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**MARINE CORPS AIR STATION
EL TORO**

**HAZARD RANKING SYSTEM
TECHNICAL REVIEW**

**San Diego Branch
Western Division
Naval Facilities Engineering Command
San Diego, California**

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EXECUTIVE SUMMARY

Marine Corps Air Station (MCAS) El Toro, commissioned in 1943, is located in a semi-urban agricultural area of Southern California. An Initial Assessment Study completed during May of 1986 identified a total of seventeen potentially contaminated sites at the station. This study concluded that "...while none of the sites pose an immediate threat to human health or the environment, nine warrant further investigation...to assess potential long-term impacts." A Plan of Action is currently being finalized to address a total of thirteen specific sites at MCAS El Toro. An investigation program is also underway to evaluate whether the station is a source of the trichloroethylene (TCE) contamination measured in three irrigation wells.

The U.S. Environmental Protection Agency (EPA) is proposing that the Marine Corps Air Station (MCAS) El Toro is included on the National Priorities List (NPL), a list that establishes those hazardous waste sites in the country potentially posing the greatest long-term threat to human health and/or the environment. This proposed listing is based on a Hazard Ranking System (HRS) score of 40.83, also proposed by EPA for the station, which exceeds the 28.50 cutoff score established arbitrarily when Superfund was initially authorized. The HRS score of 40.83 was calculated by EPA from a proposed ground water migration route subscore of 70.64. Factors contributing to this subscore included assumptions that there was an observed release of contaminants from MCAS El Toro to ground water, that those contaminants include such highly toxic and persistent compounds as PCBs, lead, and chloroform, that more than 6,705 drums of hazardous waste is disposed of in as many as 17 potential source areas at the station, that the

contaminated aquifer is suitable for domestic water supply, and that the aquifer within three miles of MCAS El Toro is used for irrigation with no other water source presently available.

The purpose of this document is to present the technical evidence to demonstrate that the proposed EPA ground water migration route subscore, and hence the HRS score, is over-estimated for MCAS El Toro. This is accomplished by showing that a significant doubt exists for any release of and contribution thereof from the station to the TCE contamination observed in ground water, that such compounds as PCBs, lead and chloroform do not exist in the groundwater and were not used or disposed of on-station at quantities to represent a threat to groundwater, that the total quantity of solvents potentially leaked, spilled or disposed of at the station is less than 1,100 drums, that the aquifer in question, and within three miles of the station, is not suitable for domestic use due to high natural total dissolved solids content, and that water sources other than the ground water extracted from the three contaminated wells exist for domestic and/or irrigation purposes.

A most probable and a worst case scenario analysis suggest that the ground water route subscore for MCAS El Toro should be 12.27 or 30.69, with resultant HRS scores of 7.09 or 17.74, respectively. Based on technical merit, it is proposed that the HRS score for the MCAS El Toro should be revised as 7.09, and thus the station should not be included on the NPL.

**MCAS EL TORO
HAZARD RANKING SYSTEM TECHNICAL REVIEW**

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SECTION 1

INTRODUCTION

Marine Corps Air Station (MCAS) El Toro is located in Orange County in Southern California, approximately 45 miles southeast of Los Angeles (Figure 1-1). Commissioned in 1943, the mission of MCAS El Toro is to maintain and operate facilities and to provide services and material to support the operation of aviation activities and units of the operating forces of the Marine Corps, Navy, and other activities as designated by the Commandant of the Marine Corps, in coordination with the Chief of Naval Operations.

MCAS El Toro is located in a semi-urban agricultural area of Southern California. To the north, south, and east, the majority of the land immediately adjacent to the station is used to raise oranges and other agricultural crops (reference 2). The University of California has an agricultural field station north of the station. A small industrial complex adjoins the station boundary to the southeast. Some commercial/industrial facilities, such as gas stations, a blacksmith, a county bus depot, a camper sale and maintenance facility, a hotel, a restaurant...etc., border MCAS El Toro along western and southwestern boundaries. The former Laguna Raceway, operated from the mid-1960's until early in the 1980's, located immediately adjacent to the southwestern boundary of the station is currently being developed as office park.

SENSITIVE RECORD

PORTIONS OF THIS RECORD ARE CONSIDERED SENSITIVE
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FIGURE 1.1 – VICINITY MAP

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1.1 BACKGROUND

As part of Installation Restoration Program (IRP), the Department of the Navy completed an Initial Assessment Study (IAS) for MCAS El Toro in May of 1986 (reference 2). A total of seventeen sites were identified by the IAS, with nine recommended for evaluation under a Confirmation Study. A Plan of Action addressing 13 sites at MCAS El Toro is currently being finalized by James M. Montgomery, Consulting Engineers, Inc. (JMM), which will incorporate regulatory agency comments on the draft plan.

In June of 1985, the Orange County Water District (OCWD) sampled all wells in the Orange County Ground Water basin for Volatile Organic Chemicals (VOCs), including several agricultural production wells owned by The Irvine Company (TIC) on and near MCAS El Toro. Two of the off station wells, TIC 47 and TIC 35, located approximately 3,000 and 6,000 ft from the station (Figure 1-2), had levels of trichloroethylene (TCE) at concentrations above the California Department of Health Services (CDHS) action level for drinking water of 5.0 ug/L. The well TIC 55, located within the western portion of the station, showed TCE concentration between 0.4 to 0.9 ug/L. Of the VOC analyses performed on 25 different occasions in the three contaminated irrigation wells, tetrachloroethylene (PCE) was reported twice at instrument detection limits. To evaluate whether MCAS El Toro is a source of the TCE contamination observed in the TIC irrigation wells, JMM prepared and submitted a Plan of Action (reference 1) as part of the Confirmation Study of the MCAS El Toro. This Perimeter Plan of Action is currently being implemented independent of the Plan of Action for the 13 sites mentioned above.

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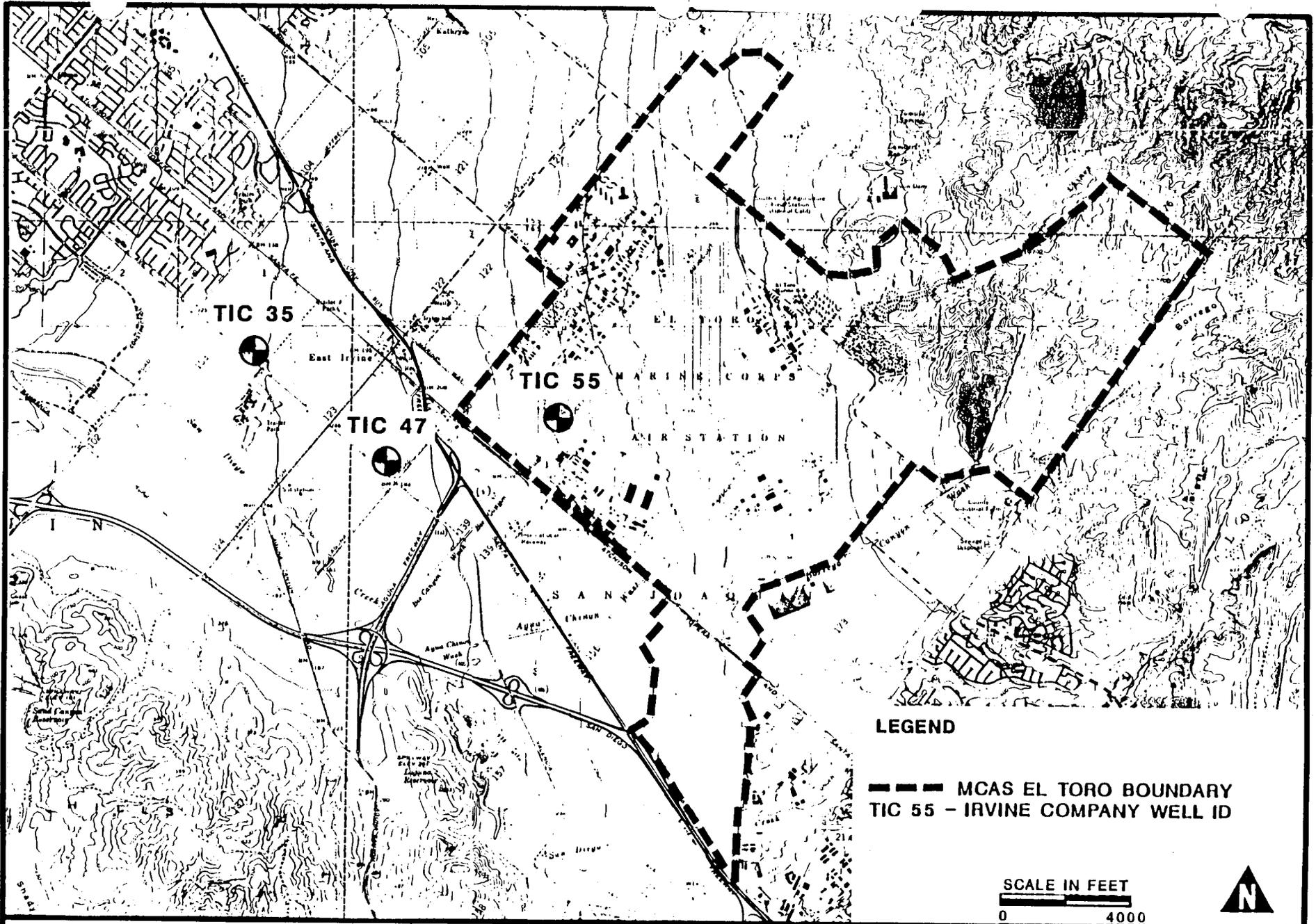
FIGURE 1-2 – LOCALE OF IRRIGATION WELLS

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MCAS EL TORO
HAZARD RANKING SYSTEM
TECHNICAL REVIEW

LOCALE OF IRRIGATION WELLS

FIGURE

1-2

SENSITIVE

1.2 PROPOSED EPA HAZARD RANKING SYSTEM SCORE

On a letter dated June 20, 1988, and addressed to the Commanding General of the MCAS El Toro, the United States Environmental Protection Agency (EPA) indicated that the station is being proposed for inclusion to the National Priorities List (NPL). The station is being proposed for NPL inclusion since the Hazard Ranking System (HRS) score of 40.83, also proposed by the EPA, exceeds the 28.50 cutoff score.

The HRS scoring is done for three hazard modes; migration, fire and explosion, and direct contact. EPA did not evaluate either the fire and explosion mode or the direct contact mode. Of the three components of the migration mode, only the ground water migration route was scored by EPA. The surface water route was not scored due to lack of target population while the air route was not scored due to lack of air monitoring data. The ground water migration route was scored by calculating subscores for five components: observed release, route characteristics, containment, waste characteristics, and targets. EPA proposed a ground water route score of 70.64 for MCAS El Toro. This, in turn, resulted in an HRS score of 40.83.

1.3 PURPOSE OF THIS DOCUMENT

The HRS is used to evaluate the relative potential of uncontrolled hazardous substance facilities to cause health or safety problems, or ecological or environmental damage. It is intended as means for applying uniform technical judgement regarding the potential hazards presented by a facility relative to other facilities. The HRS score of 40.83 proposed by EPA would place MCAS El Toro among the highest ranked sites on the current NPL. Sites such as Times Beach in Missouri (with scores ranging from 40.71 to 37.93)

and Love Canal in New York (with scores ranging from 55.71 to 51.35), where the threat to human health was so great that residents were relocated by EPA away from the contaminated area, suggest that the MCAS El Toro, where no fire and explosion or direct contact hazard exists, is over-scored in the HRS. Other sites, such as the Stringfellow Acid Pits in California (with scores ranging from 75.60 to 58.41) and the Western Sand and Gravel Site in Rhode Island (with scores ranging from 55.71 to 51.35), are documented sources of contamination of potable water aquifers. In contrast, the ground water within a 3 mile radius of MCAS El Toro is not suitable for human consumption due to high total dissolved solids (TDS) content, and is used only for irrigation.

The purpose of this document is, therefore, to demonstrate that the proposed EPA ground water migration route score, and hence the HRS score, is over-estimated for MCAS El Toro. This is accomplished by presenting, in Section 2, detailed discussions of technical issues involved in each of the categories impacting the ground water route score. A revised ground water route score is then proposed in Section 2.1.6.2. The revised HRS score is subsequently presented in Section 2.3.2.

SECTION 2

EVALUATION OF EPA'S PROPOSED HRS SCORE

The Hazard Ranking System (HRS) scoring can be done for three hazard modes; migration, fire and explosion, and direct contact. EPA did not evaluate either the fire and explosion mode or the direct contact mode. Of the three potential components of the migration mode (ground water, surface water, and air migration routes) only the ground water migration route was scored by EPA. The surface water route was not scored due to lack of a target population while the air route was not scored due to lack of air monitoring data. Thus, the discussion presented in Section 2.1 is limited to an evaluation of the ground water migration route. In addition, an alternative evaluation of the ground water route is presented in Section 2.2.

2.1 GROUND WATER ROUTE

The ground water route is scored by calculating subscores for five components: observed release, route characteristics, containment, waste characteristics, and targets. The subscores are then combined to calculate an overall score for the ground water migration route. The scoring for each component is evaluated in Sections 2.1.1 through 2.1.5 based on technical merit. For each of the five component subscores, EPA's proposed scoring is presented followed by a discussion of critical technical issues pertinent to the subscores and a proposed revised ranking for the subscore based on the relevant technical issues. A resultant revised ground water migration route score is then calculated and compared to EPA's ground water migration route score in Section 2.1.6.

2.1.1 OBSERVED RELEASE

The observed release subscore is based in the evidence of a release of a substance of concern from a facility to ground water. This evaluation can be quantitative or qualitative. Quantitative evidence pertains to direct evidence of a release measured analytically. Qualitative evidence, on the other hand, constitutes evidence only when the facility in question can be directly related to the contamination in question. If facility in question is directly related to the contamination, a subscore of 45 is assigned, otherwise a subscore of zero is given for observed release component.

2.1.1.1 EPA Proposed Score

EPA's rationale for attributing the TCE ground water contamination in the vicinity of MCAS El Toro to the station was as follows:

TCE was found in wells located on site, directly down gradient. TIC agricultural production wells 35 and 47 show levels of contaminant significantly above background, Actual depths of sampling unknown, but perforated intervals of these wells are below 260 feet, indicating that contaminants are present in the main aquifer. TIC well #111 is located near MCAS El Toro main gate, also screened below 200 feet (in the main aquifer) and so far appears to be free of contaminants. (Ref 5)

Solvents were known to have been used at the base, and 17 potential contaminant source areas have been identified. (Ref 2, chapter 8) Solvents, including TCE and PCE, were either known or suspected to have been disposed of at four of these locations. (Ref 1, p 2-1, Ref 2 appendix E) PCE was detected in soil gas on site. (Ref 1, p. 1-2)

Based on this rationale, EPA proposed a subscore of 45 for the observed release component of the ground water route.

2.1.1.2. Technical Issues

Analysis of ground water samples from TIC irrigation wells 47 and 35, located approximately 3,000 and 6,000 ft from MCAS El Toro, has revealed presence of TCE in concentrations ranging from 3.4 to 10.5 ug/L and 11.4 to 48.7 ug/L, respectively. TIC well 55, located at western fringes of the station, had reported TCE concentrations between 0.4 to 0.9 ug/L. Based on the current ground water flow gradients in the vicinity of MCAS El Toro (Figure 2-1), a potential exists for station's contribution to the ground water contamination. However, increasing TCE concentrations with distance away from the station, TCE migration characteristics in the aquifer, and known ground water velocities (average 14 ft/year), combined with pre-1980s ground water levels (Figure 2-2) suggest that the contamination at off-station irrigation wells, and even at on-station TIC 55, may not be attributable to activities at MCAS El Toro. Furthermore, background ground water TCE concentrations in respect to the station are not established.

Appendix E of Reference 2 indicates TCE to be "...solvent commonly used in industry..." and does not indicate reported or confirmed use of TCE and/or PCE at MCAS El Toro. Some chlorinated solvents are known to have been used or disposed of at the station. However, no particular evidence exists on whether TCE and/or PCE have been disposed of at any location at the station. Since TCE is the only solvent known to exist in the ground water in the vicinity of the station and it cannot be confirmed that its presence in ground water resulted from a release at the facility, direct evidence of a release from facility does not exist. Furthermore, the soil gas investigation mentioned by EPA was limited to the areas outside the MCAS El Toro, and thus PCE was not detected on-base as suggested by EPA.

SENSITIVE RECORD

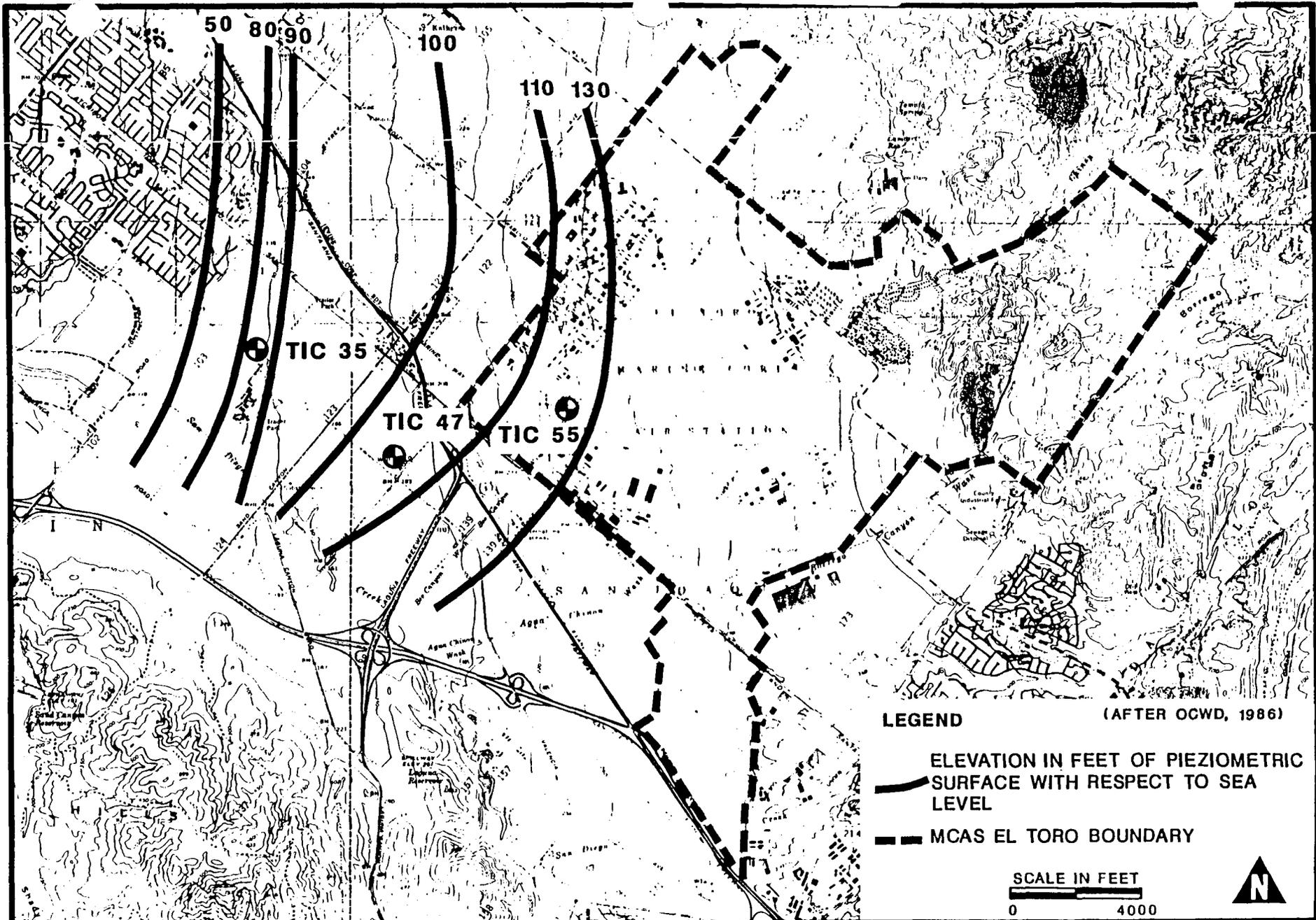
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FIGURES 2.1 AND 2.2

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LEGEND (AFTER OCWD, 1986)

— ELEVATION IN FEET OF PIEZOMETRIC SURFACE WITH RESPECT TO SEA LEVEL

- - - MCAS EL TORO BOUNDARY

SCALE IN FEET
0 4000

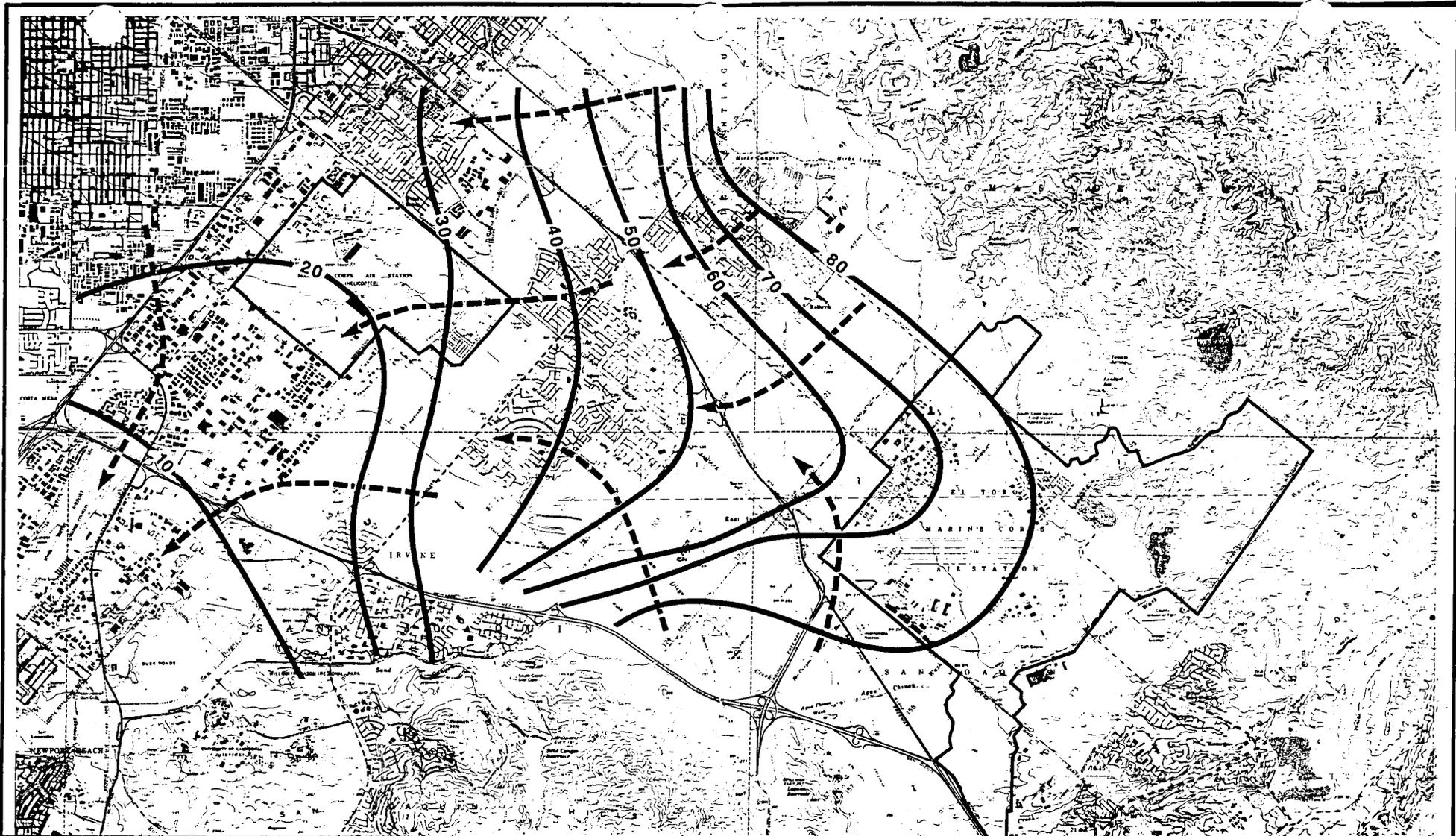


MCAS EL TORO
HAZARD RANKING SYSTEM
TECHNICAL REVIEW

GROUNDWATER ELEVATIONS
NOVEMBER 1, 1985

FIGURE
2.1

SENSITIVE




MCAS EL TORO
HAZARD RANKING SYSTEM
TECHNICAL REVIEW

— MCAS BOUNDARIES
— WATER LEVEL CONTOURS, CONTOUR INTERVAL
10' ELEVATION IN FEET ABOVE MEAN SEA LEVEL
- - - INTERPRETED GROUNDWATER FLOW DIRECTION
AFTER USGS, 1973

SCALE IN FEET
0 4000 8000


FIGURE 2.2
WATER LEVEL ELEVATIONS AND
GENERALIZED GROUNDWATER FLOW
JANUARY 1971,
TUSTIN PLAIN MAIN AQUIFER

SENSITIVE

2.1.1.3 Revised Score

Based on the discussion presented in Section 2.1.1.2, no evidence exists for a release of TCE to the ground water from MCAS El Toro. Thus, a revised subscore for the observed release component of 0 (zero) is appropriate.

2.1.2. ROUTE CHARACTERISTICS

Components of the route characteristics subscore include evaluations of depth to the aquifer of concern, net precipitation, permeability of the unsaturated zone, and the physical state of potential contaminants at the time of disposal. The score for the ground water route characteristics is the sum of the scores from each of these components.

2.1.2.1 EPA Proposed Score

Due to the assignment of a proposed value of 45 for an observed release to ground water, EPA did not calculate a route characteristics subscore.

2.1.2.2 Technical Issues

The ground water near the western and southern portion of the MCAS El Toro occur at depths greater than 100 ft below ground surface. The soil borings completed in the area by JMM during 1987 and 1988, indicate that perched to semi-perched aquifers above the water table do not exist. Hence, the assigned value for the depth to aquifer of concern should be 1 (one).

The precipitation in the area averages 12.77 inches a year (reference 2) and occurs mostly during winter. The mean

annual lake evaporation (or potential evaporation) is in excess of 80 inches a year, of which 30 percent (24 inches) occurs during November through April (reference 3). The resulting net precipitation can then be calculated as $24 - 12.77 = -11.23$ inches. Thus, the assigned value for the net precipitation should be 0 (zero).

The unsaturated zone in the area comprised mostly of silty clays and sandy silts with hydraulic conductivities ranging from 10^{-5} to 10^{-7} cm/sec. The assigned value for the permeability of the unsaturated zone should therefore be 1 (one).

At the time of any disposal or spill, it is assumed that TCE would have been in a liquid state. Thus, the assigned value for the physical state should be 3 (three). However, as mentioned previously, there has been no known disposal or spill of TCE at MCAS El Toro.

2.1.2.3 Revised Score

The discussion presented in Section 2.1.2.2 indicates that the score for the depth to the aquifer of concern, net precipitation, the permeability of the unsaturated zone, and the physical state at the time of disposal should be 2, 0, 1, and 3, respectively. The sum of these scores result in a total route characteristic subscore for ground water migration of 6 (six).

2.1.3 CONTAINMENT

Containment is a measure of the natural or artificial means that have been used to minimize or prevent a contaminant from entering the ground water.

2.1.3.1 EPA Proposed Score

Due to the assignment of a proposed value of 45 for an observed release, EPA did not calculate a containment subscore.

2.1.3.2 Technical Issues

Although no confirmed evidence of TCE disposal in any of the landfills exists, the landfills are not known to be lined and a potential exists for water ponding on the surface. Also, the potential TCE use areas mentioned in reference 1 include sites that are not containerized.

2.1.3.3 Revised Score

Although no direct evidence of TCE disposal on-base exists, if it is assumed that surface spills or disposal in unlined landfills occurred, an assigned value of 3 (three) for containment would result.

2.1.4 WASTE CHARACTERISTICS

The waste characteristics is developed by evaluating the toxicity, persistence, and quantity of hazardous waste disposed at the facility.

2.1.4.1 EPA Proposed Score

EPA evaluated TCE, PCE, PCBs, leaded fuels, battery acid (lead), and chloroform for toxicity and persistence. A score of 18 was assigned due to the inclusion of PCBs, lead, and chloroform into the ranking.

The total quantity of hazardous substances disposed at the MCAS El Toro is calculated by EPA as 6,705 drums assuming all 17 of the potential source areas identified in the Initial Assessment Study (reference 2) contributed to the release. This, in turn, resulted in a hazardous waste quantity score of 7.

The sum of the scores of 18 and 7 for the toxicity and persistence and hazardous waste quantity characteristics, respectively, resulted in an EPA proposed subscore of 25 for waste characteristics.

2.1.4.2 Technical Issues

Of the VOC analyses performed on 25 different occasions in the three contaminated irrigation wells, chloroform and PCE are the only other VOCs detected besides TCE. Chloroform was reported at the instrument detection limit four times, and PCE was reported twice at the instrument detection limit. Since both compounds were also detected only sporadically, their presence in ground water cannot be conclusive. Therefore, chloroform and PCE should not be included in toxicity and persistence ranking for the ground water route.

No fuel related compounds (benzene, ethylbenzene, toluene, or xylenes) were detected in any of the irrigation wells at any time. No evidence exists of any release of fuels into ground water. Hence, leaded fuels should not be included into the toxicity and persistence ranking for ground water route evaluations.

None of the irrigation wells were sampled for PCBs. In the Initial Assessment Study (reference 2) it is indicated that a maximum of 60 gallons of PCB-contaminated fluid (not 60 gallons of pure PCBs) might have spilled at Site 11, the Transformer Storage area (reference 2). Based on the small

quantity of fluid involved, the negative net precipitation in the area, the high affinity of PCBs for soil, and the large thickness of the unsaturated zone (in excess of 100 ft), the potential for PCB contamination of ground water from Site 11 is non-existent. Thus, PCBs should not be included in the toxicity and persistence ranking for the ground water route.

The only confirmed contaminant in ground water is TCE. This compound might have been disposed of at four of the 17 sites identified in the Initial Assessment Study for MCAS El Toro (reference 2). Included in the four disposal sites are three inactive landfills (Magazine Road, Original, and Perimeter Road landfills) which have received primarily municipal type wastes along with unknown quantities of potentially hazardous wastes. As discussed in Section 2.1.2.2, the net precipitation of -11.23 inches a year results in a small potential for leachate generation from the landfills. Thus landfills are not anticipated to be major source of TCE contamination. The fourth potential disposal area, the Petroleum Disposal Area (Site 10) might have as much as 52,000 gallons of petroleum waste (mixed with solvents) applied to 960,000 square ft for dust control.

The remaining 13 Initial Assessment Sites are not considered as potential TCE or solvent disposal areas and therefore should not be included in the waste quantity calculations. Some solvent use activities at the station might have resulted in potential releases of unknown quantities of solvents on to the ground (and potentially to ground water). The quantities leaked or spilled are impossible to estimate. However, assuming that one percent of the total amount of solvents used at the 13 solvent use areas (reference 1, Table 2-2) might have leaked or spilled, 555 gallons of liquid solvents can be calculated as an additional waste

quantity. This would result in a total of 52,555 gallons, or 1,051 drums, for a waste quantity.

2.1.4.3 Revised Score

TCE is the only known and confirmed contaminant in ground water in the vicinity of MCAS El Toro. Therefore, the toxicity and persistence score should be 12 (twelve).

A total of 1,051 drums of liquid potentially containing solvents (or TCE) might have been disposed, leaked, or spilled. Thus a hazardous waste quantity score of 5 (five) should be assigned.

The total waste characteristics score should be $12+5=17$ (seventeen).

2.1.5 TARGETS

This category is evaluated by scoring the ground water use, distance to the nearest well, and the population served by ground water.

2.1.5.1 EPA Proposed Score

EPA assumed that the water from the contaminated aquifer is used for irrigation with no other water source presently available. This resulted in a assigned value of 2 for ground water use. A standard multiplier of 3 was then used to calculate the score of 6 (six).

Based on the fact that the irrigation wells are contaminated, EPA used the distance to the nearest well as 0 ft, resulting in a score of 4 (four). The population served was calculated based on an 1,100 acres of land irrigated and 1.5 people per acre: for a total of 1,650 people and a score

of 3 (three). This, in turn, resulted in a matrix score of 30 for ground water targets.

The combined EPA proposed score for the ground water targets was calculated as $6+30=36$ (thirty-six).

2.1.5.2 Technical Issues

The ground water within 3 mile radius of MCAS El Toro contains total dissolved solids (TDS) in concentrations significantly above drinking water standards. Hence the aquifer is not conducive to, and not used for, domestic supply. The ground water in the area is used only for irrigation. An alternative water supply is readily available, although at significantly higher cost than that pumped from the aquifer. Furthermore, the area of the aquifer potentially impacted by the TCE contamination represents only a small portion of the aquifer available for irrigation water supply. Therefore, the ground water use score should have an assigned value of 1 (one).

Assuming that 0.5 inches of water a day is used for irrigating 1,100 acres results in a total required pumpage rate of 10,000 gallons per minute (gpm). This is significantly more than the total rated capacities of the five wells located within the three mile radius of the station. If all five wells are pumped at an average rate of 500 gpm continuously throughout a day, the total area that could be irrigated at 0.5 inches a day would be 266 acres. The population served can then be calculated as $266 \times 1.5 = 399$. This, in turn would result in an assigned value of 2 (two) for the population served.

2.1.5.3 Revised Score

Using the multiplier of 3, an assigned value of 1 (one) would result in a score of 3 (three) for ground water use.

An assigned values of 4 (four) for the distance to the nearest well and 2 (two) for the population served would result in a matrix score of 20 (twenty).

Thus, the total score for the ground water route targets should be $3+20=23$ (twenty-three).

2.1.6 SUMMARY OF GROUND WATER MIGRATION ROUTE

As stated previously, the objective of the ground water migration route evaluation is to assess potential impacts to ground water from past activities at MCAS El Toro. A summary of the EPA proposed ground water migration route evaluation is presented in Section 2.1.6.1. Based on the technical issues presented in previous sections, a summary of the revised ground water migration route score is presented in Section 2.1.6.2.

2.1.6.1 EPA PROPOSED ROUTE SCORE

In summary, EPA proposed a score of 45 for an observed release to ground water, which resulted in no evaluation of route characteristics. This score was assigned by assuming that the TCE contamination in ground water resulted from activities at MCAS El Toro. The waste characteristics subscore was based on a score of 18 for the toxicity and persistence, and 7 for hazardous waste quantity; for a total score 25. This score was based on the assumptions that PCBs, chloroform, and leaded fuels from station operations have contaminated the ground water, and that all potentially

hazardous sites identified during the Initial Assessment Study of the station contributed to ground water contamination.

A ground water target score of 36 was proposed by EPA, which was obtained by adding the assigned values of 6 for ground water use and 30 for the distance to the nearest well/population served. This score resulted from the assumption that of all 1,100 acres irrigated in the basin are supplied by the irrigation wells located within a 3 mile radius of MCAS El Toro. It was further assumed that the aquifer within 3 mile radius of the station is a sole-source aquifer for irrigation, and that no other water supplies exist in the area.

The multiplication of the observed release (45), waste characteristics (25), and targets (36) scores proposed by EPA resulted in 40,560. Division of this score by 57,330 and multiplication by 100 (for normalization of the score) resulted in a ground water migration route score of 70.64 proposed by EPA.

A copy of the EPA proposed ground water route work sheet is included as Figure 2-3.

2.1.6.2 REVISED ROUTE SCORE

The detailed technical basis for the revised ground water route score is presented in Sections 2.1.1.2, 2.1.2.2, 2.1.3.2, 2.1.4.2, and 2.1.5.2 for observed the release, route characteristics, containment, waste characteristics, and targets, respectively. A brief summary of the technical basis for the revised subscore for each component of the ground water route score is presented below.

Ground Water Route Work Sheet						
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)	
1 Observed Release	0 45	1	45	45	3.1	
If observed release is given a score of 45, proceed to line 4 . If observed release is given a score of 0, proceed to line 2 .						
2 Route Characteristics					3.2	
Depth to Aquifer of Concern	0 1 2 3	2		6		
Net Precipitation	0 1 2 3	1		3		
Permeability of the Unsaturated Zone	0 1 2 3	1		3		
Physical State	0 1 2 3	1		3		
Total Route Characteristics Score				15		
3 Containment	0 1 2 3	1		3	3.3	
4 Waste Characteristics					3.4	
Toxicity/Persistence	0 3 6 9 12 15 18	1	18	18		
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	7	8		
Total Waste Characteristics Score				25	28	
5 Targets					3.5	
→ Ground Water Use	0 1 2 3	3	6	9		
→ Distance to Nearest Well/Population Served	0 4 8 8 10 12 16 18 20 40 24 30 32 35 40	1	30	40		
Total Targets Score				36	49	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			40500	57.330		
7 Divide line 6 by 57.330 and multiply by 100			S_{gw} = 70.64			

**FIGURE 2
GROUND WATER ROUTE WORK SHEET**

*KEA
7/30/87*



A score of 0 is assigned to the observed release to ground water based on the fact that the TCE contamination in ground water (the only confirmed contaminant) cannot be directly attributed to the use of and release thereof to ground water at MCAS El Toro. Thus, the route characteristic and containment components were evaluated.

The confirmed depth to the water table of more than 100 ft at the western and southwestern portions of MCAS El Toro results in an assigned value of 2 (using a multiplication factor of 2) for the depth to aquifer of concern. Less than 11 inches a year of net precipitation results in an assigned value of 0 for that category. The known makeup of the unsaturated zone soils (primarily silty clays and sandy silts) results in an assigned value of 1 for the permeability of unsaturated zone. A value of 3 is assigned to the physical state of the disposed contaminant based on the assumption that TCE was liquid when used or disposed of at the station. The sum of the assigned values for individual categories result in a score of 6 for ground water route characteristics ($2+0+1+3=6$).

It is assumed that the TCE was used and/or disposed of in areas of no physical containment. This assumption results in a score of 3 for the ground water route containment.

An assigned value of 12 resulted from the toxicity and persistence evaluation of TCE, the only confirmed contaminant in the ground water. The waste quantity estimates from locations of potential TCE (or solvent) use and/or disposal result in an assigned value of 5 for the hazardous waste quantity. The total score for waste characteristics is then calculated as 17 ($12+5=17$).

The ground water in the area is used only for irrigation purposes and is not conducive to domestic use. The area of the aquifer within 3 miles of the MCAS El Toro represents only a small portion of the aquifer available for irrigation use. Furthermore, other water supplies (city and county) are readily available in the area. These known factors result in an assigned value of 3 (using the multiplication factor of 3) for ground water use. An estimation of the population served from 5 irrigation wells in the vicinity, and the assumption of contamination in those wells, results in an assigned value of 20 for the distance to the nearest well/population served. The combined score for the targets is then calculated as $3+20=23$.

Multiplication of the route characteristics, containment, waste characteristics, and targets scores (6, 3, 17, and 23, respectively) result in a value of 7,038. Division of this number by 57,330 and multiplication by 100 results in a revised score of 12.27 for the ground water migration route.

A copy of the revised ground water route work sheet is included as Figure 2-4.

2.2 ALTERNATIVE GROUND WATER ROUTE EVALUATION

An alternative evaluation of the ground water migration route is presented below based on the assumption that the TCE contamination observed in TIC wells 55, 47, and 35 are the result of past use or disposal activities at the MCAS El Toro. This assumption would lead to a score of 45 for observed release, and the evaluation of route characteristics and containment would not be conducted. The technical issues presented in Sections 2.1.4.2 and 2.1.5.2 would still be valid; and thus the scores of 17 and 23 for waste characteristics and targets would remain the same as those for the revised scoring in Section 2.1.

Ground Water Route Work Sheet

Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
---------------	--------------------------------	-------------	-------	------------	----------------

1 Observed Release	0	45	1	0	45	3.1
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If observed release is given a score of 45, proceed to line **4**.
 If observed release is given a score of 0, proceed to line **2**.

2 Route Characteristics					3.2		
Depth to Aquifer of Concern	0	1	2	3	2	2	6
Net Precipitation	0	1	2	3	1	0	3
Permeability of the Unsaturated Zone	0	1	2	3	1	1	3
Physical State	0	1	2	3	1	3	3
Total Route Characteristics Score						6	15

3 Containment	0	1	2	3	1	3	3	3.3
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4 Waste Characteristics					3.4							
Toxicity/Persistence	0	3	6	9	12	15	18	1	12	18		
Hazardous Waste Quantity	0	1	2	3	4	5	6	7	8	1	5	8
Total Waste Characteristics Score										17	26	

5 Targets					3.5												
Ground Water Use	0	1	2	3	3	3	9										
Distance to Nearest Well/Population Served	0	4	6	8	10	12	16	18	20	24	30	32	35	40	1	20	40
Total Targets Score																23	49

6 If line 1 is 45, multiply 1 x 4 x 5						
If line 1 is 0, multiply 2 x 3 x 4 x 5	7,038	57,330				

7 Divide line 6 by 57,330 and multiply by 100						
						S _{gw} = 12.27

In this event, multiplication of the observed release, waste characteristics, and targets scores of 45, 17, and 23 would result in a value of 17,595. Division of this value by 57,330 and multiplication by 100 would then result in an alternative ground water route score of 30.69.

A copy of the alternative ground water route work sheet is included as Figure 2-5.

2.3 HAZARD RANKING SYSTEM SCORE FOR MCAS EL TORO

The Hazard Ranking System (HRS) is used to evaluate the relative potential of uncontrolled hazardous substance facilities to cause health or safety problems, or ecological or environmental damage. It is intended as a means for applying uniform technical judgement regarding the potential hazards presented by a facility relative to other facilities. It is evaluated by assigning scores to three hazard modes of migration, fire and explosion, and direct contact. This section presents the results of HRS scoring proposed by EPA for the MCAS El Toro, as well as the results of revised HRS score based on a more comprehensive evaluation of available data. An alternative HRS scoring is also presented for the more conservative evaluation of potential impacts from MCAS El Toro.

2.3.1 EPA PROPOSED HRS SCORE

EPA did not evaluate either the fire and explosion mode or the direct contact mode. Of the three components of the migration mode only the ground water migration route was scored by EPA. The surface water route was not scored due to lack of a target population while the air route was not scored due to lack of air monitoring data.

Ground Water Route Work Sheet

Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
---------------	--------------------------------	-------------	-------	------------	----------------

1 Observed Release	0 45	1	45	45	3.1
---------------------------	-------------	---	----	----	-----

If observed release is given a score of 45, proceed to line **4**.
 If observed release is given a score of 0, proceed to line **2**.

2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 3	2		6	
Net Precipitation	0 1 2 3	1		3	
Permeability of the Unsaturated Zone	0 1 2 3	1		3	
Physical State	0 1 2 3	1		3	

Total Route Characteristics Score				15	
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3 Containment	0 1 2 3	1		3	3.3
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4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 12 15 18	1	12	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	5	8	

Total Waste Characteristics Score			17	26	
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5 Targets					3.5
Ground Water Use	0 1 2 3	3	3	9	
Distance to Nearest Well/Population Served	0 4 8 8 10 12 16 18 20 24 30 32 35 40	1	20	40	

Total Targets Score			23	49	
---------------------	--	--	----	----	--

6 If line 1 is 45, multiply 1 x 4 x 5					
If line 1 is 0, multiply 2 x 3 x 4 x 5			17,535	57,330	

7 Divide line 6 by 57,330 and multiply by 100	$S_{gw} = 30.69$				
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A HRS score of 40.83 is proposed by EPA for MCAS El Toro using a ground water migration route score of 70.64 (70.64/1.74=40.83).

2.3.2 REVISED HRS SCORE

Similar to EPA's evaluation, neither the fire and explosion nor the direct contact modes were evaluated for the revised scoring. The surface water route is also not scored due to lack of a target population, and the air route is not scored due to lack of air monitoring data.

Based on the ground water migration route score of 12.27, the HRS score for MCAS El Toro should be 7.09 (12.27/1.73=7.09).

2.3.3 ALTERNATIVE HRS SCORE

The alternative HRS score was also obtained using the assumptions presented in Section 2.3.2. The ground water migration route score used, however, is based on the discussion presented in Section 2.2.

An alternative ground water migration route score of 30.69 would result in an alternative HRS score for MCAS El Toro of 17.74 (30.69/1.73=17.74).

SECTION 3

PROJECT STATUS

As stated in Section 1, two Plan of Actions (POAs) have been proposed for Confirmation Studies at MCAS El Toro: the Site Inspection POA and the Perimeter Investigation POA.

The Verification Step POA, addressing 13 specific sites at the station, is currently being finalized by JMM after receiving regulatory agency comments. Following contract negotiations, it is anticipated that the work for this POA will commence during first quarter of 1989.

The Perimeter Investigation POA, which was developed to evaluate whether MCAS El Toro is a source of the TCE contamination in the TIC irrigation wells, is currently underway. This POA addresses the off-station TCE contamination by evaluating the potential for each of the individual disposal or use sites to contribute to the ground water degradation. A literature search and testing of the TIC Well 55 located on stations has been completed. Due to the age and scaled condition of TIC 55, satisfactory results to define the vertical distribution of contaminants in ground water have not been achieved. Following discussions with the Navy, a decision was made to install a 5 well cluster monitoring system near TIC 55. This cluster is currently installed and is being tested to evaluate the hydrogeologic properties of the aquifer. The ground water from various elevations will then be sampled for VOCs. In addition to the cluster wells, 8 shallow wells (50 ft deep) have been installed adjacent to drainage channel beds to evaluate potential contamination from those locations. No perched water or contaminated soils were encountered at any

of the 8 locations. A ground water flow and solute transport model is currently being developed to evaluate potential contamination migration routes. The model results will then be used to select the most probable contamination pathways where additional monitoring wells will be installed near the base perimeter. It is anticipated that the Perimeter Investigation will be finalized by December, 1988.

In addition to the work being accomplished by the Navy within MCAS El Toro boundary, the OCWD has currently undertaken an off-base ground water investigation program to define the nature and extent of TCE contamination found in TIC wells 35 and 47. It is anticipated that this study will also be completed by December, 1988. The Perimeter Investigation and off-base investigation results will then be jointly evaluated to assess the potential on- or off-station source(s) of the TCE contamination.

APPENDIX A
REFERENCES

APPENDIX A – REFERENCES

THIS APPENDIX IS NOT AVAILABLE.

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