and groundwater monitoring. This alternative should be retitled as "limited action" and the FS revised to include a true "no action" alternative. Please correct here and throughout the FS as appropriate.

38. Page 4-18, Paragraph 2:
Clarify why "Ex-situ stabilization/solidification is much more implementable at OU 10 than in-situ techniques."

39. Page 4-21, Paragraphs 2-3:
The text refers to treating contaminated water at "a wastewater treatment system" or "wastewater treatment plant". Be more specific in designating the listed wastewater treatment plant/system (i.e. the onsite IWTP or a specific offsite treatment plant).

40. Page 4-23, Paragraph 2:
"The soil washing process is implementable at OU 10 with significant treatability testing...". Further information to support this conclusion is needed, particularly in the absence of treatability test results, and given the statements made later in the FS regarding "unknowns about the success of the technology... compounded by the small quantity of soil present on site." (p. 4-33).

41. Page 4-24, Paragraph 4:
"The objective of this alternative [LTTD] is the destruction of all site contaminants through thermal oxidation." This is not an accurate description of LTTD, because metals will not be destroyed. EPA is also currently considering a distinction between LTTD units which utilize afterburners (oxidation) and those which do not. Units that involve oxidation are not likely to be considered desorption. This alternative should therefore be restated due to EPA's assessment of what constitutes desorption and what constitutes incineration.

42. Page 4-32, Paragraph 3:
Several of the remedial alternatives for soil call for excavation, disposal offsite and treatment "if necessary" or "as needed". The

need for treatment, and the appropriate type of treatment should be evaluated and presented in the FS, based on a knowledge of site contaminant characteristics, ARARs, etc.

43. Page 4-40, Paragraph 1:
"Possible upgrades to the existing recovery well system may include...". The FS should also include a description of the upgrades/modifications which were made to the existing system in order to restore it to operating condition following breakdown during the 1991-92 timeframe.

44. Page 4-41, Figure 4-13:
Further description of the chlorine chamber must be provided in order to determine whether or not the IWTP will be effective in treating the chlorinated compounds that are the primary contaminants.

45. Page 5-24, Paragraph 3:
A. The text indicates that Florida "clean" levels are useful only for determining whether or not the material needs to be treated. Cleanup goals must be specified either as risk-based levels or RCRA-based or State-regulation based *ARAR* levels. Furthermore, because stabilization/solidification (S/S) does not destroy elemental contaminants, the cleanup goals need to be framed as a reduction in leachability.

B. The text here also specifies a monolithic product from the S/S treatment. While monoliths are common, granular or friable products can also be made, and sometimes facilitate disposal and capping. Capping of monolithic products should also be considered, since a cover can reduce infiltration as well as buffering the material from weathering.

46. Page 5-24, Paragraph 4:
"If disposal offsite is determined to be infeasible due to treatment costs, onsite exsitu bioremediation may be used...'' The various remedial technologies must be evaluated, and a specific technology selected, prior to assembling the final remedial alternatives. Regarding the option of bioremediation, if organic contaminants of interest (PAHs and chlorinated benzenes) are found in isolated hot spots, with low metal and PCB contamination, some form of bioremediation at these spots may offer a suitable option for cost-effective remediation. However, treatability studies must be performed to determine the biodegradability of the contaminants by microorganisms present in the soil before the feasibility of bioremediation can be estimated. In short, further information is needed before bioremediation can be considered an appropriate technology for this site.

47. Page 5-26, Paragraph 3:
"Heavy metals will be removed from source areas to levels that comply with Florida guidance on "clean" soil." This statement is

only true if the material will be disposed offsite after treatment. For onsite disposal, which seems to be implied throughout Section 5.6, the total metal concentrations will only be reduced by the dilution that occurs incidental to the S/S treatment. Effectiveness relies on chemical and physical immobilization of the metals; permanence relies on the chemical and physical stability of the system.

48. Page 5-27, Paragraph 4:
Clarify what is meant by the term "solubilizing agent" here and in the first paragraph of Section 5.6.4. Should this read "stabilizing agent"? If so, why would stabilizers create a second contaminated matrix (p. 5-27) or require a recycle/treatment option (p. 5-28)?

49. Page 5-29, Paragraph 3:
"This alternative meets Florida guidance for "clean" soil." Is this true if the treated material remains on site at nearly its present contaminant concentrations?

50. Page 5-35, Paragraph 2:
The text here indicates a preference towards off-site incineration, yet the title of Section 5.7 (p. 5-31) indicates that the choice of off- versus on-site incineration has not yet been made. A final decision must be included in the FS, along with supporting justification (e.g. technical implementability, cost differences, etc.).

51. Appendix D:
Page D-5:
Provide the units used in the flushing coefficient equation. Is the flushing coefficient unitless?

52. Page D-6, Paragraph 2:
Briefly describe the MULTIMED modeling concept and associated assumptions, boundaries and conditions.

53. Page D-11, Table 3-2:
The units of the normalized distribution coefficient should be ml/g. Also, explain how the mean for this coefficient was calculated.

54. Pages D-15 through D-18, Tables 3-6 through 3-9:
Should the "initial concentration at landfill" provided for each chemical be equivalent to the "C_1" value for the corresponding contaminant given in Table 4-23 I.E.:

1,4 Dichlorobenzene	0.085
1,2 Dichlorobenzene	0.682
1,3 Dichlorobenzene	0.682
Chlorobenzene	0.114

55. Page D-19:
The infiltration rates assumed for the model ranged from 1 to 5 feet/year. These rates are extremely high even for a swale area that is extremely permeable. Using such high infiltration rates will cause the generated soil action levels to be overly conservative. It is recommended that the HELP model be used to generate values that are more representative for infiltration in soils in the area of NAS Pensacola.

56. Pages D-22 through D-23:
The flushing coefficient used in calculation of the soil action levels appears to be an arbitrary method for calculating a number that represents contaminant transport through the vadose zone. Rather than directly comparing contaminated soil samples to adjacent contaminated ground water samples, an average of the soil contamination levels were compared to an average of ground water contamination levels at the highest contaminated soil areas. The flushing coefficient was determined by calculating the ratio of the average soil concentrations and the average ground water concentrations. The flushing coefficient calculated for 1,4 dichlorobenzene was 12.8 (page D-22). However, using data provided in Tables 2-1 and 2-2, the flushing coefficient could range from 0.17 to 133.3 which indicates that the number obtained may be overly conservative or vice versa. It is recommended that rather than using the flushing coefficient, a partitioning coefficient should be generated that represents natural attenuation in the vadose zone. An individual contaminated ground water sample that exceeds MCLs should be compared to a nearby, upgradient soil sample. Soil samples that are contaminated above detection limits should be compared to nearby downgradient ground water samples. These ratios will be more representative of site partitioning coefficients in the vadose zone, than averaging the soil and ground water concentrations at the areas of concern. At least three separate analysis should be conducted to account for variability. If this type of data is not available, then the vadose zone module of MULTIMED should be used to determine attenuation through the vadose zone.

57. Page D-22, Paragraph 1:
The flushing coefficient data should be presented with the data in Tables 2-1 and 2-2.

58. Page D-22, Table 4-2:
Should the value of "F" for each chemical be obtained by taking the ratio of the means of C_s and C_g in Tables 2-1 and 2-23 I.E.:

1,4 Dichlorobenzene	13.1
1,2 Dichlorobenzene	10.6
1,3 Dichlorobenzene	7.6

59. MULTIMED Model Exposure Assessment Run:
According to the MULTIMED Model Exposure Assessment Run, 100 Monte

Carlo simulations were generated. Of these 100 values, 90 values exceeded the specified bounds. Therefore, only 10 useful runs were obtained. Additional Monte Carlo simulations should be run. The minimum number of Monte Carlo runs within the specified bounds that should be used is 100. This will yield more reliable 95% values of C_g.

60. Appendix E, General Comments:
A. What are the effects of fluctuations or varying groundwater flow directions? This should be examined in the sensitivity analyses along with the magnitude of transmissivity and hydraulic gradient.

B. The FS contains a limited scope of modeling to evaluate the feasibility of groundwater extraction. If groundwater extraction/treatment is a required remedial action, a full-scale aquifer pumping test must be conducted to evaluate aquifer characteristics prior to any modeling/design of additions to the existing extraction system.

61. Appendix E, Page E-5, Paragraph 2:
Describe how the fractional flows were determined for each well, e.g. 25% from well RW-1.

62. Appendix F:
Do the costs quoted include the cost of destroying or disposing of the organics desorbed from the soil? In general, the range of costs presented in this appendix are too broad to allow for an efficient comparison of the various treatment alternatives.

ATTACHMENT A

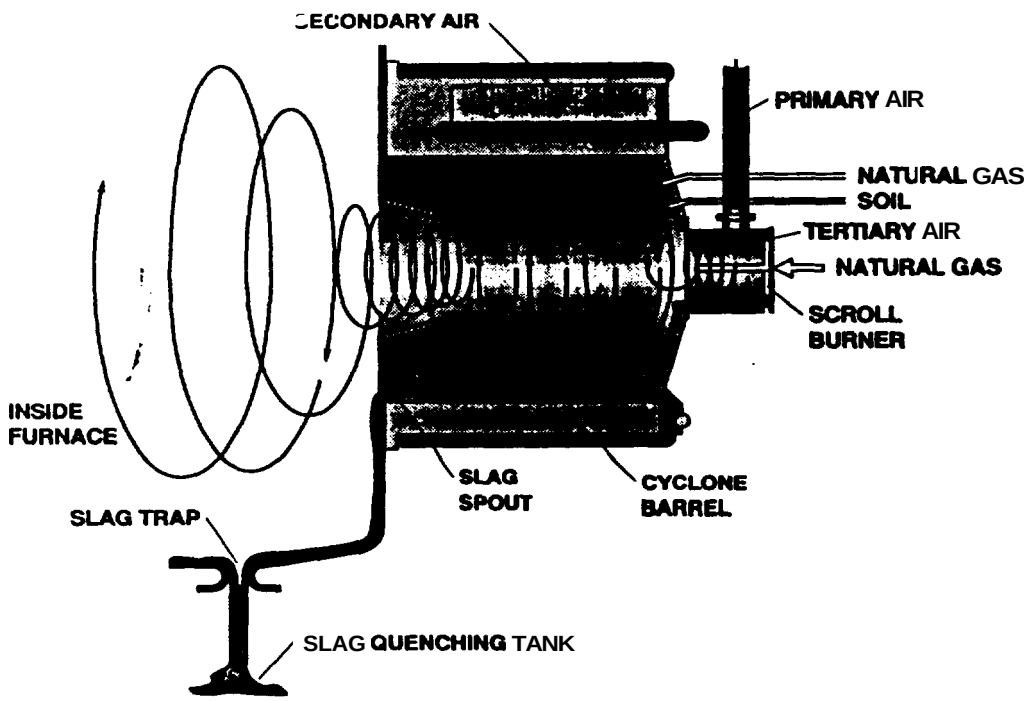
BABCOCK & WILCOX CO.
(Cyclone Furnace)

TECHNOLOGY DESCRIPTION:

This furnace technology is designed to decontaminate wastes containing both organic and metal contaminants. The cyclone furnace retains heavy metals in a non-leachable slag and vaporizes and incinerates the organic materials in the wastes.

The treated soils resemble natural obsidian (volcanic glass), similar to the final product from vitrification.

The furnace is a horizontal cylinder (see figure below) and is designed for heat release rates greater than 450,000 British thermal units (Btu) per cubic foot (coal) and gas temperatures exceeding 3,000 degrees Fahrenheit (°F). Natural gas and preheated primary combustion air (820°F) enter the furnace tangentially. Secondary air (820°F), natural gas, and the synthetic soil matrix (SSM) enter tangentially along the cyclone barrel (secondary air inlet location). The resulting swirling action efficiently mixes air and fuel and increases combustion gas residence time. Dry SSM has been tested at pilot-scale feed rates of both 50 and 200 pounds per hour (lb/hr). The SSM is retained on the furnace wall by centrifugal action; it melts and captures a portion of the heavy metals. The organics are destroyed in the molten slag layer. The slag exits the cyclone furnace (slag temperature at this location is 2,400°F) and is dropped into a water-filled slag tank where it solidifies into a nonleachable vitrified material. A small quantity of the soil also exits as flyash from the furnace and is collected in a baghouse.



Cyclone furnace

WASTE APPLICABILITY:

This technology may be applied to high-ash solids (such as sludges and sediments) and soils containing volatile and nonvolatile organics and heavy metals. The less volatile metals are captured in the slag more readily. The technology would be well-suited to mixed waste soils contaminated with organics and nonvolatile radionuclides (such as plutonium, thorium, uranium). Because vitrification has been listed as Best Demonstrated Achievable Technology (BDAT) for arsenic and selenium wastes, the cyclone furnace may be applicable to these wastes.

STATUS:

This technology was accepted into the SITE Demonstration Program in August 1991. The demonstration will be conducted at the developer's facility in winter 1991 using synthetic soil matrices spiked with heavy metals, semivolatile organics, and radionuclide surrogates.

FOR FURTHER INFORMATION:

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TECHNOLOGY DEVELOPER CONTACT:
Lawrence King
Babcock & Wilcox Co.
1562 Beeson Street
Alliance, OH 44601
216-829-7576

ATTACHMENT B

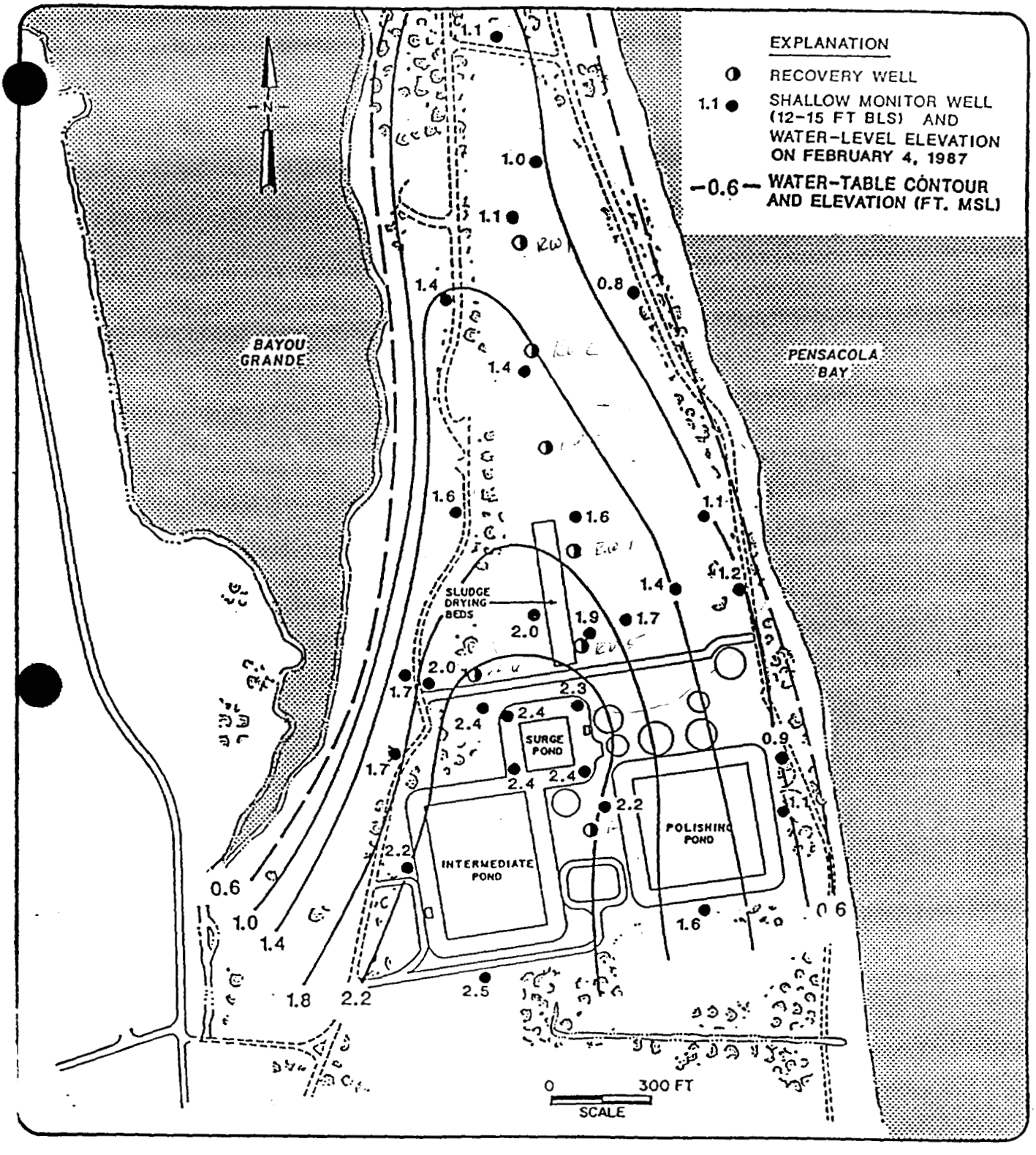


Figure 1.

Water-Table Contour Map, February 1987 (Non-Pumping Condition).

CLIENT NAME:

Naval Facilities Engineering Command, Southern Division

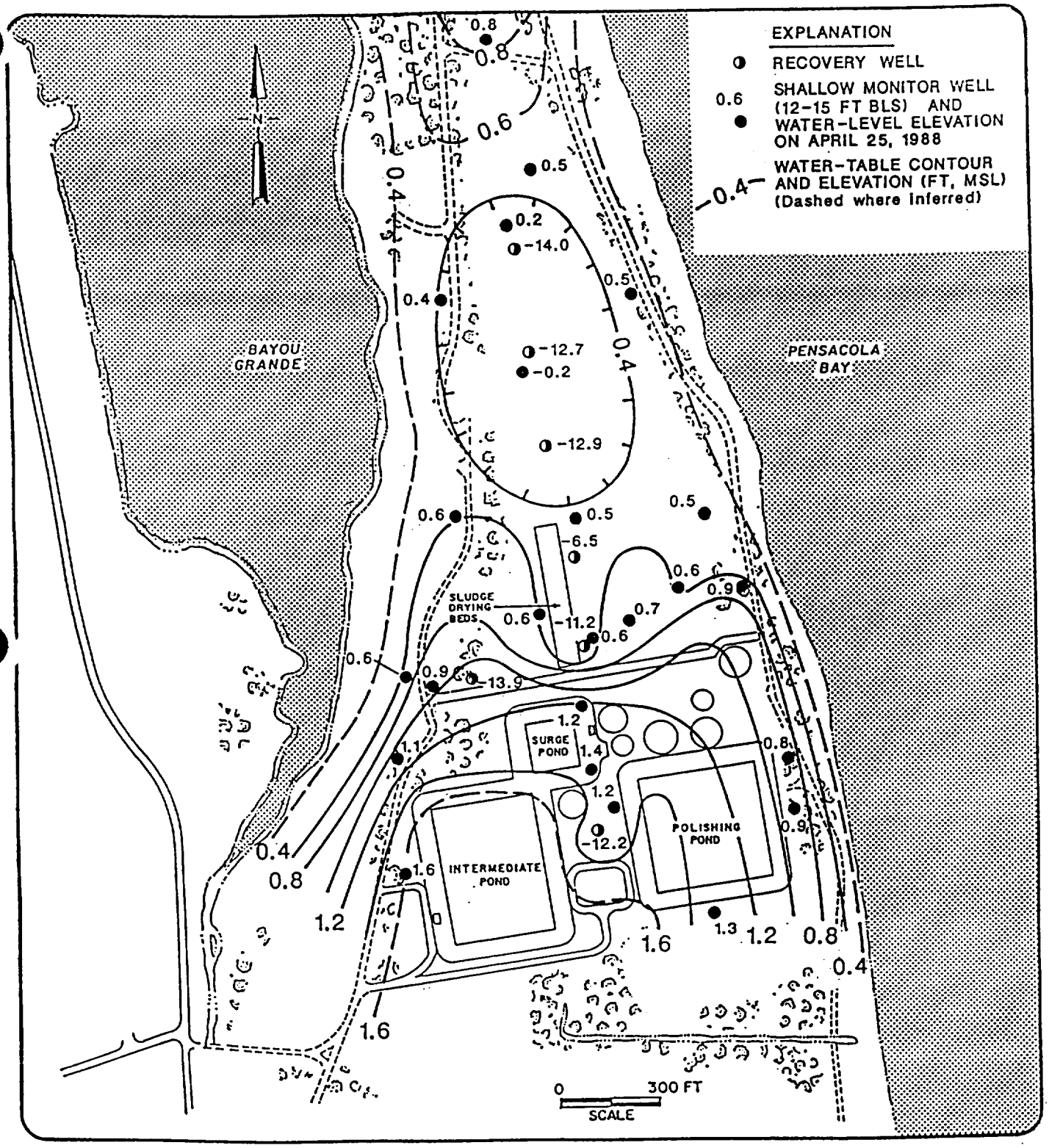


Figure 2

Water-Table Contour Map,
April 1988 (Pumping Condition).

CLIENT NAME:

Naval Facilities Engineering Command,
Southern Division

& Miller, Inc.

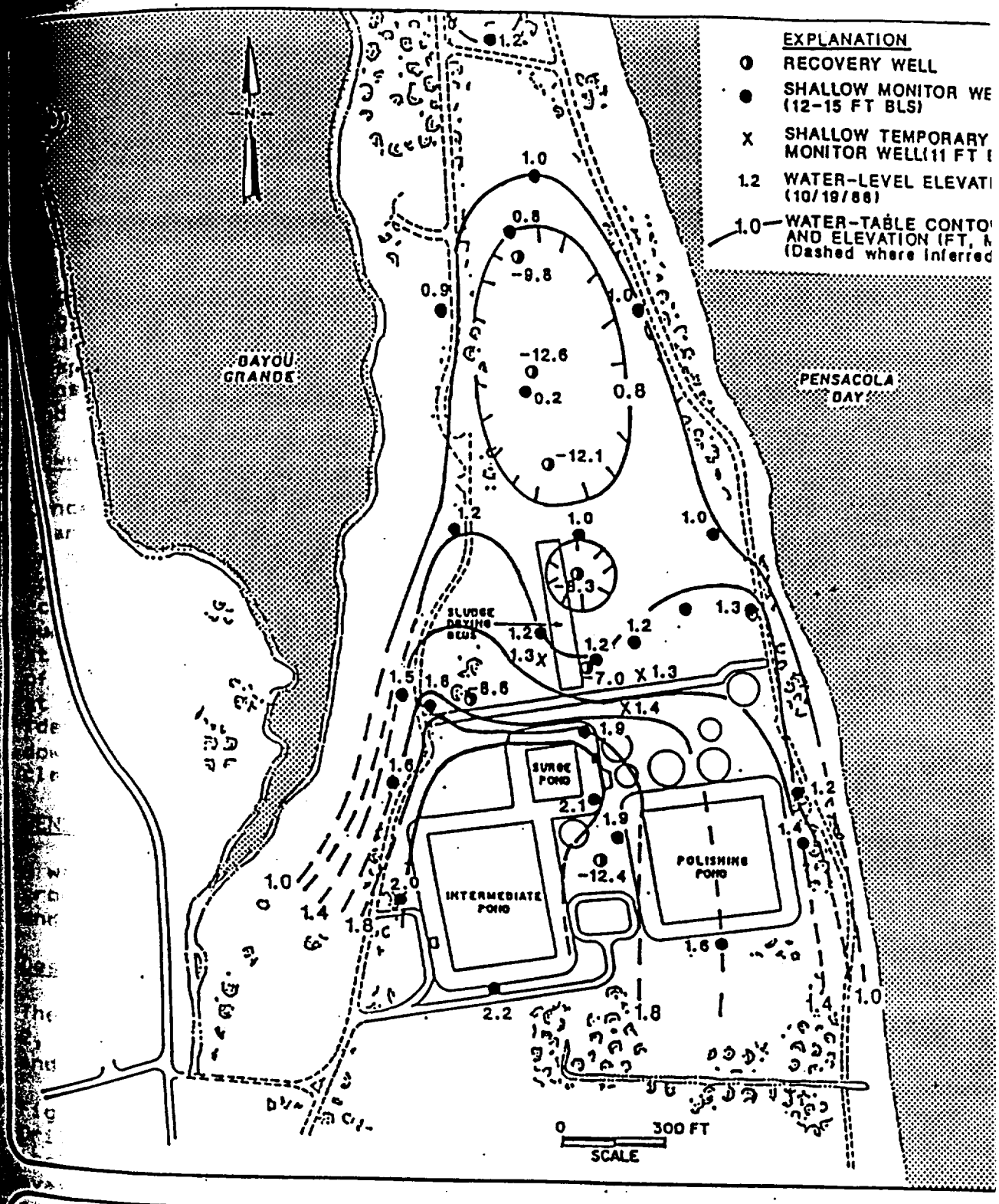
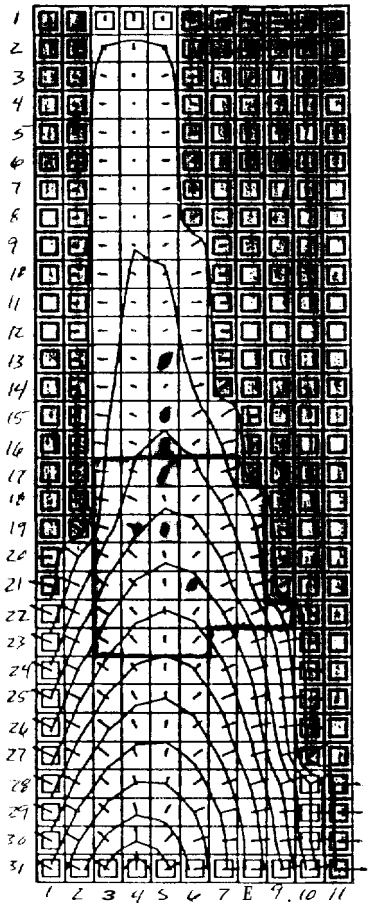


Figure 3 . Water-Table Contour Map, October 1988 (Pumping Condition).

CLIENT NAME:

Naval Facilities Engineering Comman
Southern Division

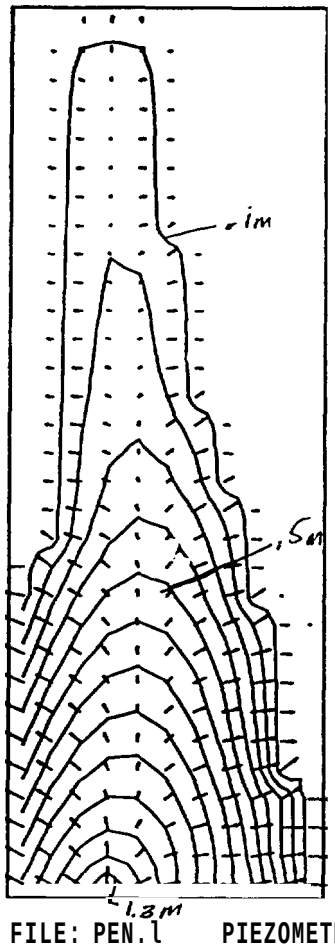


Constant Head Boundaries
Specified Flux Boundaries
• Location of Recovery wells
—— Location of OU10

FILE PFN 1 PIEZOMETER HEADS

H MIN 1 M, H MAX = 1 3 M, DELTA-H 1 M SCALE 1 13639

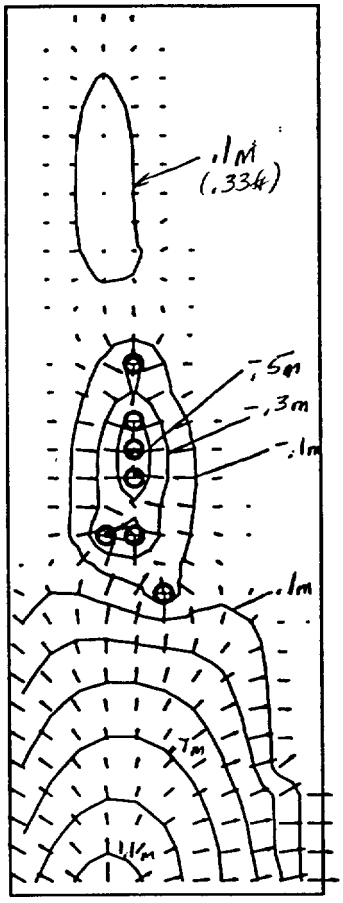
Figure 4. Boundary Conditions.



FILE: PEN.l PIEZOMETER HEADS

H-MIN = .1 M, H-MAX = 1.3 M, DELTA-H = .1 M, SCALE 1 : 13639

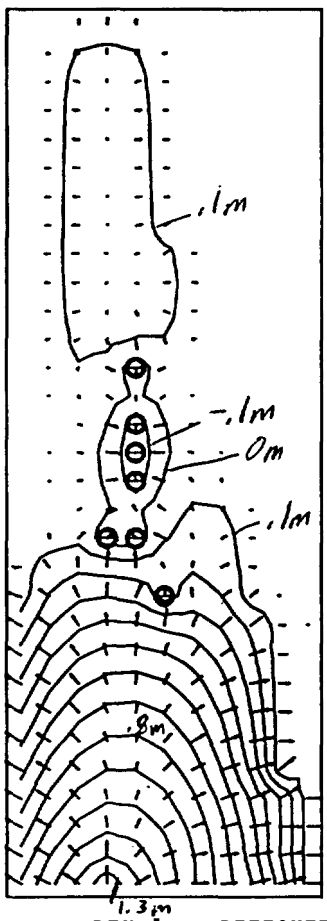
Figure 5. Potentiometric Surface *of* the Surficial Aquifer *under Steady State Conditions.*



FILE: PEN.1 PIEZOMETER HEADS AT TIME T = 365 D

H-MIN =-.7 M, H-MAX = 1.4 M, DELTA-H = .2 M, SCALE 1 : 13639

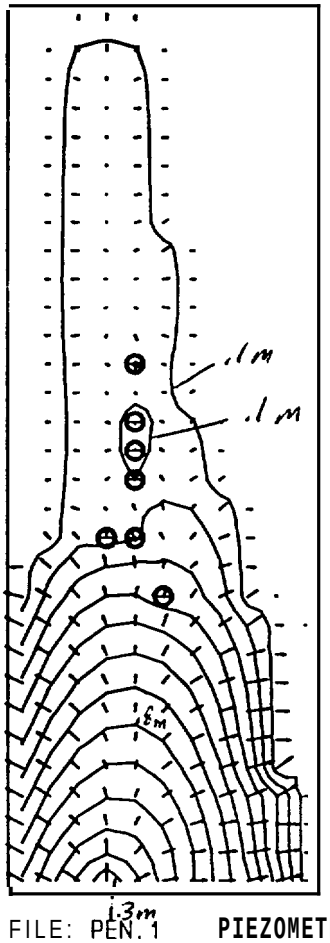
Figure 6. Potentiometric Surface of the Surficial Aquifer after pumping each well for 365 days at 10 gpm.



FILE: PEN.1 PIEZOMETER HEADS AT TIME T = 183 D .

H-MIN =-.2 M, H-MAX = 1.3 M, DELTA-H = .1 M, SCALE 1 : 13639

Figure 7. Potentiometric Surface of the Surficial Aquifer after pumping each well at 5 gpm for 183 days.



FILE: PEN.1 **PIEZOMETER** HEADS **AT TIME** T = **183** D

H-MIN = .1 **M**, **H-MAX** = 1.3 **M**, **DELTA-H = .1 M, SCALE** 1 : 13639

Figure6 . Potentiometric Surface ***of*** the Surficial Aquifer after pumping each well at 2.5 gpm for **183** days.