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MOFFETT FIELD
SSIC NO. 5090.3.A

INTERIM CLEANUP AND CONTAINMENT PLAN FOR

NAVAL AIR STATION MOFFETT FIELD, CALIFORNIA

UIC N00296

19 MARCH 1986

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WEST CENTRAL ENVIRONMENTAL SECTION

DEPARTMENT OF THE NAVY
WESTERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
SAN BRUNO, CALIFORNIA 94066

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INTRODUCTION

This plan describes the proposed remedial measure(s) at those sites where existing data are adequate to develop an interim system. Current information on the sites is limited particularly with respect to aquifer characteristics. The following plan is not intended to remediate all groundwater contamination at this time but rather to provide interim abatement until sufficient studies can be completed to implement a long term and final solution. The objective of the proposed plan is to remove contaminated groundwater and mitigate, to the extent possible with existing information, advancement of contaminant plumes.

BACKGROUND

An Initial Assessment Study (IAS) was prepared for the Naval Air Station (NAS) Moffett Field by the Naval Energy and Environmental Support Activity. The IAS identified nine (9) sites that potentially were affected by past storage, use, and disposal of hazardous materials. These sites include the following areas:

1. Site 1 - Runway Landfill
2. Site 2 - Golf Course Landfill

3. Site 3 - Marriage Road Ditch
4. Site 4 - Former Industrial Holding Ponds
5. Site 5 - Fuel Farm French Drains
6. Site 6 - Runway Apron
7. Site 7 - Hangers 2 and 3
8. Site 8 - Waste Oil Transfer Area
9. Site 9 - Old Fuel Farm

Concurrent with work on the IAS, EMCON Associates installed and sampled 23 wells in the vicinity of Sites 3, 4, 6, and 7 (1983a, 1983b). Volatile organics (VO) were identified in both soils and groundwaters. VO concentrations in soils were highest from wells along the eastern edge and at the northeast corner of Hanger 3. Total VOs in soils were less than 1 mg/kg. Groundwater concentrations were also highest in the northeast corner of Hanger 3 with concentrations for individual compounds exceeding 1000 µg/l. The most commonly detected VOs were toluene, trans-1,2-dichloroethene, trichloroethene (TCE), and tetrachloroethene.

In 1985 a site investigation was undertaken to define the nature and extent of contamination at the nine sites identified in the IAS (Earth Sciences Associates, 1985). Additional soil borings were completed and wells installed at Sites 3, 4, 6, and 7 to further define the extent of contamination at these sites. Because no previous investigations had been conducted, soil borings and wells were completed at the remaining sites to confirm whether contamination existed at these sites.

This investigation confirmed the earlier work by EMCON Associates at Sites 3, 4, 6, and 7. High VOs were found at the northeast corner of Hangers 2 and 3 and a plume of VOs extended to the north along Marriage Road ditch. The leading edge of the VO plume extends approximately halfway down Marriage Road. VOs were also detected at each of the other sites. VO concentrations ranged from less than 1 µg/l at some sites to over 10,000 µg/l at other sites. Well coverage at sites, other than Sites 3, 4, 6, and 7, was not adequate to determine the extent of contamination.

Site Assessment

All sites were evaluated to establish potential interim remedial measures. However, interim measures were not developed for several sites because either contaminant concentrations were low and further monitoring was warranted to assess the nature of contamination or there was insufficient definition of the extent of contamination to develop effective cleanup measures. The basis for the proposed remedial actions at each site are discussed below. A work plan for further characterization studies is currently being developed.

Site 1. VOs were detected in soil and groundwater. However, VO concentrations were generally less than 0.1 mg/kg in soils and 1 µg/l in groundwater. TCE and toluene were detected in the 1 to 7 µg/l range. Because of the low levels of VOs interim remedial measures have not been developed for this site at this time. Further sampling of groundwater is proposed for the next phase of field work to monitor any changes in VOs.

Site 2. VO concentrations in groundwater at Site 2 were similar to those found at Site 1. No VOs were detected in soils. As with Site 1 interim remedial measures have not been developed for this site at this time because of the low levels of contaminants. Further groundwater sampling is proposed for the next phase of field work to monitor any changes in VOs.

Sites 3, 4, 6, and 7. These areas were initially identified in the IAS as separate sites for potential contamination. However, field investigations (EMCON 1983a and b, ESA 1985) suggest that VOs are present in groundwaters beneath these sites in a single plume with at least one area of elevated concentrations near the northeast corner of Hanger 3.

Total VO concentrations in the A aquifer ranged from not detected to over 7000 µg/l with several wells having concentrations ranging from 10 to 100 µg/l. In the B aquifer total VO concentrations were below 10 µg/l. VO concentrations at these sites were the second highest levels found at the nine sites.

There are 42 wells at these sites. These wells provide sufficient characterization in the A aquifer to estimate the lateral extent of contamination. Of these wells 11 sample the B aquifer and provide general definition of contamination in this aquifer. Several additional wells are proposed in the work plan to define the leading edge of the VO plume and further sampling of existing wells is also proposed to monitor VO levels. However, current data is adequate to develop an interim remedial plan. This is described in more detail in the following section.

Site 5. VOs were detected in several soil samples with total concentrations of petroleum-related compounds exceeding 100 mg/kg. VOs were also detected in A aquifer groundwater at concentrations as high as 200 µg/l. There are no wells in the B aquifer and the lateral extent of contamination in the A aquifer cannot be clearly established with the existing four wells. Due to the lack of adequate definition of the extent of contamination, no remedial measures are proposed at this time. Further characterization is proposed for this site for the next phase of field work.

Site 8. There is only one well, which samples the A aquifer, at this site. Total VOs were approximately 70 µg/l. Due to the lack of adequate characterization data, remedial measures are not proposed at this time. Further characterization at this site is proposed for the next phase of field work.

Site 9. Two wells sample the A aquifer at this site. The highest levels of VOs observed at all sites were detected at one of thse wells. TCE concentrations as high as 11,000 µg/l were observed. Due to the lack of adequate characterization data, remedial measures are not proposed at this time. Further characterization is proposed for the next phase of field work.

Proposed Interim Remedial Measures

The proposed interim remedial measures includes construction of a french or tile drain system to collect groundwater from the A aquifer at Sites 3, 4, 6, and 7.

As discussed below no remedial measures are proposed at this time for soils or for the B aquifer.

Soils. Soil sampling and analyses were conducted during the field investigations conducted by EMCON (1983a and b) and ESA (1985). While VOs were detected in some samples, concentrations were generally low. Concentrations of individual VOs were generally less than 0.05 mg/kg along the eastern and at the northeast corner of Hanger 3 where groundwater concentrations were the highest. The soils levels of VOs do not appear to account for the high groundwater levels. Because of the low concentrations and absence of any well defined sources no remedial measures are proposed for soils at this time.

A Aquifer. As previously discussed VO concentrations were highest in the A aquifer. Field investigation conducted by ESA (1985) indicated that what has been termed the A aquifer actually consists of a number of lenses of clayey or silty sand. No well defined sand or gravel zones of substantial thickness were found. Field observations also indicate that productivity of wells in the A aquifer would be low.

Use of an extraction well or wells to remove contaminated groundwater was considered as a potential remedial measure. However due to the expected low productivity a french or tile drain system was considered more appropriate. In addition extraction from a point source, such as a well, would have more significant localized effects on water levels in the B aquifer because the two aquifers are believed to be interconnected thereby increasing the opportunity for cross contamination.

Therefore we propose to use a french or tile drain system approximately 600 ft. long along Macon Road. The drain would be centered at the intersection of Macon and Marriage Road and whould extend eastward and westward along the southern edge of Macon Road (Figure 1). An A aquifer well is proposed between MW-9 and MW-16 for the next phase of the field work. This well should provide data to determine the westerly edge of the plume. Depending on the results of the first round of sampling at this well the extent of the drain system may be modified.

The depth of the drain system would be approximately of 25 ft. below ground surface and would be constructed to extract groundwater from A aquifer zones. The proposed drain system will include 2 collection sumps - one located at each end. Based on the transmissivity values from EMCON (1983b) the productivity of the drain system is estimated to be approximately 2000 gallons per day. However, the recent field investigations suggest that this transmissivity (10,000 gpd/ft.) may be high and a more realistic yield would be 1000 gallons per day.

The location of the drain system is selected based on the water level measurements of October, 1985. These measurements suggest that the proposed location is approximately the cut-off point for the interchange of groundwater between A and B aquifers. South of Macon Road water level in the B and A aquifers are similar indicating little interchange. This suggests that the probability of contaminants from A aquifer migrating to the B aquifer is low. This is further substantiated by the water quality measurements indicating significantly higher concentrations of VOs in the A aquifer than in the B aquifer. North of Macon Road the vertical gradients are upward from B aquifer to A aquifer indicating movement of water from the B to the A aquifer and a small likelihood of cross contamination of the B aquifer.

The contamination in the A aquifer is known to extend some distance north of Macon Road; perhaps as much as 1,000 ft. However, the highest concentrations are south of Macon Road. Hence, extraction of contaminated groundwater from A aquifer at the proposed location would prevent further migration northward and induce the flow of contaminated groundwater from south.

In addition the drain system could lower water levels in the A aquifer below those in the B aquifer. Lowering of A aquifer water levels would further reduce the potential for lower aquifers to be contaminated because it would increase the gradient moving water from the B to the A aquifer. Preliminary calculations

using transmissivity values of 10,000 gpd/ft calculated by EMCON Associates (December, 1983) suggest that the lowering could be accomplished. However, the soils observed from boring logs suggest transmissivities to be much lower than 10,000 gpd/ft. Although the lower transmissivities would result in higher drawdowns, the time to accomplish such lowering may be substantially long.

The highest VO concentrations were found at MW-4 which is located at the northeast corner of Hanager 3. As part of the next phase of field work a short term pump test will be conducted on MW-4. Water levels and water quality will be monitored in MW-4 and adjacent wells. The objective of this test is to assess if the contamination is highly localized at MW-4 and can be readily removed by pumping. Depending on data from this field test remedial measures may be proposed for cleanup of the highly contaminated groundwater at this location.

B Aquifer. No remedial measures are currently planned for the B aquifer. VO concentrations in the B aquifer are below 10 µg/l and in the most recent sampling were typically below 4 µg/l. Pumping from the B aquifer would lower water levels which could increase the potential for contamination from the A aquifer, particularly south of Macon Road where VO concentrations in the A aquifer are highest and there is currently little gradient between the two aquifers.

Groundwater Treatment. Potential disposal alternatives for extracted groundwater include discharge to Marriage Road ditch, discharge to the storm water collection system, discharge to the sewer system, or treatment prior to discharge to the ditch, storm drain, or sanitary sewer. The Regional Water Quality Control Board, San Francisco Bay Region has prepared a guidance document for discharge of contaminanted groundwater to surface water. Under these guidelines the proposed drain system would be considered a long term discharge. Total VO concentractions in the A aquifer wells closest to the proposed drain system are approximately 50 µg/l. Extraction and discharge should reduce the level of VOs in the water.

Actions will be initiated, in accordance with the guidance document, to obtain a variance for a short-term discharge of untreated extracted groundwater to test the drain system. The drain system would be sampled and tested periodically over a period of one (1) to two (2) weeks to determine the yield and the water quality. Based on the results of the field test, we will implement a final disposal option which could include either direct discharge to the ditch, storm drain, or sanitary sewer or treatment prior to discharge. The field test results would provide the necessary information to design a treatment system if this is required.

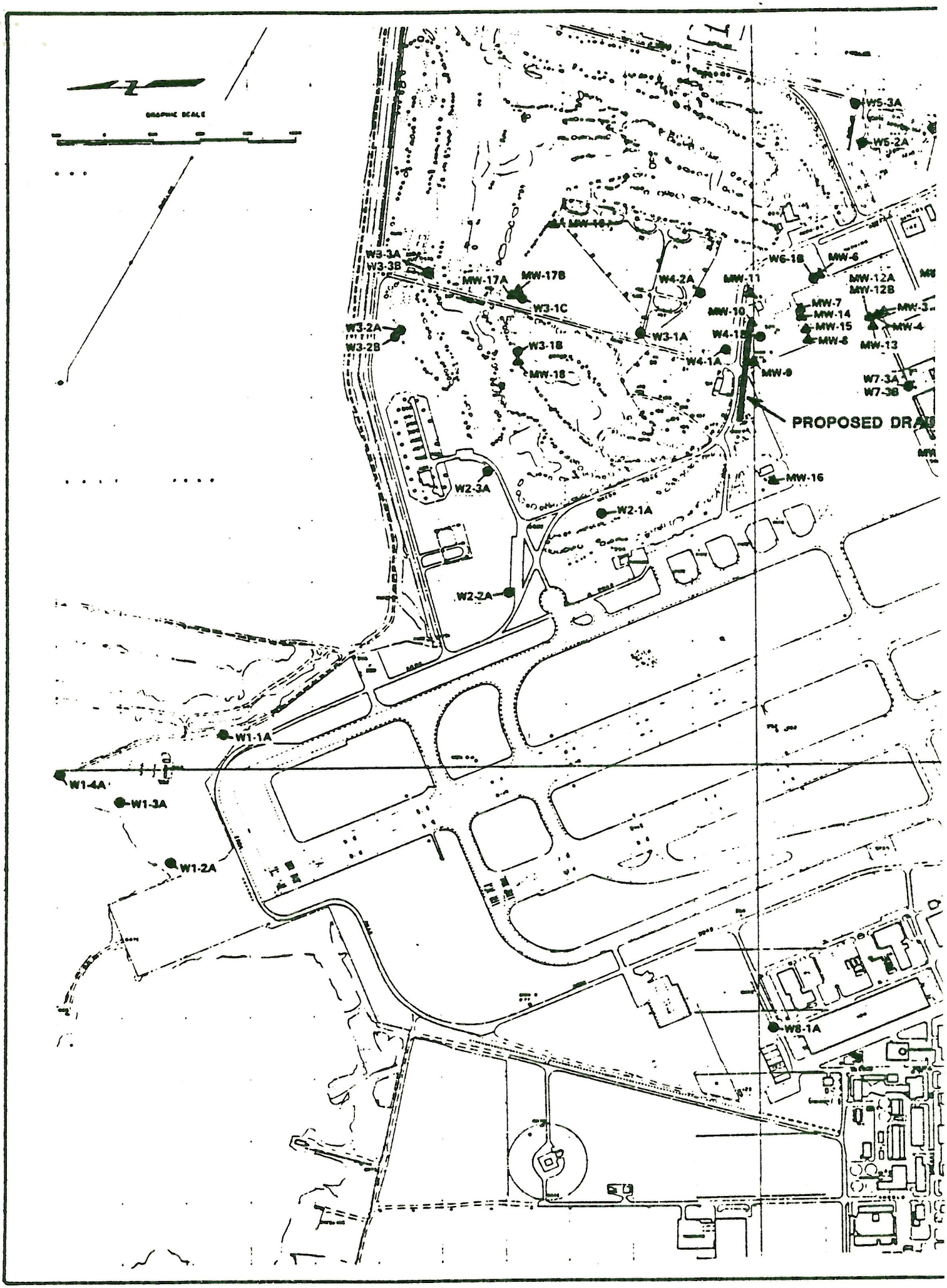
REFERENCES

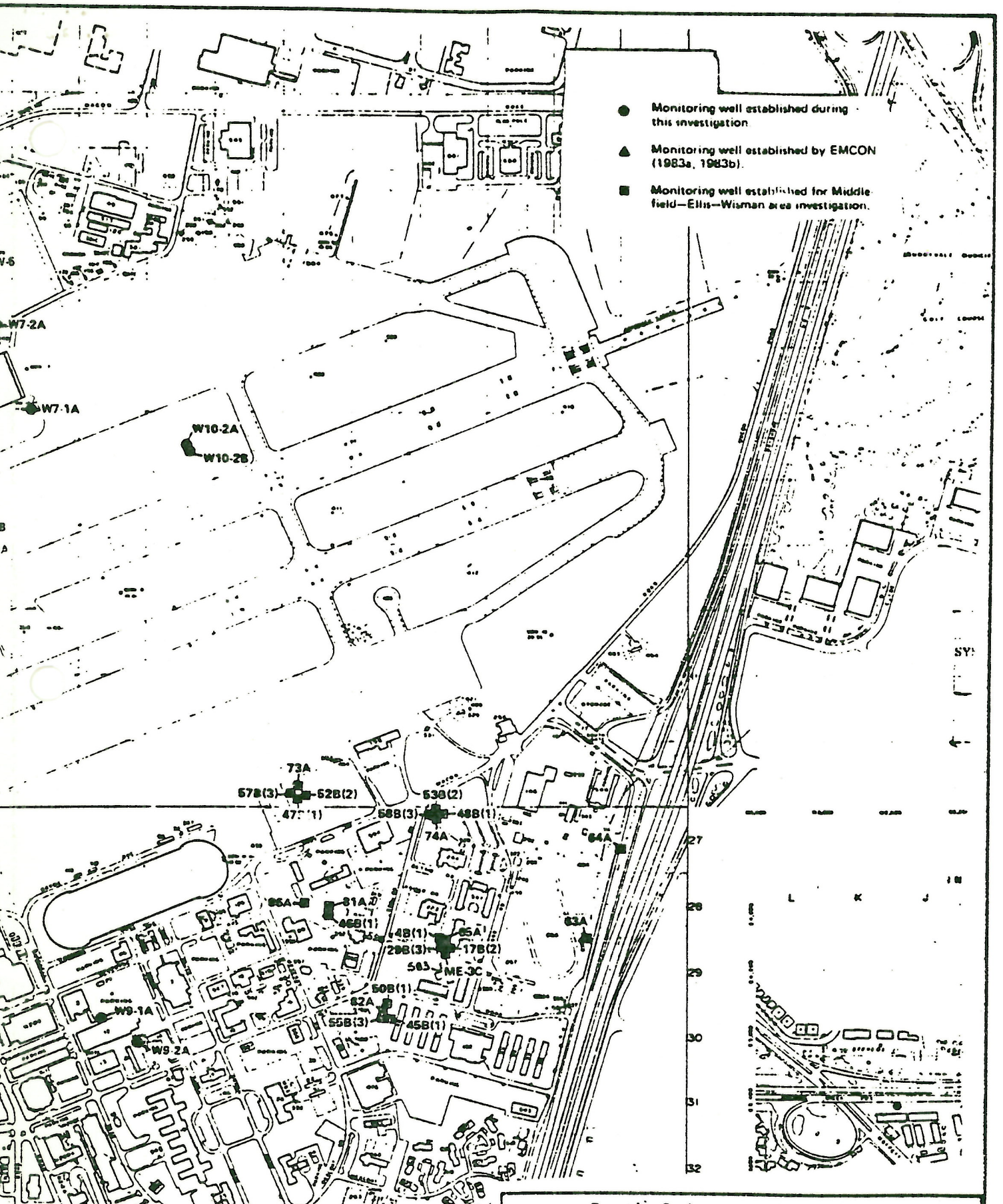
Earth Sciences Associates, 1985, Confirmation Study (Verification Step) Moffett Field Naval Air Station, November 1985

EMCON Associates, 1983a, Phase II and III Hydrogeologic Investigation Moffett Field Naval Air Station Sunnyvale, California, June 1983

EMCON Associates, 1983b, Phase IV and V Hydrogeologic Investigation Moffett Field Naval Air Station Sunnyvale, California, December 1983

Naval Energy and Environmental Support Activity, Initial Assesment Study Naval Air Station, Moffett Field, California


GRAPHIC SCALE
W5-3A
W5-2A
MW-18
W3-3A
W3-3B
MW-17A
MW-17B
W3-1C
W3-2A
W3-2B
W3-1B
MW-18
W4-2A
W3-1A
W4-1A
MW-11
MW-10
W4-1B
MW-9
W6-1B
MW-6
MW-12A
MW-12B
MW-7
MW-14
MW-15
MW-5
MW-13
MW-4
W7-3A
W7-3B
PROPOSED DRA
MW-16
W2-3A
W2-1A
W2-2A
W1-1A
W1-4A
W1-3A
W1-2A
W8-1A



Earth Sciences Associates
Palo Alto, California

PROPOSED DRAIN SYSTEM
MOFFETT FIELD NAS

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