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From: Commander, Western Division, Naval Facilities Engineering Command
To: Distribution

Subj: INSTALLATION RESTORATION PROGRAM (IRP) PRELIMINARY ARARs FOR NAVAL AIR STATION, MOFFETT FIELD

Encl: (1) ARARs for Groundwater at NAS Moffett Field, California

1. Please review and comment on the Preliminary Applicable or Relevant and Appropriate Requirements (ARARs) for Groundwater at Naval Air Station, Moffett Field, California.

2. Should you have any questions regarding this matter, the point of contact is Commander, Western Division, Naval Facilities Engineering Command (Attn: Mr. Stephen Chao, Code 1813SC, (415) 877-7512).

Original signed by:

RICHARD SERAYDARIAN
By direction

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INTERNATIONAL TECHNOLOGY CORPORATION

November 10, 1989

Ms. Paula Pritz
Martin Marietta Energy Systems, Inc.
HAZWRAP
Tri-County Mall, MS 7606
P.O. Box 2003
Oak Ridge, TN 37831-7606

Dear Paula:

SUBJECT: Revised Preliminary ARARs for NAS Moffett Field RI/FS, Task Order X-09, IT Project Number 409616 (A1T247)

Enclosed are five copies of the Preliminary ARARs for Moffett Field. These ARARs have been revised to address comments from you and the Navy. It is intended for WESTDIV's submission to EPA.

By copy of this letter, I am also submitting 10 copies to WESTDIV. Please call me if you have any questions concerning these ARARs.

Sincerely,

C. Keith Bradley
Project Manager

sw

Enclosures

cc: Stephen Chao, WESTDIV (10 copies)

ENCLOSURE (/)

PRELIMINARY

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR GROUND WATER AT NAVAL AIR STATION MOFFETT FIELD, CALIFORNIA

November 1989

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1.0 INTRODUCTION

The purpose of this report is to provide a basis for identifying preliminary, chemical-specific applicable or relevant and appropriate requirements (ARARs) for ground water at Naval Air Station (NAS) Moffett Field. A quantitative baseline risk assessment will be conducted as part of the Remedial Investigation (RI) in compliance with the draft document, Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA [U.S. Environmental Protection Agency (EPA), 1988a]. Final ARARs will be identified from the preliminary ARARs list as part of the risk assessment process.

To determine the preliminary ARARs list, an approach based on a site-specific review of relevant existing information has been adopted. The relevant areas reviewed are:

- Federal regulatory guidance concerning ARARs (Section 2.0)
- Hydrogeology and ground water uses at Moffett Field (Section 3.2)
- Land uses in the Moffett Field area (Section 3.3).

Section 4.0 provides a rationale for ARAR identification based on this review. A source listing for the preliminary ARARs is provided in Table 4-1. Finally, Section 5.0 summarizes the findings of this letter report and offers recommendations.

2.0 REGULATORY GUIDANCE REVIEW

The EPA has provided guidance on compliance with the ARAR identification process. Actual ARARs are to be identified on a site-specific basis (EPA, 1987; EPA, 1988b). A two-part analysis is to be employed in the identification process. These steps are to determine whether:

- A given requirement is applicable; or
- A given requirement is relevant or appropriate.

Evaluation of site-specific factors, including physical characteristics of the site, is an integral part of this process. The results of this evaluation should then be compared with the prerequisites for the statutory or regulatory requirement under consideration (EPA, 1988b). As an example under this guidance, for Maximum Contaminant Levels (MCLs) promulgated under the Safe Drinking Water Act (SDWA) to be considered as ARARs at a site, the surface water or ground water under consideration would have to be demonstrated to be potable and utilized as drinking water, either currently or at some planned future date, at a point downgradient of a chemical source.

For chemicals for which ARARs are not available, EPA has provided guidance on the use and application of other chemical-specific advisory levels, such as carcinogenic potency factors (CPFs) or reference doses (R_fDs) (EPA, 1987). The agency has termed these data as "to-be-considered materials" (TBCs) (EPA, 1988b). While not actually ARARs, these data may be used to determine risk-based cleanup levels in a site-specific approach. In fact, EPA has identified its preferred approach to be based on a risk assessment that employs both ARARs and TBCs in conjunction with site-specific factors (EPA, 1988b).

3.0 RESOURCE USES AT NAS MOFFETT FIELD

3.1 INTRODUCTION

Reviewing the regulatory guidance is the first step in identifying preliminary ARARs for ground water at Moffett Field. The second step is a site-specific review of resource uses. This includes a review of:

- Available hydrogeological information
- Present and future uses of ground water
- Present and future land uses.

The purpose of this review is to determine the uses of ground water downgradient from the sites at Moffett Field. The results of this review will be used in the framework of the regulatory guidance (Section 2.0) to identify preliminary site-specific ARARs for Moffett Field. The primary sources for this review are the Master Plan: Naval Air Station Moffett Field, Western Division Naval Facilities Engineering Command (WESTDIV, 1985) and Active Wells Report/Potential Conduits Investigation (Kennedy/Jenks/Chilton, 1988).

3.2 HYDROGEOLOGY AND GROUND WATER USE

The hydrogeology of the area that includes Moffett Field has been described in detail in previous documents [Naval Energy and Environmental Support Activity (NEESA), 1984; WESTDIV, 1985; Kennedy/Jenks/Chilton, 1988; and IT Corporation, 1988]. Aquifers in the vicinity of Moffett Field consist of alluvial sand or sand and gravel deposits separated by nearly impermeable silts and clays. In the interior part of the Santa Clara Valley, the numerous aquifers have been divided into two broad units: the upper aquifer zone and the lower aquifer zone. The distinction between the two aquifers is that water in the lower aquifer zone is semiconfined under a laterally extensive clay aquitard at depths of 150 to 200 feet and that water in the upper aquifer zone is generally unconfined. Aquifers in the upper zone are generally thin and discontinuous. The topmost aquifer usually occurs at a depth of 15 to 20 feet. Aquifer materials range from silty sand to fine-to-coarse gravel. Salt-water intrusion has occurred in the upper aquifer zone.

Ground water flow at Moffett Field is to the north, towards San Francisco Bay. The residential and commercial areas that border Moffett Field to the

east, west, and south are not downgradient of the sites at the base. The lower C aquifer zone that underlies Moffett Field, NASA's Ames Research Center, and the salt evaporation ponds operated by the Leslie Salt Company is the only potable aquifer zone (IT Corporation, 1988).

Currently, ground water is not used at Moffett Field to supply on-base residences or occupational areas (WESTDIV, 1985). The source of water for these purposes at Moffett Field and the Ames Research Center is the San Francisco Water Department (SFWD) aqueduct. At present, the limited uses of ground water at Moffett Field from the lower C aquifer zone are agricultural irrigation and watering greens for the base golf course (WESTDIV, 1985).

According to the Master Plan for Moffett Field, there are no future plans for additional production wells on the base. Expansion of base facilities and buildings has been scheduled; however, it is expected that these facilities will be supplied with fresh water from the SFWD aqueduct. This is the source of water for all present facilities and plans exist for the expansion of this system (WESTDIV, 1985). The Ames Research Center currently shares all its utilities with the air station. This arrangement is expected to continue for the foreseeable future (WESTDIV, 1985).

3.3 LAND USE

The area north of the base consists of salt evaporators, marshlands, and mud flats (WESTDIV, 1985; NEESA, 1984). Future residential development of this area is projected to be limited due to the physical nature of the terrain. The land to the north of Moffett Field is not well suited for construction of homes or buildings. The soil is very plastic and the water table in the area is high. Shifting soil conditions can cause buildings, foundations, and roads to shift or deform and underground pipelines to bend or break. This area is also highly susceptible to flooding from either rain events or spring tides (WESTDIV, 1985).

Based on current water supply systems and the nature of the downgradient terrain, it is improbable that use of ground water downgradient from the Moffett Field sites would include provision of water from the lower aquifer zone for direct human consumption. Other changes in land use in this area are

equally unlikely. The wetlands adjacent to Moffett Field are federally protected by Presidential Executive Order 11990 and the Clean Water Act (WESTDIV, 1985). The remaining area is presently being used as salt evaporators (WESTDIV, 1985). This terrain is not conducive to future commercial or residential development.

WESTDIV (1985) has evaluated the possible uses of lands surrounding Moffett Field from a health and safety perspective. Criteria such as the potential of an aircraft accident or noise levels from low-flying aircraft were used to evaluate the "acceptability" of certain activities in these contiguous areas. Nearly one-third of the area (an area nearly 4,000 feet wide extending from the northern-most boundary of the base to the edge of the mud flat) was considered as unacceptable for use as a residential or business development because of the "measurable potential for aircraft accidents" or high noise levels.

The future development or construction of new facilities in the area of Moffett Field is likely to be restricted to the air station itself. Since a pipeline system is already in place for supplying all facilities associated with the air station with fresh water from the SFWD aqueduct, the use of ground water in this area will likely remain restricted to irrigation. The potential for humans to directly consume ground water from the lower aquifer zone is highly improbable because no exposure pathway currently exists. Furthermore, the available information on projected future use of the Moffett Field area indicates that no exposure pathway for direct consumption is likely to be established.

4.0 PRELIMINARY ARAR IDENTIFICATION

The analysis described in Section 3.0 demonstrates that it is unlikely that ground water at Moffett Field will be used for any purpose other than agricultural irrigation and watering for the foreseeable future. However, ground water also migrates north and recharges San Francisco Bay. The Bay is less than 5 miles to the north of Moffett Field. This scenario implies that potential primary receptors at Moffett Field are agricultural and the estuarine organisms which inhabit San Francisco Bay. Therefore, the preliminary ARARs identified for the RI at Moffett Field would be those federal or state criteria, standards, or regulations for agricultural water or for marine organisms living in San Francisco Bay. In the absence of chemical-specific ARARs that meet these site-specific prerequisites, TBCs should be identified as part of a risk assessment process.

Moffett Field is located in the San Francisco Bay Basin Region of the California Regional Water Quality Control Boards. Thus, water quality objectives that may function as ARARs are established by this Board. In addition, federal water quality criteria with the appropriate site-specific prerequisites may also be identified as preliminary ARARs.

Water quality criteria for agricultural water supplies at the well head have been established by the SFRWQCB. The water quality objectives for agricultural supply waters include heavy metals but do not address organic constituents (SFRWQCB, 1986).

Water quality criteria for ambient waters such as San Francisco Bay are addressed both by the EPA and SFRWQCB. The Clean Water Act (§304) provides for the establishment of water quality criteria. The EPA has published criteria for 65 compounds or compound groups (EPA, 1986). These criteria present scientific data which "can be useful to derive regulatory requirements based on consideration of water quality impacts" (EPA, 1986). Because of recharge to the San Francisco Bay, Ambient Water Quality Criteria for protection of aquatic life (marine acute and chronic) are included on a preliminary list of

ARARs for Moffett Field. These criteria are to apply to potential levels of chemicals in the bay after recharge by ground water from the lower aquifer zone.

According to the SFRWQCB (1986), the southern end of San Francisco Bay is considered a "unique, water quality limited, hydrodynamic and biological environment." Because of the unique environment, the Regional Board states that "site-specific water quality objectives are absolutely necessary in this area..." (SFRWQCB, 1986). The board has recommended that objectives developed for other sections of the bay be used for guidance only in developing site-specific objectives. This guidance requires a comprehensive environmental risk assessment such as the assessment to be conducted as part of the RI at Moffett Field. The assessment will determine the amounts and types of chemicals entering the bay, identify potential receptors, and evaluate the potential impacts resulting from exposures to these chemicals.

Table 4-1 gives the sources for the preliminary ARARs discussed above. Table 4-2 gives the agricultural water supply objectives of the SFRWQCB, and the applicable ambient water quality criteria are provided in Table 4-3.

Table 4-1. Source Listing for Preliminary ARARs
Naval Air Station Moffett Field

Preliminary ARAR Type	Source
Water Quality Objective, Agricultural Supply Water	Water Quality Control Plan (SFRWQCB, 1986)
Ambient Water Quality Criteria for Protection of Aquatic Life: Marine Acute/Chronic	Clean Water Act (§304) and Quality Criteria for Water (EPA, 1986)

Table 4-2. Water Quality Objectives for Agricultural Supply Waters

Chemical Name	Objective[a]
Aluminum	(5) 5/20
Arsenic	(0.2) 0.1/2.0
Beryllium	0.1/0.5
Boron	(5.0) 0.5/2
Chloride	142/355
Cadmium	(0.05) 0.01/.05
Chromium	(1.0) 0.10/1.0
Cobalt	(1.0) 0.05/5.0
Copper	(0.5) 0.2/5.0
Fluoride	(2.0) 1.0/15.0
Iron	5.0/20.0
Lead	(0.1) 5.0/10.0
Lithium	2.5[b]
Manganese	0.2/10.0
Molybdenum	(0.5) 0.01/0.05
Nickel	0.2/2.0
NO_3 + NO_2 (as N)	(100) 5/30[c]
pH (units)	5.5 - 8.3/4.5 - 9.0
Selenium	(0.05) 0.02
Vanadium	(0.1) 0.10/1.0
Zinc	(25) 2.0/10.0

[a]Where two values appear (e.g., a/b), the first number represents a threshold concentration (where effects are noticeable) and the second represents a limiting concentration (where effects are undesirable). All values are expressed in mg/l except as noted. Numbers in parentheses are allowable concentrations for livestock watering.
[b]For citrus irrigation, maximum 0.075 mg/l.
[c]For sensitive crops. Values are actually for NO_3-N + NH_4-N.

Table 4-3. Clean Water Act Ambient Water Quality Criteria for Protection of Aquatic Life

Chemical Name	Marine Acute/Chronic Criterion (mg/l)
Acenapthene	$0.9^{(a)}/0.7^{a}$
Acenaphthylene	3.0×10^{-1a}
Acrolein	5.5×10^{-2a}
Aldrin	1.3×10^{-3}
Arsenic (V) and Compounds	$2.3^{a}/1.3 \times 10^{-2}$
Arsenic (III) and Compounds	$6.9 \times 10^{-2}/3.6 \times 10^{-2}$
Benzene	$5.1^{a}/0.7^{a}$
Cadmium and Compounds	$4.3 \times 10^{-2}/9.3 \times 10^{-2}$
Carbon Tetrachloride	5.0×10^{1}
Chlordane	$9.0 \times 10^{-5}/4.0 \times 10^{-6}$
Chlorinated Benzenes	$1.6 \times 10^{-1a}/1.2 \times 10^{-1a}$
Chlorinated Naphthalenes	7.5×10^{-3a}
Chromium III and Compounds	1.0×10^{1}
Chromium VI and Compounds	$1.1/5.0 \times 10^{-2}$
Copper and Compounds	$2.9 \times 10^{-3}/2.9 \times 10^{-3}$
Cyanides	$1.0 \times 10^{-3}/1.0 \times 10^{-3}$
DDT	$1.3 \times 10^{-4}/1.0 \times 10^{-6}$
Dichlorobenzenes	1.9^{a}
1,2-Dichloroethane (EDC)	1.1×10^{2a}
Dichloroethylenes	2.2×10^{2a}
1,1-Dichloroethylene	2.2×10^{2}
1,3-Dichloropropene	0.7^{a}
Dieldrin	$0.7 \times 10^{-3}/1.9 \times 10^{-6}$
Endosulfan	$3.4 \times 10^{-5}/8.7 \times 10^{-6}$
Endrin	$3.7 \times 10^{-5}/2.3 \times 10^{-6}$
Ethylbenzene	4.3×10^{-1a}
Fluoranthene	$4.0 \times 10^{-2a}/1.6 \times 10^{-2a}$
Heptachlor	$5.3 \times 10^{-5}/3.6 \times 10^{-6}$
Hexacalorobutadiene	3.2×10^{-2a}
Hexachlorocyclopentadiene	7.0×10^{-3a}

Table 4-3. (Continued)

Chemical Name	Marine Acute/Chronic Criterion (mg/l)
Hexachloroethane	9.4×10^{-1}[a]
Isophorone	1.2×10^{1}[a]
Lead and Compounds (Inorganic)	$0.1/5.6 \times 10^{-3}$
Mercury and Compounds (Alkyl)	$2.14 \times 10^{-3}/2.5 \times 10^{-5}$
Mercury and Compounds (Inorganic)	$2.1 \times 10^{-3}/2.5 \times 10^{-5}$
Methoxychlor	3×10^{-5}[a]
Nickel and Compounds	$7.5 \times 10^{-2}/8.3 \times 10^{-3}$
Nitrobenzene	6.6
Nitrophenols	4.8[a]
Nitrosamines	3.3×10^{3}[a]
Pentachlorinated Ethanes	3.9×10^{-1}[a]$/2.8 \times 10^{-1}$[a]
Pentachlorophenol	$1.3 \times 10^{-2}/7.9 \times 10^{-3}$
Phenol	5.8
Phthalate Esters	2.9[a]$/3.4 \times 10^{-3}$[a]
Polychlorinated Biphenyls (PCBs)	$1.0 \times 10^{-2}/3.0 \times 10^{-5}$
Selenium and Compounds	$4.1 \times 10^{-1}/5.4 \times 10^{-2}$
Silver and Compounds	2.3×10^{-3}
1,1,2,2-Tetrachloroethane	9.0[a]
Tetrachloroethylene	1.0×10^{1}[a]$/4.5 \times 10^{-1}$[a]
2,3,4,6-Tetrachlorophenol	4.4×10^{-1}
Thallium and Compounds	2.1×10^{-3}[a]
Toluene	6.3[a]/5.0[a]
Toxaphene	$2.1 \times 10^{-4}/2 \times 10^{-7}$
1,1,1-Trichloroethane	3.1×10^{1}[a]
Trichloroethylene	2.0[a]
Zinc and Compounds	$9.6 \times 10^{-2}/8.6 \times 10^{-2}$

[a]Lowest Observed Effect Level (LOEL).

5.0 RECOMMENDATIONS

This report has reviewed the federal and state regulatory guidance and the site-specific conditions at Moffett Field to identify a preliminary list of ARARs for ground water. The purpose of this preliminary list is to aid in the establishment of method detection limits for the field investigation phase of the RI.

Based on site-specific uses of ground water at Moffett Field, the following recommendations can be made:

- Ground water from the lower C aquifer zone (the only potable aquifer zone) is used primarily for irrigation purposes. No future change in this usage pattern is expected. Therefore, the preliminary ARARs for analysis of these water sources should be the agricultural supply water quality objectives (SFRWQCB, 1986).

- Previous ground water studies at Moffett Field have identified volatile organic compounds present in the ground water (ERM-West, 1987). The site-specific ARARs for agricultural supply waters containing these organic compounds should be determined through the risk assessment process in compliance with EPA guidance.

- Ground water from the lower aquifer zone also recharges the San Francisco Bay. Estuarine organisms are potential receptors. If Phase I field investigation efforts establish the potential for site-related chemicals at Moffett Field to contribute to concentrations in bay waters, sampling of bay waters at the Moffett Field property boundary may prove needed. If sampling is required, method detection limits for bay water should comply with the Ambient Water Quality Criteria established by EPA (1986) for acute and chronic exposures to marine organisms.

Potential direct human consumption of ground water from the lower aquifer zone is not expected to occur in the absence of a viable exposure pathway. The review of current and projected uses of the land area at Moffett Field support the conclusion that no exposure pathway is likely to be established in the foreseeable future. Therefore, ARARs pertaining to drinking water do not meet the prerequisites for applicability, relevance, or appropriateness under EPA guidance.

6.0 REFERENCES

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Environmental Protection Agency (U.S.), 1987, "Superfund Program: Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements," Federal Register, 52(166):32496-32499.

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