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THE UNITED STATES AIR FORCE

INSTALLATION RESTORATION PROGRAM

FINAL
FIRST
FIVE-YEAR REVIEW OF RECORD OF DECISION
FOR
MARBO ANNEX OPERABLE UNIT

ANDERSEN AIR FORCE BASE, GUAM

July 2004

THE UNITED STATES AIR FORCE INSTALLATION RESTORATION PROGRAM

FINAL
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Andersen Air Force Base, Guam

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13. ABSTRACT ***(Maximum 200 words)***

This Five-Year Review of Record of Decision (ROD) presents the results of the implemented remedies for impacted soils and groundwater for MARBO Annex Operable Unit. This document includes the review of the latest available data since the ROD was signed in 1998 to determine the current and the future effectiveness of the implemented remedies in protecting the human health and the environment.

14. SUBJECT TERMS

- *Andersen AFB*
- *Remedial Investigation/Feasibility Study*
- *Public Involvement*
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- *Human Health Risk Assessment*
- *Ecological Risk Assessment*
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

July 6, 2004

Gregg Ikehara
36 CES/CEVR
Unit 14007
APO AP 96543-4007

Re: EPA Concurrence with the Air Force's *First Five-Year Review of the Record of Decision for MARBO Annex Operable Unit at Andersen Air Force Base.*

Dear Mr. Ikehara,

EPA has reviewed the *First Five-Year Review of the Record of Decision for MARBO Annex Operable Unit at Andersen Air Force Base.* This Five-Year Review addresses completed and ongoing remedial actions taken pursuant to the Record of Decision ROD for the MARBO Annex signed in July, 1998. The remedies specified in the ROD included soil removal actions at three sites, a soil cover and institutional controls at one site, and monitored natural attenuation, wellhead treatment and institutional controls for the groundwater.

EPA agrees that the soil remedial actions at the MARBO Laundry and Landfill 29 have been successfully completed and that these sites are suitable for unrestricted access. The remedial action at Waste Pile 6 is still underway because of the discovery of additional contamination. This remedial action of soil removal should be completed in the summer of 2004, and the site should then be suitable for unrestricted access. Access to the site is currently restricted during the remedial process.

The soil cover for Waste Pile 7 was properly installed in the spring of 2000. However, as the report notes, and as EPA observed during the field inspection in February, 2004, a wild pig has wallowed at the site. While the wallow did not breach the cover and has been successfully repaired, such activities do pose an increased risk for a breaching of the cover in the future. As suggested in the Five-Year Review, the Operations and Maintenance (O&M) plan for this site should be amended to include quarterly monitoring of the cover integrity, with repairs as necessary. Also as suggested in the Five-Year review, warning notices should be posted to implement the institutional controls specified in the ROD.

EPA is not convinced that monitored natural attenuation, the groundwater remedy specified in the ROD, is remediating the site in a timely manner. EPA agrees with the Air Force that human health is currently protected because no one is exposed to the water. We also agree that the provisions in the ROD calling for the Air Force to provide treatment if water is produced from

the contaminated portion of the aquifer will protect human health in the future. However, we require additional proof that the current remedy will actually remediate the aquifer to drinking water quality within the 45 year time frame stated in the ROD. Recognizing the hydrogeologic complexities of a karst aquifer with a fresh water lens overlying basal salt water, we agree with the Air Force's recommendations to acquire additional data through new borings and monitoring wells. We will reevaluate the current remedy during the next Five Year Review, and will require a ROD Amendment if monitored natural attenuation is not proven to be effective. The ROD Amendment would specify either an active remediation system or a technical impracticability (TI) waiver.

Please submit to EPA a workplan to further investigate the groundwater at MARBO by 11/30/2004. Please also submit the modified O&M Plan for Waste Pile 7 by 9/30/2004. Finally, please submit copies of the written implementation (Base Operating Plan, deed restrictions, etc.) of the institutional controls for Waste Pile 7 and the groundwater by 9/30/2004.

Please call Mark Ripperda of my staff if you have any questions regarding the Five-Year Review

Sincerely,

Kathleen Johnson, Chief
Federal Facility and Site Cleanup Branch
Superfund Division

cc: Mike Cruz, GEPA

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AAFES	Army and Air Force Exchange Service
AFB	Air Force Base
AFI	Air Force Instruction
AOC	Area of Concern
AOI	Area of Interest
APEC	Allied Pacific Environmental Consulting
ARAR	Applicable or Relevant and Appropriate Requirement
ASHA	Andy South Housing Area
AST	aboveground storage tank
bcy	bank cubic yards
BEE	Bioenvironmental Engineering
bgs	below ground surface
BTV	Background Threshold Value
ca	cancer
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
CRP	Community Relations Plan
CU	Consolidation Unit
CWA	Clean Water Act
DAWR	Department of Aquatic and Wildlife Resources
DCE	dichloroethene
DO	Dissolved Oxygen
EA	EA Engineering, Science, and Technology, Inc.
EBS	Environmental Baseline Survey
EE/CA	Engineering Evaluation/Cost Analysis
EPC	Exposure Point Concentration
ERA	Ecological Risk Assessment
FFA	Federal Facility Agreement
GC/MS	Gas Chromatography/Mass Spectrometer
GEPA	Guam Environmental Protection Agency
GovGuam	Government of Guam
GPA	Guam Power Authority
gpm	gallons per minute
GPZ	Groundwater Protection Zone
GWA	Guam Waterworks Authority
GWMP	Groundwater Monitoring Plan

HHRA	Human Health Risk Assessment
HI	Hazard Index
IC	Institutional Control
IRP	Installation Restoration Program
lcy	loose cubic yard
LTGM	Long-Term Groundwater Monitoring
LTM	Long-Term Monitoring
MARBO	Marianas Bonins Command
MCL	Maximum Contaminant Level
mgd	million gallons per day
mg/kg	milligrams per kilogram
µg/L	Micrograms Per Liter
MLLW	mean lowest level water
msl	mean sea level
nc	non-cancer
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ND	non-detect
NFA	No Further Action
NGL	Northern Guam Lens
NPL	National Priorities List
OEW	Ordnance and Explosives Waste
O&M	Operation and Maintenance
OU	Operable Unit
OSWER	Office of Solid Waste and Emergency Response
PA	Preliminary Assessment
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PDB	passive diffusion bag
PRG	Preliminary Remediation Goal
PUAG	Public Utility Agency of Guam
RA	Remedial Action
RAB	Restoration Advisory Board
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RGO	Remedial Goal Objective
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
RVR	Remedial Verification Report

SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act of 1986
SDWA	Safe Drinking Water Act
SVOC	semivolatile organic compound
TBC	To Be Considered
TCE	trichloroethene
TI	technical infeasibility
TSCA	Toxic Substance Control Act
TSP	triple superphosphate
USAF	United States Air Force
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
USN	United States Navy
VOC	volatile organic compound

Five-Year Review Summary Form

SITE IDENTIFICATION

Site name *(from Waste LAN)*: MARBO Annex Operable Unit

EPA ID *(from Waste LAN)*: CERCLIS identification number of GU6571999519

Region: Pacific Ocean	**State:** Guam	**City/County:** Yigo

SITE STATUS

NPL status: X Final Deleted Other (specify) _____

Remediation status (choose all that apply): Under Construction X Operating X Complete

Multiple OUs?* Yes X No	**Construction completion date**: 07 / 17 / 1998

Has site been put into reuse? Yes X No

REVIEW STATUS

Lead agency: EPA State Tribe X Other Federal Agency United States Air Force

Author name: Joel Lazzeri, P.G., Toraj Ghofrani, P.E., and Jeff Morrell

Author title: Program Manager	**Author affiliation:** USAF Contractor

Review period:** 02 / 11 / 2004 to 04 / 11 / 2004

Date(s) of site inspection: 02 / 19 / 2004

Type of review: Post-SARA; Pre-SARA; NPL-Removal only; Non-NPL Remedial Action Site; X NPL State/Tribe-lead; Regional Discretion

Review number: X**1** (**first**) 2 (second) 3 (third) other (specify) __

Triggering Action:

Actual RA Onsite Construction at OU # _____ Actual RA Start at OU # ____

Construction completion Previous Five-Year Review Report

X Other (specify) _____the mobilization for the cleanup of IRP Site 20/Waste Pile 07____

Triggering action date *(from WasteLAN)*: 03 / 02 / 1999

Due date *(five years after triggering action date)*: 03 / ___ 02/ 2004

* ["OU" refers to operable unit.]

** [Review period should correspond to the actual start an end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, Continued

Issues, Recommendations and Follow-up Actions, and Protectiveness Statement(s):

Based on human health and ecological risk assessments, there were no COCs associated with IRP Site 23/Waste Pile 5 and IRP Site 37/War Dog Borrow Pit and these sites were recommended for *No Further Action* in accordance with the 17 July 1998 ROD for MARBO OU. These sites should not be included in the future five-year reviews of MARBO OU.

Based on human health and ecological risk assessments, there were COCs associated with IRP Site 22/Waste Pile 6, IRP Site 24/Landfill 29, and IRP Site 38/MARBO Laundry. For these sites, *Soil Removal* was selected as the Remedial Action (RA), in accordance with 17 July 1998 ROD for MARBO OU. The RA implementation is completed at IRP Site 22/Waste Pile 6, IRP Site 24/Landfill 29, and IRP Site 38/MARBO and RA is protective of human health and the environment. These sites also should not be included in the future five-year reviews of MARBO OU.

Based on human health and ecological risk assessments, there were COCs associated with IRP Site 20/Waste Pile 7and *Soil Cover* was selected as the RA, in accordance with 17 July 1998 ROD for MARBO OU. The RA implementation is completed at IRP Site 20/Waste Pile 7, but the RA is not functioning as designed. Pig wallowing and the growth of small trees have damaged a small area of the *Soil Cover* and there are truck track marks on the *Soil Cover*. If these effects continue the RA will may not be protective of human health and the environment. Quarterly Operation and Maintenance (O&M) and event driven O&M are recommended, in addition to the posting of warning signs around the periphery of the site to restrict any activities that may impact the structural integrity of the *Soil Cover*. The milestone is targeted for 01 October 2004. IRP Site 20/Waste Pile 7 should be included in the future five-year reviews of MARBO OU.

Based on human health and ecological risk assessments, the MARBO groundwater is impacted by TCE and PCE. In accordance with 17 July 1998 ROD for MARBO OU, *Natural Attenuation* was selected as RA in addition to three institutional controls (ICs): 1) *Land Use Restrictions*; 2) *Groundwater Monitoring*; and 3) *Existing Wellhead Treatment.*

Natural Attenuation has always been implemented and ICs were implemented in early 1998, with the exception of wellhead treatment. Wellhead treatment was discontinued shortly after its implementation, in early 1998, because it was no longer required to meet USAF water demands and the stripping tower that was being used to treat the water was fouling up too often to make operations cost effective. The RA, however, is functioning as intended and it is protective of human health and the environment. Overall the natural attenuation process is operating as intended at MARBO, though the process may not be proceeding at the rate estimated in the MARBO ROD. The overall timeframe for the remediation to go to completion, which was estimated at approximately 45 years, may take longer.

Several issues remain associated with RA for MARBO groundwater, including:

- Freshwater, transition and marine zones need better definition,
- PCE and TCE source(s) in MARBO Annex have not been identified,
- Fate and transport of TCE and PCE within MARBO at depth are poorly understood, and
- Tumon-Maui well is currently not being used, and as such no benefits are derived from either use of the water or the remedial effects.
- Natural attenuation may not be remediating the site in timely manner. If, during the next five-year review period, natural attenuation does not appear to be effective a ROD amendment may be required to either specify an active remediation or a technical infeasibility (TI) waiver.

In response to above listed issues, the following recommendations are made:

- Deep soil borings should be drilled at IRP Sites 52 and 54 to look for potential source areas,
- Additional open boreholes, penetrating the entire freshwater lens, should be considered to better understand hydrogeology and fate and transport of PCE and TCE at depth,
- Dye trace study, relevant to IRP-31 and IRP-29, should be considered, and
- Tumon-Maui well long-term use should be evaluated.

The milestone for most issues listed above is targeted for 31 December 2005 and later for items requiring additional funding (drilling). MARBO groundwater should be included in the future five-year reviews of MARBO OU.

Notes:
-Summarize issues (see Chapter 3).
-Summarize recommendations and follow-up actions (see chapter 3)
-Include individual operable unit protectiveness statements. For sites that have reached construction completion and have more than on OU, include an additional and comprehensive protectiveness statement covering all of the remedies at the site (see Chapter4).

Other Comments: None.
Make any other comments here.

EXECUTIVE SUMMARY

This is the first five-year review to evaluate if remedies that were implemented for the Record of Decision (ROD) for the Marianas Bonins (MARBO) Command Annex Operable Unit (OU) are still protective of human health and the environment. The five-year review has been completed in accordance with the United States Environmental Protection Agency (USEPA) Comprehensive Five-Year Review Guidance, June 2001, USEPA 540-R-01-007, and Office of Solid Waste and Emergency Response (OSWER) No. 9355.77-03B-P. To complete this five-year review of the July 1998 Final MARBO OU ROD, all relevant activities that have been performed and data and documents that have been generated since the implementation of remedial action have been reviewed. Recommendations are provided to close any data gaps and improve the effectiveness of the remedial action in protecting human health and the environment.

A *No Further Action* ROD was approved for the Harmon OU. As the ROD resulted in site conditions that allowed for unlimited use and unrestricted exposure, no five-year review is required. Remedial Investigation (RI) and Remedial Action (RA) activities are ongoing at the Northwest Field and the Main Base OUs, and there are no RODs to discuss. The Urunao ROD has just been finalized and no five-year review is required. All RA activities at MARBO Annex, under the MARBO OU, have been completed. In addition, three Areas of Concern (AOCs), located in MARBO Annex (AOC 54, AOC 55, and AOC 56), have been added as Installation Restoration Program (IRP) Site 52, IRP Site 53, and IRP Site 54, respectively and will be managed in the Basewide OU. The USAF is programming funding for IRP Site 52, IRP Site 53, and IRP Site 54 engineering evaluations/cost analyses (EE/CAs) that will be conducted in 2004 or 2005. The EE/CAs will characterize the extent of potential Contaminants of Concern (COCs), and if there are unacceptable risks posed to human health or the environment the EE/CAs will provide recommendations for RAs based on risk-based cleanup goals. The RA should be completed in the next five years. Until the EE/CAs and RAs are completed warning signs should be posted around IRP Site 52, IRP Site 53, and IRP Site 54. The next five-year review should include verification that the EE/CAs and RAs were fully implemented and that they meet protectiveness standards.

This five-year review evaluates the MARBO OU ROD and related actions, and focuses on the MARBO OU and the new IRP Sites in the Basewide OU. The MARBO OU includes IRP Site 20/Waste Pile 7, IRP Site 22/Waste Pile 6, IRP Site 23/Waste Pile 5, IRP Site 24/Landfill 29, IRP Site 37/War Dog Borrow Pit, IRP Site 38/MARBO Laundry, and the groundwater beneath them.

According to MARBO OU ROD, there were no COCs at IRP Site 23/Waste Pile 5 or IRP Site 37/War Dog Borrow Pit that posed unacceptable risks to human health or the environment; therefore, a *No Further Action* (NFA) was recommended for these sites. A review of available documents and a site inspection confirm that the NFA is still functioning as intended and is still protective of human health and the environment. The nature of the source still remains unknown. Unless a new source of contamination is found at the in the interim, the site should not be included in future five-year reviews.

The RAs for IRP Site 22/Waste Pile 6, IRP Site 24/Landfill 29, and IRP Site 38/MARBO Laundry involved removal of all soils (*Soil Removal*) to levels below Remedial Action Objectives (RAOs). These sites are classified as *Completed RAs*. After reviewing available documents and conducting site visits, the *Soil Removals* are still functioning as intended and are still protective of human health and the environment. Unless a new source of contamination is found at the site in the interim, the site should not be included in future five-year reviews.

The RA for IRP Site 20/Waste Pile 7 is considered an *Operating RA*, as the selected remedy (*Soil Cover*) has been initiated, but must be maintained in perpetuity to be protective of human health and the environment. After reviewing available documents and performing a site inspection it was determined that the *Soil Cover* is functioning as intended by the ROD, and is protective of human health and the environment. However, several concerns were identified, that should be addressed to assure that the selected remedy is maintained optimally. Pig wallowing activity has damaged a small area of the *Soil Cover* and several small trees have been observed growing on the *Soil Cover*. If these activities are allowed to continue unchecked the structural integrity of the *Soil Cover* may be compromised. A regular quarterly Operation and Maintenance (O&M) program is recommended to verify and maintain the integrity of the *Soil Cover*. As part of the O&M program "event driven" inspections are recommended to check the integrity of the *Soil Cover* after natural disasters, such as typhoons or earthquakes. Furthermore, to prevent intrusive activities (such as driving trucks, trenching, or excavation) that would damage the *Soil Cover*, signs should be posted around the periphery of site. The next five-year review should include verification that signs are properly posted and that the O&M program is being implemented to meet protectiveness standards.

The selected alternative for the MARBO Annex Groundwater consisted of *Natural Attenuation with Institutional Controls*. This alternative included natural attenuation to achieve the remediation goal of decreasing trichloroethene (TCE) and tetrachloroethene (PCE) concentrations in the aquifer to levels below Maximum Contaminant Level (MCLs). The natural attenuation of the TCE and PCE would be due primarily to the physical processes of dispersion and dilution, and not to dechlorination processes. The timeframe to achieve cleanup goals (MCLs) was estimated at 10 to 40 years, assuming a continued source of PCE and TCE did not exist. Supplemental to the natural attenuation were three institutional controls (ICs), that included: 1) *Land Use Restrictions* to monitor and restrict groundwater access in areas impacted by TCE/PCE); 2) *Groundwater Monitoring* (to monitor TCE/PCE and confirm the stability of TCE/PCE plumes in the MARBO Annex); and 3) *Existing Wellhead Treatment* (to ensure public health risk is within acceptable range at existing USAF production wells).

The selected alternative is classified as an *Operating Remedial Action*, as the RA has been implemented but residual COCs have been left in place at concentrations that do not allow for unrestricted use of or unlimited access to the land. The O*perating RA* may require many more years before cleanup levels can be fully achieved.

Since approval of the MARBO OU ROD, significant new data has been collected in both the MARBO Annex and down gradient locations in Harmon and Tumon. In addition a re-survey of monitoring wells indicated that several well elevations used to generate potentiometric surface maps were in error. A newly generated groundwater potentiometric surface map for the

MARBO Annex, based on the re-surveyed elevations and the Fall 2003 groundwater elevations, reveal a much "flatter" groundwater gradient in the vicinity of IRP-31 and IRP-12 than previous believed. This new information significantly changes the potential relationship between the PCE and TCE observed at the MARBO Laundry wells (IRP-14 and IRP-29) and those observed in IRP-31.

The ICs specified in the MARBO OU ROD were fully implemented with the exception of wellhead treatment for MW-2. MW-2 was taken off production in early 1998 as it was no longer required to meet USAF water demands and the stripping tower that was being used to treat the water was fouling up too often to make operations cost effective. The remedy, however, is functioning as intended, in that it is still protective of human health and the environment. Overall the natural attenuation process is operating as intended at MARBO, despite ambiguous TCE trends in IRP-31, though the process may not be proceeding at the rate estimated in the MARBO ROD. The overall timeframe for the remediation to go to completion, which was estimated at approximately 45 years, may take longer. The primary limitation to these estimates includes the uncertainty of the total TCE/PCE mass that may exist in the subsurface. As the source(s) of the PCE and TCE have never been positively identified the estimated cleanup times should take this in to consideration, with the understanding that actual cleanup times may exceed the high end of the range (45 years). The EE/CAs and RAs that are programmed for the three new IRP sites, will be designed to explore for possible TCE and PCE sources. If, during the next five-year review period, natural attenuation does not appear to be effective in remediating the site in timely manner, a ROD amendment may be required to either specify an active remediation or a technical infeasibility (TI) waiver.

The next five-year review of MARBO ROD is scheduled after 02 March 2009, five years from this review, and should include a full review of the groundwater at MARBO Annex. The related review period would be from 02 March 2004 to 02 March 2009.

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1.0 INTRODUCTION

On 14 October 1992, the United States Environmental Protection Agency (USEPA) Region IX formally listed Andersen Air Force Base (AFB) on the National Priorities List (NPL) with a Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) identification number of GU6571999519. By 30 March 1993, the United States Air Force (USAF) entered into a Federal Facility Agreement (FFA) with the USEPA and the Guam Environmental Protection Agency (GEPA) and began its Superfund clean-up program in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Under the CERCLA, Andersen AFB is required to conduct a Record of Decision (ROD) review every five years. This Five-Year ROD review has been prepared for the Marianas Bonins (MARBO) Command Annex in accordance with the USEPA Comprehensive Five-Year Review Guidance, June 2001, USEPA 540-R-01-007, and Office of Solid Waste and Emergency Response (OSWER) No. 9355.77-03B-P.

1.1 The Purpose of the Five-Year Review

The purpose of a five-year review is to evaluate if remedies implemented at Andersen AFB are protective of human health and the environment. To do this, all relevant activities that have been performed and data and documents that have been generated since the implementation of remedial action are reviewed. If necessary, recommendations are provided to close any data gaps and improve the effectiveness of the remedial action in protecting human health and the environment.

1.2 Overview of the Five-Year Review Process

This Five-Year ROD Review is mandated as part of the Superfund Amendments and Reauthorization Act of 1986 (SARA), which amended the CERCLA. A five-year review is applicable to sites that a ROD, or a Decision Document, was signed on or after the 17 October 1986, the effective date of the SARA. According to CERCLA §121(c), as amended:

"a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the congress a list of facilities for which such review is required, the results of all such reviews, and any action taken as a result of such reviews."

This requirement is further defined in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP); 40 C.F.R Part 300.430(f)(4)(ii), and states that:

"If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the remedial action."

According to USEPA guidelines (USEPA, 2001), a five-year review is triggered when a remedial action (RA) results in residual hazardous materials, pollutants, or contaminants remaining at a site above concentrations that would allow unlimited use and unrestricted exposure of the site. For the MARBO ROD, the remedial action that has left residual contaminants in place that restrict unlimited use is the mobilization for the cleanup of Installation Restoration Program (IRP) Site 20/Waste Pile 7. This mobilization was initiated on 02 March 1999. This is the first five-year review of the MARBO ROD and covers the period of 02 March 1999 through 02 March 2004.

The USAF is the lead agency that is conducting this five-year review for the MARBO Annex ROD. EA Engineering Science and Technology Inc. (EA) has been contracted by the USAF to conduct the site inspection and prepare this five-year review for Andersen AFB. The review team includes the USAF, USEPA Region IX, and GEPA.

1.3 Site Location

Guam is the largest of the Mariana Islands and is located in the western Pacific Ocean between 13°15′ and 13°39′ north latitude and 144°37′ and 144°57′ east longitude, approximately halfway between Japan and New Guinea (Figure 1-1). The island has an area of nearly 209 square miles and is approximately 30 miles long and 4 to 8 miles wide.

Andersen AFB is located in the northern half of the island and it consists of several parcels of land in the northern half of the island (Figure 1-2). The largest contiguous portion of Andersen AFB property consists of the Main Base and Northwest Field, which together are approximately 8 miles wide, 2 to 4 miles long, and 24.5 square miles in area. The active base operations are located at the Main Base. Northwest Field has been generally inactive since the mid-1950s (EA, 1997a). The Main Base and Northwest Field are bounded by the Rota Channel to the north, the Philippine Sea to the west, and the Pacific Ocean to the east (Figure 1-2).

Additional Andersen AFB properties include smaller, non-contiguous areas to the south, such as the Harmon Annex and the MARBO Annex (Figure 1-2). The Harmon Annex, comprising 1,817 acres, is located approximately 4 miles south of Northwest Field. The MARBO Annex, comprising 2,432 acres, lies approximately 4 miles south of the Main Base.

1.4 Site Physical Characteristics

MARBO Annex is located on a broad, uplifted limestone plateau that is underlain by volcanic rocks. The limestone plateau includes numerous sinkholes and ranges in elevation from 300 to over 500 feet above mean sea level (msl). The sinkholes are very porous and provide rapid infiltration of surface water to the underlying fresh water aquifer, rendering no permanent surface water bodies at MARBO Annex.

The surface of the limestone plateau is interrupted by two volcanic peaks, Mount Santa Rosa and Mataguac Hill, that are located northeast and north of the MARBO Annex, respectively (Figure 1-3). These low-permeability volcanic outcrops extend into the subsurface to form a lateral barrier that directs the groundwater flow towards the Tumon Bay (Figure 1-3). According to groundwater monitoring data (FWENC/EA, 2003a), the groundwater at MARBO Annex is encountered at approximately 281 feet to 400 feet below ground surface (bgs). Based on the 2001 Guam Water Quality Standards, the groundwater at MARBO, whether fresh or saline, is categorized as a G-1 Resource Zone for potable water (GEPA, 2001). Consequently, any wastewater discharges within the G-1 Resource Zone is regarded as tributary to the potential potable groundwater supply and must be free of pollutants.

Water extracted from production wells in the MARBO Annex area is blended with water produced in other locations, and distributed to Dededo, Yigo, Barrigada, Mangilao, and Andersen AFB, where the water usage is approximately 17 million gallons per day (mgd) (Barrett, 1992). Currently, seven of the eight Andersen AFB production wells (MW-series wells), located on the MARBO Annex (Figure 1-4), are used for water production, and can yield approximately 2.1 mgd, to meet the average Base consumption of 1.6 mgd (Andersen AFB, 2003a).

There are no residential areas within the MARBO Annex. The nearest populated areas are in the nearby villages of Dededo and Yigo located west, north, and east of the MARBO Annex. As of 2000, the combined population of Dededo and Yigo is approximately 62,000, which is approximately 40 percent of the island's population (United States Census Bureau, 2001). Dispersed, low-density populations characterize the area between these villages and the MARBO Annex.

MARBO Annex is located in the interior of Guam, away from the coastal cliff line and marine environments. Therefore, MARBO Annex is not within the range of the critical habitats of threatened or endangered species such as the Mariana crow (*Corvus Kubaryi*), the Mariana fruit bat (*Pteropus mariannus*), the Fire tree (*Serianthes nelsonii*), and the Ufa-Halomtano tree (*Heritiera longipetiolata*) (USAF, 1994 and Department of Aquatic and Wildlife Resources [DAWR], 1988).

1.5 Land and Resource Use

Presently, MARBO Annex properties are inactive. According to the Andersen AFB archives, MARBO Annex was developed for military housing, warehouses, industrial support facilities, and operational facilities (FWENC/EA, 2002a). From 1944 through 1950, MARBO Annex was under the jurisdiction of the Naval Government of Guam. Following the Organic Act of 1950, the United States Government took control of MARBO Annex and was administered by the United States Navy (USN). By 1956 all operations at MARBO Annex had ceased, except for the USN Power Plant and the water production wells. On 25 June 1958, the USAF assumed control of MARBO Annex. Based on review of available Real Estate Property records at Andersen AFB, all temporary buildings on the MARBO Annex were removed prior to June 1960.

Subsequent to finalization of the MARBO ROD in 1998 various land parcels have been transferred or have been proposed for transfer to other federal agencies or the Government of Guam (GovGuam). Two parcels, covering 81 acres and 395 acres (Figure 1-5) have been transferred to GovGuam. The 81-acre parcel (Figure 1-5; green) contains an active Guam Waterworks Authority (GWA) production well (Y-20) and includes the planned construction of a High School. The 231-acre parcel (Figure 1-5; magenta) contains a fire station and an active GWA production well (Y-19), and future land use plans include construction of a police station. Another 1,569-acre parcel was offered to the United States Marines, for training facilities, however in the fall of 2003 the Marines indicated that they are not interested in acquiring the property. The Air Force is currently considering alternate plans for future disposition of this parcel. Another 224-acre parcel (Figure 1-5; blue) is being retained by the Air Force for a variety of purposes. An area, near IRP Site 20, is being retained to ensure institutional controls (ICs) are maintained for the MARBO ROD. Several linked areas are being retained to support the Air Force groundwater production and distribution system at MARBO. Two areas (MARBO Laundry and Army and Air Force Exchange Service [AAFES] Warehouse) are being retained for Air Force warehousing activities.

1.6 Andersen AFB Operable Units

Andersen AFB elected to use an Operable Unit (OU) approach to manage the remedial investigations under their IRP. According to the 1993 FFA, the OUs were formed to:

- expedite the completion of environmental activities,
- evaluate sites with similar locations and potentially similar requirements as unique groups,
- complete remedial design investigations at sites where closure decisions have been previously reached with GovGuam, and
- provide a screening mechanism for evaluating newly or tentatively identified sites for inclusion in the Remedial Investigation/Feasibility Study (RI/FS).

Prior to 1996 the original OUs were designated numerically (ICF, 1994):

- OU-1 was designated for soils and potential contaminant sources associated with IRP Sites within the Main Base Landfill Complex (Table 1-1),
- OU-2 was designated for groundwater basewide (MARBO Annex, Main Base, Harmon Annex, and Northwest Field),
- OU-3 was designated for soils and potential contaminant sources associated with IRP Sites within the MARBO Annex (Table 1-1),
- OU-4 was designated for soils and potential contaminant sources associated with IRP Sites within the Harmon Annex, Northwest Field, and the Main Base, that lie inside the Groundwater Protection Zone (GPZ) (Table 1-1),

- OU-5 was designated for soils and potential contaminant sources associated with IRP Sites within the Harmon Annex, Northwest Field, and the Main Base, that lie outside the GPZ (Table 1-1), and

- OU-6 was designated for Basewide documents and any IRP Sites added to the IRP subsequent to execution of the FAA in 1994 (Table 1-1).

In 1996 the USAF, USEPA, and GEPA agreed that to effectively respond to projected property transfers (Harmon and MARBO Annexes) the criteria used to develop the original numerical OU designations were impractical for effective management of the IRP (Table 1-1). The increased focus on property transfers created the need for grouping sites into geographically distinct OUs that combined soil, potential contaminant sources, and groundwater (Andersen AFB, 2003b). An example of how the OU re-designation has benefited the IRP would be the three IRP Sites located in Harmon Annex: IRP Site 18/Landfill 23, IRP Site 19/Landfill 24, and IRP Site 39/Harmon Substation. Under the original OU classification scheme the groundwater under Harmon Annex was designated in OU-2 and IRP Sites 18, 19, and 39 (located inside the GPZ) were designated in OU-4. The creation of a geographically distinct Harmon OU, combining soil, potential contaminant sources, and groundwater, was useful in expediting the property transfer. The re-designated OUs are presented in Table 1-1 and illustrated in Figure 1-6:

- Harmon OU,
- MARBO OU,
- Main Base OU,
- Northwest Field OU,
- Urunao OU (Andersen AFB, 2003b), and
- Basewide OU.

Additionally, Andersen AFB is in process of initiating Preliminary Assessments (PAs) at 19 AOCs in 2004. These AOCs, located in the Northwest Field OU and Main Base OU, and are as follows:

- AOC-80 – Clearing West of Housing,
- AOC-83 – Tank Farm,
- AOC-84 – Native Plantation,
- AOC-85 – Building 8024,
- AOC-93 – South Runway Approach Zone,
- AOC-94 – Unexploded Ordnance,
- AOC-99 – Service Apron "H" and Quonset Huts,
- AOC-105 – Building 18006,
- AOC-106 – Area Outside Landfill 14,
- AOC-I01 – 400-Foot Trench,
- AOC-I02 – Cliff Line,
- AOC-I03 – Waste Pile AOI-3,
- AOC-I04 – Quarry,
- AOC-I05 – Coral Dump Site,

- AOC-I06 – Asphalt Drum Area,
- AOC-I07 – Asphalt Drum Area and OEW Area,
- AOC-I08 – Abandoned Sewage Disposal Sinkhole,
- AOC-I09 – Quarry Cliff Line, and
- AOC-I10 – Waste Pile.

1.6.1 Sites Covered under the MARBO OU

A *No Further Action* ROD was approved for the Harmon OU (FWENC/EA, 2002b). As the ROD resulted in site conditions that allowed for unlimited use and unrestricted exposure, no five-year review is required. RI and RA activities are ongoing at the Northwest Field and the Main Base OUs, and there are no RODs to discuss. The Urunao ROD has just been finalized (FWENC/EA, 2003b) and no five-year review is required. All RA and RA activity at MARBO Annex, under the MARBO OU, have been completed. In addition, three Areas of Concern (AOCs), located in MARBO Annex (AOC 54, AOC 55, and AOC 56), have been added as IRP Site 52, IRP Site 53, and IRP Site 54, respectively (Figure 1-4). As these are new IRP Sites they will be managed in the Basewide OU. Consequently, this five-year review evaluates the MARBO ROD and related actions, and focuses on the MARBO OU and the new IRP Sites in Basewide OU.

The MARBO OU includes the following six IRP Sites, along with the groundwater beneath them (Figure 1-4):

- IRP Site 20/Waste Pile 7,
- IRP Site 22/Waste Pile 6,
- IRP Site 23/Waste Pile 5,
- IRP Site 24/Landfill 29,
- IRP Site 37/War Dog Borrow Pit, and
- IRP Site 38/MARBO Laundry.

There were no contaminants of concern (COCs) at IRP Site 23/Waste Pile 5 or IRP Site 37/War Dog Borrow Pit that posed unacceptable risks to human health or the environment (EA, 1998a). Subsequently, a *No Further Action* was recommended for these IRP sites. As such, they will be briefly evaluated in this five-year review.

The four remaining IRP sites at MARBO Annex are grouped and presented together according to a common remedial action (RA). The RA for IRP Site 22/Waste Pile 6, IRP Site 24/Landfill 29, and IRP Site 38/MARBO Laundry are *Completed RAs*. The RAs for IRP Site 20/Waste Pile 7 and the groundwater beneath the MARBO Annex are considered *Operating RAs*, where the *RA* has been initiated but the cleanup levels have not been achieved. In the case of IRP Site 20, cleanup levels will never be achieved as protectiveness depends on implementation of engineering controls (cover) and land use controls.

Three AOCs (AOC 54, AOC 55, and AOC 56), located in MARBO Annex, were previously recommended for further investigation under the Phase II Environmental Baseline Survey (EBS) (EA, 1998b). These AOCs were not part of the MARBO OU and were not included in the

MARBO ROD. They have recently been re-designated as IRP Site 52, IRP Site 53, and IRP Site 54, respectively, and are scheduled for further environmental investigation in 2005, under the Basewide OU.

Furthermore, as presented in Figure 1-4, the following areas at MARBO Annex will not be discussed in this five-year review:

- The MARBO Power Plant and AAFES Warehouse are active facilities still operated by the Guam Power Authority (GPA) and Andersen AFB, respectively.

- Andy South Housing Area (ASHA) encompasses approximately 561 acres within the MARBO Annex and consists of 60 single-family housing units, 6 three-story buildings, 53 townhouses, and other support facilities. The United States Army Air Corps developed ASHA between 1946 and 1948 as part of MARBO Annex to house military personnel and administrative activities and to warehouse supplies. ASHA continued to be actively utilized for military housing and support services through the summer of 1996. Since then, several environmental investigations have been completed at ASHA in preparation for potential transfer of the property (FWENC/EA, 2002a). Typhoon Paka in December 1997 and Typhoon Chata'an in July 2002 severely damaged the structures at ASHA. In preparation for property transfer, ASHA is currently scheduled for remediation based on the results of the Phase I and II EBS (EA, 1998c and 1998d).

As presented in Table 1-2, a summary status of all sites covered under the first five-year review for MARBO OU is provided including a list all of the sites under review, their Contaminants of Potential Concern (COPCs) or COCs, their original selected RA, status of RA, current protectiveness status, and any recommendations for action or future review.

1.7 Site Chronology

Andersen AFB began investigating the MARBO Annex as early as 1985. A chronology of documents related to MARBO is presented in Appendix A, based on the Andersen AFB Administrative Record. These documents include work plans, quality assurance project plans, environmental investigation reports, groundwater monitoring reports, and the record of public involvement.

The chronology of events and documents that are most directly related to cleanup sites at MARBO for the five-year review are presented below:

10 March 1985	Phase I Record Search designated IRP sites at MARBO (ESE, 1985)
14 October 1992	FFA; Andersen Air Force Base was included on the USEPA NPL
February 1994	Sampling and Analysis Plan (SAP) Addendum to OU 6 for OU3 (for soil)
February 1994	Work Plan Addendum to OU 6 for OU3 (for soil)
March 1994	Sampling and Analysis Plan (SAP) Addendum to OU 6 for OU 2 (for groundwater)

March 1994	Work Plan Addendum to OU 6 for OU 2 (for soil)
December 1996	Final OU3 Remedial Investigation (for soil)
January 1997	Final OU3 Focused Feasibility Study (for soil)
March 1997	Final OU2 MARBO Annex Remedial Investigation (for groundwater)
October 1997	Final OU2 MARBO Annex Focused Feasibility Study (for groundwater)
October 1997	Final MARBO Annex Proposed Plan (for soil and groundwater)
24 October 1997	Public Meeting held for MARBO Annex Proposed Plan
17 July 1998	Final MARBO Annex OU Record of Decision (for soil and groundwater)
31 October 1998	Final Quality Program Plan and Remedial Action document, MARBO Annex OU
31 October 1998	Final Environmental Cleanup Plan and Remedial Action document, MARBO Annex OU
16 February 1999	Remedial mobilization began at Site 38/MARBO Laundry
23 February 1999	Remedial mobilization began at Site 22/Waste Pile 6
02 March 1999	Remedial mobilization began at Site 20/Waste Pile 7
10 May 1999	Remedial action completed at Site 38/MARBO Laundry
25 May 1999	Completed soil cover at Site 20/Waste Pile 7
31 May 1999	Completed phase 1 of Remedial Action (RA) at Site 22/Waste Pile 6
13 November 1999	Commenced phase 2 of RA at Site 22/Waste Pile 6
15 September 2000	Final Site 24/Landfill 29 Quality Program Plans
30 November 2000	Final Site 24/Landfill 29 Environmental Cleanup Plan
30 November 2000	Remedial mobilization began at Site 24/Landfill 29
31October 2000	Final Site 20/Waste Pile 07 Remedial Verification Report (RVR)
31 October 2000	Final Site 38/MARBO Laundry RVR
26 February 2001	Completed phase 2 RA at Site 22/Waste Pile 6
26 March 2001	Completed RA at Site 24/Landfill 29
04 May 2001	Interim Site 22/Waste Pile 06 Remedial Verification Report
02 October 2001	Final Site 24/Landfill 29 RVR
24 January 2003	Final Environmental Cleanup Plan, MARBO Annex OU
24 January 2003	Final Addendum to Quality Program Plan, MARBO Annex OU

24 January 2003	Interim Site 22/Waste Pile 06 Environmental Cleanup Plan
28 April 2003	Phase 3- Remedial Mobilization began at Site 22/Waste Pile 6
23 January 2004	Completed RA at Site 22/Waste Pile 6
25 June 2004	Final Site 22/Waste Pile 06 Remedial Verification Report (RVR)

1.8 Public Involvement at Andersen AFB

The USAF has been actively involved in soliciting public involvement and input regarding the decisions on environmental investigations and remedial activities for Andersen AFB sites. This has been done through Community Relations Plans (CRP), Public Notices and Meetings, and the Restoration Advisory Board (RAB), as follows.

1.8.1 Community Relations

In accordance with CERCLA Sections 113 and 117, an extensive community relations program was initiated to involve the community in the decision-making process. In August 1992, to inform and involve the local community, Andersen AFB conducted 67 interviews with local government officials, residents, and concerned citizens to determine the level of community concern and interest in the environmental investigations. These community interviews provided the basis for the 1993 CRP (ICF, 1993). The 1993 CRP described activities to keep the nearby communities informed of the progress of the environmental investigations at Andersen AFB sites and provide opportunities for input from residents regarding cleanup plans. In response to the USEPA request, Andersen AFB conducted 27 additional interviews in 1998, and updated the CRP (EA, 1998e).

Andersen AFB also made copies of the all-relevant IRP documents available to the public in both the Administrative Record and the Information Repository at the following locations:

Installation Restoration Program
36 CES/CEVR, Unit 14007, Andersen AFB, Guam
APO AP 96543-4077
Telephone: (671) 366-5080
Contact: Mr. Gregg Ikehara, Installation Project Manager

Nieves M. Flores Memorial Library
254 Martyr Street,
Hagatna, Guam 96910
Telephone: (671) 475-4751, 4752, 4753, or 4754
Contact: Christine Scott-Smith

University of Guam
Federal Document Department, RFK Library, UOG Station
Mangilao, Guam 96923
Telephone: (671) 735-2321
Contact: Walfrid C. Benavente

1.8.2 Public Notices/Public Meetings

In accordance with USEPA Guidelines (USEPA, 1999), notices of the availability for the final MARBO OU Remedial Investigation (ICF, 1996) and Focused Feasibility Study (EA, 1997) documents were published in the Guam *Pacific Daily News*, followed by a public meeting, and a comment period.

In October of 1997 the Proposed Plan for the MARBO OU was released to the public for review and comments, with a public comment period from 10 October to 10 November 1997. A public meeting was held in the Tumon Bay Hilton Hotel on 24 October 1997 where the Proposed Plan was presented and representatives from USEPA, GEPA, and Andersen AFB responded to public comments. All verbal and written comments were incorporated in the MARBO OU ROD, which was finalized in May 1998.

1.8.3 Restoration Advisory Board

The USAF has promoted community relations and encouraged public involvement in cleanup decisions through the RAB, established in 1995. Currently, the RAB is comprised of community members, elected officials, USAF officials, and representatives from regulatory agencies. The RAB meets on a quarterly basis to discuss program progress and to advise the community on the status and plans for the various IRP sites.

In addition to RAB meetings, in 1993 Andersen AFB provided a brochure that was prepared to respond to community concerns and to inform the public about Andersen AFB's IRP investigations (ICF, 1993). In February 1997, a fact sheet for the Harmon Annex was distributed to the community that explained the status of all IRP investigations, as well as, the status of P.L. 103-339 (EA, 1998e). A complete summary of the history and status of community involvement for the IRP at Andersen AFB is presented in the December 2000 *Final Management Action Plan* (Andersen AFB, 2000).

The five-year review is an important milestone for public involvement. The public will be informed of the Andersen AFB five-year review for MARBO ROD by distributing a notice of the five-year review to RAB members, who will be encouraged to disseminate this information to other community members. Also, a notice of the RAB meeting, which includes a discussion of the five-year review, will be published in the Guam *Pacific Daily News*.

1.8.4 Interviews

As part of the five-year review policy, representatives of Andersen AFB and EA interviewed key personnel, including representatives of regulatory agencies and the community of Guam. The key personnel included:

- the Honorable Senator Joanne M. Salas Brown,
- the Honorable Senator Larry F. Kasperbauer,
- Mr. Fred M. Castro, Administrator of the GEPA, and
- Mr. Victor Wuerch, Hydrogeologist with the GEPA.

For the most part, the above-referenced interviewees were satisfied with the status of MARBO Annex OU. Senator Brown and Mr. Fred Castro expressed concerns with regard to the continued shut down of the Tumon-Maui Well treatment system knowing that it is potentially a source of water for the island. Senator Brown was equally concerned about the Guam Waterworks Authority (GWA) taking over operation of the Tumon-Maui Well with contamination. Senator Brown stated that Andersen AFB should return properties to the community in their original condition and Mr. Fred Castro commented that the GEPA and Andersen AFB need to come up with a consensus as to what to do with the Tumon-Maui Well. Mr. Victor Wuerch expressed concerns with regard to the source of groundwater contamination at MARBO and its potential down gradient impact on Tumon Bay.

Senator Larry F. Kasperbauer emphasized that he would like to see Andersen AFB continue its cooperation with the GEPA and USEPA to resolve the groundwater problem at MARBO Annex. He also suggested that the RAB meetings should be held in the community environment to encourage public participations, and not in hotels where some of the public may feel intimidated.

The content of the interview was recorded, transcribed, and presented in Appendix B, using forms from the USEPA Guidance Document (USEPA, 2001).

1.9 Organization of Report

The remainder of this document is organized as follows:

- Chapter 2 presents the first five-year review for IRP Site 23/Waste Pile 5 and IRP Site 37/War Dog Borrow Pit where no *RA* was necessary at the site.

- Chapter 3 presents the first five-year review for IRP Site 22/Waste Pile 6, IRP Site 24/Landfill 29, and IRP Site 38/MARBO Laundry with *Completed RA*.

- Chapter 4 presents the first five-year review for IRP Site 20/Waste Pile 7 with *Operating RA*.

- Chapter 5 presents the first five-year review for former AOC 54, AOC 55, and AOC 56, that have been re-designated as IRP Site 52, IRP Site 53, and IRP Site 54.

- Chapter 6 presents the first five-year review of the MARBO Annex groundwater.

- Chapter 7 presents references cited in this report.

1.10 Next Five-Year Review

The next five-year review for Andersen AFB is required by 02 March 2009, five years from the date of this review. The relative review period would be from 02 March 2004 to 02 March 2009.

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TABLE 1-1. OPERABLE UNIT DESIGNATIONS FOR ANDERSEN AFB, GUAM.

Original OU Designation	Site Number	Site Name	Revised OU Designation
OU-1	1	Landfill 1	Main Base (Landfill Complex)
	2	Landfills 2, 4, & 5	
	3	Waste Pile 3	
	29	Waste Pile 2	
	35	Waste Pile 1	
OU-2	Basewide Groundwater		Groundwater linked to OUs
OU-3	20	Waste Pile 7	MARBO Annex
	22	Waste Pile 6	
	23	Waste Pile 5	
	24	Landfill 29	
	37	War Dog Borrow Pit	
	38	MARBO Laundry	
OU-4	4	Landfill 6	Main Base
	5	Landfill 7	Main Base
	7	Landfill 9	Northwest Field
	16	Landfill 21	Northwest Field
	17	Landfill 22	Northwest Field
	18	Landfill 23	Harmon Annex
	19	Landfill 24	Harmon Annex
	21	Landfill 26	Northwest Field
	26	Firefighter Training Area 2	Main Base
	27	Hazardous Waste Storage Area 1	Main Base
	28	Chemical Storage Area 1	Main Base
	30	Waste Pile 4	Northwest Field
	31	Chemical Storage Area 4	Northwest Field
	32	Drum Storage Area 1	Main Base
	39	Harmon Substation	Harmon Annex
OU-5	6	Landfill 8	Main Base
	8	Landfill 10a (formerly Landfill 10)	Main Base
		Landfill 10b (formerly Landfill 11)	
		Landfill 10c (formerly Landfill 12)	
	9	Landfill 13	Main Base
	10	Landfill 14	Main Base
	11	Landfill 15a (formerly Landfill 15)	Main Base
		Landfill 15b (formerly Landfill 16)	
	12	Landfill 17	Main Base
		Pati Point Dump Site	
	13	Landfill 18	Main Base
	14	Landfill 19	Main Base
	15	Landfill 20	Main Base
	25	Firefighter Training Area 1	Main Base
	33	Drum Storage Area 2	Main Base
	34	PCB Storage Area	Main Base
	36	Ritidian Point Dump Site	Northwest Field
No OU designation	40	Urunao Dumpsites 1 & 2	Urunao
	52	AOC-54	Basewide
	53	AOC-55	Basewide
	54	AOC-56	Basewide
	Not programmed at this time	AOC-65, AOC-67, AOC-68, AOC-69, AOC-80, AOC-83, AOC-84, AOC-85, AOC-93, AOC-94, AOC-99, AOC-105, AOC-106, AOC-I01, AOC-I02, AOC-I03, AOC-I04, AOC-I05, AOC-I06, AOC-I07, AOC-I08, AOC-I09, and AOC-I10	Basewide

TABLE 1-2. SUMMARY STATUS OF SITES COVERED UNDER FIRST-FIVE YEAR REVIW OF MARBO OU.

Site Name, COPCs, or COCs	Selected RA per 17 July 1998 Record of Decision for MARBO OU	RA Status	Issues	Recommendations and Milestone Date	RA Protectiveness? Yes/No	
					Current	Future
IRP Site 23/Waste Pile 5 COPCs = Aluminum, Antimony, Arsenic, Beryllium, Chromium, Lead, and Manganese. COCs = None, based on human health and ecological risk assessment results.	*No Further Action*	Not Applicable (N/A)	No issues and should not be included in future five-year reviews	None	Y	Y
IRP Site 37/War Dog Borrow Pit COPCs = Lead. COCs = None, based on human health and ecological risk assessment results.	*No Further Action*	Not Applicable (N/A)	No issues and should not be included in future five-year reviews	None	Y	Y
IRP Site 22/Waste Pile 6 COCs = Antimony, Arsenic, Cadmium, Chromium, Lead, Manganese, Benzo(a)pyrene, Benzo(b)fluoranthene , Indeno(1,2,3-cd)pyrene, based on human health and ecological risk assessment results.	*Soil Removal*	Completed in 3 phases from February-May 1999, November 2000-February 2001, and April-January 2004	No issues and should not be included in future five-year reviews	None	Y	Y
IRP Site 24/Landfill 29 COCs = Antimony and Lead, based on human health and ecological risk assessment results.	*Soil Removal*	Completed on 26 March 2001	No issues and should not be included in future five-year reviews	None	Y	Y

TABLE 1-2. SUMMARY STATUS OF SITES COVERED UNDER FIRST-FIVE YEAR REVIW OF MARBO OU.

Site Name, COPCs, or COCs	Selected RA per 17 July 1998 Record of Decision for MARBO OU	RA Status	Issues	Recommendations and Milestone Date	RA Protectiveness? Yes/No	
					Current	Future
IRP Site 38/MARBO Laundry COCs = Aroclor 1254 and Lead, based on human health and ecological risk assessment results.	*Soil Removal*	Completed on 31 October 2000	No issues and should not be included in future five-year reviews	None	Y	Y
IRP Site 20/Waste Pile 7 COCs = 4,4'-DDE, 4,4'-DDT, Dieldrin, Alpha chlordane, Gamma chlordane, Aroclor 1260, and Lead, based on human health and ecological risk assessment results.	*Soil Cover*	Completed on 25 May 1999	Several issues = Pig wallow and small trees has damaged small area of the *Soil Cover* and there are truck track marks on *Soil Cover*.	Recommendations = Quarterly Operation and Maintenance (O&M) and event driven O&M are recommended, in addition to posting warning signs around the periphery of the site to restrict any activities that may jeopardize the structural integrity of the *Soil Cover*. Milestone Date = 10/01/2004	N	Y
MARBO Annex Groundwater COCs = PCE and TCE, based on human health and ecological risk assessment results.	*Natural Attenuation* plus 3 three institutional controls (ICs): 1) *Land Use Restrictions* 2) *Groundwater Monitoring* 3) *Existing Wellhead Treatment*	*Natural Attenuation* Has always been implemented Additionally ICs were implemented in early 1998, with the exception of well head treatment	Several Issues = Lack of information to compare groundwater conditions in MARBO Annex with Harmon; Freshwater, transition and marine zones are poorly defined; PCE and TCE sources in MARBO Annex have not been identified; Fate and transport of TCE and PCE within MARBO in depth are poorly understood; No available Volatile Organic Compounds (VOC) data for newly installed GWA production well in MARBO Annex violates ICs; Additional downgradient data is required in the Harmon area;. Tumon-Maui Well is currently not being used, and as such no benefits are derived from either use of the water or the remedial effects.	Recommendations = HMW-1, HMW-2, HMW-3, and EX-6 wells should be sampled one more time using vertical profiling; Chloride data should be collected to determine extent of freshwater lens, transition zone, and marine water in the Harmon area; Deep soil borings should be drilled at IRP Sites 52 & 54 to look for potential source areas; Additional open boreholes through the entire freshwater lens should be considered better understand hydrogeology and fate and transport at depth; Dye trace study, relevant to IRP-31 and IRP-29, should be considered ; VOC samples should be collected at GWA wells to verify compliance with ICs; Tumon Maui well long term use should be evaluated. Milestone Dates = 10/01/2004 and 2/3/2005	N	Y

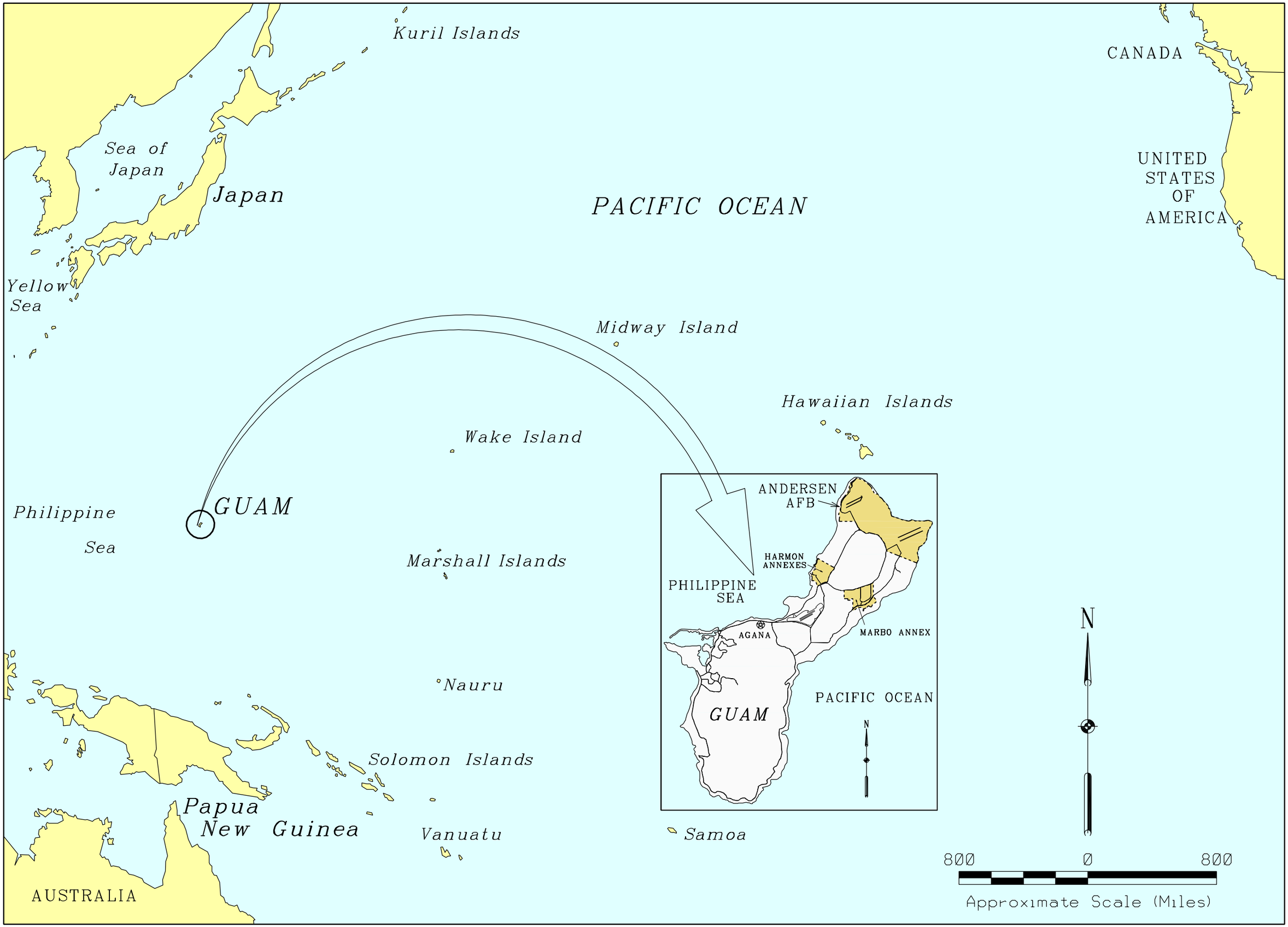

Figure 1-1. Location Map of Guam.

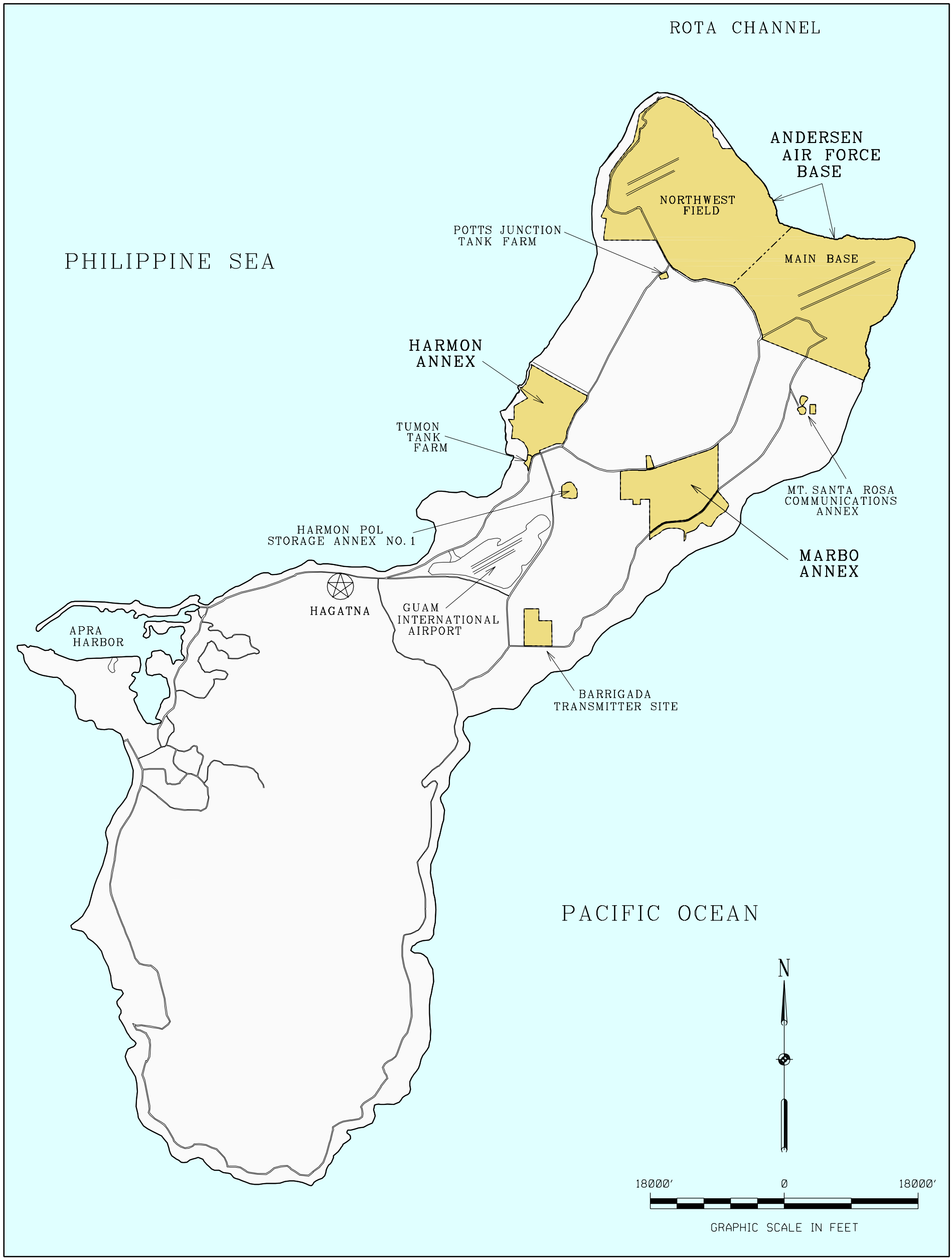

Figure 1-2. Location Map of Andersen Air Force Base on Guam.

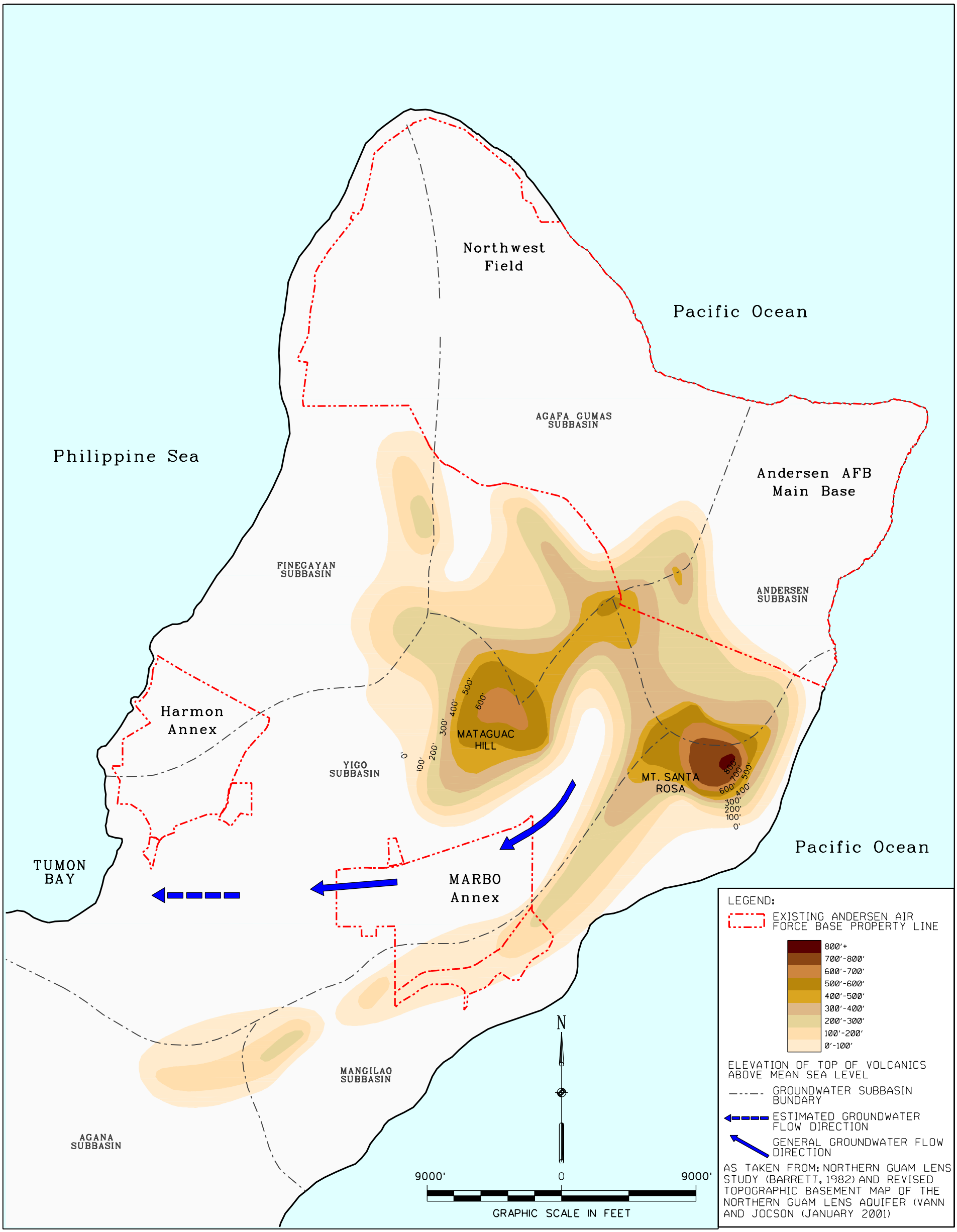

Figure 1-3. Volcanic Structure Contours.

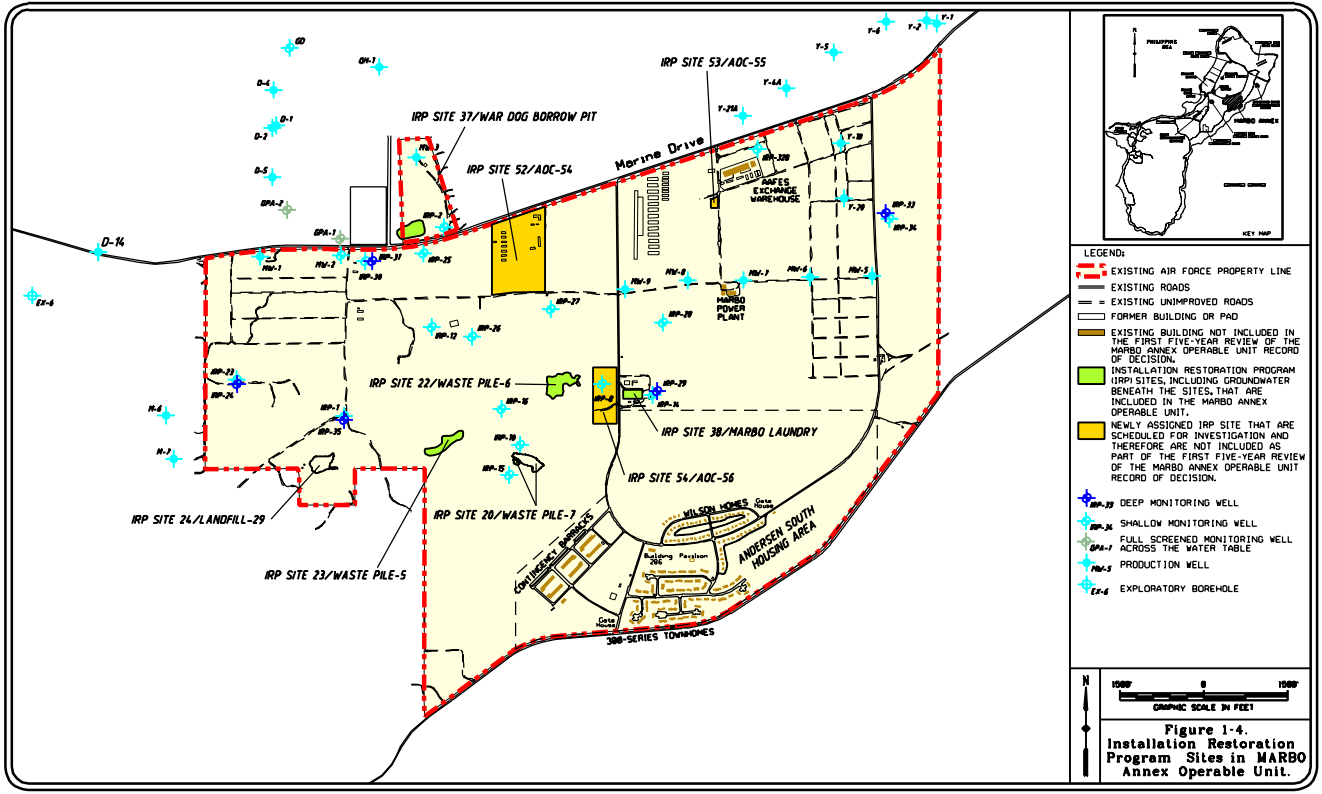

Figure 1-4.
Installation Restoration Program Sites in MARBO Annex Operable Unit.

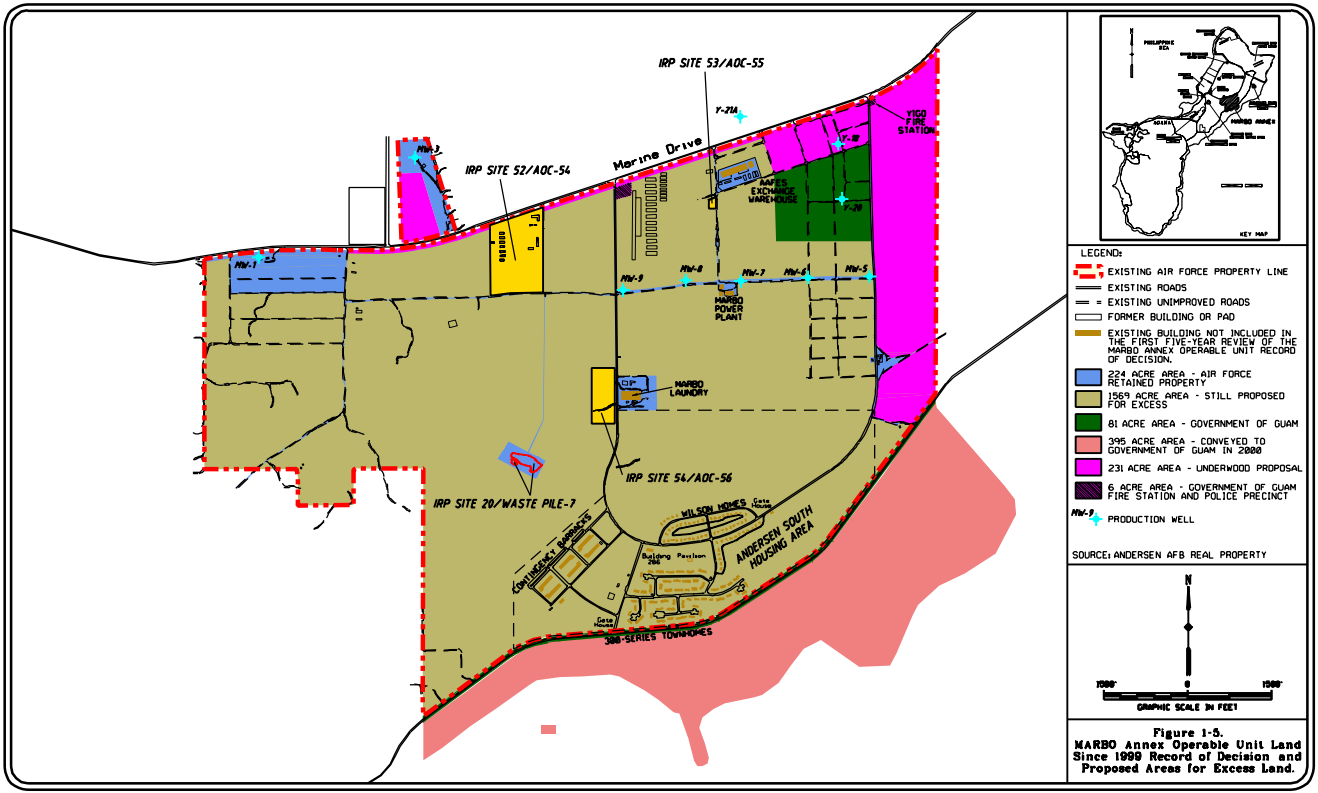

Figure 1-5.
MARBO Annex Operable Unit Land Since 1999 Record of Decision and Proposed Areas for Excess Land.

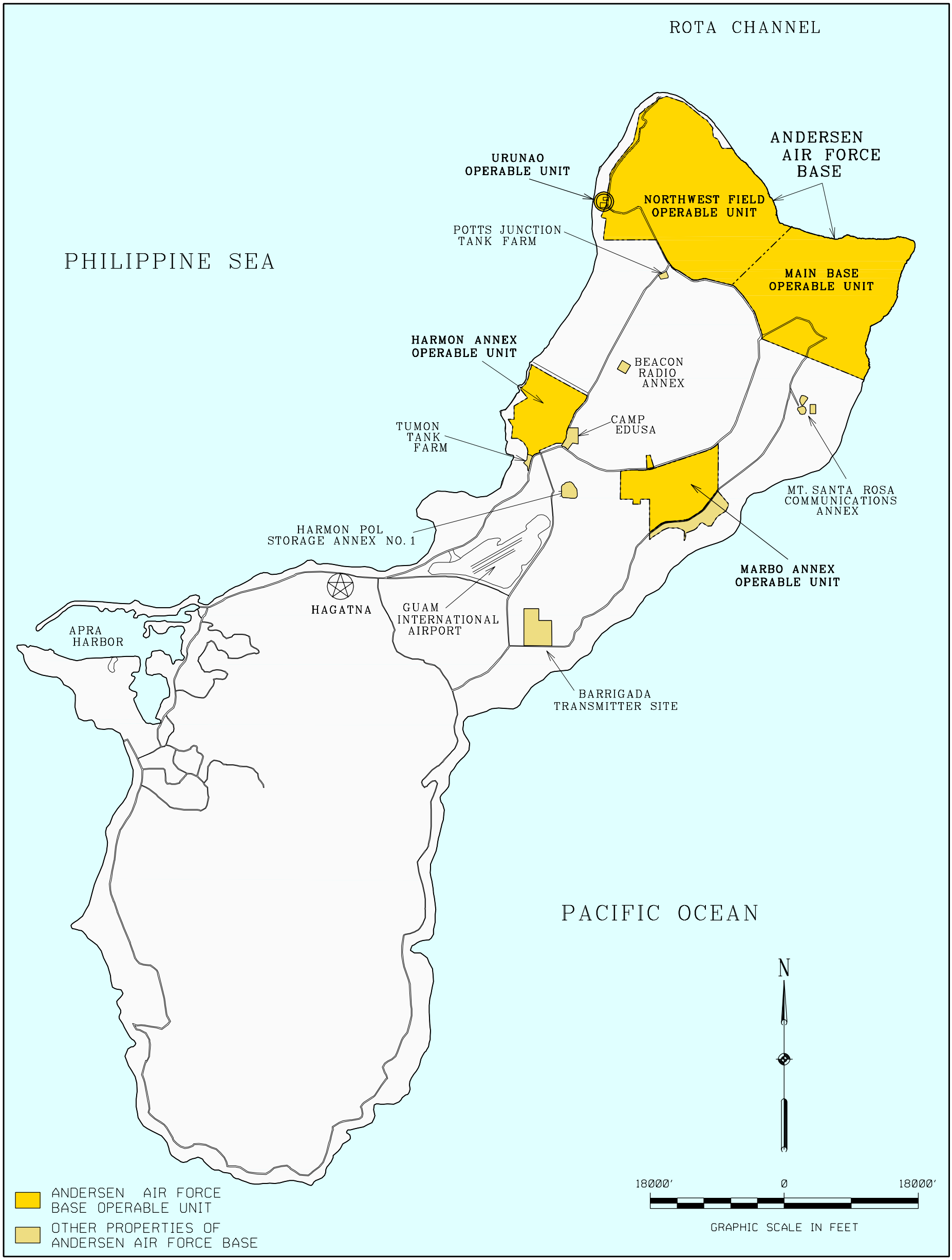

Figure 1-6. Location Map of Andersen Air Force Base Operable Units on Guam.

2.0 MARBO ANNEX SITES WITH NO REMEDIAL ACTION NEEDED

According to the MARBO ROD remedial actions (RAs) were not required at IRP Site 23/Waste Pile 5 and IRP Site 37/War Dog Borrow Pit because no COCs were identified.

2.1 First Five-Year Review of IRP Site 23/Waste Pile 5

2.1.1 IRP Site 23/Waste Pile 5 Background

IRP Site 23/Waste Pile 5 (Waste Pile 5) is located southwest of the MARBO Laundry (Figure 1-5). As presented in Figure 2-1, the site included a 2.17-acre landfill that consisted of seven large trenches filled with wire, fence material, bottles, cans, cardboard, kitchenware, and other municipal waste materials. The trenches ranged from 150 to 650 feet in length and 1.5 to 14.5 feet in depth (EA, 1997). The trench surfaces were covered with a mixture of soil, debris, and vegetation. Waste Pile 5 also included an 8-foot deep drainage ditch, located approximately 900 feet north of the trench landfill, which may have been used for disposal of sanitary sewage (Figure 2-1). Additionally, the site included several surface depressions and two deteriorated drums.

According results of the Human Health Risk Assessment (HHRA) and Ecological Risk Assessment (ERA), all target analytes were detected below concentrations that posed unacceptable risks to human health and the environment. As such no COCs were detected at Waste Pile 5 and no initial response or RA was required (EA, 1997).

2.1.2 Technical Assessment of Remedial Action at IRP Site 23/Waste Pile 5

Question A: Is the remedy functioning as intended by the ROD?

This question is not applicable for the Waste Pile 5.

Question B: Are the exposure assumptions, toxicity data, cleanup values, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

According to the RI/FS for Waste Pile 5 (ICF, 1996), Exposure Point Concentrations (EPCs) were calculated for the HHRA. All Constituents of Potential Concern (COPCs), except lead, had EPCs that were below their respective 1995 Residential Preliminary Remediation Goal (PRG) or Background Threshold Value (BTV). The 2002 Residential PRG (USEPA, 2002) for lead (400 mg/kg) is the same as 1995 Residential PRG (USEPA, 1995).

COPCs	EPCs (mg/kg)	1995 Residential PRGs or BTV (mg/kg)	2002 Residential PRGs or BTV (mg/kg)
Aluminum	123,894	173,500	173,500
Antimony	20.4	63	63
Arsenic	44.5	62	62
Beryllium	2.1	3.34	3.34
Chromium	623	1,030	1,080
Lead	602	400	400
Manganese	1,693	3,150	5,500

Consequently, the conclusions of the HHRA, as presented in 1996 RI/FS document (ICF, 1996), remain the same. Lead levels pose no unacceptable risks to human health or the environment.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

The land use at Waste Pile 5 has not changed. With the absence of any COCs, access to the site remains unrestricted and uses for the site are unlimited. No other information has come to light that could call into question the above-referenced condition of the site.

2.1.3 Protectiveness Statement for IRP Site 23/Waste Pile 5

Based on the review of existing data and site inspections, Waste Pile 5 is currently protective of human and the environment and will remain so into the future, unless a new source of contamination is discovered at the site.

2.1.4 Next Review of IRP Site 23/Waste Pile 5

The second five-year review of the MARBO ROD is scheduled after 02 March 2009, five years from this review. The second five-year review of MARBO ROD should not include Waste Pile 5, unless a new source of contamination is found at the site.

2.2 First Five-Year Review of IRP Site 37/War Dog Borrow Pit

2.2.1 IRP Site 37/War Dog Borrow Pit Background

IRP Site 37/War Dog Borrow Pit (War Dog Borrow Pit) is an abandoned quarry located in the northernmost portion of the MARBO Annex (Figure 1-5). As presented in Figure 2-2, the site included a 1.82-acre landfill within the quarry that contained construction debris and scrap automobile parts. The average thickness of fill material ranged from 2.5 feet to 8.5 feet above ground surface. Fill material within the trenches extended from 4.5 to 8.5 feet bgs. The fill layer within the trenches was covered with approximately 2 feet of re-cemented limestone. The re-cemented limestone was fully exposed in some areas, whereas in other areas it was covered with surface soil and vegetation. Miscellaneous trash and debris were widely scattered on the ground surface, along with several soil mounds (EA, 1997).

According to HHRA and ERA, all target analytes were detected below levels that posed unacceptable risks to human health and the environment. As such no COCs were detected at the War Dog Borrow Pit and no initial response or *RA* was required (EA, 1998a). Subsequently, no initial response or remedial action was necessary at the site (EA, 1997).

2.2.2 Technical Assessment of Remedial Action at IRP Site 37/War Dog Borrow Pit

Question A: Is the remedy functioning as intended by the ROD?

This question is not applicable for the War Dog Borrow Pit.

Question B: Are the exposure assumptions, toxicity data, cleanup values, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

According to the OU3 RI/FS (ICF, 1996), the only COPC identified at the War Dog Borrow Pit was lead. This was based on an EPC (833 mg/kg) that exceeded the 1995 Residential PRG (400 mg/kg), but was less than the 1995 Industrial PRG (1,000 mg/kg). However the EPC was based on one subsurface soil sample, collected at a depth of 11 feet bgs. Due to the isolated nature and depth of the sample it was not considered to pose unacceptable risks to human health or the environment (EA, 1998a). As presented below, the 1995 and 2002 Residential PRG for lead remains unchanged (400 mg/kg) however the 2002 Industrial PRG has dropped to 750 mg/mg. Regardless, the conclusions of the HHRA (ICF, 1996) remain unchanged; in that lead levels associated with the one, isolated lead sample do not pose unacceptable risks to human health or the environment.

COPC	EPC (mg/kg)	1995 Residential PRG (mg/kg)	2002 Residential PRG (mg/kg)	BTV (mg/kg)
Lead	833	400	400	166

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Land use at the War Dog Borrow Pit has not changed since the ROD, and with absence of COCs at the site, access to the site is unrestricted and site use is unlimited. No other information has come to light that could call into question the above-referenced condition of the site.

2.2.3 Protectiveness Statement for IRP Site 37/War Dog Borrow Pit

Based on the review of existing data and site inspections, the War Dog Borrow Pit is currently protective of human health and the environment. The toxicity values and the Residential PRG for lead have not changed, though the Industrial PRG for lead has changed from 1,000 mg/kg to 750 mg/kg. The current protectiveness of War Dog Borrow Pit is equally valid for the future, unless a new contamination source is introduced to the site.

2.2.4 Next Review of IRP Site 37/War Dog Borrow Pit

The next five-year review of MARBO ROD is scheduled after 02 March 2009, five years from this review. The second five-year review of MARBO ROD should not include War Dog Borrow Pit, unless a new source of contamination is found at the site.

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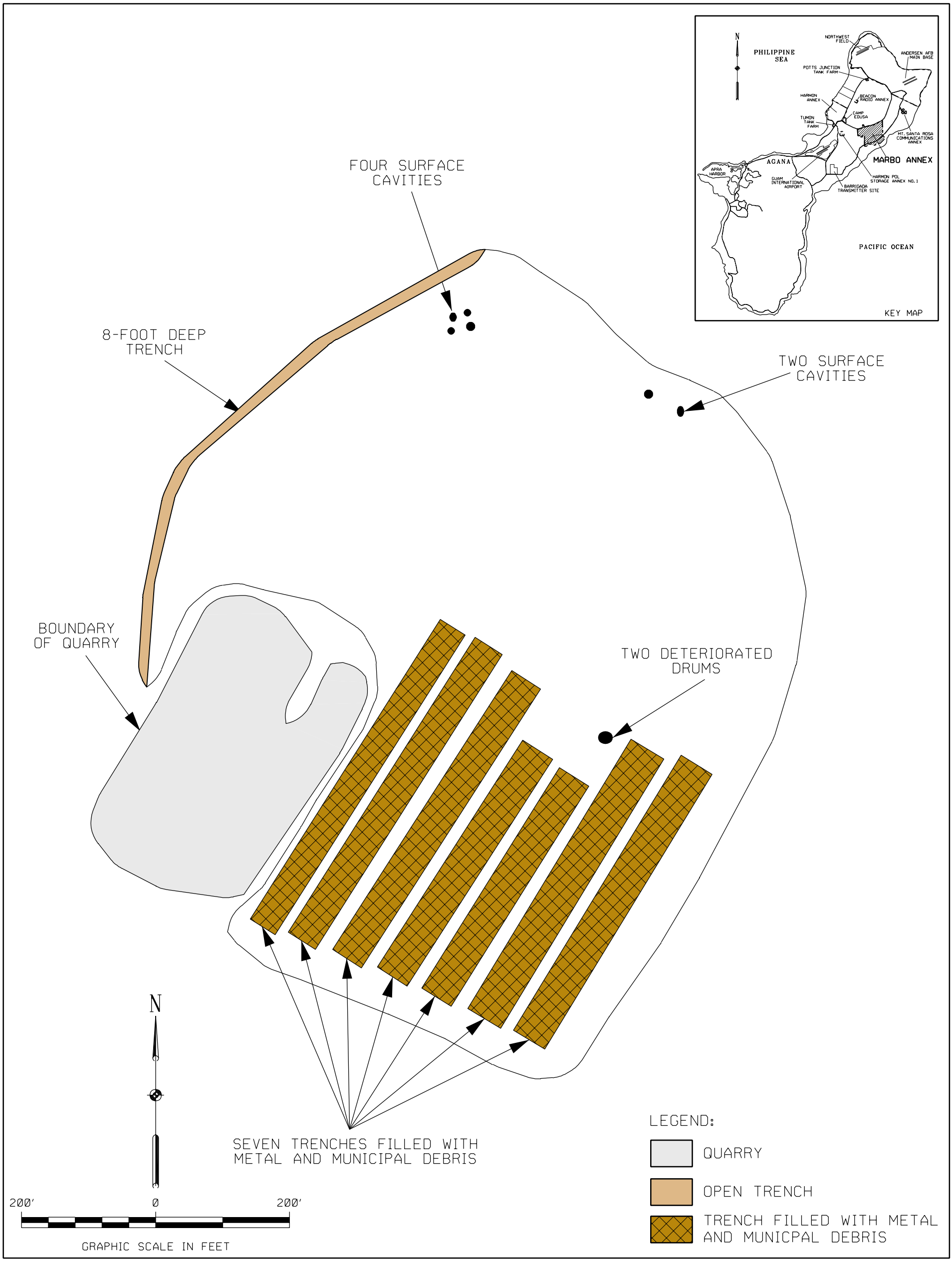

Figure 2-1. Features of Site 23/Waste Pile 5, MARBO Annex, Andersen Air Force Base, Guam.

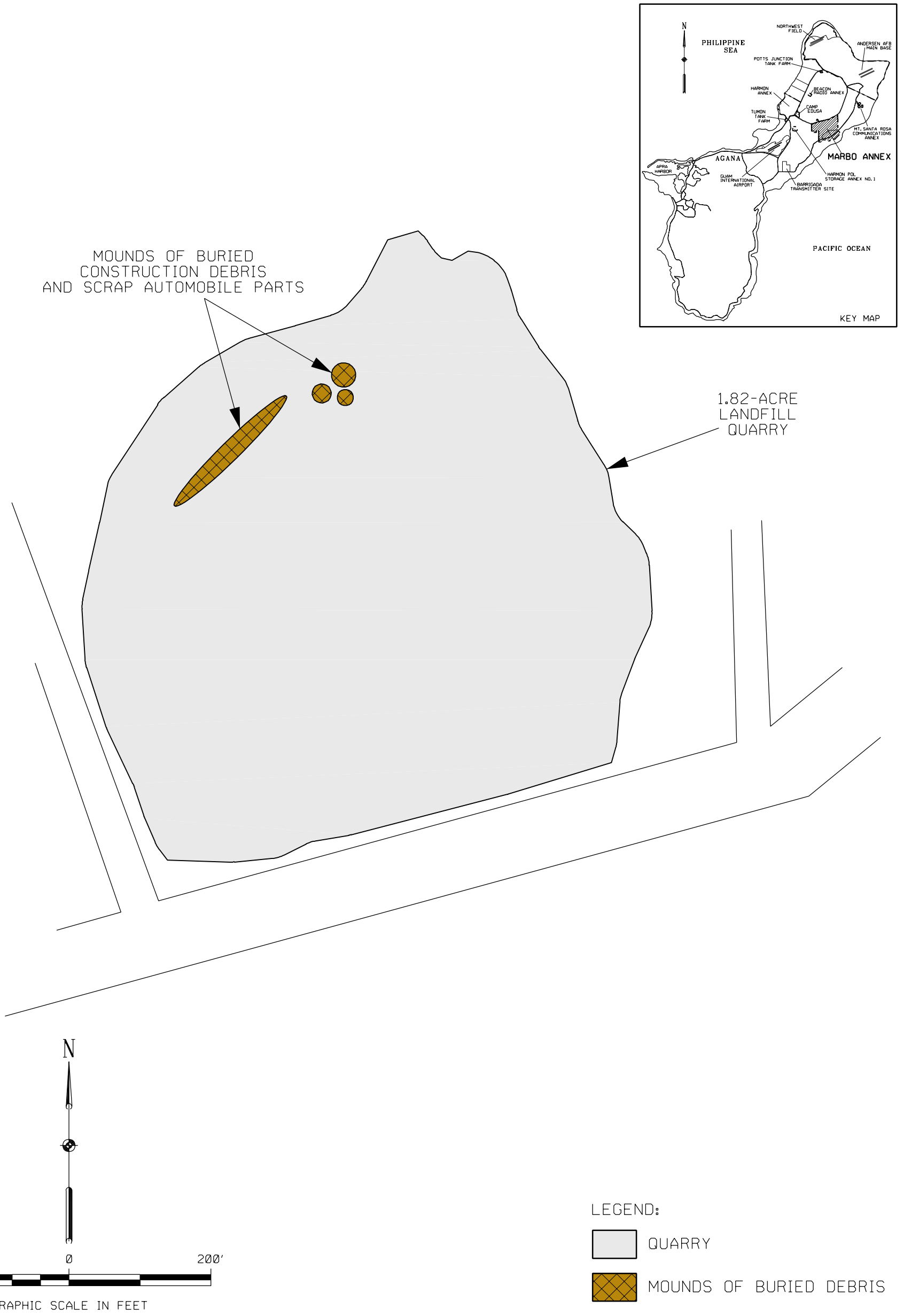

Figure 2-2. Features of Site 37/War Dog Borrow Pit, MARBO Annex, Andersen Air Force Base, Guam.

3.0 MARBO ANNEX SITES WITH COMPLETED REMEDIAL ACTIONS

Since the MARBO ROD was signed on 17 July 1998, RAs have been completed at IRP Site 22/Waste Pile 6, IRP Site 24/Landfill 29, and IRP Site 38/MARBO Laundry. The first five-year review of these sites is presented below.

3.1 First Five-Year Review of IRP Site 22/Waste Pile 6

3.1.1 IRP Site 22/Waste Pile 6 Background

IRP Site 22/Waste Pile 6 (Waste Pile 6) is a small site located centrally within the MARBO Annex (Figure 1-4). There were seven Areas of Interest (AOIs) at the site (Figure 3-1):

- A *Car Battery Area* containing six car battery casings, including the additional southern excavation,
- A *Radio Battery Area* containing nine apparent alkaline radio batteries,
- An *Unknown Battery Area* containing three possible batteries,
- A *Roofing Material Pile*,
- A *Metal Debris Pile* with subsurface metal debris,
- An *Empty Drum Pile* where empty drums were detected in the shallow subsurface, and
- An *Asphalt Drum Pile* including approximately 108 deteriorated stacked drums containing approximately 2,900 gallons of paving grade asphalt, some of which had leaked to the ground.

3.1.2 History of Contamination at IRP Site 22/Waste Pile 6

According to the HHRA and ERA, each AOI was impacted by COCs and required a RA. The COCs that were identified for each AOI are listed below along with their EPCs, BTVs, 1995 Residential PRGs (USEPA, 1995), and 2002 Residential PRGs (USEPA, 2002).

COCs by AOI	EPCs (mg/kg)	1995 Residential PRGs (mg/kg)	2002 Residential PRGs (mg/kg)	BTVs (mg/kg)
Car Battery Area				
Antimony	823	31	31	63
Lead	5,910	400	400	166
Radio Battery Area				
Antimony	71	31	31	63
Cadmium	42	38	37	6.5
Lead	1,560	400	400	166

COCs by AOI	EPCs (mg/kg)	1995 Residential PRGs (mg/kg)	2002 Residential PRGs (mg/kg)	BTVs (mg/kg)
Unknown Battery Area				
Lead	**3,410**	400	400	166
Roofing Material Pile				
Benzo(a)pyrene	**15**	0.061	0.062	NA
Benzo(b)fluoranthene	**32**	0.61	0.62	NA
Indeno(1,2,3-cd)pyrene	**5.6**	0.61	0.62	NA
Metal Debris Pile				
Cadmium	**183**	38	37	6.5
Empty Drum Pile				
Chromium	**1,290**	210	210	1,080
Asphalt Drum Pile				
Benzo(a)pyrene	**1.5**	0.061	0.062	NA
Benzo(b)fluoranthene	**7.6**	0.61	0.62	NA
Benzo(a)anthracene	**1.9**	0.61	0.62	NA
Arsenic	**74**	0.38	0.39	62
Chromium	**1,270**	210	210	1,080
Lead	**903**	400	400	166

NA = Not Applicable, BTV is applicable only for inorganic compounds (metals).

3.1.3 Initial Response at IRP Site 22/Waste Pile 6

The COCs detected in Waste Pile 6 soils were determined to be relatively stable and immobile, therefore no immediate response was required.

3.1.4 Basis for Taking Action at IRP Site 22/Waste Pile 6

- Elevated lead (EPC of 5,910 mg/kg) and antimony (EPC of 823 mg/kg) concentrations in soils contributed to unacceptable non-cancer risks (Hazard Index (HI)=27) to human health at the *Car Battery Area*.

- Elevated lead (EPC of 1,560 mg/kg), antimony (EPC of 71 mg/kg), and cadmium (EPC of 42 mg/kg) concentrations in soil contributed to unacceptable non-cancer risks (HI=12) at the *Radio Battery Area*.

- At the *Unknown Battery Area*, elevated lead (3,410 mg/kg) concentrations in soil were the basis for taking action.

- Elevated benzo(a)pyrene (15 mg/kg), benzo(b)fluoranthene (32 mg/kg), and indeno(1,2,3-cd)pyrene (5.6 mg/kg) concentrations in soil contributed to unacceptable cancer ($3x10^{-5}$) and non-cancer risks (HI=3) at the *Roofing Material Pile.*

- Elevated cadmium (EPC of 183 mg/kg) concentrations in soil contributed to unacceptable non-cancer risks (HI=6) at the *Metal Debris Pile.*

- Elevated chromium (EPC of 1,270 mg/kg) concentrations in soil contributed to unacceptable non-cancer risks (HI=6) at the *Empty Drum Pile.*

- Elevated arsenic (74 mg/kg), chromium (1,270 mg/kg), lead (903 mg/kg), benzo(a)pyrene (1.5 mg/kg), benzo(b)fluoranthene (7.6 mg/kg), and benzo(a)anthracene (1.9 mg/kg) concentrations in soil contributed to unacceptable cancer ($3x10^{-4}$) and non-cancer (HI=3) risks at the *Asphalt Drum Pile.*

Though the COC-impacted soils did not require an immediate initial response, a RA was proposed for the site to protect the future human and ecological receptors.

3.1.5 Remedial Action at IRP Site 22/Waste Pile 6

The COC-impacted soil at Waste Pile 6 was originally estimated at 30 bank cubic yards (bcy). In addition to the soil removal, six battery casings, 12 batteries, and other asphalt and metal debris were scheduled for removal. The impacted areas were estimated to cover an area of approximately 814 square feet, to a depth of approximately 1 foot (ICF, 1997a). The MARBO ROD (EA, 1998a), evaluated *No Action* and *Soil Removal* remedial alternatives for Waste Pile 6. The *Institutional Control (IC)* and *Soil Cover* options were not considered as viable remedial alternatives as they restricted future land use at the site. To allow unrestricted use of the site, the *Soil Removal* alternative was selected as the preferred alternative. The Remedial Action Objective (RAO) for the *Soil Removal* alternative was to protect the human health and the environment by:

- eliminating the direct exposure path to COCs to allow unrestricted access to the site, and

- minimizing the potential migration of COCs to groundwater beneath the site.

3.1.6 Remedial Action Implementation at IRP Site 22/Waste Pile 6

According to the Interim Remedial Verification Report (RVR) (Shaw, 2004), the cleanup levels were established based on the greater value of the Residential PRG or the BTV. Due to significant increases in soil volumes and the number of batteries and battery casings that needed disposal, the cleanup action at Waste Pile 6 was completed during three distinct phases. The first phase was performed February 1999 through May 1999, the second phase was performed November 2000 through February 2001, and the last phase was performed April through January 2004. According to the June 2004 RVR, the RA for the seven AOIs at IRP Site 22/Waste Pile 6 were completed as follows:

- Approximately 14,393 loose cubic yards (lcy) of non-hazardous COC-impacted soil and solid debris were removed and transported to the Andersen AFB Sanitary Landfill for disposal.

- Approximately 130 lcy of lead-impacted soil were removed and treated with triple super phosphate to reduce the lead concentrations below the RCRA toxicity characteristic for hazardous waste. This non-hazardous 130 lcy of lead-impacted soil were then transported to the Andersen AFB Sanitary Landfill for disposal.

- Approximately 10 lcy of roofing tar materials were removed and transported to the Andersen AFB Sanitary Landfill for disposal.

- Approximately 1,500 gallons of discarded asphalt from 108 full or partially full 55-gallon drums were removed and transported to the asphalt debris stockpile locates at IRP Site 35/Waste Pile 1. This asphalt debris was later incorporated into the IRP Site 2/Landfill 2 trenches, and the empty 55-gallon drums were transported to the Andersen AFB Sanitary Landfill for disposal.

- Fifty empty 55-gallong drums and drum remnants, 80 lcy of metallic debris, and 8 rubber tires were recovered, containerized, and shipped to an off-island facility for disposal.

- Two 55-gallon drums of alkaline batteries and 7 drums and 12 boxes of lead-acid batteries and battery casings were recovered, containerized, and shipped to an off-island facility for disposal.

- Approximately 62 lcy of asbestos-containing materials were removed and transported to the Andersen AFB Sanitary Landfill for disposal.

Confirmation soil samples were collected from all excavated areas and analyzed for COCs and all confirmation sample results were below cleanup levels at the seven AOIs at Waste Pile 6 (Shaw, 2004). Based on clean confirmation sample results, Waste Pile 6 was restored by backfilling the excavated areas deeper than one foot, using 6-inch minus clean imported fill. The backfilled materials were placed in 6-inch to 12-inch loose lifts and compacted to a minimum of 85 percent of the maximum dry density. The site was then graded to direct the flow of stormwater runoff away from roads and structures, to avoid ponding, and to foster growth of native shrubs, plants, and trees (Shaw, 2004).

3.1.7 Document and Data Review for IRP Site 22/Waste Pile 6

Since the MARBO ROD was signed the only documents generated, regarding Waste Pile 6, are those verifying the implementation of the *Soil Removal* alternative at the site. There were no operation and maintenance (O&M) or long term monitoring (LTM) programs required after the completion of the *Soil Removal* alternative, based on confirmation samples (Shaw, 2004). Therefore no additional information is necessary to further evaluate the effectiveness of the implemented remedy.

3.1.8 Site Inspection of IRP Site 22/Waste Pile 6

The site was last inspected on 19 February 2004 by a team consisting of Mr. Gregg Ikehara (Andersen AFB), Mr. Mark Ripperda (USEPA), Mr. Michael Cruz (GEPA), Dr. Jim Rosacker

and Mr. Paul Dusenbury (Booz-Allen Hamilton), and representatives of the "study" and "cleanup" contractors.

The inspection team walked through the site and examined the excavated areas in all seven AOIs at Waste Pile 6 and agreed that the project objectives had been met. The COC-impacted soil and associated debris have been removed and Waste Pile 6 has been properly restored, thus requiring no further remedial action. (Photos 3-1 and 3-2).

3.1.9 Technical Assessment of Remedial Action at IRP Site 22/Waste Pile 6

Question A: Is the remedy functioning as intended by the ROD?

The June 2004 Final RVR (Shaw, 2004) for Waste Pile 6 was the last document issued for this site. There are no additional data available since the completion of the *Soil Removal* alternative. Based on the site inspection, the remedy is functioning as intended by the ROD. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Question B: Are the exposure assumptions, toxicity data, cleanup values, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Exposure assumptions for lead, antimony, cadmium, benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, and benzo(a)anthracene have not changed since the ROD was signed in 1998. There have been some minor changes to some of the toxicity data and cleanup values for arsenic, benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, and benzo(a)anthracene, however the changes are insignificant and do not change the conclusion of the HHRA and ERA results. In addition the cleanup values for the Waste Pile 6 COCs, based on the higher of the Residential PRG or BTV, have been modified to reflect the 2002 Residential PRGs, as presented below.

COCs by AOI	EPCs (mg/kg)	Waste Pile 6 RGOs (mg/kg)	2002 Residential PRGs or BTVs (mg/kg)
Unknown Battery Area			
Lead	**3,410**	400	400
Roofing Material Pile			
Benzo(a)pyrene	**15**	0.061	0.062
Benzo(b)fluoranthene	**32**	0.61	0.62
Indeno(1,2,3-cd)pyrene	**5.6**	0.61	0.62
Metal Debris Pile			
Cadmium	**183**	38	37
Empty Drum Pile			
Chromium	**1,290**	1,080	210

COCs by AOI	EPCs (mg/kg)	Waste Pile 6 RGOs (mg/kg)	2002 Residential PRGs or BTVs (mg/kg)
Asphalt Drum Pile			
Benzo(a)pyrene	**1.5**	0.061	0.062
Benzo(b)fluoranthene	**7.6**	0.61	0.62
Benzo(a)anthracene	**1.9**	0.61	0.62
Arsenic	**74**	62	62
Chromium	**1,270**	1,080	1,080
Lead	**903**	400	400

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No information has come to light to call into question the effectiveness of the selected remedy. The Applicable or Relevant and Appropriate Requirements (ARARs), "to be considered" (TBC), pertinent to *Soil Removal* are still met and the human health and ecological risks have been adequately addressed at the site.

3.1.10 Technical Assessment Summary of IRP Site 22/Waste Pile 6

The selected remedy for Waste Pile 6 was completed in early 2004. Based on the available documents, data, and the site inspection the *Soil Removal* alternative has functioned as intended by the ROD. The remedy eliminates the direct exposure path to COCs and minimizes the potential migration of COCs to groundwater beneath the site.

3.1.11 Issues, Recommendations, and Follow-up Actions for IRP Site 22/Waste Pile 6

Issues	Recommendations / Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affect Protectiveness? Yes/No	
					Current	Future
None	None	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

3.1.12 Protectiveness Statement for IRP Site 22/Waste Pile 6

Based on the review of existing data and site inspections, the *Soil Removal* alternative at Waste Pile 6 is currently protective of human health and the environment. This protectiveness is equally valid for the future, unless new contamination is introduced to the site.

3.1.13 Next Review of IRP Site 22/Waste Pile 6

The next five-year review of the MARBO ROD is scheduled after 02 March 2009, five years from this review. The second five-year review of MARBO ROD should not include Waste Pile 6, unless a new contaminant source is discovered at the site.

3.2 First Five-Year Review of IRP Site 24/Landfill 29

3.2.1 IRP Site 24/Landfill 29 Background

IRP Site 24/Landfill 29 (Landfill 29) is located in the southwest portion of the MARBO Annex (Figure 1-5).

Though early reconnaissance of Landfill 29 characterized the site as a landfill feature, the existence of a landfill was not confirmed during the thorough field investigation conducted during the RI. The RI concluded that the original site boundary did not define a true disposal site (i.e., a landfill or consolidated waste dump), but instead was an abandoned quarry that contained scattered drum remnants and metallic debris (Figure 3-2). The RI identified three primary disposal areas that included: 1) a *2.4-Acre Landfill* located south-southwest of the "original" site boundary (Figures 3-2 and 3-3), 2) an area west of the original site boundary containing soil-filled drums ("*Surface Drum Area"*), and 3) a small area within the original site boundary consisting of shallow subsurface metallic debris ("*Subsurface Metallic Debris Area*").

Though there were numerous areas of scattered metallic debris around the site, there were three primary AOIs:

- A *2.4-Acre Landfill*, located south-southwest of the original site boundary, contained mostly municipal waste (i.e., bottles, cans, ferrous and copper metallic debris, and crushed empty deteriorated drums). Measurements taken during excavations showed the average thickness of the fill layer was 4.2 feet (3 to 6.5 feet), and the average depth to the bottom of the fill layer was 6.2 feet (range of 5 to 8.5 feet) bgs. The waste material was covered with a relatively uniform 2-foot layer of re-cemented limestone and several inches of soil. The surface of the landfill was vegetated.

- A *Surface Drum Area,* west of the original site boundary, consisted of an estimated 86 empty or soil-filled drums/drum remnants, and the Subsurface Metallic Debris Area contains subsurface metallic debris.

- A *Subsurface Metallic Debris Area*, located within the original site boundary, contained subsurface metallic debris.

3.2.2 History of Contamination at IRP Site 24/Landfill 29

According to the HHRA and ERA, only the *Surface Drum Area* and the *Subsurface Metallic Debris Area* were impacted by COCs and required RAs. COCs that were identified at Landfill 29 include antimony and lead (EA, 1997). The EPCs that were used in the HHRA and their respective 1998 Residential PRGs, 2002 Residential PRG, and applicable BTVs are listed below.

COCs by AOI	EPCs (mg/kg)	1998 Residential PRGs (mg/kg)	2002 Residential PRGs (mg/kg)	1998 BTVs (mg/kg)
Surface Drum Area				
Antimony	224	31	31	63
Lead	18,700	400	400	166

COCs by AOI	EPCs (mg/kg)	1998 Residential PRGs (mg/kg)	2002 Residential PRGs (mg/kg)	1998 BTVs (mg/kg)
Subsurface Metallic Debris Area				
Antimony	123	31	31	63
Lead	1,120	400	400	166

3.2.3 Initial Response at IRP Site 24/Landfill 29

The COCs detected in Landfill 29 soils were determined to be relatively stable and immobile, therefore no immediate response was required.

3.2.4 Basis for Taking Action at IRP Site 24/Landfill 29

The bases for taking actions at Landfill 29 were due to:

- Elevated antimony (EPC of 224 mg/kg) and lead (EPC of 18,700 mg/kg) concentrations in soils that contributed to unacceptable cancer ($2x10^{-4}$) and non-cancer (HI=10) risks to human health at the *Surface Drum Area*.

- Elevated antimony (EPC of 123 mg/kg) and lead (EPC of 1,120 mg/kg) concentrations in soils that contributed to unacceptable non-cancer risks (HI=4) to human health at the *Subsurface Metallic Debris Area*.

Though the condition of the COC-impacted soil did not require an immediate initial response, an RA was proposed for the site to protect the future human and ecological receptors.

3.2.5 Remedial Action at IRP Site 24/Landfill 29

The COC-impacted soil at the *Surface Drum Area* and the *Subsurface Metallic Debris Area* was estimated at 35 bcy. This includes drums partially filled with soil at the *Surface Drum Area* and metallic debris at the *Subsurface Metallic Debris Area*. The depth of the impacted soil at the *Surface Drum Area* and the *Subsurface Metallic Debris Area* were estimated at 1 foot and 2 feet, respectively (ICF, 1997a). According to the MARBO ROD, signed on 17 July 1998 (EA, 1998a), *No Action* and *Soil Removal* were evaluated as potential remedial alternatives for Landfill 29. The *IC* and *Soil Cover* were not considered as potential remedial options for Landfill 29 because these alternatives would restrict future land use. Consequently, to obtain unrestricted future land use, *Soil Removal* was proposed to be protective of human health and the environment. The RAOs for the *Soil Removal* alternative were determined to protect human health and the environment by:

- eliminating the direct exposure path to COCs to allow unrestricted access to the site, and

- minimizing the potential migration of COCs to groundwater beneath the site.

3.2.6 Remedial Action Implementation at IRP Site 24/Landfill 29

According to the Final RVR (Shaw, 2001), implementing the cleanup levels of 400 mg/kg and 63 mg/kg for lead and antimony, resulted in a significant increase in the actual soil cleanup volumes versus those estimated in the RI/FS (ICF, 1996). Due to the increase in cleanup volumes, the MARBO ROD had to be amended (Andersen AFB, 2000). Approximately 14,247 bcy of lead- and antimony-contaminated soil and 1,433 bcy of solid waste were removed from Landfill 29 and disposed of at the Consolidation Unit (IRP Site 02/Landfill 2). All lead- and antimony-contaminated soil was treated with a 2 percent triple super phosphate (TSP), using a pug mill before disposal at the Consolidation Unit. Landfill 29 was backfilled with 8,438 bcy of clean fill and 1,692 bcy of topsoil, taken from an on-site borrow pit. The backfilled material was placed in 6-inch to 12-inch loose lifts that were compacted to a minimum of 85 percent dry density (Figure 4-1) (Shaw, 2001).

3.2.7 Document and Data Review for IRP Site 24/Landfill 29

Since the MARBO ROD was signed, no supporting documents have been generated for Landfill 29, other than those verifying the implementation of the *Soil Removal* alternative. There were no operation and maintenance (O&M) or long term monitoring programs required after the completion of the *Soil Removal* alternative, based on 145 confirmation samples (Shaw, 2001). Therefore no additional information is necessary to further evaluate the effectiveness of the implemented remedy.

3.2.8 Site Inspection of IRP Site 24/Landfill 29

The site was last inspected on 19 February 2004 by a team of Mr. Gregg Ikehara of Andersen AFB, Mr. Mark Ripperda of USEPA, Mr. Michael Cruz of GEPA, Dr. Jim Rosacker and Mr. Paul Dusenbury of Booz-Allen Hamilton, and representatives of the "study" and "cleanup" contractors.

The inspection team walked through the site and examined the excavated areas at Landfill 29 and found that the project objective has been met. The COC-impacted soil and associated debris have all been removed from the site and Landfill 29 has been properly restored requiring no further remedial action (Photo 3-3).

3.2.9 Technical Assessment of Remedial Action at IRP Site 24/Landfill 29

Question A: Is the remedy functioning as intended by the ROD?

The September 2001 Final RVR for Landfill 29 was the last document issued for Landfill 29. There are no additional data available since the completion of the *Soil Removal* alternative. Based on site inspection, the remedy is functioning as intended by the ROD. There have been no changes in the physical condition of the site that would affect the protectiveness of the remedy.

Question B: Are the exposure assumptions, toxicity data, cleanup values, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

The land and resource use at Landfill 29 has not changed. With COC-impacted soil and solid debris removed from the site followed by clean confirmation sampling, the future land use at Landfill 29 is unlimited and the access to site is unrestricted.

The toxicity data and PRGs for antimony and lead have not significantly changed, since the ROD was signed, that would alter the conclusion of the HHRA and ERA results. The Landfill 29 RGOs for the Landfill 29 COCs as intended by the ROD were selected to correspond to the 1998 Residential PRG for lead and the BTV for antimony. As presented below, the RGOs have not changed.

COCs	EPCs (mg/kg)	Landfill 29 RGOs (mg/kg)	2002 Residential PRGs or BTVs (mg/kg)
Surface Drum Area			
Antimony	224	63	63
Lead	18,700	400	400
Subsurface Metallic Debris Area			
Antimony	123	63	63
Lead	1,120	400	400

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could alter or call into question the protectiveness of the remedy at Landfill 29. The ARARs and TBCs, pertinent to *Soil Removal* are still met and the human health and ecological risks have been adequately addressed at the site.

3.2.10 Technical Assessment Summary of IRP Site 24/Landfill 29

Based on the available document, data, and site inspection the *Soil Removal* alternative has functioned as intended by the ROD to eliminate the direct exposure path to COCs and to minimize the potential migration of COCs to groundwater beneath the site.

3.2.11 Issues, Recommendations, and Follow-up Actions for IRP Site 24/Landfill 29

Issues	Recommendations / Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affect Protectiveness? Yes/No	
					Current	Future
None	None	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

3.2.12 Protectiveness Statement for IRP Site 24/Landfill 29

Based on the review of existing data and site inspections, the *Soil Removal* alternative at Landfill 29 is currently protective of human health and the environment. This protectiveness is equally valid for the future, unless a new contamination source is introduced to the site.

3.2.13 Next Review of IRP Site 24/Landfill 29

The next five-year review of the MARBO ROD is scheduled after 02 March 2009, five years from this review. The second five-year review of MARBO ROD should not include Landfill 29, unless a new contamination source is discovered at the site.

3.3 First Five-Year Review of IRP Site 38/MARBO Laundry

3.3.1 IRP Site 38/MARBO Laundry Background

IRP Site 38/MARBO Laundry (MARBO Laundry) is located in the eastern half of the MARBO Annex (Figure 1-5). The MARBO Laundry was operated as a military laundry facility between 1948 and 1973 (Figure 4-2). The laundry facility was modified in 1970 to include a dry cleaning facility. This facility may have discharged solvents to the base sanitary sewer via a floor drain in the dry cleaning room. Since 1974, MARBO Laundry has been utilized as a storage facility for furniture, among other uses (ICF, 1996). The building was renovated during the RI, and the renovation was completed in 1997. The renovation included scraping old paint from the outside walls, causing paint chips to be deposited on the ground surface (grass or soil) outside the building. Surface soil samples were collected along the periphery of the building (ICF, 1996).

As presented in Figure 4-2, the primary areas of interest included:

- The *North* and *South Transformer Areas*.
- *Areas Near the Edge of the Building* surrounding the MARBO Laundry.

3.3.2 History of Contamination at IRP Site 38/MARBO Laundry

According to HHRA and ERA, surface soils in the *North* and *South Transformer Areas* and the *Areas Near the Edge of Building* were impacted by COCs and required RA. The COCs at the *North* and *South Transformer Areas* were Aroclor 1254 and lead. The surface soil in the *Areas Near the Edge of the Building* were impacted by Aroclor 1254 (EA, 1997). The EPCs that were used in the MARBO ROD for the HHRA and their respective 1995 and 2002 Residential PRGs are listed below:

COCs	EPC (mg/kg)	1995 Residential PRGs (mg/kg)	2002 Residential PRGs (mg/kg)
North and South Transformer Areas			
Aroclor 1254	26	1.4 (nc)	0.22 (ca)
Lead	4,210	400	400

COCs	EPC (mg/kg)	1995 Residential PRGs (mg/kg)	2002 Residential PRGs (mg/kg)
Area Near the Edge of the Building			
Aroclor 1254	1.9	1.4 (nc)	0.22 (ca)

(nc) – the 1995 Residential PRG is based on non-cancer endpoint
(ca) – the 2002 Residential PRG is based on cancer endpoint

3.3.3 Initial Response at IRP Site 38/MARBO Laundry

The COCs at MARBO Laundry were in soil and relatively stable and immobile. Thus, no immediate response was necessary.

3.3.4 Basis for Taking Action at IRP Site 38/MARBO Laundry

The basis for taking action at the MARBO Laundry included the elevated lead concentrations and unacceptable cancer ($4x10^{-4}$) and non-cancer (HI=19) risks associated with Aroclor 1254 concentrations at the *South Transformer Area.* Elevated lead concentrations and unacceptable cancer risks ($2x10^{-5}$) were associated with elevated Aroclor 1254 concentrations at the *North Transformer Area*. Unacceptable cancer ($5x10^{-5}$) and non-cancer (HI=3) risks were associated with elevated Aroclor 1254 concentrations at the *Area Near the Edge of the Building*.

3.3.5 Remedial Action at IRP Site 38/MARBO Laundry

The lead- and Aroclor 1254-impacted soil at the *North* and *South Transformer Areas* and the *Area Near the Edge of Building* was estimated to extend five feet from the edge of the building and the transformers to a depth of 1 foot, approximately 135 bcy (ICF, 1997a).

According to the MARBO ROD (EA, 1998a), *No Action* and *Soil Removal* were evaluated as potential remedial alternatives for the MARBO Laundry. The *IC* and *Soil Cover* alternatives were not considered favorably as they would restrict the future land use at the site. Consequently, in order to allow unrestricted future use of the land, *Soil Removal* was proposed as the alternative that would be protective of human health and the environment, and would allow unrestricted use of the land. The RAO for *Soil Removal* at MARBO Laundry was deemed protective of human health and the environment by:

- eliminating the direct exposure path to COCs to allow unrestricted access to the site, and
- minimizing the potential migration of COCs to groundwater beneath the site.

3.3.6 Remedial Action Implementation at IRP Site 38/MARBO Laundry

According to the Final RVR (Shaw, 2000) the 1998 Residential PRGs were used as RAOs for lead and Aroclor 1254. Using the 1998 Residential PRGs as cleanup levels (400 mg/kg for lead and 0.97 mg/kg for Aroclor 1254), increased the cleanup volume over what was originally estimated by the RI/FS (ICF, 1996). According to the final RVR, approximately 450 bcy of lead- and Aroclor 1254-impacted soil were removed from MARBO Laundry and disposed of at

Andersen AFB Main Base Landfill. The final cleanup area was a 5- by 15-foot wide by 1- to 4.5-foot deep excavation along the edge of the building (Figure 4-2). The Aroclor 1254-impacted soil was transported in accordance with the Toxic Substance Control Act (TSCA). MARBO Laundry excavated areas were backfilled with 450 bcy of clean fill that was compacted to 90 percent of the maximum dry density (Shaw, 2000).

3.3.7 Document and Data Review for IRP Site 38/MARBO Laundry

Since the MARBO ROD was signed, no supporting documents have been generated pertaining to the MARBO Laundry, other than documents verifying the implementation of the *Soil Removal* at the site. There was no O&M or long term monitoring program required after the implementation of the *Soil Removal* alternative, based on 35 confirmation samples (Shaw, 2000). Therefore no additional information is necessary to further evaluate the effectiveness of the implemented remedy.

3.3.8 Site Inspection of IRP Site 38/MARBO Laundry

The site was last inspected on 19 February 2004 by a team of Mr. Gregg Ikehara of Andersen AFB, Mr. Mark Ripperda of USEPA, Mr. Michael Cruz of GEPA, Dr. Jim Rosacker and Mr. Paul Dusenbury of Booz-Allen Hamilton, and representatives of the "study" and "cleanup" contractors.

The inspection team walked through the site and examined the excavated areas at MARBO Laundry and found that the project objective had been met. The COC-impacted soil and associated debris have all been removed from the site and MARBO Laundry has been properly restored requiring no further remedial action (Photos 3-4 through 3-6).

3.3.9 Technical Assessment of Remedial Action at IRP Site 38/MARBO Laundry

Question A: Is the remedy functioning as intended by the ROD?

The Final RVR for MARBO Laundry (Shaw, 2000) was the last related document issued for the site. There are no additional data available since the implementation of the *Soil Removal* alternative. Based on site inspection, the remedy is functioning as intended by the ROD. There have been no changes in the physical condition of the site that would affect the protectiveness of the remedy.

Question B: Are the exposure assumptions, toxicity data, cleanup values, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

The land and resource use at MARBO Laundry has not been changed and the site still remains inactive. With COC-impacted soil removed from the site, followed by clean confirmation sampling, the future land use at MARBO Laundry is unlimited and access to site is unrestricted.

The toxicity data and PRGs for antimony and lead have not changed significantly, since the ROD was signed, that would alter the HHRA and ERA results. The RGOs used for the MARBO

Laundry cleanup were revised to the meet the 1998 Residential PRGs for lead and Aroclor 1254 rather than the 1995 Residential PRGs. As presented below, the 1995 Residential PRG for lead has not changed between 1995, 1998, and 2002. The Residential PRG for Aroclor 1254 has changed from 1.4 mg/kg in 1995, to 0.97 mg/kg in 1998, to 0.22 mg/kg in 2002. It should be noted that the 1995 and 1998 Residential PRGs for Aroclor 1254 represent non-cancer endpoints and that the 2002 Residential PRG represents a cancer endpoint. A review of the Final RVR (Shaw, 2000) indicates that the RA was conducted in three phases, until Aroclor 1254 and lead concentrations at 20 confirmatory sample locations were below cleanup goals (400 mg/kg for lead and 0.97 mg/kg for Aroclor 1254). Soil was removed along the north and south sides of the laundry building, to a depth of 1-foot bgs, and 20 confirmatory samples were collected (ten each on each side of the building). Confirmatory samples collected at eight locations were below cleanup goals for both Aroclor 1254 and lead, and no additional RA was required. Around 12 sample locations, where Aroclor 1254 and/or lead concentrations exceeded the cleanup goals, additional soils were removed to a depth of 3-ft bgs, followed by confirmatory sampling. Confirmatory samples at nine of these locations were below cleanup goals for both Aroclor 1254 and lead, and no additional RA was required. At this point the lead cleanup was completed. Around the remaining three locations, Aroclor 1254-contaminated soil was removed to a depth of 4.0- to 4.5-ft bgs, followed by confirmatory sampling. Confirmatory samples at all three locations were below cleanup goals for Aroclor 1254, and no additional RA was required. At the completion of the RA, all confirmation samples had Aroclor 1254 concentrations below both the 1998 Residential PRGs (0.97 mg/kg) and the revised 2002 Residential PRG (0.22 mg/kg).

COCs	EPC (mg/kg)	MARBO Laundry RGOs (mg/kg)	2002 Residential PRGs or BTVs (mg/kg)
North and South Transformer Areas			
Aroclor 1254 (pre-cleanup)	26	0.97 (nc)	0.22 (ca)
Lead	4,210	400	400
Area Near the Edge of the Building			
Aroclor 1254	1.9	0.97 (nc)	0.22 (ca)

(nc) – the 1995 Residential PRG is based on non-cancer endpoint
(ca) – the 2002 Residential PRG is based on cancer endpoint

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could call into question the protectiveness of the remedy at MARBO Laundry. The ARAR and TBCs, pertinent to the *Soil Removal* alternative are still met and risks to human health and the environment have been adequately addressed at the site.

3.3.10 Technical Assessment Summary of IRP Site 38/MARBO Laundry

Based on the available document, data, and site inspection the *Soil Removal* has functioned as intended by the ROD to eliminate the direct exposure path to COCs and to minimize the potential migration of COCs to groundwater beneath the site.

3.3.11 Issues, Recommendations, and Follow-up Actions for IRP Site 38/MARBO Laundry

Issues	Recommendations / Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affect Protectiveness? Yes/No	
					Current	Future
None	None	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

3.3.12 Protectiveness Statement for IRP Site 38/MARBO Laundry

Based on the review of existing data and site inspections, the *Soil Removal* alternative at MARBO Laundry is currently protective of human health and the environment. This protectiveness is equally valid for the future, unless a new contamination source is introduced to the site.

3.3.13 Next Review of IRP Site 38/MARBO Laundry

The next five-year review of MARBO ROD is scheduled after 02 March 2009, five years from this review. The second five-year review of MARBO ROD should not include MARBO Laundry, unless a new source of contamination is discovered at the site.

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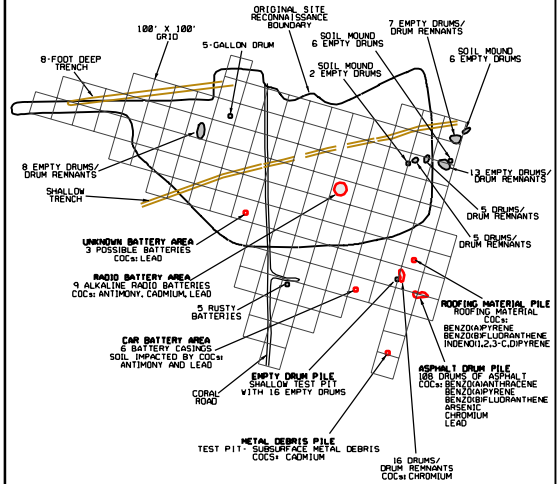
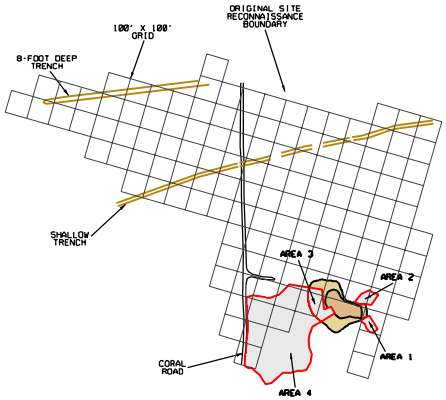
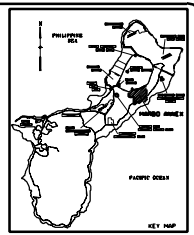


IRP SITE 22/WASTE PILE 6
BEFORE REMEDIAL ACTION



IRP SITE 22/WASTE PILE 6
REMEDIAL ACTION UNDER CONSTRUCTION



LEGEND:

- PROPOSED AREAS FOR EXCAVATION AND REMOVAL OF IMPACTED MATERIAL
- COMPLETED EXCAVATION AND REMOVAL AREA (1999)
- COMPLETED EXCAVATION AND REMOVAL AREA (2001)
- EXISTING ROADS

COCs = CONSTITUENTS OF CONCERN

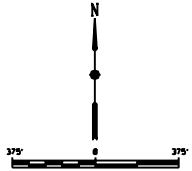


Figure 3-1.
Before and After Remedial Action.
IRP Site 22/Waste Pile 6, MARBO Annex, Andersen AFB, Guam.

Photo 3-1 Area 2 at Waste Pile 6 After Completion of Remedial Action During February 2004 Site Inspection.

Photo 3-2 Area 4 at Waste Pile 6 After Completion of Remedial Action During February 2004 Site Inspection.

Photo 3-3 Landfill 29 After Completion of Remedial Action During February 2004 Site Inspection.

Photo 3-4 South Side of MARBO Laundry After Completion of Remedial Action During February 2004 Site Inspection.

Photo 3-5 North Side of MARBO Laundry After Completion of Remedial Action During February 2004 Site Inspection.

Photo 3-6 Remnant of Former Transformer at MARBO Laundry After Completion of Remedial Action During February 2004 Site Inspection.

4.0 MARBO ANNEX SITES WITH OPERATING REMEDIAL ACTIONS

IRP Site 20/Waste Pile 7 (Waste Pile 7) is classified as *Operating Remedial Action (RA)*, as the RA has been implemented but residual COCs have been left in place at concentrations that do not allow for unrestricted use of or unlimited access to the land. An *Operating RA* may require management in perpetuity (Waste Pile 7). The first five-year review of Waste Pile 7 is evaluated herein.

4.1 First Five-Year Review of Site 20/Waste Pile 7

4.1.1 Site 20/Waste Pile 7 Background

Waste Pile 7 is located in the south-central portion of the MARBO Annex (Figure 1-3). Waste Pile 7 was an abandoned quarry that was partially filled with waste, and covered with soil and vegetation. Waste Pile 7 was divided into two broad areas of concern with respect to the potential for contamination. Area A included the *Buried Waste Area (*approximately 1.84 acres in size with an average depth to the bottom of the fill layer of 10.8 feet), and a small area covered with ten empty, deteriorated drum remnants (Figure 4-1). Area B included numerous mounds of soil, some of which were covered with construction debris, municipal trash, and metal debris (EA, 1998a).

4.1.2 History of Contamination at Site 20/Waste Pile 7

According to the HHRA and ERA, Area A had some surface soil contamination that required a RA. The COCs identified at Waste Pile 7 included lead, pesticides (4,4'-DDE, 4,4-DDT, dieldrin, alpha chlordane and gamma chlordane), and the PCB-Aroclor 1260 (EA, 1997a). The EPCs that were used in the HHRA in the MARBO RI/FS (ICF, 1996) are presented below along with their respective BTVs and the 1995 and 2002 Residential PRGs:

COCs	EPCs (mg/kg)	1995 Residential PRGs (mg/kg)	2002 Residential PRGs (mg/kg)	BTVs (mg/kg)
4,4'-DDE	6.7	1.3	1.7	NA
4,4'-DDT	6.2	1.3	1.7	NA
Dieldrin	0.12	0.028	0.030	NA
Alpha chlordane	0.44	0.34	0.35	NA
Gamma chlordane	0.38	0.34	0.35	NA
Aroclor 1260	4.4	0.066 #	0.22	NA
Lead	3,604	400	400	166

# = PRG is based on total PCB concentration; prior to 2000 there was no PRG for Aroclor 1260.
NA = Not Applicable, BTV is applicable only for inorganic compounds (metals).

4.1.3 Initial Response

The COCs detected in Waste Pile 7 soils were determined to be relatively stable and immobile, therefore no immediate response was required.

4.1.4 Basis for Taking Action at Site 20/Waste Pile 7

The basis for taking action at Waste Pile 7 related to excess cancer ($2x10^{-4}$) and non-cancer (HI=4) risks associated with elevated concentrations of Aroclor 1260, pesticides, and lead in surface and subsurface soils in the *Buried Waste Area* (Figure 4-1). Though the condition of the COC-impacted soil did not require an immediate initial response, an RA was proposed for the site to be protective of future human and ecological receptors.

4.1.5 Remedial Action at Site 20/Waste Pile 7

The COC-impacted soils at *Buried Waste Area* covered an approximately 1.8-acre area to a depth of 3 to 17 feet deep (Figure 4-1). According to the MARBO ROD (EA, 1998a), *No Action, IC, Soil Removal,* and *Soil Cover* remedial alternatives were evaluated for Waste Pile 7. However, due to the high volume of the COC-impacted soils that would require removal or treatment, the *Soil Cover* alternative was selected as the preferred alternative. The soil cover alternative was deemed to be protective of human health and the environment. The RAOs for the *Soil Cover* alternative that would be protective of human health and the environment included:

- eliminating the direct exposure path to COCs, and
- minimizing the potential migration of COCs to groundwater beneath the site.

Though the *Soil Cover* alternative eliminates direct exposure to COCs, it does not allow for unrestricted future land use at Waste Pile 7. As such, a written concurrence of the three FFA signatories is required before USAF can take any action at Waste Pile 7 that could compromise the structural integrity of the *Soil Cover*. Similarly, the USAF shall notify the other two FFA signatories of any plan to release or transfer the Waste Pile 7 property to a federal, or non-federal entity, in accordance with CERCLA 120(h)(3) (EA, 1998). In addition the MARBO ROD stipulates that the USAF shall also place warning signs around the periphery of Waste Pile 7 to notify the public and to restrict activities that may jeopardize the structural integrity of the *Soil Cover*, such as trenching or excavation.

4.1.6 Remedial Action Implementation at Site 20/Waste Pile 7

According to final RVR, all municipal trash and metallic debris were relocated to the low-lying section of the *Buried Waste Area* and then the *Soil Cover* was constructed over the 1.8-acre *Buried Waste Area* (Shaw, 2000).

The *Soil Cover* consisted of a 6-inch lift of 6-inch minus crush coral sub grade, covered by a 12-inch lift of a 2-inch minus limestone gravel containment layer, which in turn was covered by a 6-inch lift of topsoil. The sub grade and containment layers were compacted to 95 percent of the maximum dry density. As presented in Figure 4-1, water control structures were constructed using 12-inch deep earthen swales, 6-inch to 10-inch diameter boulder riprap, and a large ponding basin to control the drainage pattern and minimize the erosion against a potential

50-year storm. The site was then re-vegetated and an orange plastic fence was initially installed to protect the re-vegetated areas from erosion by wildlife (Shaw, 2000).

4.1.7 Document and Data Review for Site 20/Waste Pile 7

Since the MARBO ROD was signed, the only documents generated regarding Waste Pile 7, are those verifying the implementation of the *Soil Cover* alternative at the site. There was no O&M or LTM program requirement for the *Soil Cover* alternative and therefore there are no supporting data to further evaluate the effectiveness of the remedy.

4.1.8 Site Inspection of Site 20/Waste Pile 7

The site was last inspected on 19 February 2004 by a team of Mr. Gregg Ikehara (Andersen AFB), Mr. Mark Ripperda (USEPA), Mr. Michael Cruz (GEPA), Dr. Jim Rosacker and Mr. Paul Dusenbury (Booz-Allen Hamilton), and representatives of "study" and "cleanup" contractors.

The inspection team walked through the site and examined the excavated areas at Waste Pile 7 and found that, for the most part, the soil cover, the riprap, and the ponding basin at Waste Pile 7 were intact (Photos 4-1 and 4-2). However, according to the last site inspection on 22 April 2004, the upper 6 inches of the *Soil Cover* and the re-vegetation are damaged by a small pig wallow and rainfall (Photo 4-3), and also by growth of small trees (Photo 4-4). Additionally, there were signs of truck traffic at the site and no warning signs were observed around the site to warn against intrusive activities such as driving, trenching, or excavation at the site (Photos 4-5 and 4-6).

4.1.9 Technical Assessment of Remedial Action at Site 20/Waste Pile 7

Question A: Is the remedy functioning as intended by the ROD?

The final RVR for Waste Pile 7 (Shaw, 2002) was the last related document issued for Waste Pile 7. There are no additional data available since implementing the Soil Cover. Based on the site inspection, the remedy is not fully functioning as intended by the ROD. Over time, continued, unchecked growth of small trees, pig wallowing activity, and truck traffic at the site may jeopardize the integrity of the Soil Cover at Waste Pile 7.

Question B: Are the exposure assumptions, toxicity data, cleanup values, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

The land and resource use at Waste Pile 7 has not been changed. With COC-impacted soil beneath the *Soil Cover*, the future land use at Waste Pile 7 is still restricted. The site and its vicinity are still inactive and therefore the exposure assumptions for the HHRA and ERA are still valid for the site. No new human health or ecological exposure pathways or receptors have been identified for the site.

The toxicity data and Residential PRGs for 4,4'-DDE, 4,4-DDT, dieldrin, alpha chlordane, gamma chlordane, and Aroclor 1260 have changed slightly since the ROD was signed on 17 July 1998. However, those changes do not alter the HHRA and ERA results or the effectiveness of

the selected remedy. As presented below, even though some of the Residential PRGs have changed since 1995, the changes are insignificant and do not alter the remedial alternative for Waste Pile 7.

COCs	EPCs (mg/kg)	1995 Residential PRGs (mg/kg)	2002 Residential PRGs (mg/kg)
4,4'-DDE	6.7	1.3	1.7
4,4'-DDT	6.2	1.3	1.7
Dieldrin	0.12	0.028	0.030
Alpha chlordane	0.44	0.34	1.6
Gamma chlordane	0.38	0.34	1.6
Aroclor 1260	4.4	0.066#	0.22
Lead	3,604	400	400

= PRG is based on total PCB concentration rather than Aroclor; prior to 2000 there was no PRG for Aroclor 1260.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Based on the site inspection, the integrity of the *Soil Cover* is starting to deteriorate and if allowed to continue, the *Soil Cover* may not be protective of the human health or the environment.

4.1.10 Technical Assessment Summary of Site 20/Waste Pile 7

Based on the available document, data, and site inspection the *Soil Cover* alternative is not functioning as intended by the ROD to eliminate the direct exposure path to COCs and to minimize the potential migration of COCs to groundwater beneath the site. The specific issues at Waste Pile 7 are discussed in the section below, followed by recommendations.

4.1.11 Issues, Recommendations, and Follow-up Actions for Site 20/Waste Pile 7

Issues	Recommendations / Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affect Protectiveness? Yes/No	
					Current	Future
1) No signs are posted around the *Soil Cover* to prevent activities that may damage the cover, such as driving trucks, trenching, or excavation.	Post warning signs around the periphery of the site to restrict any activities that may jeopardize the structural integrity of the *Soil Cover*.	USAF	USEPA & GEPA	10/01/2004	N	Y
2) Pig wallow and small trees have damaged small area of the *Soil Cover*. If continues, soil erosion may expose COCs to surface.	Implement a quarterly O&M program to check the integrity of the *Soil Cover*).	USAF	USEPA & GEPA	10/01/2004	N	Y
3) The *Soil Cover* is subject to frequent island natural disasters such as typhoons and earthquakes that can damage the structural integrity of the *Soil Cover*.	Implement an event driven inspection program to check the integrity of the *Soil Cover* after each natural disaster.	USAF	USEPA & GEPA	10/01/2004	N	Y

A daily report should be kept of every O&M visit to the site. The daily report should include: the date, weather condition, personnel on site, observations regarding the structural integrity of the soil cover (supported by photographs), and any corrective actions that are performed (supported by photographs). These daily reports should be compiled in a semi-annual report and distributed to the Remedial Project Managers (RPM).

4.1.12 Protectiveness Statement for Site 20/Waste Pile 7

Based on the review of existing data and site inspections, the *Soil Cover* at Waste Pile 7 is currently protective of human health and the environment. This protectiveness is valid as long as erosion, tree roots, typhoons, or earthquakes do not damage the structural integrity of the *Soil Cover*. In order for the *Soil Cover* to be protective in the long-term, a regular maintenance program is recommended for the site along with a site inspection after any natural disaster to ensure the structural integrity of the *Soil Cover*. Additionally, posting signs are recommended around the site to prevent any subsurface exploration that may damage the *Soil Cover*.

4.1.13 Next Review of Site 20/Waste Pile 7

The next five-year review of MARBO ROD is scheduled after 02 March 2009, five years from this review, and should include Waste Pile 7. The related review period would be from 02 March 2004 to 02 March 2009.

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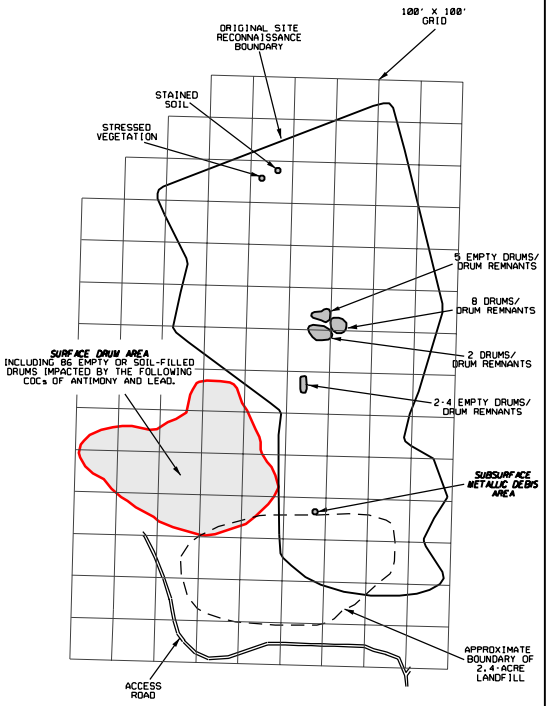
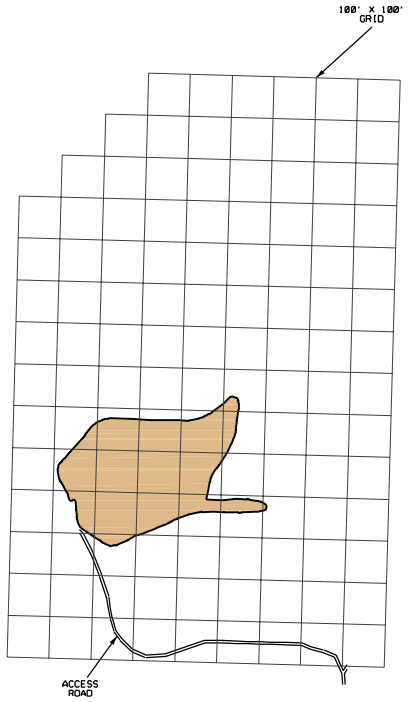
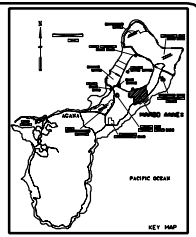


IRP SITE 24/LANDFILL 29
BEFORE REMEDIAL ACTION



IRP SITE 24/LANDFILL 29
AFTER REMEDIAL ACTION IN MARCH 2001



LEGEND:

- PROPOSED AREA FOR EXCAVATION AND REMOVAL OF IMPACTED MATERIAL
- COMPLETED EXCAVATION AND REMOVAL AREA
- EXISTING ROADS

COCs - CONSTITUENTS OF CONCERN

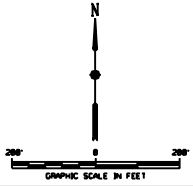


Figure 4-1.
Before and After Remedial Action.
IRP Site 24/Landfill 29, MARBO Annex, Andersen AFB, Guam.

Photo 4-1 Waste Pile 7 After Completion of Remedial Action During February 2004 Site Inspection.

Photo 4-2 Waste Pile 7 Drainage Area After Completion of Remedial Action During February 2004 Site Inspection.

Photo 4-3 Soil Cover Damaged by Pig Wallow at Waste Pile 7 After Completion of Remedial Action During February 2004 Site Inspection.

Photo 4-4 Small Tree Growing on Soil Cover at Waste Pile 7 After Completion of Remedial Action During February 2004 Site Inspection.

Photo 4-5 Sign of Truck Traffic at Waste Pile 7 After Completion of Remedial Action During February 2004 Site Inspection.

Photo 4-6 Waste Pile 7 Entrance Sign During February 2004 Site Inspection.

5.0 NEW IRP SITES IN MARBO ANNEX SCHEDULED FOR REMEDIAL INVESTIGATION UNDER THE BASEWIDE OPERABLE UNIT

Even though AOC 54, AOC 55, and AOC 56 are located in the MARBO Annex, they were not part of MARBO Annex OU and were not included in the July 1998 MARBO OU ROD. By the time AOC 54, AOC 55, and AOC 56 were studied under the Phase II EBS (EA, 1998b), the MARBO OU ROD had already been signed. However, according to the Phase II EBS, AOC 54, AOC 55, and AOC 56 were recommended for further investigation. Further investigation of these sites may help identify potential TCE and PCE sources observed in the nearby MARBO groundwater. Subsequently, AOC 54, AOC 55, and AOC 56 have been re-classified as IRP Site 52, IRP Site 53, and IRP Site 54, respectively, and are programmed for further environmental investigation under the FFA and in accordance with the CERCLA. Remedial investigations of IRP Site 52, IRP Site 53, and IRP Site 54 are programmed for 2005 as part of the Basewide OU, and investigation results will be included in the second five-year review. Until these sites are investigated, warning signs should be posted around IRP Site 52, IRP Site 53, and IRP Site 54. A brief background of IRP Site 52, IRP Site 53, and IRP Site 54 are presented in this section.

5.1 IRP Site 52 (Formerly AOC 54) Operational Support Buildings

5.1.1 IRP Site 52/Operational Support Buildings Background

IRP Site 52/Operational Support Buildings (IRP Site 52) is located in the north-central portion of the MARBO Annex (Figure 1-3). An initial investigation was conducted under the Phase I and II EBSs under the former designation of AOC 54 (EA, 1998b and ICF, 1995). According to the EBS reports, IRP Site 52 includes the foundations (concrete pads) of former operational support buildings including tool shops, a carpenter shop, a generator shop, a heavy vehicle shop, and vehicle maintenance shops (Figure 5-1). In addition, a concrete pit associated with the former location of the heavy vehicle shop was located at the site. Due to past operations at the former shops, potentially hazardous materials may have been discharged to the soils.

5.1.2 History of Contamination at IRP Site 52/Operational Support Buildings

During the Phase II EBS field investigation the concrete pads and surrounding area were covered by trees and heavy vegetation (EA, 1998b). No evidence of stained soil or stressed vegetation was evident at the site. The Phase II EBS included collecting 8 composite surface soil samples within 5 feet of the concrete pads, at depths of 2 inches to 6 inches bgs. Additionally, 13 discrete surface soil samples were collected to better define the extent of the contamination and to verify the presence of specific COPCs detected in the composite surface soil samples. Composite and discrete surface soil samples were analyzed for semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and metals (EA, 1998b).

No SVOCs or PCBs were detected in any of the surface soil samples at concentrations that exceeded Residential PRGs (Figure 5-1 and Table 5-1). Composite surface soil samples AAFB06A54S031 and AAFB06A54S038 contained antimony at concentrations that exceeded the BTV (63 mg/kg) and the 1995 Residential PRG (31 mg/kg) (Figure 5-1 and Table 5-1). Additionally, lead concentrations exceeding the BTV (166 mg/kg) and the 1995 Residential PRG

(400 mg/kg), were detected in composite surface soil samples AAFB06A54S029, AAFB06A54S030, AAFB06A54S032, and AAFB06A54S038, (Figure 5-1).

Discrete surface soil samples were collected adjacent to sample locations areas where aluminum, antimony and lead were detected in composite surface soil samples (EA, 1998b). Lead concentrations exceeding the BTV and Residential PRG were detected in discrete surface soil samples AAFB06A54S995, AAFB06A54S996, AAFB06A54S998, AAFB06A54S1003, AAFB06A54S1004, AAFB06A54S1005, and AAFB06A54S1007 (Table 5-1 and Figure 5-1).

No subsurface soil samples were collected, as per the approved work plans, because bedrock was encountered at depths shallower than 2 feet bgs. A total of 53 soil gas samples were collected, and analyzed for VOCs using the on-base gas chromatograph/mass spectrometer (GC/MS). No target VOCs were detected in any of the 53 soil gas samples.

At conclusion of the Phase II EBS, according to Air Force Instruction (AFI) 32-7066 (USAF, 1994), IRP Site 52 was classified as a Category 6, where contamination is present at concentrations above action levels, and required response actions have not yet been implemented.

5.1.3 Upcoming Field Investigation at IRP Site 52/Operational Support Buildings

The USAF is programming funding for an EE/CA at IRP Site 52 that is currently scheduled for 2005. The EE/CA will establish RAOs and characterize cleanup areas for lead-contaminated soil. In addition to discrete surface soil samples, because no subsurface soil samples were collected during the EBS, the EE/CA will include subsurface soil sampling, trenching, or soil borings to investigate for potential subsurface contaminant sources (Figure 5-2. Furthermore, the subsurface investigation may explore for suspected source areas of chlorinated VOCs that are observed in the groundwater (monitoring well IRP-31) down gradient of the site (Figure 5-2). If a source of chlorinated VOCs is found at IRP Site 52, a monitoring well will be programmed.

5.2 IRP Site 53 (Formerly AOC 55) Operational Support Buildings

5.2.1 IRP Site 53/Operational Support Buildings Background

IRP Site 53/Operational Support Buildings (IRP Site 53) is located in the north-central portion of the MARBO Annex (Figure 1-3). An initial investigation was conducted under the Phase I and II EBSs under the former designation of AOC 55 (EA, 1998b and ICF, 1995). According to the Phase I EBS records and the Phase II EBS field verification, IRP Site 53 was a former gas station with two associated rusted aboveground storage tanks (ASTs) as shown in Figure 5-3. Due to past operations, discharge of fuel-related constituents to the soils may have occurred.

5.2.2 History of Contamination at IRP Site 53/Operational Support Buildings

During the Phase II EBS field investigation, the areas near the rusted ASTs were covered by trees and heavy vegetation (EA, 1998b). No evidence of stained soil or stressed vegetation was evident at the site. The Phase II EBS field investigation included collecting two composite surface soil samples within 5 feet of the ASTs. Composite surface soil samples were collected at

3- to 6-inches bgs and analyzed for SVOCs, PCBs and metals (EA, 1998b). No SVOCs or PCBs were detected in any of the soil samples (Figure 5-3). Composite surface soil samples AAFB06A55S048 and AAFB06A55S049 contained lead and manganese, respectively, at concentrations that exceeded the BTVs and 1995 Residential PRGs (Table 5-2). The COCs (lead) detected in IRP Site 53 soils were determined to be relatively stable and immobile, therefore no immediate response was required.

No subsurface soil samples were collected, as per the approved work plans, because bedrock was encountered at depths shallower than 2 feet bgs. However 10 soil gas samples were collected and analyzed for VOCs using the on-base GC/MS. No target VOCs were detected in any of the soil gas samples.

According to AFI 32-7066 (USAF, 1994), IRP Site 53 was assigned to Category 6, where contamination is present at concentrations above action levels, and required response actions have not yet been implemented.

5.2.3 Remedial Action at IRP Site 53/Operational Support Buildings

The Air Force is programming funding for an EE/CA at IRP Site 53, which is currently scheduled for 2005. The EE/CA will establish RAOs and characterize cleanup areas for lead-contaminated soil. In addition to discrete surface soil samples, the EE/CA will include subsurface soil sampling to investigate for potential subsurface contaminant sources (Figure 5-4). IRP Site 53 is not a probable source of the TCE or PCE observed in MARBO groundwater, so no monitoring wells are currently being proposed.

5.3 IRP Site 54 (Formerly AOC 56) Operational Support Buildings

5.3.1 IRP Site 54/Operational Support Buildings Background

IRP Site 54/Operational Support Buildings (IRP Site 54) is located in the central portion of the MARBO Annex (Figure 1-3). An initial investigation was conducted under the Phase I and II EBSs under the former designation of AOC 56 (EA, 1998b and ICF, 1995). According to the EBS reports, IRP Site 54 included a sign paint shop, battery shop, refrigeration shop, plumbing shop, electric shop, carpenter shop, welding shop, motor pool garage, grease stand, machine shop, preventive maintenance shops, generator shack, paint shed, steam shop, and warehouses (Figure 5-5).

5.3.2 History of Contamination at IRP Site 54/Operational Support Buildings

During the Phase II EBS field investigation the concrete pads and surrounding area were covered by trees and heavy vegetation (EA, 1998b). No evidence of stained soil or stressed vegetation was evident at the site.

The Phase II EBS included collecting 11 composite surface soil samples within 5 feet of the concrete pads, at depths of 2- to 6-inches bgs. Additionally, 7 discrete surface soil samples were collected to better define the extent of the contamination and verify the presence of specific

COPCs detected in the composite surface soil samples. Composite and discrete surface soil samples were analyzed for SVOCs, PCBs, and metals (EA, 1998b).

Surface soil samples AAFB06A56S092, AAFB06A56S095, AAFB06A56S103, AAFB06A56S110, and AAFB06A56S111 contained benzo(a)pyrene at concentrations that exceeded the 1995 Residential PRG (61 mg/kg) (Table 5-3 and Figure 5-5). The PCB Aroclor 1260 was detected in sample AAFB06A56S100 at concentrations equal to the 1995 Residential PRG for total PCBs (Table 5-3 and Figure 5-5). Surface soil samples AAFB06A56S092, AAFB06A56S096, AAFB06A56S100, AAFB06A56S101, and AAFB06A56S109 contained lead at concentrations that exceeded the 1995 Residential PRG (400 mg/kg) (Table 5-3 and Figure 5-5). The COCs detected in IRP Site 54 soils were determined to be relatively stable and immobile, therefore no immediate response was required.

No subsurface soil samples were collected, as per the approved work plans, because bedrock was encountered at depths shallower than 2 feet bgs. However 53 soil gas samples were collected and analyzed for VOCs using the on-base GC/MS. No target VOCs were detected in any of the soil gas samples.

At the conclusion of the Phase II EBS, according to AFI 32-7066 (USAF, 1994), IRP Site 54 was classified as a Category 6, where contamination is present at concentrations above action levels, and required response actions have not yet been implemented.

5.3.3 Upcoming Field Investigation at IRP Site 54/Operational Support Buildings

The Air Force is programming funding for an EE/CA at IRP Site 54 that is scheduled for 2005. The EE/CA will establish RAOs and characterize cleanup areas for benzo(a)pyrene-, lead-, and Aroclor 1260-contaminated soil. Because no subsurface soil samples were collected during the EBS, in addition to discrete surface soil samples, the EE/CA will include trenching or soil borings to investigate for potential subsurface contaminant sources. Also, the subsurface exploration may explore for suspected source areas of chlorinated VOCs that are observed in the groundwater (monitoring well IRP-31) down gradient of the site (Figure 5-6). If a source of chlorinated VOCs is found at IRP Site 54, a monitoring well will be programmed.

TABLE 5-1. IRP SITE-52 (FORMER AOC-54) SOIL SAMPLE RESULTS.

	Sample Identifier					A54S028	A54S029	A54S030	A54S031	A54S032	A54S038	A54S040	A54S041D
	Sampling Depth (ft)			**PRG**	**PRG**	0.20-0.30	0.00-0.30	0.20-0.40	0.30-0.30	0.30-0.40	0.20-0.30	0.20-0.50	0.20-0.50
Method	Analyte	Units	**BTVs**	**Res**	**Indust**								
SEMIVOLATILE ORGANIC COMPOUNDS													
SW8270	PYRENE	ug/kg	N/A	**2,300,000**	54,000,000	<370	110 J	<800	<440	<380	<420	<810	<840
TOTAL METALS													
SW6010	ALUMINUM	mg/kg	**173,500**	76,000	100,000	9,200	28,200	24,500	**232,000**	34,700	16,200	893 N	1,010 N
SW6010	ANTIMONY	mg/kg	**63**	31	820	3.4 BN	11.7 BN	42.4 N	6.5 BN	16.1 BN	**85.3 N**	2.5 B	2.4 B
SW6010	BARIUM	mg/kg	335	**5,400**	100,000	98.2	188	25.2	43.6	105	62.7	3.1 B	3.7 B
SW6010	BERYLLIUM	mg/kg	3.3	**150**	2,200	<0.1	0.39 B	0.31 B	0.8 B	0.56 B	0.18 B	<0.12	<.12
SW6010	CADMIUM	mg/kg	6.5	**37**	810	1.8	7.4	5.3	3.1	2.8	6	0.32 B	.4 B
SW6010	CALCIUM	mg/kg	N/A	N/A	N/A	351,000	278,000	329,000	283,000	318,000	293,000	362,000	331,000
SW6010	CHROMIUM, TOTAL	mg/kg	**1,080**	210	450	75.1 E	339 E	169 E	71.5 E	372 E	178 E	9.4	10.7
SW6010	COBALT	mg/kg	29	**4,700**	100,000	2.4 B	9.3	4.9 B	7.2	6.9	5.8 B	<1.1	<1
SW6010	COPPER	mg/kg	72.2	**2,900**	76,000	16.5	86.3	126	25.8	13.7	266	3.6 B	3.7 B
SW6010	IRON	mg/kg	**116,495**	23,000	100,000	18,000	88,100	23,500	39,200	29,100	43,500	1,110 E	1,250 E
SW6010	LEAD	mg/kg	166	**400**	750	266 E	**1,540 E**	**480 E**	211 E	**732 E**	**935 E**	35.5	44.6
SW6010	MAGNESIUM	mg/kg	N/A	N/A	N/A	3,520 E	1,670 E	1,710 E	2,230 E	1,620 E	1,750 E	4,000	4,320
SW6010	MANGANESE	mg/kg	5,500	**1,800**	32,000	230 E	801 E	383 E	419 E	351 E	327 E	46.4	64.6
SW6010	NICKEL	mg/kg	242.5	**1,600**	41,000	14.2 B	68	36.5	66.2	47.8	32.8	<1.1	<1
SW6010	POTASSIUM	mg/kg	N/A	N/A	N/A	38 B	62.9 B	43.7 B	76.3 B	36.3 B	79.5 B	91.1 B	75.5 B
SW6010	SILVER	mg/kg	14.9	**390**	10,000	<0.28	<0.33	<0.33	<0.39	<0.33	<0.34	4.1 BN	3.6 BN
SW6010	SODIUM	mg/kg	N/A	N/A	N/A	108	181	72.8 B	94 B	55 B	87.7 B	798	987
SW6010	VANADIUM	mg/kg	206	**550**	14,000	8.4 B	29.5	26.6	52.4	40	20.1	1.2 B	1.3 B
SW6010	ZINC	mg/kg	111	**23,000**	100,000	213 E	782 E	233 E	209 E	871 E	1,200 E	22	23.3
SPECIFIC METALS													
SW7060	ARSENIC	mg/kg	**62**	0.39	2.7	1.3 *	2 *	2.2 *	3.7 *	0.51 B*	2.8 BS	0.34 B	.28 B
SW7471	MERCURY	mg/kg	0.28	**23**	610	<0.05	0.1 B	0.17	0.13	0.1	0.09 B	<0.05	<.05
SW7841	THALLIUM	mg/kg	1.42	**5.2**	130	<0.21	0.28 BN	<0.24	0.28 BN	<0.22	<0.24	<0.24	<.24

BTV = Background Threshold Value
2002 PRG = Preliminary Remediation Goal
N/A = Not applicable
J = Indicates an estimated value
E = Reported value is estimated due to the presence of interference
N = Spiked sample recovery is not within control limits
D = Duplicate sample
For detailed laboratory results see Appendix B.
j = Duplicate is not within QAPP control limit (50%)

B = Reported value is less than the Contract Required Detection Limit, but greater than the Instrument Detection Limit
S = Reported value is determined by the method of standard additions
* = Duplicate analyses is not within control limits
** = PRG for thallium acetate
NA = Not analyzed
Bold and shaded indicates Concentration = or > the higher of BTV or Residential PRGs
Bold indicates Concentration = or > the higher of BTV or Industrial PRGs

TABLE 5-1. IRP SITE-52 (FORMER AOC-54) SOIL SAMPLE RESULTS.

	Sample Identifier					A54S042	A54S994	A54S995	06A54S996	06A54S997	06A54S998	06A54S999-D	06A54S1000
	Sampling Depth (ft)			**PRG**	**PRG**	0.30-0.50	0.17-0.17	0.33-0.33	0.33-0.33	0.25-0.25	0.50-0.50	0.50-0.50	0.17-0.33
Method	Analyte	Units	**BTVs**	**Res**	**Indust**								
SEMIVOLATILE ORGANIC COMPOUNDS													
SW8270	PYRENE	ug/kg	N/A	**2,300,000**	54,000,000	<750	NA	NA	NA	NA	NA	NA	NA
TOTAL METALS													
SW6010	ALUMINUM	mg/kg	**173,500**	76,000	100,000	7,900 N	NA	NA	NA	NA	NA	NA	22,200
SW6010	ANTIMONY	mg/kg	**63**	31	820	6 B	NA	NA	NA	NA	NA	NA	NA
SW6010	BARIUM	mg/kg	335	**5,400**	100,000	6.7 B	NA	NA	NA	NA	NA	NA	NA
SW6010	BERYLLIUM	mg/kg	3.3	**150**	2,200	<0.1	NA	NA	NA	NA	NA	NA	NA
SW6010	CADMIUM	mg/kg	6.5	**37**	810	1.1	NA	NA	NA	NA	NA	NA	NA
SW6010	CALCIUM	mg/kg	N/A	N/A	N/A	334,000	NA	NA	NA	NA	NA	NA	NA
SW6010	CHROMIUM, TOTAL	mg/kg	**1,080**	210	450	51.5	NA	NA	NA	NA	NA	NA	NA
SW6010	COBALT	mg/kg	29	**4,700**	100,000	<0.93	NA	NA	NA	NA	NA	NA	NA
SW6010	COPPER	mg/kg	72.2	**2,900**	76,000	26.2	NA	NA	NA	NA	NA	NA	NA
SW6010	IRON	mg/kg	**116,495**	23,000	100,000	6,560 E*	NA	NA	NA	NA	NA	NA	NA
SW6010	LEAD	mg/kg	166	**400**	750	203	249 E	**3,350 E**	**614 E**	65.4 E	**729 Ej**	211 Ej	NA
SW6010	MAGNESIUM	mg/kg	N/A	N/A	N/A	1,600	NA	NA	NA	NA	NA	NA	NA
SW6010	MANGANESE	mg/kg	5,500	**1,800**	32,000	242	NA	NA	NA	NA	NA	NA	NA
SW6010	NICKEL	mg/kg	242.5	**1,600**	41,000	7.5 B	NA	NA	NA	NA	NA	NA	NA
SW6010	POTASSIUM	mg/kg	N/A	N/A	N/A	47 B	NA	NA	NA	NA	NA	NA	NA
SW6010	SILVER	mg/kg	14.9	**390**	10,000	3.8 BN	NA	NA	NA	NA	NA	NA	NA
SW6010	SODIUM	mg/kg	N/A	N/A	N/A	77.4 B	NA	NA	NA	NA	NA	NA	NA
SW6010	VANADIUM	mg/kg	206	**550**	14,000	8.6 B	NA	NA	NA	NA	NA	NA	NA
SW6010	ZINC	mg/kg	111	**23,000**	100,000	71.5 *	NA	NA	NA	NA	NA	NA	NA
SPECIFIC METALS													
SW7060	ARSENIC	mg/kg	**62**	0.39	2.7	0.5 B	NA	NA	NA	NA	NA	NA	NA
SW7471	MERCURY	mg/kg	0.28	**23**	610	0.06 B	NA	NA	NA	NA	NA	NA	NA
SW7841	THALLIUM	mg/kg	1.42	**5.2**	130	<0.21	NA	NA	NA	NA	NA	NA	NA

BTV = Background Threshold Value
2002 PRG = Preliminary Remediation Goal
N/A = Not applicable
J = Indicates an estimated value
E = Reported value is estimated due to the presence of interference
N = Spiked sample recovery is not within control limits
D = Duplicate sample
For detailed laboratory results see Appendix B.
j = Duplicate is not within QAPP control limit (50%)

B = Reported value is less than the Contract Required Detection Limit, but greater than the Instrument Detection Limit
S = Reported value is determined by the method of standard additions
* = Duplicate analyses is not within control limits
** = PRG for thallium acetate
NA = Not analyzed
Indicates value exceeds Residential PRGs and BTVs
Bold indicates the higher value of Residential PRGs vs. BTVs

TABLE 5-1. IRP SITE-52 (FORMER AOC-54) SOIL SAMPLE RESULTS.

	Sample Identifier					06A54S1001	06A54S1002	06A54S1003	06A54S1004	06A54S1005	06A54S1006	A54S1007
	Sampling Depth (ft)			PRG	PRG	0.17-0.33	0.17-0.33	0.17-0.33	0.17-0.33	0.17-0.33	0.17-0.33	0.17-0.33
Method	Analyte	Units	BTVs	Res	Indust							
SEMIVOLATILE ORGANIC COMPOUNDS												
SW8270	PYRENE	ug/kg	N/A	**2,300,000**	54,000,000	NA	NA	NA	NA	NA	NA	NA
TOTAL METALS												
SW6010	ALUMINUM	mg/kg	**173,500**	76,000	100,000	34,100	29,100	NA	NA	NA	NA	NA
SW6010	ANTIMONY	mg/kg	**63**	31	820	NA	NA	NA	NA	5.9 BE	7.9 BE	25.6 E
SW6010	BARIUM	mg/kg	335	**5,400**	100,000	NA	NA	NA	NA	NA	NA	NA
SW6010	BERYLLIUM	mg/kg	3.3	**150**	2,200	NA	NA	NA	NA	NA	NA	NA
SW6010	CADMIUM	mg/kg	6.5	**37**	810	NA	NA	NA	NA	NA	NA	NA
SW6010	CALCIUM	mg/kg	N/A	N/A	N/A	NA	NA	NA	NA	NA	NA	NA
SW6010	CHROMIUM, TOTAL	mg/kg	**1,080**	210	450	NA	NA	NA	NA	NA	NA	NA
SW6010	COBALT	mg/kg	29	**4,700**	100,000	NA	NA	NA	NA	NA	NA	NA
SW6010	COPPER	mg/kg	72.2	**2,900**	76,000	NA	NA	NA	NA	NA	NA	NA
SW6010	IRON	mg/kg	**116,495**	23,000	100,000	NA	NA	NA	NA	NA	NA	NA
SW6010	LEAD	mg/kg	166	**400**	750	NA	NA	**875 E**	**2,550 E**	**411 E**	318 E	**1,310 E**
SW6010	MAGNESIUM	mg/kg	N/A	N/A	N/A	NA	NA	NA	NA	NA	NA	NA
SW6010	MANGANESE	mg/kg	5,500	**1,800**	32,000	NA	NA	NA	NA	NA	NA	NA
SW6010	NICKEL	mg/kg	242.5	**1,600**	41,000	NA	NA	NA	NA	NA	NA	NA
SW6010	POTASSIUM	mg/kg	N/A	N/A	N/A	NA	NA	NA	NA	NA	NA	NA
SW6010	SILVER	mg/kg	14.9	**390**	10,000	NA	NA	NA	NA	NA	NA	NA
SW6010	SODIUM	mg/kg	N/A	N/A	N/A	NA	NA	NA	NA	NA	NA	NA
SW6010	VANADIUM	mg/kg	206	**550**	14,000	NA	NA	NA	NA	NA	NA	NA
SW6010	ZINC	mg/kg	111	**23,000**	100,000	NA	NA	NA	NA	NA	NA	NA
SPECIFIC METALS												
SW7060	ARSENIC	mg/kg	**62**	0.39	2.7	NA	NA	NA	NA	NA	NA	NA
SW7471	MERCURY	mg/kg	0.28	**23**	610	NA	NA	NA	NA	NA	NA	NA
SW7841	THALLIUM	mg/kg	1.42	**5.2**	130	NA	NA	NA	NA	NA	NA	NA

BTV = Background Threshold Value
2002 PRG = Preliminary Remediation Goal
N/A = Not applicable
J = Indicates an estimated value
E = Reported value is estimated due to the presence of interference
N = Spiked sample recovery is not within control limits
D = Duplicate sample
For detailed laboratory results see Appendix B.
j = Duplicate is not within QAPP control limit (50%)

B = Reported value is less than the Contract Required Detection Limit, but greater than the Instrument Detection Limit
S = Reported value is determined by the method of standard additions
* = Duplicate analyses is not within control limits
** = PRG for thallium acetate
NA = Not analyzed
Indicates value exceeds Residential PRGs and BTVs
Bold indicates the higher value of Residential PRGs vs. BTVs

TABLE 5-2. IRP SITE 53 (FORMER AOC-55) SOIL SAMPLE RESULTS.

	Sample Identifier					A55S048	A55S049
	Sampling Depth (ft)			PRG	PRG	0.30-0.50	0.00-0.50
Method	Analyte	Units	BTVs	Res	Indust		
TOTAL METALS							
SW6010	ALUMINUM	mg/kg	**173,500**	76,000	100,000	39,800 N	159,000 N
SW6010	ANTIMONY	mg/kg	**63**	31	820	5.2 B	6.4 B
SW6010	BARIUM	mg/kg	335	**5,400**	100,000	20	74
SW6010	BERYLLIUM	mg/kg	3.3	**150**	2,200	0.64 BN	2.2 N
SW6010	CADMIUM	mg/kg	6.5	**37**	810	4.5	8.3
SW6010	CALCIUM	mg/kg	N/A	N/A	N/A	286,000	29,300
SW6010	CHROMIUM, TOTAL	mg/kg	**1,080**	210	450	194	605
SW6010	COBALT	mg/kg	29	**4,700**	100,000	8.2	31.4
SW6010	COPPER	mg/kg	72.2	**2,900**	76,000	19.2	64.1
SW6010	IRON	mg/kg	**116,495**	23,000	100,000	41,300 E*	108,000 E*
SW6010	LEAD	mg/kg	166	**400**	750	**786**	32.3
SW6010	MAGNESIUM	mg/kg	N/A	N/A	N/A	1,950	1,170
SW6010	MANGANESE	mg/kg	5,500	**1,800**	32,000	1,960	**4,320**
SW6010	NICKEL	mg/kg	242.5	**1,600**	41,000	41.3	186
SW6010	POTASSIUM	mg/kg	N/A	N/A	N/A	85.9 B	65.5 B
SW6010	SILVER	mg/kg	14.9	**390**	10,000	3 BN	<0.48
SW6010	SODIUM	mg/kg	N/A	N/A	N/A	53.6 B	61.1 B
SW6010	VANADIUM	mg/kg	206	**550**	14,000	25.9	106
SW6010	ZINC	mg/kg	111	**23,000**	100,000	103 *	175 *
SPECIFIC METALS							
SW7060	ARSENIC	mg/kg	**62**	0.39	2.7	11.3	3.1 B
SW7471	MERCURY	mg/kg	0.28	**23**	610	0.15	0.16
SW7841	THALLIUM	mg/kg	1.42	**5.2**	130	<0.26	0.44 BN

BTV = Background Threshold Value
2002 PRG = Preliminary Remediation Goal
N/A = Not applicable
E = Reported value is estimated due to the presence of interference
N = Spiked sample recovery is not within control limits
For detailed laboratory results see Appendix B.
j = Duplicate is not within QAPP control limt (50%)

B = Reported value is less than the Contract Required Detection Limit, but greater than the Instrument Detection Limit
* = Duplicate analyses is not within control limits
** = PRG for thallium acetate
Bold and shaded indicates Concentration = or > the higher of BTV or Residential PRGs
Bold indicates Concentration = or > the higher of BTV or Industrial PRGs

TABLE 5-3. IRP SITE 54 (FORMER AOC-56) SOIL SAMPLE RESULTS.

Method	Analyte	Units	BTVs	PRG Res	PRG Indust	A56S092 0.00-0.30	A56S093 0.20-0.50	A56S094 0.20-0.50	A56S095 0.20-0.50	A56S096D 0.20-0.50	A56S097 0.20-0.50	A56S098 0.20-0.50
SEMIVOLATILE ORGANIC COMPOUNDS												
SW8270	ANTHRACENE	ug/kg	N/A	**22,000,000**	**100,000,000**	<390	<400	<850	<420	<410	<780	<390
SW8270	BENZO(A)ANTHRACENE	ug/kg	N/A	**620**	2,900	160 J	<400	<850	160 J	<410	<780	<390
SW8270	BENZO(A)PYRENE	ug/kg	N/A	**62**	290	**220 J**	<49	<52	**330 J**	<50	<47	<47
SW8270	BENZO(B)FLUORANTHENE	ug/kg	N/A	**620**	2,900	550	<400	<850	600	<410	<780	<390
SW8270	BENZO(G,H,I)PERYLENE	ug/kg	N/A	**N/A**	N/A	<390	<400	<850	650	<410	<780	<390
SW8270	BENZO(K)FLUORANTHENE	ug/kg	N/A	**6,200**	29,000	170 J	<400	<850	170 J	<410	<780	<390
SW8270	BENZOIC ACID	ug/kg	N/A	**100,000,000**	100,000,000	86 J	<2,000	<4,100	1,900 J	<2,000	<3,800	<1,900
SW8270	CARBAZOLE	ug/kg	N/A	**24,000**	86,000	<390	<400	<850	230 J	<410	<780	<390
SW8270	CHRYSENE	ug/kg	N/A	**62,000**	290,000	410	<400	<850	250 J	<410	<780	<390
SW8270	FLUORANTHENE	ug/kg	N/A	**2,300,000**	30,000,000	380 J	<400	<850	110 J	<410	<780	<390
SW8270	INDENO(1,2,3-C,D)PYRENE	ug/kg	N/A	**620**	2,900	<390	<400	<850	500	<410	<780	<390
SW8270	PHENANTHRENE	ug/kg	N/A	**N/A**	N/A	<390	<400	<850	340 J	<410	<780	<390
SW8270	DIBENZO(A,H)ANTHRACENE	ug/kg	N/A	**62**	290	<390	<400	<850	<420	<410	<780	<390
SW8270	PYRENE	ug/kg	N/A	**23,000,000**	54,000,000	690	<400	<850	180 J	<410	<780	<390
PESTICIDE												
SW8080	PCB-1260 (AROCLOR 1260)	µg/kg	NA	**220**	1000	<36	<37	<38	<38	50	<35	45
TOTAL METALS												
SW6010	ALUMINUM	mg/kg	**173,500**	76,000	100,000	3,140	8,340	25,800	25,100	33,200	7,380	16,000
SW6010	ANTIMONY	mg/kg	**63**	31	820	4 B	2.5 B	3.8 Bj	4.4 B	7 Bj	2.8 B	4.7 B
SW6010	BARIUM	mg/kg	335	**5,400**	100,000	160	9.5 B	17	16.9	26.3	47.2	24.3
SW6010	BERYLLIUM	mg/kg	3.34	**150**	2,200	<0.12	<0.11	0.41 B	0.32 B	0.52 B	<0.11	0.2 B
SW6010	CADMIUM	mg/kg	6.5	**37**	810	0.61 N	0.58 N	1.1 N	1.3 N	1.4 N	0.8 N	1.3 N
SW6010	CALCIUM	mg/kg	N/A	N/A	N/A	365,000	350,000	311,000	299,000	301,000	360,000	302,000
SW6010	CHROMIUM, TOTAL	mg/kg	**1,080**	210	450	26.5 E	56.8 E	153 E	127 E	175 E	60.8 E	103 E
SW6010	COBALT	mg/kg	29	**4,700**	100,000	<1.1	<1	3.3 B	3.2 B	4.5 B	<0.99	2.6 B
SW6010	COPPER	mg/kg	72.2	**2,900**	76,000	358 *	6.7 *	7.7 *j	16 *	267 *j	7.5 *	35.7 *
SW6010	IRON	mg/kg	**116,495**	23,000	100,000	8,230 *	5,800 *	20,300 *	18,700 *	23,900 *	8,080 *	18,000 *
SW6010	LEAD	mg/kg	166	**400**	750	**1,520 E***	45.4 E*	116 E*j	115 E*	**903 E*j**	193 E*	242 E*
SW6010	MAGNESIUM	mg/kg	N/A	N/A	N/A	2,070	2,000	2,370	1,940	2,160	3,280	1,810
SW6010	MANGANESE	mg/kg	5,500	**1,800**	32,000	145 E	202 E	768 Ej	461 E	457 Ej	117 E	224 E
SW6010	NICKEL	mg/kg	242.5	**1,600**	41,000	7.4 B	9 B	24.7	23	22.6	7.3 B	17.6
SW6010	POTASSIUM	mg/kg	N/A	N/A	N/A	80.3 B	84 B	153 Bj	87.1 B	81 Bj	60.8 B	82.3 B
SW6010	SILVER	mg/kg	14.9	**390**	10,000	3.5 B	3.7 B	2.8 B	2.9 B	3.2 B	3.8 B	3.1 B
SW6010	SODIUM	mg/kg	N/A	N/A	N/A	129	122	196	148	129	418	619
SW6010	VANADIUM	mg/kg	206	**550**	14,000	2.6 B	12.2	30.4	17.1	26.1	6.3 B	18.1
SW6010	ZINC	mg/kg	111	**23,000**	100,000	249 E	99.8 E	65.9 Ej	183 E	447 Ej	46.2 E	171 E
SW7060	ARSENIC	mg/kg	**62**	.39	2.7	0.66	7.9 S	14 j	11.3	7.6 j	13.4 +	4.8 S
SW7471	MERCURY	mg/kg	0.28	**23**	610	0.06 B	<0.06	0.08 B	0.08 B	0.1 B	<0.05	0.18
SW67740	SELENIUM	mg/kg	**NA**	**390**	10,000	0.76 BE	<0.58	<0.61	<0.6	<0.6	<1.1	<0.57
SW7840	THALLIUM	mg/kg	1.42	**5.2**	130	<0.22	<0.23	0.27 BW	<0.24	<0.24	<0.22	<0.23
SW9012	CYANIDE	mg/kg	N/A	**11**	35	0.26	<0.25	0.76 j	0.28	<0.24 j	0.33	0.66

BTV = Background Threshold Value; 2002 PRG = Preliminary Remediation Goal;
N/A = Not applicable; J = Indicates an estimated value; E = Reported value is estimated due to the presence of interference; N = Spiked sample recovery is not within control limits; D = Duplicate sample; j = Duplicate is not within QAPP control limt (50%); For detailed laboratory results see Appendix B.
Bold and shaded indicates concentration = or > the higher of BTV or Residential PRGs
Bold indicates Concentration = or > the higher of BTV or Industrial PRGs

B = Reported value is less than the Contract Required Detection Limit, but greater than the Instrument Detection Limit
S = Reported value is determined by the method of standard additions
W = Postdigestion spike for furnace AAS analysis is out of control limits (85-115%) and sample absorbance is less than 50% of spike absorbance
* = Duplicate analyses is not within control limits
** = PRG for thallium acetate
NA = Not analyzed

TABLE 5-3. IRP SITE 54 (FORMER AOC-56) SOIL SAMPLE RESULTS.

	Sample Identifier					A56S099	A56S100	A56S101	A56S102	A56S103
	Sampling Depth (ft)			PRG	PRG	0.20-0.50	0.20-0.30	0.20-0.30	0.20-0.40	0.20-0.40
Method	Analyte	Units	BTVs	Res	Indust					
SEMIVOLATILE ORGANIC COMPOUNDS										
SW8270	ANTHRACENE	ug/kg	N/A	**22,000,000**	**100,000,000**	<430	<390	<2,100	<810	150 J
SW8270	BENZO(A)ANTHRACENE	ug/kg	N/A	**620**	2,900	<430	88 J	<2,100	<810	170 J
SW8270	BENZO(A)PYRENE	ug/kg	N/A	**62**	290	<52	<47	<100	<49	**320 J**
SW8270	BENZO(B)FLUORANTHENE	ug/kg	N/A	**620**	2,900	<430	260 J	<100	<810	580
SW8270	BENZO(G,H,I)PERYLENE	ug/kg	N/A	**N/A**	N/A	<430	<390	<2,100	<810	<420
SW8270	BENZO(K)FLUORANTHENE	ug/kg	N/A	**6,200**	29,000	<430	<390	<2,100	<810	170 J
SW8270	BENZOIC ACID	ug/kg	N/A	**100,000,000**	100,000,000	<2,100	<1,900	<10,000	<4,000	850 J
SW8270	CARBAZOLE	ug/kg	N/A	**24,000**	86,000	<430	<390	<2,100	<810	150 J
SW8270	CHRYSENE	ug/kg	N/A	**62,000**	290,000	<430	240 J	<2,100	<810	250 J
SW8270	FLUORANTHENE	ug/kg	N/A	**2,300,000**	30,000,000	<430	250 J	<2,100	<810	91 J
SW8270	INDENO(1,2,3-C,D)PYRENE	ug/kg	N/A	**620**	2,900	<430	<390	<2,100	<810	<420
SW8270	PHENANTHRENE	ug/kg	N/A	**N/A**	N/A	<430	<390	<2,100	<810	<420
SW8270	DIBENZO(A,H)ANTHRACENE	ug/kg	N/A	**62**	290	<430	<390	<2,100	<810	<920
SW8270	PYRENE	ug/kg	N/A	**23,000,000**	54,000,000	<430	270 J	<2,100	<810	210 J
PESTICIDE										
SW8080	PCB-1260 (AROCLOR 1260)	µg/kg	NA	**220**	1000	47	66	<38	<38	<38
TOTAL METALS										
SW6010	ALUMINUM	mg/kg	**173,500**	76,000	100,000	51,700	4,120	16,300	47,400	27,600
SW6010	ANTIMONY	mg/kg	**63**	31	820	6.2 B	17.4	7.4 B	8.5 B	4.2 B
SW6010	BARIUM	mg/kg	335	**5,400**	100,000	72.5	20.8	26.9	45.8	19.6
SW6010	BERYLLIUM	mg/kg	3.34	**150**	2,200	0.94 B	<0.11	0.18 B	0.83 B	0.4 B
SW6010	CADMIUM	mg/kg	6.5	**37**	810	2.3 N	1.7 N	1.4 N	1.9 N	1.5 N
SW6010	CALCIUM	mg/kg	N/A	N/A	N/A	226,000	336,000	312,000	222,000	279,000
SW6010	CHROMIUM, TOTAL	mg/kg	**1,080**	210	450	393 E	57.2 E	120 E	354 E	159 E
SW6010	COBALT	mg/kg	29	**4,700**	100,000	7.9	1.8 B	2.5 B	8.1	4.1 B
SW6010	COPPER	mg/kg	72.2	**2,900**	76,000	31.8 *	28.3 *	31.4 *	25.4 *	21.1 *
SW6010	IRON	mg/kg	**116,495**	23,000	100,000	37,400 *	15,600 *	14,200 *	38,300 *	21,800 *
SW6010	LEAD	mg/kg	166	**400**	750	31.6 E*	**1,980 E***	**925 E***	162 E*	140 E*
SW6010	MAGNESIUM	mg/kg	N/A	N/A	N/A	1,730	1,540	2,180	1,570	2,000
SW6010	MANGANESE	mg/kg	5,500	**1,800**	32,000	1,010 E	149 E	342 E	889 E	509 E
SW6010	NICKEL	mg/kg	242.5	**1,600**	41,000	72.3	8.1 B	22	74.7	28.9
SW6010	POTASSIUM	mg/kg	N/A	N/A	N/A	132 B	72.3 B	117 B	90.2 B	85 B
SW6010	SILVER	mg/kg	14.9	**390**	10,000	1.6 B	4.2 B	3.1 B	1.7 B	2.8 B
SW6010	SODIUM	mg/kg	N/A	N/A	N/A	144	48.6 B	158	108 B	163
SW6010	VANADIUM	mg/kg	206	**550**	14,000	52.4	2.5 B	25.6	60.8	22.5
SW6010	ZINC	mg/kg	111	**23,000**	100,000	118 E	793 E	411 E	148 E	218 E
SW7060	ARSENIC	mg/kg	**62**	.39	2.7	4.2	6.3 +	5.2 S	3.6	6.9
SW7471	MERCURY	mg/kg	0.28	**23**	610	0.15	0.07 B	0.26	0.13	0.08 B
SW67740	SELENIUM	mg/kg	**NA**	**390**	10,000	<0.63	<0.57	<0.59	<0.58	<0.6
SW7840	THALLIUM	mg/kg	1.42	**5.2**	130	0.45 B	<0.23	<0.24	0.48 B	<0.24
SW9012	CYANIDE	mg/kg	N/A	**11**	35	<0.27	0.53	0.28	<0.25	0.33

BTV = Background Threshold Value; 2002 PRG = Preliminary Remediation Goal;
N/A = Not applicable; J = Indicates an estimated value; E = Reported value is estimated due to the presence of interference; N = Spiked sample recovery is not within control limits; D = Duplicate sample; j = Duplicate is not within QAPP control limt (50%); For detailed laboratory results see Appendix B.
Bold and shaded indicates concentration = or > the higher of BTV or Residential PRGs
Bold indicates Concentration = or > the higher of BTV or Industrial PRGs

B = Reported value is less than the Contract Required Detection Limit, but greater than the Instrument Detection Limit
S = Reported value is determined by the method of standard additions
W = Postdigestion spike for furnace AAS analysis is out of control limits (85-115%) and sample absorbance is less than 50% of spike absorbance
* = Duplicate analyses is not within control limits
** = PRG for thallium acetate
NA = Not analyzed

TABLE 5-3. IRP SITE 54 (FORMER AOC-56) SOIL SAMPLE RESULTS.

Method	Analyte	Units	BTVs	PRG Res	PRG Indust	Method	A56S1009 0.17-0.50	A56S1010 0.17-0.50	A56S1011 0.17-0.50	A56S1012 0.17-0.50	A56S1013 0.17-0.50	A56S1014 0.17-0.50	A56S1015 0.17-0.50
SEMIVOLATILE ORGANIC COMPOUNDS													
SW8270	ANTHRACENE	ug/kg	N/A	**22,000,000**	**100,000,000**	SW8310	<7.8	28	24	NA	NA	<7.6	<7.7
SW8270	BENZO(A)ANTHRACENE	ug/kg	N/A	**620**	2,900	SW8310	<3.1	32	39	NA	NA	3.4	<3.1
SW8270	BENZO(A)PYRENE	ug/kg	N/A	**62**	290	SW8310	3.3	**96**	**130**	NA	NA	<3.0	<3.1
SW8270	BENZO(B)FLUORANTHENE	ug/kg	N/A	**620**	2,900	SW8310	7.4	160	230	NA	NA	4.8	5.9
SW8270	BENZO(G,H,I)PERYLENE	ug/kg	N/A	**N/A**	N/A	SW8310	<3.1	<3.1	<3.1	NA	NA		
SW8270	BENZO(K)FLUORANTHENE	ug/kg	N/A	**6,200**	29,000	SW8310	<3.1	68	89	NA	NA	<3.0	<3.1
SW8270	BENZOIC ACID	ug/kg	N/A	**100,000,000**	100,000,000	SW8310	<3.1	<3.1	<3.1	NA	NA		
SW8270	CARBAZOLE	ug/kg	N/A	**24,000**	86,000	SW8310	<3.1	<3.1	<3.1	NA	NA		
SW8270	CHRYSENE	ug/kg	N/A	**62,000**	290,000	SW8310	15	75	68	NA	NA	10	12
SW8270	FLUORANTHENE	ug/kg	N/A	**2,300,000**	30,000,000	SW8310	<11	63	79	NA	NA	<11	<11
SW8270	INDENO(1,2,3-C,D)PYRENE	ug/kg	N/A	**620**	2,900	SW8310	<3.1	73	89	NA	NA	<3.0	<3.1
SW8270	PHENANTHRENE	ug/kg	N/A	**N/A**	N/A	SW8310	<3.1	<3.1	<3.1	NA	NA		
SW8270	DIBENZO(A,H)ANTHRACENE	ug/kg	N/A	**62**	290	SW8310	<3.1	15	21	NA	NA	<3.0	<3.1
SW8270	PYRENE	ug/kg	N/A	**23,000,000**	54,000,000	SW8310	<14	52	63	NA	NA	<14	<14
PESTICIDE													
SW8080	PCB-1260 (AROCLOR 1260)	µg/kg	NA	**220**	1000		NA	NA	NA	<91	NA	NA	NA
TOTAL METALS													
SW6010	ALUMINUM	mg/kg	**173,500**	76,000	100,000		NA	NA	NA	NA	NA	NA	NA
SW6010	ANTIMONY	mg/kg	**63**	31	820		NA	NA	NA	NA	NA	NA	NA
SW6010	BARIUM	mg/kg	335	**5,400**	100,000		NA	NA	NA	NA	NA	NA	NA
SW6010	BERYLLIUM	mg/kg	3.34	**150**	2,200		NA	NA	NA	NA	NA	NA	NA
SW6010	CADMIUM	mg/kg	6.5	**37**	810		NA	NA	NA	NA	NA	NA	NA
SW6010	CALCIUM	mg/kg	N/A	N/A	N/A		NA	NA	NA	NA	NA	NA	NA
SW6010	CHROMIUM, TOTAL	mg/kg	**1,080**	210	450		NA	NA	NA	NA	NA	NA	NA
SW6010	COBALT	mg/kg	29	**4,700**	100,000		NA	NA	NA	NA	NA	NA	NA
SW6010	COPPER	mg/kg	72.2	**2,900**	76,000		NA	NA	NA	NA	NA	NA	NA
SW6010	IRON	mg/kg	**116,495**	23,000	100,000		NA	NA	NA	NA	NA	NA	NA
SW6010	LEAD	mg/kg	166	**400**	750		**3,790 EN**	81.7 EN	40.4 EN	150 EN	72 EN	NA	NA
SW6010	MAGNESIUM	mg/kg	N/A	N/A	N/A		NA	NA	NA	NA	NA	NA	NA
SW6010	MANGANESE	mg/kg	5,500	**1,800**	32,000		NA	NA	NA	NA	NA	NA	NA
SW6010	NICKEL	mg/kg	242.5	**1,600**	41,000		NA	NA	NA	NA	NA	NA	NA
SW6010	POTASSIUM	mg/kg	N/A	N/A	N/A		NA	NA	NA	NA	NA	NA	NA
SW6010	SILVER	mg/kg	14.9	**390**	10,000		NA	NA	NA	NA	NA	NA	NA
SW6010	SODIUM	mg/kg	N/A	N/A	N/A		NA	NA	NA	NA	NA	NA	NA
SW6010	VANADIUM	mg/kg	206	**550**	14,000		NA	NA	NA	NA	NA	NA	NA
SW6010	ZINC	mg/kg	111	**23,000**	100,000		NA	NA	NA	NA	NA	NA	NA
SW7060	ARSENIC	mg/kg	**62**	.39	2.7		NA	NA	NA	NA	NA	NA	NA
SW7471	MERCURY	mg/kg	0.28	**23**	610		NA	NA	NA	NA	NA	NA	NA
SW67740	SELENIUM	mg/kg	**NA**	**390**	10,000		NA	NA	NA	NA	NA	NA	NA
SW7840	THALLIUM	mg/kg	1.42	**5.2**	130		NA	NA	NA	NA	NA	NA	NA
SW9012	CYANIDE	mg/kg	N/A	**11**	35		NA	NA	NA	NA	NA	NA	NA

BTV = Background Threshold Value; 2002 PRG = Preliminary Remediation Goal;
N/A = Not applicable; J = Indicates an estimated value; E = Reported value is estimated due to the presence of interference; N = Spiked sample recovery is not within control limits; D = Duplicate sample; j = Duplicate is not within QAPP control limt (50%); For detailed laboratory results see Appendix B.
Bold and shaded indicates concentration = or > the higher of BTV or Residential PRGs
Bold indicates Concentration = or > the higher of BTV or Industrial PRGs

B = Reported value is less than the Contract Required Detection Limit, but greater than the Instrument Detection Limit
S = Reported value is determined by the method of standard additions
W = Postdigestion spike for furnace AAS analysis is out of control limits (85-115%) and sample absorbance is less than 50% of spike absorbance
* = Duplicate analyses is not within control limits
** = PRG for thallium acetate
NA = Not analyzed

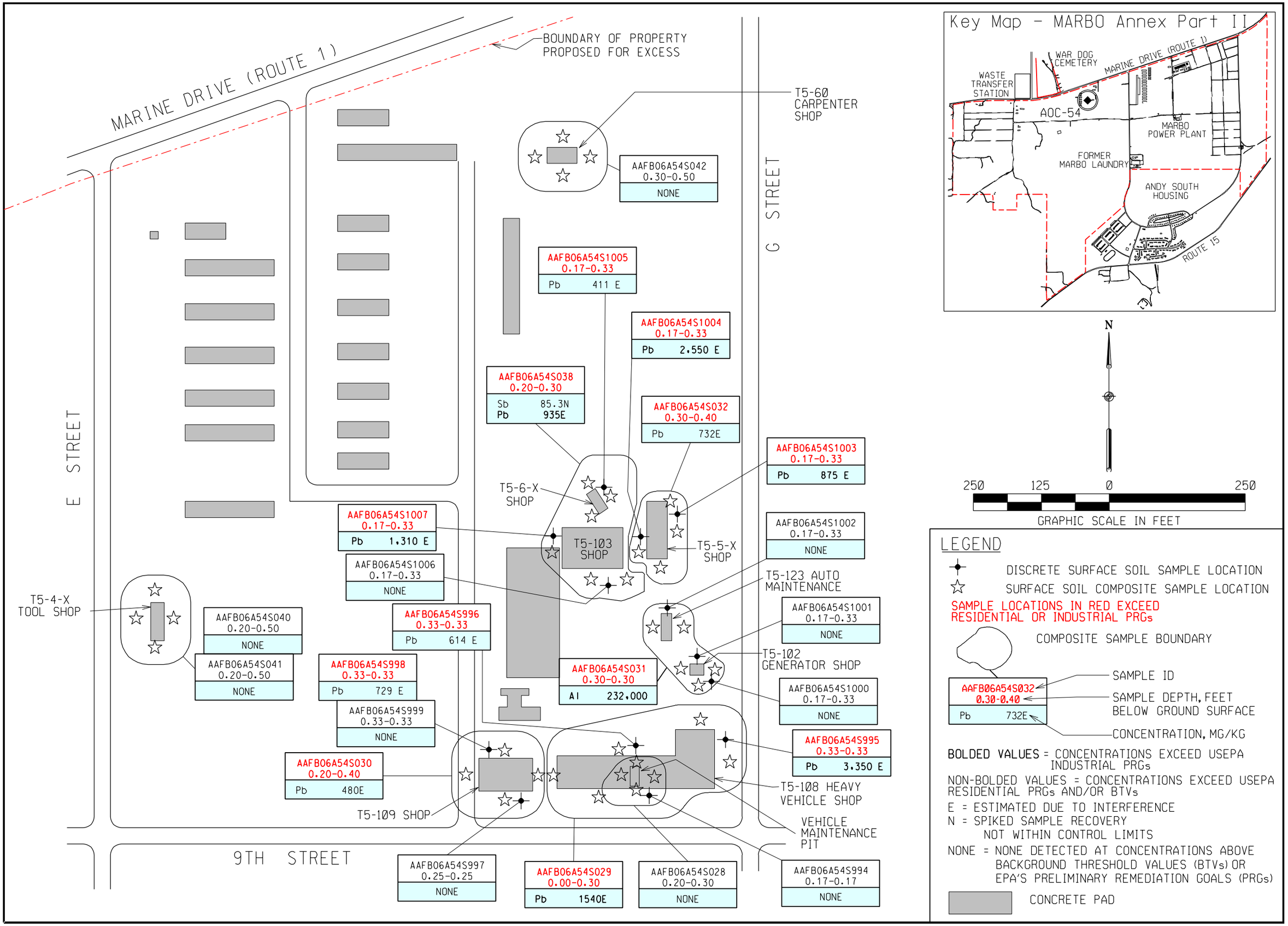


Figure 5-1. IRP Site-52 (Former AOC-54) Soil Sample Locations and Results at MARBO Annex.

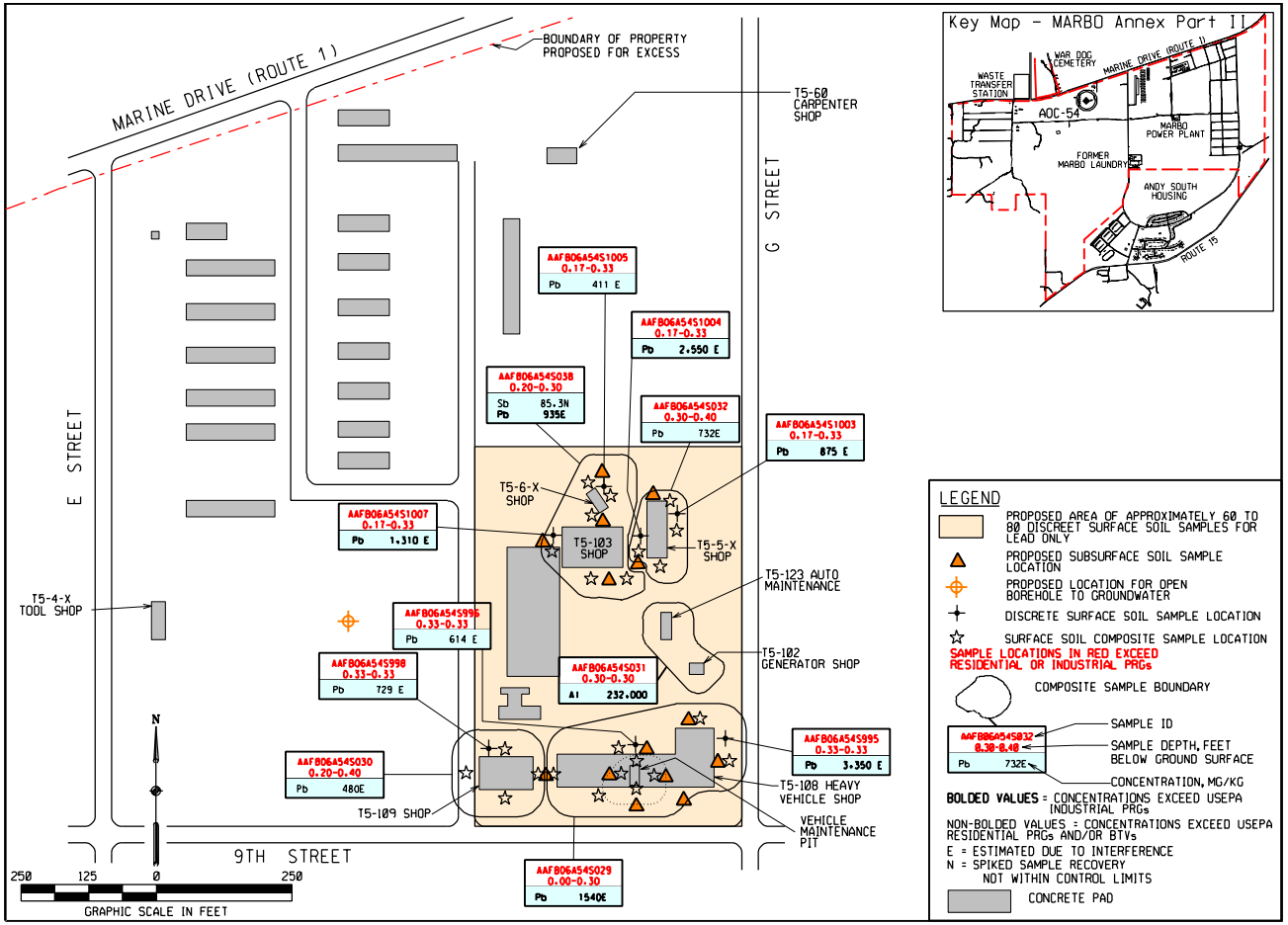


Figure 5-2. IRP Site-52 (Former AOC-54) Proposed Surface and Subsurface Investigation at MARBO Annex.

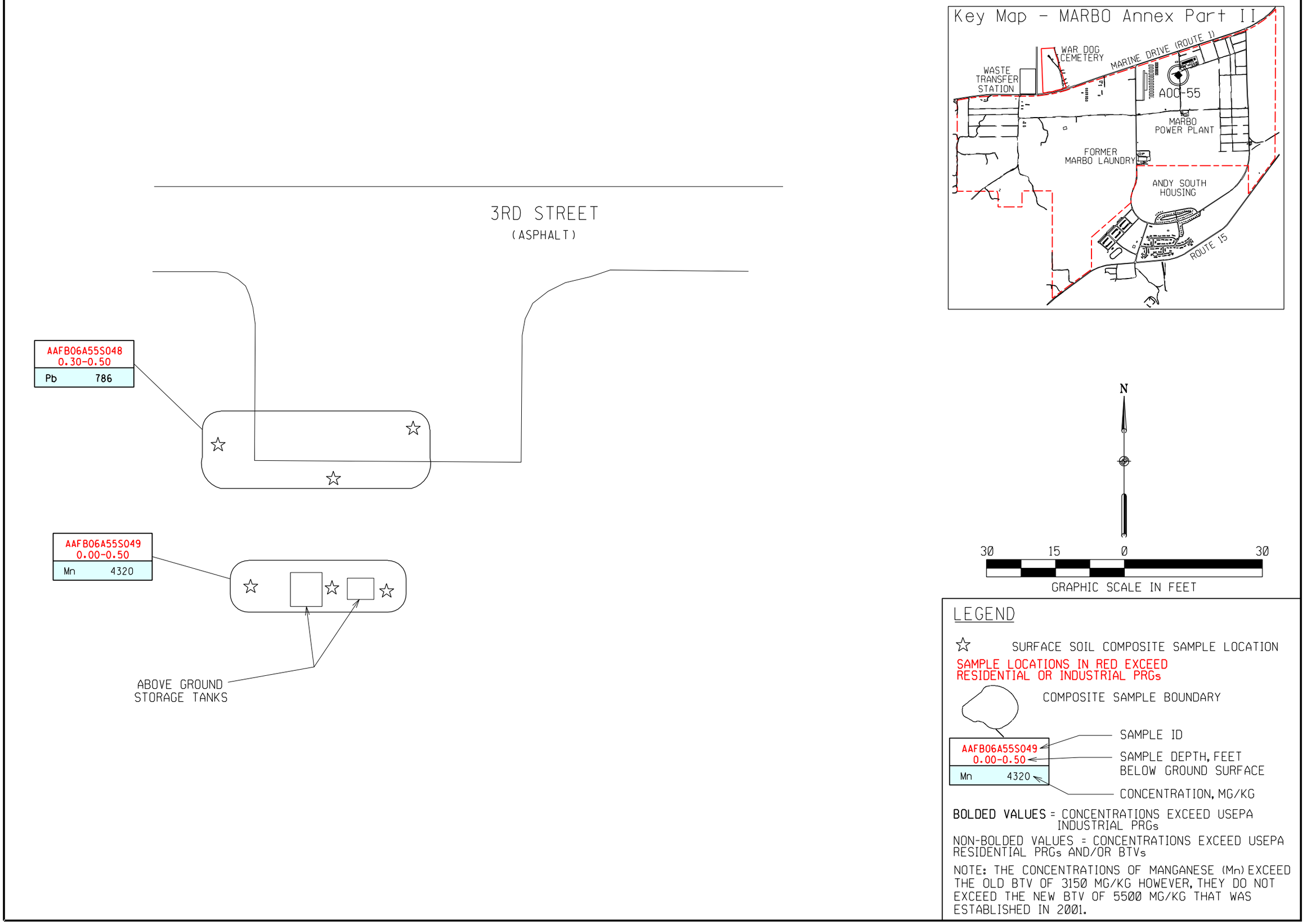


Figure 5-3. IRP Site-53 (Former AOC-55) Soil Sample Locations and Results at MARBO Annex.

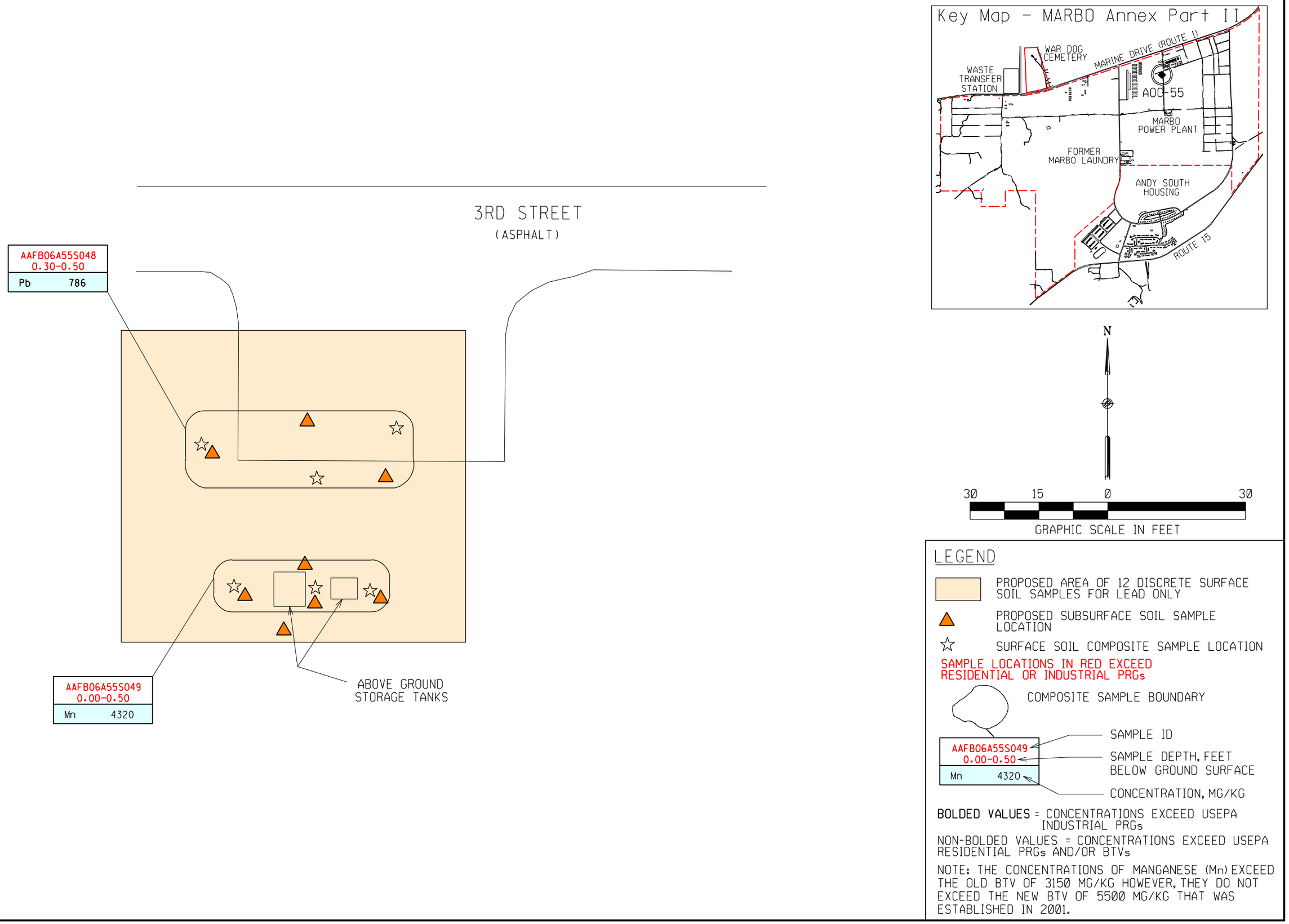


Figure 5-4. IRP Site-53 (Former AOC-55) Proposed Surface and Subsurface Soil Sample Locations at MARBO Annex.

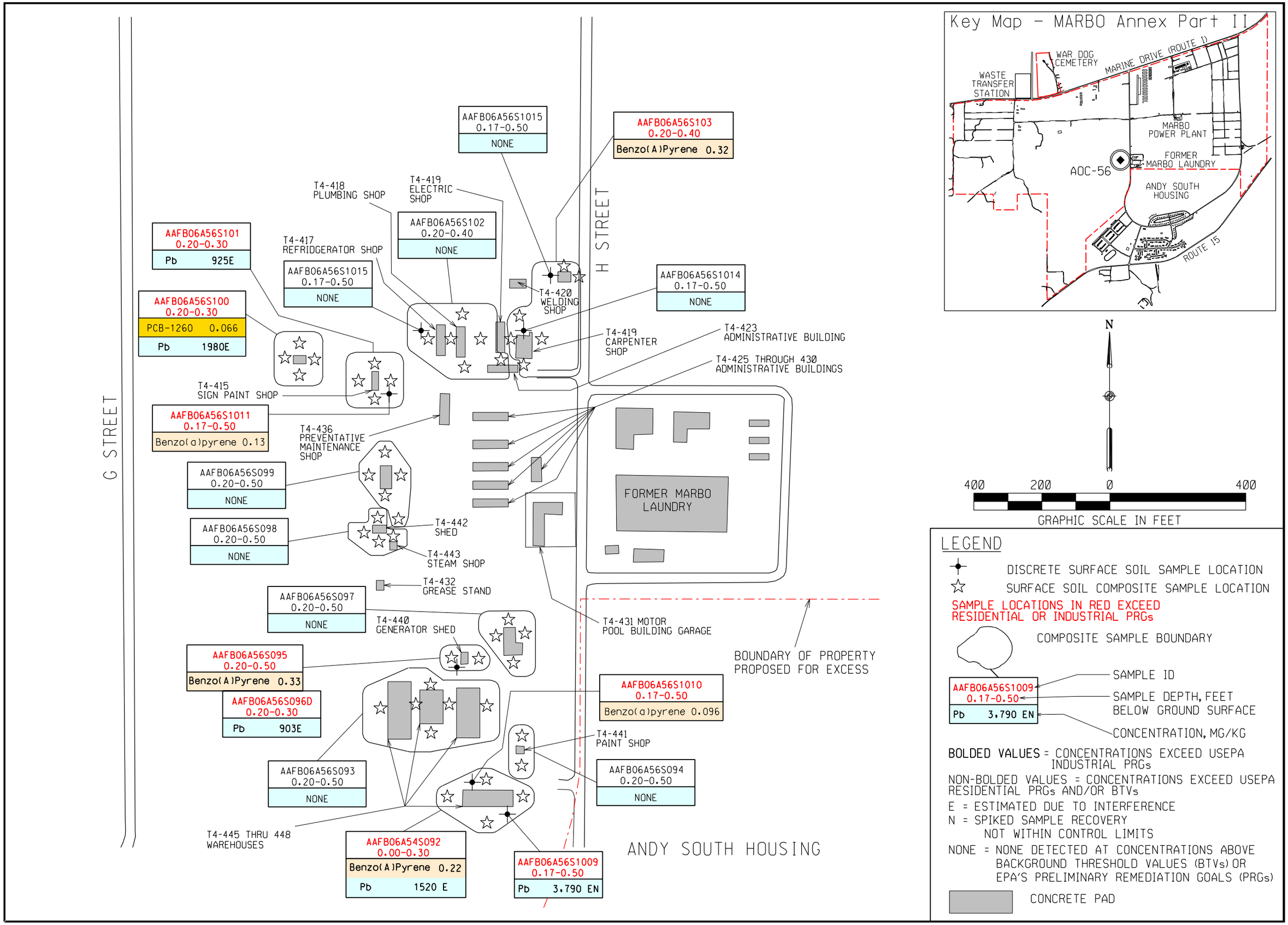


Figure 5-5. IRP-Site-54 (Former AOC-56) Soil Sample Locations and Results at MARBO Annex.

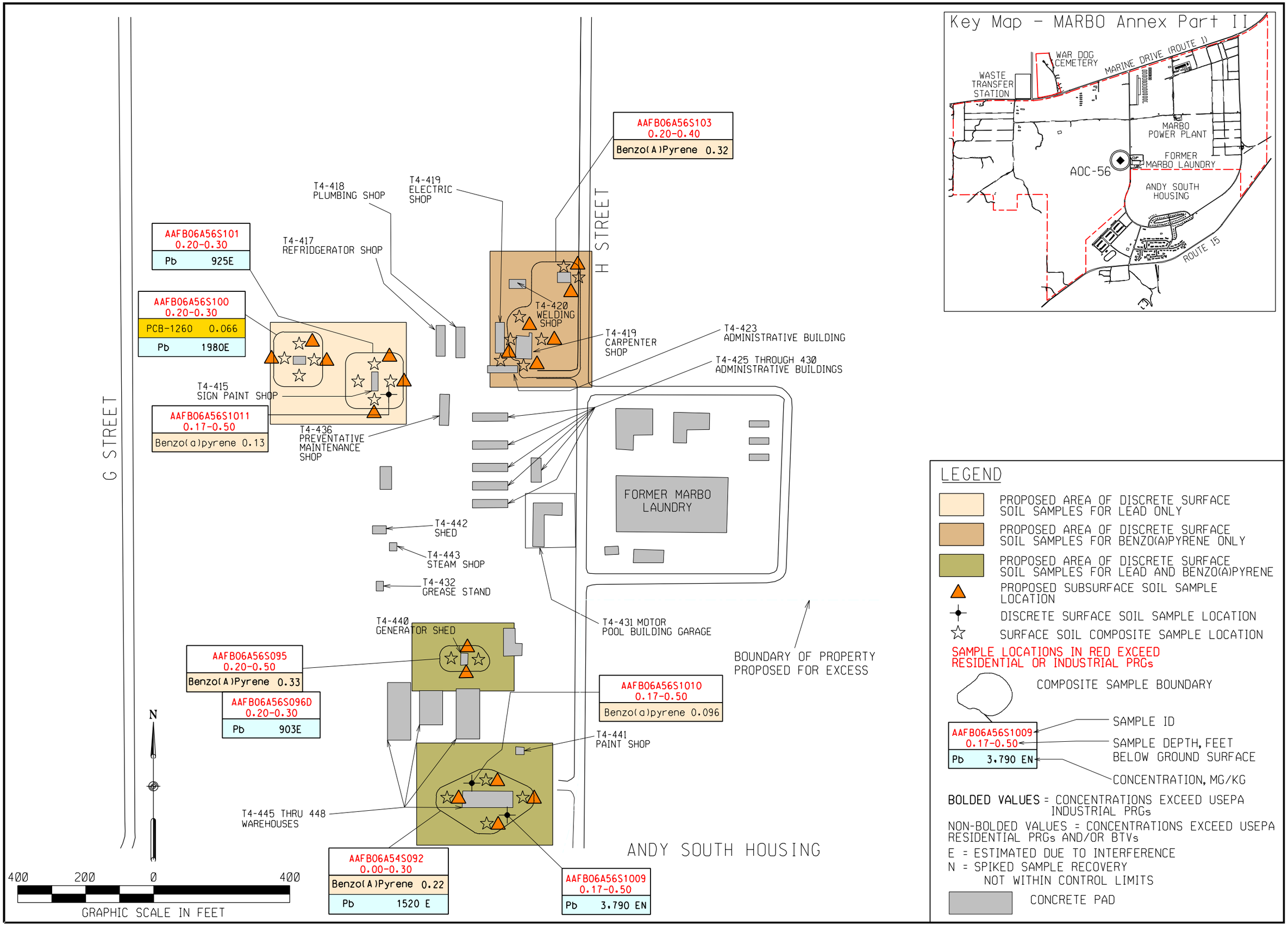


Figure 5-6. IRP-Site-54 (Former AOC-56) Proposed Surface and Subsurface Soil Sample Locations at MARBO Annex.

6.0 MARBO ANNEX GROUNDWATER

According to the MARBO ROD (EA, 1998a), groundwater beneath MARBO Annex was impacted by low levels of trichloroethene (TCE) primarily in the northern portion of the MARBO Annex (southwest of IRP Site 37), and tetrachloroethene (PCE) primarily in the vicinity of the former MARBO Laundry (IRP Site 38), as shown in Figure 1-4. The selected alternative for MARBO Annex Groundwater consisted of *Natural Attenuation with Institutional Controls*. This alternative was intended to utilize natural attenuation of TCE and PCE to achieve the remediation goal of decreasing concentrations in the aquifer to levels below USEPA established Maximum Contaminant Levels (MCLs).

As stipulated in the MARBO ROD (EA, 1998a), natural attenuation of TCE and PCE in the groundwater would be due primarily to the physical processes of dispersion and dilution, and not to dechlorination processes. Also the ROD indicated that the timeframe to achieve cleanup goals could take 10 to 40 years, assuming a continued source of PCE and TCE did not exist. Supplemental to the natural attenuation processes were three institutional controls (ICs), which included:

1) *Land Use Restrictions* to monitor and restrict groundwater access in areas impacted by TCE/PCE),

2) *Groundwater Monitoring* (to monitor TCE/PCE and confirm the stability of TCE/PCE plumes in the MARBO Annex), and

3) *Existing Wellhead Treatment* (to ensure public health risk is within acceptable range at existing Air Force production wells).

The selected groundwater alternative is classified as an *Operating Remedial Action (RA)*, as the RA has been implemented but residual COCs have been left in place at concentrations that do not allow for unlimited use of or unrestricted access to the land. In addition, the O*perating RA* may require many more years before cleanup levels can be fully achieved. The first five-year review of MARBO Annex Groundwater is evaluated herein.

6.1 First Five-Year Review of MARBO ANNEX Groundwater

6.1.1 MARBO Annex Groundwater Background

The initial groundwater activities were conducted at MARBO Annex in 1989 that included monitoring well installation, groundwater elevation measurements, and sampling and analysis. A total of five IRP monitoring wells were installed and sampled during this phase, including IRP-1, IRP-2, IRP-8, IRP-10 and IRP-12 (Figure 6-1). Each well was installed in the upper portion of the freshwater lens (i.e., shallow wells), in the Mariana/Barrigada limestone formations. The wells were sampled in May, August, and October 1989. Three discrete rounds of water level measurements were made; one in June and two in October 1989. Groundwater samples were also collected from four Guam Waterworks Authority (GWA) off-site production wells (M-6, D-1, D-4, and D-5) and eight on-site Andersen AFB production wells (MW-1

through MW-3 and MW-5 through MW-9). The analytical results are presented in the IRP Phase II, Stage 1 Final Report (Battelle, 1989).

6.1.1.1 Phase II, Stage 1 Activities

Phase II, Stage 1 groundwater activities were completed in December 1991. Three additional IRP monitoring wells were installed and sampled, including IRP-14, IRP-15 and IRP-16. IRP-14 was installed to monitor the groundwater in the vicinity of the MARBO Laundry (IRP Site 38), and IRP-15 and IRP-16 were installed to monitor groundwater in the vicinity of Waste Pile 7 (IRP Site 20). Groundwater sampling and measurements were conducted on the same wells, with the addition of IRP-14, IRP-15, IRP-16, and GWA production well Y-2 (Figure 6-1). GWA production well M-6 was not sampled during this stage of work. Groundwater samples were collected and depth-to-water measurements were conducted twice during this stage; in April 1989 and August 1989. The analytical results are presented in the IRP Phase II, Stage 2 Final Report (SAIC, 1991).

6.1.1.2 Phase II, Stage 2 Activities

Phase II, Stage 2 groundwater activities, conducted from November 1995 to February 1996, included: borehole drilling, lithologic well logging, borehole condition logging, down hole geophysics, monitoring well installation, water level measurements, and groundwater sampling. A total of 13 monitoring wells were installed, IRP-23 through IRP-35. Monitoring wells IRP-24, IRP-29, IRP-31, IRP-33, and IRP-35 were installed approximately 90 feet below the top of the groundwater surface (deep wells), to monitor water quality at the base of the freshwater lens (Figure 1-4). The remaining monitoring wells were installed at the top of the freshwater lens (shallow wells).

6.1.1.3 Long-Term Groundwater Monitoring Program

The Long-Term Groundwater Monitoring (LTGM) Program was initiated in October 1995 in accordance with the following agency approved documents and variances:

- Groundwater Monitoring Plan (GWMP) (EA, 1995),
- MARBO Annex ROD (EA, 1998a), and
- Technical Memorandum on Long-Term Groundwater Monitoring at MARBO (EA, 1998f).

The LTGM program was designed to ensure compliance with the CERCLA, RCRA, Clean Water Act (CWA), Safe Drinking Water Act (SDWA), and all Applicable or Relevant and Appropriate Requirements (ARARs) with the goals of:

- establishing baseline groundwater elevation and water quality data at monitoring and production wells,
- evaluating the baseline data and identifying critical sampling locations,
- installing new monitoring wells in those critical sampling locations, and

- determining modifications to monitoring points, monitoring frequency, and analytical methods.

Since the LTGM Program was initiated in 1995, 18 semi-annual (twice per year) rounds of groundwater sampling have been conducted at the MARBO Annex. The analytical results for monitoring points in the LTGM Program are provided in Appendix C, and analytical results for auxiliary monitoring points (outside the LTGM Program) are presented in Appendix D.

Initially 46 monitoring and production wells were sampled and analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), pesticides, polychlorinated biphenyls (PCBs), metals, cyanide, and water quality parameters (total dissolved solids, alkalinity, chlorides, and sulfate). Groundwater samples were collected and groundwater elevations were measured during October-November 1995 (Round 1), February-March 1996 (Round 2), October-November 1996 (Round 3), and April-May 1997 (Round 4), and utilized in the OU3 FFS and ROD documents in order to assess longer-term trends. A total of 21 IRP wells, 23 production wells, and two Guam Power Authority (GPA) monitoring wells (GPA-1 and GPA-2) were sampled for the ROD (EA, 1998a).

6.1.1.3.1 Post-ROD LTGM Program

In 1998, these monitoring and production wells were evaluated according to criteria established in the GWMP (EA, 1995) to determine whether they should be retained in the LTGM Program. Wells meeting the following criteria were recommended for retention in the LTGM Program:

- wells with detected target analyte concentrations at or above ARARs, including the most current *Drinking Water Standards and Health Advisories* MCLs,
- wells located down gradient of a potential source area, and
- wells that provide a strategic monitoring location.

6.1.1.3.2 1998 Technical Memorandum

A February 1998 technical memorandum (EA, 1998f) requested that 12 monitoring and production wells be removed from the LTGM Program (Table 6-1 and Figure 6-1) based on a review of the trends observed from four groundwater sampling events (Rounds 1 through 4). This memorandum also requested that the analytical parameters for the remaining 34 wells be reduced to VOCs, only, with the exception of three wells (IRP-10, IRP-15, and IRP-16) located near Waste Pile 7. In support of the RA (soil cover) for Waste Pile 7, IRP-10, IRP-15, and IRP-16 were to be monitored for VOCs, PAHs, pesticides, metals, cyanide, SVOCs, PCBs, and water quality parameters. The USEPA and GEPA approved this request. A subsequent technical memorandum (EA, 2001), based on the evaluation of additional analytical data (Rounds 5 through 11), recommended that SVOCs, PCBs, and total dissolved solids be removed as analytical parameters from IRP-10, IRP-15, and IRP-16. The USEPA and GEPA approved this request.

6.1.1.3.3 2003 Technical Memorandum

After completion of the Spring 2003 sampling event (Round 16) a technical memorandum (EA, 2003) summarized the historical groundwater analytical data and evaluated data trends to support a further reduction of sampling points, sampling frequency, and analytical parameters at the MARBO Annex OU. Based on the 2003 memorandum (EA, 2003):

- five IRP monitoring wells (IRP-1, IRP-2, IRP-12, IRP-23, and IRP-26) were removed from the LTGM Program (Table 6-1 and Figure 6-1). The remaining 14 IRP monitoring wells (IRP-8, IRP-10, IRP-14, IRP-15, IRP-16, IRP-24, IRP-25, IRP-27, IRP-29, IRP-30, IRP-31, IRP-33, IRP-34, and IRP-35) were retained in the LTGM Program, to be analyzed for VOCs only. Monitoring wells IRP-8, IRP-30, IRP-33, and IRP-34 were retained in the LTGM Program due to their strategic locations, and are analyzed for VOCs only (Table 6-1 and Figure 6-1). Monitoring wells IRP-10, IRP-15, and IRP-16 were retained in the LTGM Program due to their proximity to IRP Site 20/Waste Pile 7, and are analyzed for VOCs, pesticides, and metals.

- four of the five GWA production wells (D-2, D-5, M-6, and M-7) were removed from the LTGM Program. GWA production well D-14 was retained in the LTGM Program, due to its location down gradient from MARBO Annex, and is analyzed for VOCs only (Table 6-1 and Figure 6-1).

- five of the eight Andersen AFB production wells (MW-3, MW-5, MW-6, MW-7, and MW-8) were removed from the LTGM Program. Three Andersen AFB production wells (MW-1, MW-2, and MW-9) were retained in the LTGM Program, and are analyzed for VOCs only (Table 6-1 and Figure 6-1).

- GPA monitoring wells GPA-1 and GPA-2 were retained in the LTGM Program, and are analyzed for VOCs only (Table 6-1 and Figure 6-1).

- With the exception of IRP-31, IRP-14, and IRP-29, the groundwater sampling frequency was reduced from a semi-annual basis to an annual basis.

The above changes were all approved at the May 2004 RPM meeting.

A total of 20 monitoring and production wells are regularly monitored as part of the LTGM Program at the MARBO Annex (Table 6-1 and Figure 6-1). Five of the IRP wells are “deep” monitoring wells that were screened at/near the base of the freshwater lens (IRP-24, IRP-29, IRP-31, IRP-33, and IRP-35). The deep monitoring wells are generally screened approximately 90 to 100 feet below the production wells and shallow monitoring wells in order to monitor water quality near the freshwater/saltwater interface. The remaining IRP monitoring wells are screened in the upper portion of the freshwater lens, at approximately the same depth as the nearby production wells. The GPA wells are fully screened across the fresh water lens. (Table 6-1 and Figure 6-1).

The technical memoranda cited in this section are provided in Appendix E.

6.1.1.4 Auxiliary Groundwater Data

Additional groundwater monitoring points (monitoring wells, production wells, rock borings, and springs), which were either not sampled regularly as part of the LTGM Program, which preceded the program, or which were added subsequent to the MARBO OU ROD are also considered in this five-year review. These data are the result of sampling efforts by the USAF, GWA, and GEPA. Relevant analytical data for these sampling points are presented in Appendix D of this report.

6.1.1.4.1 Pre-LTGM Program Data for MW-1 and MW-2

In addition to data collected in the LTGM Program, some of the MARBO Annex production wells (MW-1 and MW-2) were monitored for TCE and PCE, by Base Bioenvironmental, prior to 1996. These data, though not equivalent to the OU2 RI data, are important as they can be used to establish TCE trends preceding 1996. A plot of TCE concentrations in observed MW-1 and MW-2 from 1978 through 1996 is presented at the end of Appendix D (Figure D-1) and will be discussed in the following sections. Additional pre-1996 data for other USAF production wells is available in the OU3 FFS Report (EA, 1997b).

6.1.1.4.2 Rock Boring EX-6

The rock boring, EX-6, was installed by the United States Geological Survey (USGS) in 1982 as part of the Northern Guam Lens (NGL) Study (Camp, Dresser & McKee, Inc. and Barrett, Harris & Associates, 1982). EX-6, located downgradient of the MARBO Annex (Figure 6-2), was sampled in the Spring 2000 (Round 10), Fall 2000 (Round 11), and Spring 2004 (Round 18) groundwater sampling events. Well information is presented in Table 6-1 and analytical results (VOCs) are summarized in Appendix D, Table D-1.

6.1.1.4.3 GWA Production Wells

Several GWA production wells were installed in the MARBO Annex after the MARBO OU ROD was finalized. Production well Y-18 (formerly Y-1) was installed in the MARBO Annex (Figure 1-4), by GWA, in December 1998 (Earth Tech, 1998). The well is located on a parcel that is proposed for transfer to GovGuam (Figure 1-5; magenta). The well is constructed of 6-inch diameter steel casing, with approximately 50 feet of screen (395-445 feet). Pumping and drawdown tests were performed on the well, with an average drawdown of 4.5 feet at an average pumping rate of 210 gallons per minute (gpm) (Earth Tech, 2002). In addition, the well was sampled for metals (EPA methods 200.7 and 245.1) and water quality parameters (pH by EPA 325.2, chloride by EPA 325.2, fluoride by EPA 340.2, hardness by SM 2340B, specific conductance by EPA 120.1, and turbidity by EPA 180.1) in December 1998. No records of any VOC analytical results were found for Y-18, so the USAF collected a sample during the Spring 2004 (Round 18) groundwater-sampling event.

Production well Y-20 (formerly Y-3) was installed in the MARBO Annex (Figure 1-4) by GWA in January 1999 (Earth Tech, 1999). The well is located on a parcel that has been transferred to GovGuam (Figure 1-5; green). The well was constructed of 6-inch diameter steel casing, with

approximately 50 feet of screen (395-445 feet). Pumping and drawdown tests were performed on the well, with an average drawdown of 2.0 feet at an average pumping rate of 425 gpm (Earth Tech, 2002). In addition the well was sampled for metals (EPA methods 200.7 and 245.1) and water quality parameters (pH by EPA 325.2, chloride by EPA 325.2, fluoride by EPA 340.2, hardness by SM 2340B, specific conductance by EPA 120.1, and turbidity by EPA 180.1) in January 1999. No records of any VOC analytical results were found for Y-20, so the USAF collected a sample during the Spring 2004 (Round 18) groundwater sampling event.

6.1.1.4.4 GEPA Harmon Monitoring Wells

Three additional monitoring wells (HMW-1, HMW-2, and HMW-3) were installed by GEPA in an area of Harmon down gradient of the MARBO Annex (Figure 6-2). Installation of these wells was prompted by the discovery of PCE and TCE in the Tumon-Maui and Guam Plaza Hotel production wells (APEC, 2002).

HMW-1 was installed in October 2001, near the intersection of Route 16 and the Harmon Loop Road (Figure 6-3), to characterize groundwater quality adjacent to a potential source of PCE (dry cleaners). The well is screened across the entire fresh water lens (169-279 feet). Two discrete groundwater samples, collected from near the top of the screened interval, were collected in October 2001 and January 2002 (APEC, 2002). In May 2002 the USAF, in support of the GEPA program, collected two samples using a piston pump at depths of 184 and 260 feet. In May 2004 the USAF collected four samples using a low flow piston pump at depths of 195, 225, 260, and 275 feet. Sampling information and groundwater data are presented in Table 6-1 and analytical results are summarized in Appendix D (Table D-2) and discussed in Section 6.1.2.

HMW-2 was installed in May 2002, near the intersection of Route 16 and the Harmon Loop Road (Figure 6-3) to characterize groundwater quality adjacent to a potential source of PCE (dry cleaners). The well is screened across the entire fresh water lens (170-300 feet). One discrete groundwater sample, collected from near the top of the screened interval, was collected in June 2002 (APEC, 2003a). In November 2003, EA under contract to the USAF and in support of the GEPA program, collected six vertically profiled groundwater samples using passive diffusion bag (PDB) samplers. The PDB technology has been proven effective for collecting groundwater samples for VOC analysis based on a study conducted in 2002 (Vroblesky, D.A., Joshi, M., Morrell, J., and Peterson J.E., 2002). Sampling information and groundwater data are presented in Table 6-1 and analytical results are summarized in Appendix D (Table D-3) and discussed in Section 6.1.2.

HMW-3 was installed in May 2003, near the Guam Sports Complex (Figure 6-3), to characterize groundwater quality along the axis of the Yigo-Tumon Trough, downgradient of MARBO Annex. The well is screened across the entire fresh water lens (240-375 feet). In November 2003, the USAF, in support of the GEPA program, collected six, vertically-profiled groundwater samples using PDB samplers. In May 2004, the USAF collected four samples using a low flow piston pump at depths of 270, 345, 366, and 372 feet. Sampling information and groundwater data are presented in Table 6-1 and analytical results are summarized in Appendix D (Table D-4) and discussed in Section 6.1.2.

6.1.1.4.5 Tumon Bay Springs

Between August 2000 and August 2001, PCR Environmental (under contract to the GEPA) completed groundwater sampling from eight springs in Tumon Bay (Figures 6-2 and 6-4). The study characterized rainfall conditions, groundwater discharge, and groundwater quality from the eight springs for four events over one annual cycle (PCR, 2002). Spring locations are presented on Figure 6-4 and analytical results are presented in Appendix D (Table D-5) and discussed in Section 6.1.2.

6.1.1.4.6 The Tumon-Maui Well

The Tumon-Maui well, located in Tumon (Figure 6-4), was constructed in 1947 and is owned by the USAF. The well facilities include a slanted tunnel that was dug into the subsurface to intercept the water table. The base of the slanted tunnel leads to a pump room that is adjacent to a horizontal infiltration gallery. The infiltration gallery is a straight, 1,000-foot long tunnel that intercepts the upper 1.5 feet of the fresh-water aquifer. Due to it's proximity to the ocean the freshwater lens at the Tumon-Maui well is relatively thin. The well is designed to skim fresh water from the top of the aquifer to reduce the potential of saltwater intrusion. There are two turbine pumps located in the pump room, each with a capacity of 900 gallons per minute (gpm). These turbines lift the water vertically (approximately 100 feet) to a chlorination station at the surface, on the west side of Marine Drive. Water from this station is piped approximately six miles to treatment and storage facilities in MARBO, and eventually to the Main Base 12 miles away. A brief chronological history directly or indirectly related to the Tumon-Maui well is provided below:

- 1947 – Tumon-Maui well was constructed and started operation.
- 1985 – USAF Bioenvironmental Engineering (BEE) staff began collecting production well samples, including Tumon-Maui, to analyze for VOCs.
- October 1994 – USAF issued an agreement with Public Utility Agency of Guam (PUAG; subsequently known as GWA) to interconnect with the USAF water system at Andersen South Tank 4, and provide PUAG with 330 gpm.
- March 1995 – PCE concentrations in the monthly BEE sampling efforts (14.6 μg/L) exceeds MCL (5 μg/L)
- September-October 1995 – Public notices posted in Pacific Daily News indicating PCE exceedances in Tumon-Maui well. Well shut down until a treatment facility can be constructed.
- October 1995 – Alternative Analysis is prepared (Winzler and Kelly, 1995) to remediate Tumon-Maui. Five alternatives are evaluated and the packed tower-air stripper is the selected alternative.
- January 1997 – Packed tower-air stripper is constructed in MARBO to treat water from Tumon-Maui and USAF MW-2 production wells.
- January 1997 through December 1997 – Operation of air stripper hampered by excessive calcium carbonate scaling of packing media. While USAF evaluates alternatives, Tumon-Maui and MW-2 are only operated intermittently.
- November 1997 – USAF began participating in island-wide water conservation program.

- March 1998 – USAF determined that alternatives to fix/replace air stripper are not feasible considering that water from Tumon-Maui and MW-2 are not necessary for USAF mission.
- June 1998 – USAF notifies GEPA that they intend to modify air stripper to rectify the problem related to scale buildup. USAF proposes adding a sequestering agent, sodium hexa-metaphosphate to reduce scaling. USAF also notifies GEPA that due to several interconnections with GWA, and less overall consumption, that the USAF can satisfy all potable water demands without the use of the Tumon-Maui well.
- July 1998 – MARBO ROD for soil and groundwater finalized.
- December 1998 – Air stripper is shut down while USAF considers long-term options.
- July 2004 – USAF currently assessing long-term disposition of the Tumon-Maui well.

In October 2003 and May 2004 the USAF collected grab samples from the Tumon-Maui well. Historical groundwater data are presented in Table 6-1 and analytical results are summarized in Appendix D (Table D-5) and discussed in Section 6.1.2.

6.1.1.5 Initial Survey and Re-Survey of MARBO Annex Monitoring Wells

A component of this five-year review included verification of the elevation survey data for the monitoring wells at MARBO Annex. The monitoring wells that were installed prior to the OU2 RI (IRP-01, IRP-02, IRP-03, IRP-08, IRP-10, IRP- 12, IRP-14, IRP-15, and IRP-16) were surveyed in February and March of 1994. The GPA wells (GPA-1 and GPA-2) were surveyed in February of 1995. The wells installed as part of the OU2 RI (IRP-23, IRP-24, IRP-25, IRP-26, IRP-27, IRP-28, IRP-29, IRP-30, IRP-31, IRP-32B, IRP-33, IRP-34, and IRP-35) were surveyed in November 1995, at the completion of the OU2 RI drilling program.

Based on initial elevation survey data, groundwater elevations have been measured during each of the 18 semiannual groundwater monitoring events, and potentiometric surface maps that were generated from these data are presented in the following documents:

- *Groundwater Maps for Operable Unit 2* (ICF, 1995b)
- *Final Groundwater Monitoring Plan for Andersen AFB* (EA, 1995)
- *Groundwater Summary Report for Andersen AFB* (EA, 1998g)
- *Spring 1998 Groundwater Data Monitoring Report for Andersen AFB* (EA, 1998h)
- *Fall 1998 Groundwater Data Monitoring Report for Andersen AFB* (EA, 1999a)
- *Spring 1999 Groundwater Data Monitoring Report for Andersen AFB* (EA, 1999b)
- *Fall 1999 Groundwater Data Monitoring Report for Andersen AFB* (EA, 2000)
- *Spring 2000 Groundwater Monitoring Main Base, Northwest field, and MARBO Annex Operable Units* (EA/URS, 2000)
- *Fall 2000 Groundwater Monitoring Main Base, Northwest Field, and MARBO Annex Operable Units* (EA/URS, 2001a)
- *Spring 2001 Groundwater Monitoring Main Base, Northwest Field, and MARBO Annex Operable Units* (EA/URS, 2001b)
- *Fall 2001 Groundwater Data Monitoring Report for Andersen AFB* (FWENC/EA, 2002c)

- *Spring 2002 Groundwater Monitoring Report for Andersen AFB* (FWENC/EA, 2002d)
- *Fall 2002 Groundwater Monitoring Report for Andersen AFB* (FWENC/EA, 2003b)
- *Spring 2003 Groundwater Monitoring Report for Andersen AFB* (FWENC/EA, 2003c)

A review of the historical potentiometric surface maps indicates consistent results between them. Each of the groundwater potentiometric surface maps indicates a prominent "low" feature in the vicinity of IRP-12 and a "high" feature in the vicinity of IRP-16. The Fall 1998 potentiometric surface map (EA, 1999a), a representative map that illustrates both these features, is illustrated in Figure 6-5. As these features are key to the interpretation of groundwater flow within MARBO Annex, a primary objective of the re-survey was to confirm that these two features exist. A re-survey of 23 monitoring wells was performed in December 2003, by a Guam-licensed surveyor. Both location data (x and y coordinates) and elevation data (z coordinate) were measured. Both the original survey data and the re-survey data are presented in Table 6-2 and illustrated in Figure 6-6. As presented in Table 6-2, there were slight (0.01 feet to 0.20 feet) elevation variances, between the two surveys, for most of the wells. However, two wells (IRP-08 and IRP-12) showed excessive variations that affected the contouring and interpretation of previous potentiometric surface maps. The re-surveyed elevations for IRP-12 and IRP-08 are 1.86 feet higher and 1.11 feet lower, respectively.

A newly generated groundwater potentiometric surface map for the MARBO Annex, based on the re-surveyed elevations and the Fall 2003 groundwater elevations, reveals a more subtle potentiometric surface map than previous ones (Figure 6-7). Though the "high" centered around IRP-16 persists with the new data, the "low" centered around IRP-12 disappears. This new depiction of the groundwater surface is significant as it challenges some of the former conceptions relevant to shallow groundwater flow. This issue, and how it impacts the MARBO ROD and future actions, are addressed in more detail in the following sections.

6.1.2 History of Contamination of the MARBO Annex Groundwater

6.1.2.1 Nature and Extent of TCE and PCE

6.1.2.1.1 MARBO Annex

During previous groundwater sampling events at the MARBO Annex, VOCs, SVOCs, PAHs, PCBs, pesticides, TAL metals, and cyanide were detected in groundwater samples collected from one or more monitoring wells. However, these analytes were detected either inconsistently or at concentrations below their respective MCL. No SVOCs, PAHs, PCBs, pesticides, or TAL metals were determined to be COCs so there is no further discussion regarding them in this document. The following VOCs were detected in at least one groundwater sample at MARBO Annex:

- 1,1,1,2-tetrachloroethane
- 1,1-dichloroethene (1,1-DCE)
- 1,1,2-trichloroethane (1,1,2-TCA)
- 1,2,4-trichlorobenzene
- 2-hexanone

- acetone
- benzene
- bromodichloromethane
- bromomethane
- carbon disulfide
- carbon tetrachloride
- chloroform
- chloromethane
- cis-1,2-dichloroethene
- dibromochloromethane
- dichlorodifluoromethane
- methyl ethyl ketone (2-butanone)
- methylene chloride
- m,p-xylenes
- naphthalene
- tetrachloroethene(PCE)
- trichloroethene (TCE)
- toluene
- trichlorofluoromethane

Of the VOCs listed above, only TCE and PCE have been detected consistently at concentrations exceeding their respective MCL (5 μg/L), and they are the only COCs at MARBO Annex. In addition, two chlorinated VOCs, 1,1-dichloroethene (1,1-DCE) and 1,1,2-trichloroethane (1,1,2-TCA), have been detected above their MCL (7 μg/L and 5 μg/L) once and twice, respectively. Historical analytical data acquired for the MARBO Annex LTGM Program are presented in Appendix C. The historical ranges of TCE and PCE concentrations observed in groundwater samples collected at MARBO Annex as part of the LTGM Program are illustrated in Figure 6-8. In addition, Figure 6-8 illustrates the historical ranges of concentrations of TCE and PCE "daughter" products, cis-1,2-dichloroethene (1,2-DCE) and 1,1-DCE. Wells with groundwater samples with COCs that exceeded their respective MCL are highlighted in red.

Based on 18 rounds of groundwater sampling, TCE and PCE concentrations have been detected above MCLs (5 μg/L), at two locations inside the MARBO Annex (Figure 6-8). TCE and PCE concentrations were detected at concentrations exceeding the MCL in four wells (IRP-31, MW-2, GPA-1, and GPA-2) located west and southwest of Site 37 and the Waste Transfer Station (Figure 6-8). The groundwater samples collected from IRP-31 have had TCE and PCE concentrations ranging from 110 to 605 μg/L and 0.9 to 6.1 μg/L, respectively (Table C-1, Figure 6-8, and Figure 6-9). The groundwater samples collected from GPA-1 have had TCE and PCE concentrations ranging from non-detect (ND) to 14 μg/L and ND to 0.4 μg/L, respectively (Table C-1, Figure 6-8, and Figure 6-9). The groundwater samples collected from GPA-2 have had TCE and PCE concentrations ranging from ND to 6.7 μg/L and ND to 0.4 μg/L, respectively (Table C-1, Figure 6-8, and Figure 6-9). The groundwater samples collected from MW-2 have had TCE and PCE concentrations ranging from ND to 6 μg/L and ND to 0.2 μg/L, respectively (Table C-1, Figure 6-8, and Figure 6-9).

As illustrated in Figure 6-9, MW-2 is screened near the top of the freshwater lens ("shallow") and samples are representative of the shallow freshwater lens. Monitoring well IRP-31 is screened near the base of the fresh water lens and/or top of the transition zone ("deep"), and groundwater samples are representative of that zone. GPA-1 and GPA-2 are screened across the freshwater lens and extend into the marine zone ("fully screened"), however groundwater samples have consistently been collected from the transition zone as illustrated in Figure 6-9. Overall, groundwater samples collected from these four wells have had TCE concentrations 1 to 2 orders of magnitude higher than the respective PCE concentrations. The source for the TCE and PCE observed in these wells was not identified during the OU 3 RI (ICF, 1997b) and has not been identified in the interim.

As illustrated in Figure 6-10, there have been no consistent trends for TCE concentrations observed in groundwater samples collected from IRP-31, GPA-1, and MW-2 during the Fall 1996 through Spring 2004 sampling events. Groundwater samples collected from IRP-31 trended with higher TCE concentrations from Fall 1996 through Spring 1998; leveled off through Fall 1999; decreased through Fall 2001; increased again through Spring 2003 to the highest TCE concentration (605 μg/L); and have been relatively stable through Spring 2004. TCE observed in groundwater samples collected from GPA-1 and MW-2 appear to trend the opposite of those observed for IRP-31 (Figure 6-10). TCE concentrations decreased from Fall 1996 through Fall 1998 (to trace levels); increased through Spring 2000, and leveled off through Fall 2003.

At the other location, near the MARBO Laundry, PCE concentrations have been detected above MCLs (5 μg/L) in groundwater samples collected from IRP-14 ("shallow") and IRP-29 ("deep") (Figure 6-8). At this location PCE is the more prevalent chlorinated constituent in groundwater, and TCE concentrations have never exceeded 2 μg/L. The 18 "shallow" groundwater samples, collected from IRP-14, have had ND TCE and PCE concentrations ranging from 1.6 to 11 μg/L. The "deep" groundwater samples, collected from IRP-29, have had TCE and PCE concentrations ranging from ND to 2 μg/L and 4.5 to 18 μg/L, respectively (Table C-1, Figure 6-8, and Figure 6-9). Converse to the other location (IRP-31) where TCE is prevalent, PCE concentrations in groundwater at MARBO Laundry are typically an order of magnitude higher than the respective TCE concentration. The source of the PCE in groundwater was not definitively attributed to the MARBO Laundry during the OU 3 RI (ICF, 1997b). However the source of PCE is suspected to relate to former dry cleaning activities at the MARBO Laundry.

As illustrated in Figure 6-11, there has been a systematic decrease in PCE concentrations in groundwater samples collected from IRP-14 (shallow well) from Fall 1996 (10 μg/L) through Spring 2004 (1.8 μg/L). However there have been no consistent PCE trends in IRP-29 (deep well), as PCE concentrations increased from Fall 1996 (1.0 μg/L) through Spring 1998 (6.0 μg/L); decreased through Spring 2002 (1.1 μg/L); and increased through Spring 2004 (18 μg/L).

Additional groundwater monitoring points (monitoring wells, production wells, rock borings, and springs), which were either not sampled regularly as part of the LTGM Program, which preceded the program, or which were added subsequent to the MARBO OU ROD are also considered in this five-year review. These data are the result of sampling efforts by the USAF,

GWA, and GEPA. Relevant analytical data for these sampling points are presented in Appendix D of this report.

6.1.2.1.2 Harmon Wells

As discussed in Section 6.1.1.4, auxiliary data from locations down gradient of the MARBO Annex, were collected and/or reviewed for this five-year review. These data are critical to confirming that the selected alternative is protective of human health and the environment.

Three rounds of groundwater samples have been collected from EX-6: April 2000, October 2000, and May 2004. One shallow groundwater sample (320 feet) collected in May 200, one shallow (320 feet) and one deep groundwater sample (415 feet) collected in October 2000, and one shallow (325 feet) and two deep (446 and 448 feet) groundwater samples collected in May 2004 had ND PCE and TCE. Sampling information and groundwater analytical data are summarized in Appendix D (Table D-1) and are depicted in Figure 6-13.

Three additional monitoring wells (HMW-1, HMW-2, and HMW-3) were installed in Harmon. Four series of groundwater samples were collected from HMW-1: two by APEC and two by EA. The two APEC samples were collected on 23 October 2001 and 2 January 2002 using a bailer (Table D-2). Both samples were ND for TCE and PCE, however the reporting limit was equivalent to the MCL (5 μg/L). On 22 May 2002, EA collected two samples, at depths of 184 and 260 feet, using a low flow piston pump. The shallow groundwater sample had traces of PCE (0.4 μg/L) and ND for TCE, and the deep groundwater sample was ND for both TCE and PCE (Table D-2 and 6-13). On 12 May 2004, EA collected four samples, at depths of 195, 225, 260, and 275 feet using a piston pump. The groundwater sample collected at 195 feet had traces of PCE (0.2 μg/L) and TCE (0.5 μg/L). The samples collected at 225 and 260 feet had ND PCE and traces of TCE (0.4 μg/L). The sample collected at 275 feet had ND PCE and traces of TCE (0.3 μg/L). Sampling information and groundwater analytical data are summarized in Appendix D (Table D-2) and are depicted in Figure 6-12.

Two series of groundwater samples were collected from HMW-2: one by APEC and one by EA. The APEC sample was collected on 4 June 2002 using a bailer (Table D-3). The sample was ND for TCE and PCE, however the reporting limit was equivalent to the MCL (5 μg/L). On 17 November 2002, EA collected six samples, at depths of 191.4, 211.4, 231.4, 251.4, 271.4, and 291.4 feet, using PDBs. The sample collected at 231.4 feet had trace (0.4 μg/L) concentrations of PCE and ND TCE. The other five samples had ND PCE and TCE (Table D-3 and Figure 6-12). Sampling information and groundwater analytical data are summarized in Appendix D (Table D-3) and are depicted in Figure 6-12.

Two series of groundwater samples were collected from HMW-3 on 17 November 2002 and 13 May 04. On 17 November 2002 EA collected six samples, and a duplicate sample, at depths of 258.9, 288.9, 318.9, 348.9, 358.9, and 368.9 feet, using PDBs. All samples were ND for both PCE and TCE (Table D-4 and Figure 6-12). On 12 May 2004, EA collected four samples, at depths of 270, 345, 366, and 372 feet using a piston pump. The groundwater sample collected at 270 feet had ND PCE and traces of TCE (0.2 μg/L). The sample collected at 345 feet had traces of PCE (0.3 μg/L) and TCE (0.2 μg/L). The samples collected at 366 and 372 feet ND PCE and

TCE. Sampling information and analytical data are summarized in Appendix D (Table D-4) and are depicted in Figure 6-12.

An east-west trending cross section, constructed through HW-1, HMW-2, HMW-3, and EX-6, is illustrated in Figure 6-13. Due to the limited chloride data for these wells, the extent of the freshwater lens, transition zone, and marine water, may be off slightly. The cross section indicates that based on available data, there are only barely detectable traces of TCE and PCE in the freshwater lens.

6.1.2.1.3 Tumon Bay Springs

Between August 2000 and August 2001 PCR Environmental collected groundwater seep samples from eight springs in Tumon Bay (Figure 6-4 and Table D-5). Samples collected at the Hilton Onshore Spring and Marriott Onshore Spring had ND TCE and PCE (Table D-5). Samples collected farther north along Tumon Bay had detectable concentrations of PCE and TCE. One sample collected at the Reef Onshore Spring in August 2001 exceeded the MCL for PCE. One sample collected at the Westin Onshore Spring in June 2001 exceeded the MCL for TCE. Two samples collected from the Outrigger Offshore Spring in August 2000 and August 2001 exceeded the MCL for PCE.

6.1.2.1.4 The Tumon-Maui Well

Analytical data for the Tumon-Maui well are presented in Table D-6 (Appendix D). Water table measurements, made by the AF in May 1995, indicate that the well draws down approximately 3 inches when it is pumped at a rate of 1,000 gpm. Groundwater samples collected between 1989 and 1997, when the production well was active, had PCE concentrations in the 1 to 22 μg/L range, and consistently exceeded the MCL (5 μg/L). TCE, with one exception, was either ND or detected at trace concentrations (<1.0 μg/L) in these same samples. Groundwater samples collected in October 2003 and May 2004, with the well inactive, had trace PCE (0.7 and 0.6 μg/L, respectively) and ND TCE. Historical chloride concentration data are poorly documented, though USAF files indicate several samples with chloride contents of approximately 150 ppm.

6.1.2.2 Fate and Transport of TCE and PCE

6.1.2.2.1 Conceptual Site Model

Cross-sectional information and a block diagram showing potential groundwater and contaminant migration pathways in the vadose zone and aquifer were included in the OU2 RI report (ICF, 1997b) and are presented in Appendix F. A description of the potential pathways and flow regime for groundwater and TCE/PCE that were discussed in the ROD are summarized as follows. In the limestone karst environment, precipitation percolates rapidly into the soils and limestone bedrock. The upper portion of the epikarst zone limestone is capable of storing large volumes of water due to dissolution porosity that has developed with time. Dissolution decreases with depth, decreasing the storage capacity. Epikarst water is gradually released to the underlying vadose zone and to the aquifer as diffuse recharge. Discrete/concentrated runoff

occurs only where there are enlarged joints, faults, brecciated zones, and surface depressions that concentrate runoff to a discrete subsurface inlet.

The vertical migration of groundwater is altered due to interconnecting fractures, solution cavities, or lithologic changes. Vertical flow and flow along the hydraulic gradient occurs where vadose zone groundwater contacts the water table. The rate and direction of flow is further altered by encountering other preferential pathways. The flow regime in the vadose zone ranges from diffuse/slow flow, similar to a macro-porous media aquifer, to preferential/channeled fracture flow. Underlying structural features, lithologic features, and secondary porosity may influence groundwater flow and, therefore, complicate the migration of TCE and PCE.

As shown in Figure 6-14, groundwater flow within the MARBO Annex may be controlled by complex faulting near the center of the Annex, as described in the OU2 RI Report (ICF, 1997b). In addition, groundwater flow to the southwest, northwest, and northeast of the MARBO Annex may be influenced by the numerous GWA production wells that capture some of the groundwater flow. Groundwater flow within MARBO Annex may also be influenced by USAF production wells.

6.1.2.2.2 Groundwater Flow

As discussed in the previous section there is a groundwater "high" west of the MARBO Laundry that appears to influence groundwater over a significant portion of the MARBO Annex (Figure 6-7). To the south of this "high," groundwater flow may also be affected by a fault and breccia zone near the southern boundary of the MARBO Annex (Figure 6-14). It is uncertain if groundwater flows along this fault zone or passes through and continues south. However, groundwater flow toward the south is ultimately controlled by a northeast-southwest trending volcanic ridge that generally parallels Route 15 (Figures 6-2 and 6-14). Due to this "high," groundwater flow in the MARBO Laundry area would be to the north or south.

Based on previous elevation survey data, groundwater flow from the IRP-31 area appeared to flow primarily into a groundwater "low" centered around IRP-12 (Figure 6-5). A potentiometric surface map, based on new elevation survey data (Figure 6-7) depicts a much flatter groundwater gradient in the vicinity of IRP-31, with an overall westward flow component. Some of the groundwater in this vicinity may also be influenced by flow gradients induced by nearby production wells.

The ROD assumed groundwater velocities of 20-36 feet/day that were derived from the dye trace investigation performed at the Main Base (ICF, 1995c). This estimate appears to be representative of the MARBO Annex based on the hydraulic gradient and lithology, and is consistent with other investigations indicating the age of the freshwater lens may be less than 5 years (Mink and Lau, 1977). The OU2 RI assumed that if it takes 10 aquifer volumes to remediate the groundwater system, the aquifer could be cleansed naturally within 50 years, assuming no additional contamination is stored in the vadose zone. However, because of potential movement of contaminants from the vadose to the phreatic zone, contaminant persistence may continue for an unknown period of time, but should diminish, assuming the primary source is gone.

6.1.2.2.3 Dechlorination Processes

Contaminant transformations can occur through degradation of PCE and TCE, however based on high dissolved oxygen (DO) concentrations in the shallow aquifer, these processes are anticipated to be insignificant. Deeper in the aquifer, where DO should decrease, and more anaerobic conditions should prevail, the likelihood for degradation of PCE and TCE is more likely. Evidence of these transformations in the shallow aquifer, based on the presence of degradation byproducts, is minimal based on observations of analytical data at the MARBO Annex (Appendix C and Figure 6-8). As discussed in the previous section, and as illustrated in Figure 6-8, there are very few occurrences of degradation byproducts such as 1,2-DCE and 1,1-DCE, and the absence of vinyl chloride. The highest concentrations of the degradation byproducts 1,2-DCE and 1,1-DCE have been observed in samples collected from IRP-31 (Figures 6-8 and 6-9), near the base of the freshwater lens.

6.1.3 Initial Response

The COCs detected in the MARBO Annex Groundwater were determined to be relatively safe as there were no imminent human health risks, therefore no immediate response was required.

6.1.4 Basis for Taking Action at the MARBO Annex Groundwater

The basis for taking action at the MARBO Annex Groundwater was to protect human health through implementation of ICs.

6.1.5 Remedial Action for the MARBO Annex Groundwater

As noted previously, ICs are active mechanisms that were to be implemented, along with natural attenuation, to provide protectiveness. The ICs consisted of the following three components that would help eliminate the risk of direct exposure path to COCs.

1) **Land Use Restrictions** involve placing restrictions on the property deeds pertaining to the installation of water supply wells on properties affected by PCE- and TCE-impacted groundwater. The intent of land use restrictions is to reduce potential exposure to contaminants by legally restricting future groundwater development from those areas that are impacted. The implementation mechanism for this component would be through the GEPA's Wellhead Protection Program and Well Installation licensing and permitting. As part of the Wellhead Protection Program, GEPA has developed a Groundwater Protection Zone Map that identifies those areas where surface activities above the resource or recharge zone have the ability to impact the water quality. The metes and bounds descriptions of the land are designated on this map along with other pertinent information (GEPA, 1993). The GEPA reviews groundwater data from the Andersen AFB CERCLA process, and all well installation applications are reviewed by the GEPA first prior to installation. Also, as part of the Wellhead Protection Program, installation of new production wells within 1,000 feet of an existing production well is prohibited. As GEPA has been involved with the

development of this ROD, this would easily facilitate the necessary transfer of information from Andersen AFB to the GEPA, for implementation of the above-mentioned ICs.

2) **Long-Term Groundwater Monitoring** at the MARBO Annex was proposed for the existing monitoring wells and production wells. Groundwater would be analyzed for TCE, PCE and other constituents that would be deemed pertinent for monitoring. Long-term monitoring was to proceed according to a formalized LTGM Program.

3) **Existing Wellhead Treatment** was proposed for three of the production wells in MARBO Annex (MW-1, MW-2 and MW-3), until TCE and/or PCE concentrations are consistently below MCLs. Groundwater samples from two of these wells (MW-1 and MW-2) had slightly exceeded the MCL for TCE in the past. The endorsement and recommendation of continued wellhead treatment in these production wells was to provide additional health risk benefit to those wells that exceed MCLs for TCE and/or PCE.

6.1.6 Remedy Implementation at MARBO Annex Groundwater

The ICs specified in the ROD were fully implemented, with the exception of wellhead treatment for MW-2. MW-2 was taken off production in early 1998 as it was no longer required to meet USAF water demand and the stripping tower used to treat the water was fouling due to frequent carbonate crustation of the spherical packing media.

6.1.7 Document and Data Review for MARBO Annex Groundwater

Documents examined in support of this ROD review are cited in the list of references that are provided in Chapter 8.

6.1.8 Site Inspection of the MARBO Annex Groundwater

A general site inspection of the MARBO Annex was conducted during the Fall 2003 groundwater sampling event. All wells were in good condition and were properly secured.

6.1.9 Technical Assessment of Remedial Action for the MARBO Annex Groundwater

Question A: Is the remedy functioning as intended by the ROD?

The remedy is functioning as intended in the ROD, in that it is still protective of human health and the environment as long as ICs are implemented. However, the natural attenuation process is not operating as intended at IRP-31, based on the lack of a clear decreasing trend of TCE concentrations. The natural attenuation calls on the physical processes of dispersion and dilution, which are largely dependent on the volume and rate of water traveling through the vadose zone and aquifer. The ROD made certain assumptions relevant to recharge rates and residence times in order to estimate potential times for TCE and PCE to attenuate below MCLs. The primary limitation to these estimates includes the uncertainty of the total TCE/PCE mass that may exist in the subsurface. As the source(s) of the PCE and TCE have never been positively identified, the estimated cleanup times should take this in to consideration, with the

understanding that actual cleanup times may exceed the high end of the range. The EE/CAs and RAs that are programmed for the three new IRP sites will be designed to explore for possible TCE and PCE sources.

Question B: Are the exposure assumptions, toxicity data, cleanup values, and Remedial Action Objectives (RAOs) used at the time of the remedy selection still valid?

There are no changes in exposure assumptions, toxicity data, cleanup values, or RAOs that are significant or that alter the validity of the selected remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

There is no new information that has come to light that questions the protectiveness of the remedy. The recently obtained groundwater data collected in Harmon, suggests that the elevated TCE and PCE concentrations observed in MARBO Annex (IRP-31) are not present in the freshwater lens in Harmon. Should the PCE and TCE concentrations in groundwater at MARBO Annex remain unchanged, or increases, during the next five years indicating that the ineffectiveness of natural attenuation in remediating the site in timely manner, a ROD amendment may be required to either specify an active remediation or a technical infeasibility (TI) waiver.

6.1.10 Technical Assessment Summary of the MARBO Annex Groundwater

Based on the data review, the RAOs were addressed as intended in the ROD.

6.1.11 Issues, Recommendations, and Follow-up Actions for the MARBO Annex Groundwater

Issues	Recommendations / Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affect Protectiveness? Yes/No	
					Current	Future
1) PCE and TCE sources in MARBO Annex have not been identified.	Deep soil borings should be drilled at IRP Sites 52/54 to look for potential source areas. If chlorinated VOC sources are found at either site, one or more borings may be drilled at strategic locations through the extent of the fresh water lens.	USAF	USEPA & GEPA	12/31/2005	N	Y
2) Fate and transport of TCE and PCE within MARBO are poorly understood, particularly at depth.	To better understand hydrogeology and fate and transport at depth, drill 1-2 borings (open bore wells) through the entire freshwater lens. In addition a dye trace study, relevant to IRP-31 and IRP-29, should be considered.	USAF	USEPA & GEPA	12/31/2005	N	Y
3) Tumon-Maui Well is currently not being used, and as such no benefits are derived from either use of the water or the remedial effects.	USAF should assess long-term need for Tumon Maui well. Determine what to do with the Tumon-Maui well if the well is not essential to USAF mission	USAF	USEPA & GEPA	10/01/2005	N	Y

6.1.12 Protectiveness Statement for the MARBO Annex Groundwater

Tap water samples were collected from Y-18 and Y-20 on May 2004 and analyzed for VOCs as part of the Spring 2004 LTGM program. Based on the results (ND for PCE and TCE) the ICs are functioning as intended and the remedy is protective of the human health and the environment.

Additionally, even though wellhead treatment of MW-2 was part of the initial remedy, it is no longer in effect. However it's usefulness was more effective as a protective measure than as a means to remediate the groundwater. MARBO Annex production wells MW-1 and MW-3 continue to produce potable water, and are monitored to assure that PCE and TCE concentrations remain consistently below the MCL.

6.1.13 Next Review of the MARBO Annex Groundwater

The next five-year review of MARBO ROD is scheduled after 02 March 2009, five years from this review, and should include a full review of the groundwater at MARBO Annex. The related review period would be from 02 March 2004 to 02 March 2009.

TABLE 6-1. HISTORICAL REDUCTION OF GROUNDWATER MONITORING AND PRODUCTION WELLS FOR MARBO ANNEX, ANDERSEN AFB, GUAM.

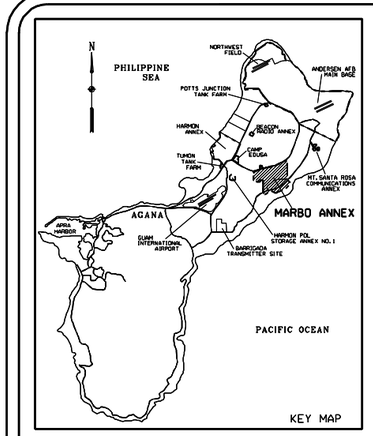
LTGM Program Status	Well Identification	Well Type	Screened Interval (feet below ground surface)	Borehole Total Depth (feet below ground surface)	Concentrations Exceeding ARARs (COC)	Rationale for Discontinuation and Continuation of Sampling
Wells Removed From The Long-Term Groundwater Monitoring Program In 1998	D-1	Production	Unknown	Unknown	None	Concentrations were Not Detected or Below Action Levels
	D-3	Production	Unknown	Unknown	None	Concentrations were Not Detected or Below Action Levels
	D-4	Production	Unknown	Unknown	None	Concentrations were Not Detected or Below Action Levels
	IRP-28	Shallow Screened	342-362	480	None	Concentrations were Not Detected or Below Action Levels
	IRP-32B	Shallow Screened	367-387	420	None	Concentrations were Not Detected or Below Action Levels
	M-5	Production	Unknown	Unknown	None	Concentrations were Not Detected or Below Action Levels
	M-15	Production	Unknown	Unknown	None	Concentrations were Not Detected or Below Action Levels
	Y-2	Production	Unknown	Unknown	None	Concentrations were Not Detected or Below Action Levels
	Y-3	Production	Unknown	Unknown	None	Concentrations were Not Detected or Below Action Levels
	Y-4	Production	Unknown	Unknown	None	Concentrations were Not Detected or Below Action Levels
	Y-5	Production	Unknown	Unknown	None	Concentrations were Not Detected or Below Action Levels
	Y-6	Production	Unknown	Unknown	None	Concentrations were Not Detected or Below Action Levels
Wells Removed From The Long-Term Groundwater Monitoring Program In 2003	D-2	Production	383-418	418	None	Concentrations were Not Detected or Below Action Levels
	D-5	Production	372-412	412	None	Concentrations were Not Detected or Below Action Levels
	IRP-1	Shallow Screened	276-316	320	None	Concentrations were Not Detected or Below Action Levels
	IRP-2	Shallow Screened	360-400	404	None	Concentrations were Not Detected or Below Action Levels
	IRP-12	Shallow Screened	329-369	376	None	Concentrations were Not Detected or Below Action Levels
	IRP-23	Shallow Screened	307-327	460	None	Concentrations were Not Detected or Below Action Levels
	IRP-26	Shallow Screened	310-330	460	None	Concentrations were Not Detected or Below Action Levels
	M-6	Production	320-405	405	None	Concentrations were Not Detected or Below Action Levels
	M-7	Production	290-340	340	None	Concentrations were Not Detected or Below Action Levels
	MW-3	Production	408-428	428	None	Concentrations were Not Detected or Below Action Levels
	MW-5	Production	Unknown	475	None	Concentrations were Not Detected or Below Action Levels
	MW-6	Production	Unknown	497	None	Concentrations were Not Detected or Below Action Levels
	MW-7	Production	Unknown	408	None	Concentrations were Not Detected or Below Action Levels
	MW-8	Production	Unknown	390	None	Concentrations were Not Detected or Below Action Levels
Wells Currently Sampled Annually In The Long-Term Groundwater Monitoring Program	D-14	Production	330-370	375	None	Downgradient from MARBO Annex
	GPA-1	Full Screened	345-554	554	Yes (Trichlorethene)	Downgradient from MARBO Annex
	GPA-2	Full Screened	345-681	681	Yes (Trichlorethene)	Downgradient from MARBO Annex
	IRP-8	Shallow Screened	350-390	400	None	Downgradient from Site 38/MARBO Laundry
	IRP-10	Shallow Screened	292-331	338	None	Adjacent to Site 20/Waste Pile 7
	IRP-14	Shallow Screened	362-402	412	Yes (Tetrachlorethene)	Adjacent to Site 38/MARBO Laundry
	IRP-15	Shallow Screened	294-334	338	None	Adjacent to Site 20/Waste Pile 7
	IRP-16	Shallow Screened	281-321	326	None	Downgradient from Site 22/Waste Pile 6
	IRP-24	Deep Screened	410-430	445	None	Adjacent to MARBO Annex Boundary
	IRP-25	Shallow Screened	353-373	480	None	Downgradient from Site 37/War Dog Borrow Pit
	IRP-27	Shallow Screened	324-344	460	None	Downgradient from Site 22/Waste Pile 6
	IRP-29	Deep Screened	459-479	520	Yes (Tetrachlorethene and Trichloroethene)	Adjacent to Site 38/MARBO Laundry
	IRP-30	Shallow Screened	349-369	480	None	Downgradient from Site 38/MARBO Laundry
	IRP-31	Deep Screened	445-465	480	Yes (Tetrachlorethene and Trichloroethene)	Downgradient from Site 38/MARBO Laundry
	IRP-33	Shallow Screened	472-492	520	None	Adjacent to MARBO Annex Boundary
	IRP-34	Deep Screened	392-412	520	None	Adjacent to MARBO Annex Boundary
	IRP-35	Deep Screened	380-400	412	None	Adjacent to Site 24/Landfill 29
	MW-1	Production	345-385	385	None	Adjacent to MARBO Annex Boundary
	MW-2	Production	349-379	379	Yes (Trichlorethene)	Adjacent to MARBO Annex Boundary
	MW-9	Production	Unknown	472	None	Downgradient from Site 38/MARBO Laundry
Auxiliary Points	EX-6	Rock Boring	None	463	None	Concentrations were Not Detected or Below Action Levels
	HMW-1	Full Screened	169-279	280	None	Concentrations were Not Detected or Below Action Levels
	HMW-2	Full Screened	170-300	320	None	Concentrations were Not Detected or Below Action Levels
	HMW-3	Full Screened	240-375	377	None	Concentrations were Not Detected or Below Action Levels

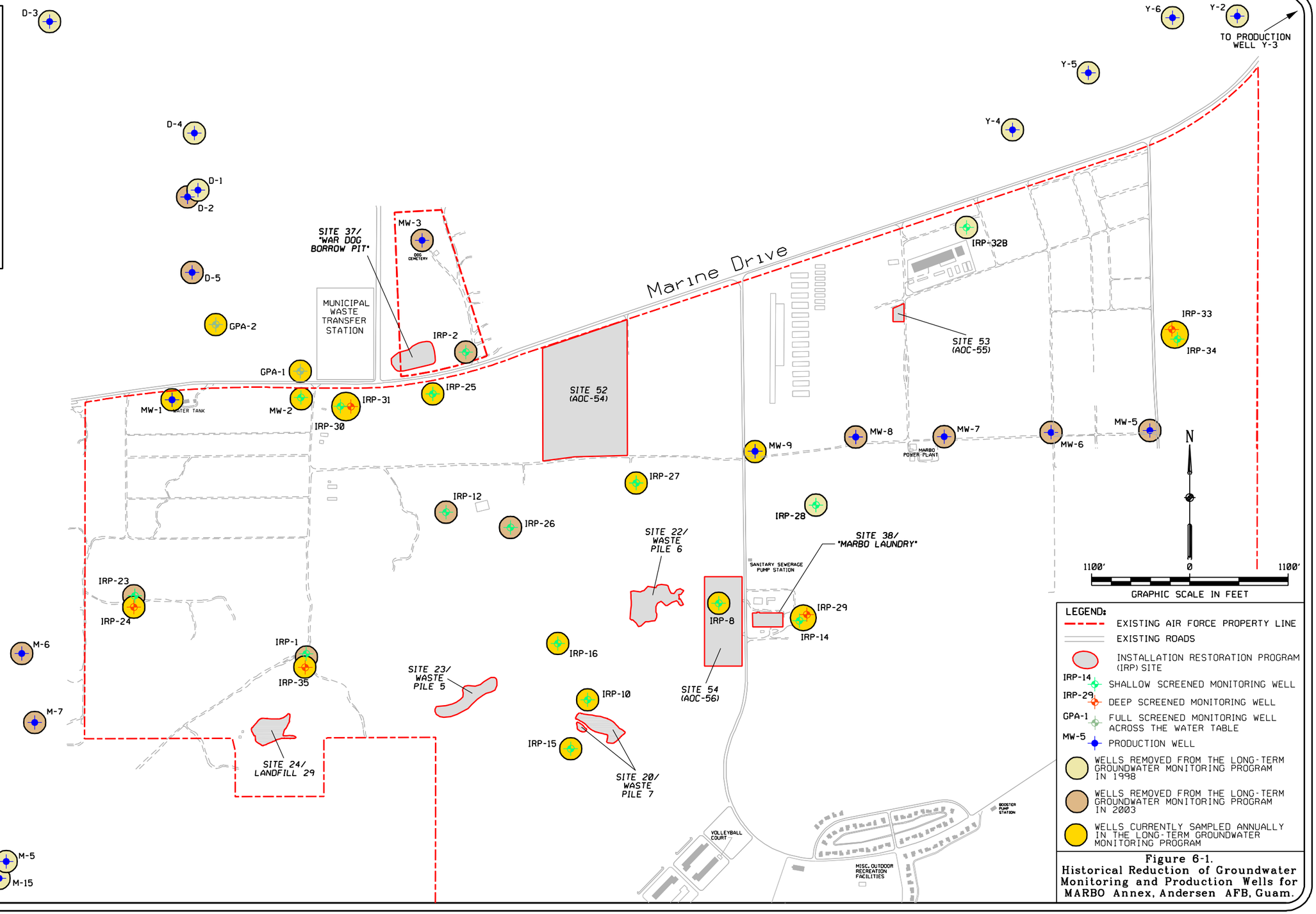
ARAR - Applicable or Relevant and Appropriate Requirement
COC - Constiuent of Concern

TABLE 6-2. MARBO ANNEX MONITORING WELL SURVEY COORDINATES AND ELEVATIONS. (1994/1995 survey data as compared to 2003 survey data)

Well ID	Initial Survey Date	Coordinates		Datum: Mean Lowest Low Water (MLLW)			New Survey Date	Coordinates		Datum: Mean Lowest Low Water (MLLW)			Differential
		Northing	Easting	Brass Cap/ Steel Plate	Top of Casing	Sounding Tube		Northing	Easting	Brass Cap/ Steel Plate	Top of Casing	Sounding Tube	
GPA-1	February 1995	179058.88	200084.17	359.39	360.33	NA	December 2003	179060.54	200083.43	359.26	360.19	NA	-0.14
GPA-2	February 1995	179,578.03	199,138.59	361.55	362.76	NA	November 2003	179,578.03	199,138.59	361.55	362.72	NA	-0.04
IRP-01	February/March 1994	175897.86	200151.95	287.68	NA	289.89	December 2003	175897.52	200151.86	287.72	NA	289.91	0.02
IRP-02	February/March 1994	179272.50	201938.01	373.04	NA	374.88	December 2003	179272.17	201937.91	372.88	NA	374.71	-0.17
IRP-08	February/March 1994	176,462.39	204,765.93	364.47	367.13	NA	November 2003	176,462.39	204,765.93	364.47	366.02	NA	-1.11
IRP-10	February/March 1994	175,384.19	203,391.50	306.07	NA	307.64	November 2003	175,384.19	203,391.50	306.07	NA	307.56	-0.08
IRP-12	February/March 1994	177,478.97	201,716.24	345.45	NA	344.94	November 2003	177,478.97	201,716.24	345.45	NA	346.80	1.86
IRP-14	February/March 1994	176,266.94	205,671.53	378.88	NA	380.65	November 2003	176,266.94	205,671.53	378.88	NA	380.55	-0.10
IRP-15	February/March 1994	174,834.90	203,109.81	311.62	NA	313.31	November 2003	174,834.90	203,109.81	311.62	NA	313.21	-0.10
IRP-16	February/March 1994	176,013.58	202,965.29	298.90	NA	300.50	November 2003	176,013.58	202,965.29	298.90	NA	300.42	-0.08
IRP-23	November 1995	176544.40	198233.85	318.37	NA	320.71	December 2003	176544.11	198233.09	318.32	NA	320.66	-0.05
IRP-24	November 1995	176419.86	198222.24	314.18	315.87	NA	December 2003	176419.57	198221.89	314.13	315.81	NA	-0.05
IRP-25	November 1995	178,803.14	201,566.48	363.95	NA	365.37	November 2003	178,803.14	201,566.48	363.95	NA	365.27	-0.10
IRP-26	November 1995	177,309.82	202,438.90	321.69	323.28	NA	November 2003	177,309.82	202,438.90	321.69	323.14	NA	-0.14
IRP-27	November 1995	177,808.33	203,845.49	335.52	NA	337.31	November 2003	177,808.33	203,845.49	335.52	NA	337.20	-0.11
IRP-28	November 1995	177559.91	205855.43	352.54	NA	354.45	December 2003	177560.33	205854.77	352.45	NA	354.35	-0.10
IRP-29	November 1995	176,334.04	205,755.76	381.26	383.02	NA	November 2003	176,334.04	205,755.76	381.26	382.92	NA	-0.10
IRP-30	November 1995	178,665.60	200,534.91	360.54	NA	361.94	November 2003	178,665.60	200,534.91	360.54	NA	361.82	-0.12
IRP-31	November 1995	178,660.75	200,651.79	362.19	363.54	NA	November 2003	178,660.75	200,651.79	362.19	363.41	NA	-0.13
IRP-32B	November 1995	180667.41	207541.33	379.32	NA	381.84	December 2003	180668.09	207541.00	379.27	NA	381.79	-0.06
IRP-33	November 1995	179525.73	209837.41	402.35	NA	404.67	December 2003	179526.04	209872.98	402.42	404.45	NA	-0.23
IRP-34	November 1995	179417.39	209900.22	403.75	NA	405.37	December 2003	179417.73	209899.91	403.82	NA	405.43	0.06
IRP-35	November 1995	175823.76	200155.14	284.77	286.04	NA	December 2003	175824.04	200155.21	284.81	286.09	NA	0.05

NOTE:
NA - Not Applicable





LEGEND:

- EXISTING AIR FORCE PROPERTY LINE
- EXISTING ROADS
- INSTALLATION RESTORATION PROGRAM (IRP) SITE
- IRP-14 SHALLOW SCREENED MONITORING WELL
- IRP-29 DEEP SCREENED MONITORING WELL
- GPA-1 FULL SCREENED MONITORING WELL ACROSS THE WATER TABLE
- MW-5 PRODUCTION WELL
- WELLS REMOVED FROM THE LONG-TERM GROUNDWATER MONITORING PROGRAM IN 1998
- WELLS REMOVED FROM THE LONG-TERM GROUNDWATER MONITORING PROGRAM IN 2003
- WELLS CURRENTLY SAMPLED ANNUALLY IN THE LONG-TERM GROUNDWATER MONITORING PROGRAM

Figure 6-1.
Historical Reduction of Groundwater Monitoring and Production Wells for MARBO Annex, Andersen AFB, Guam.

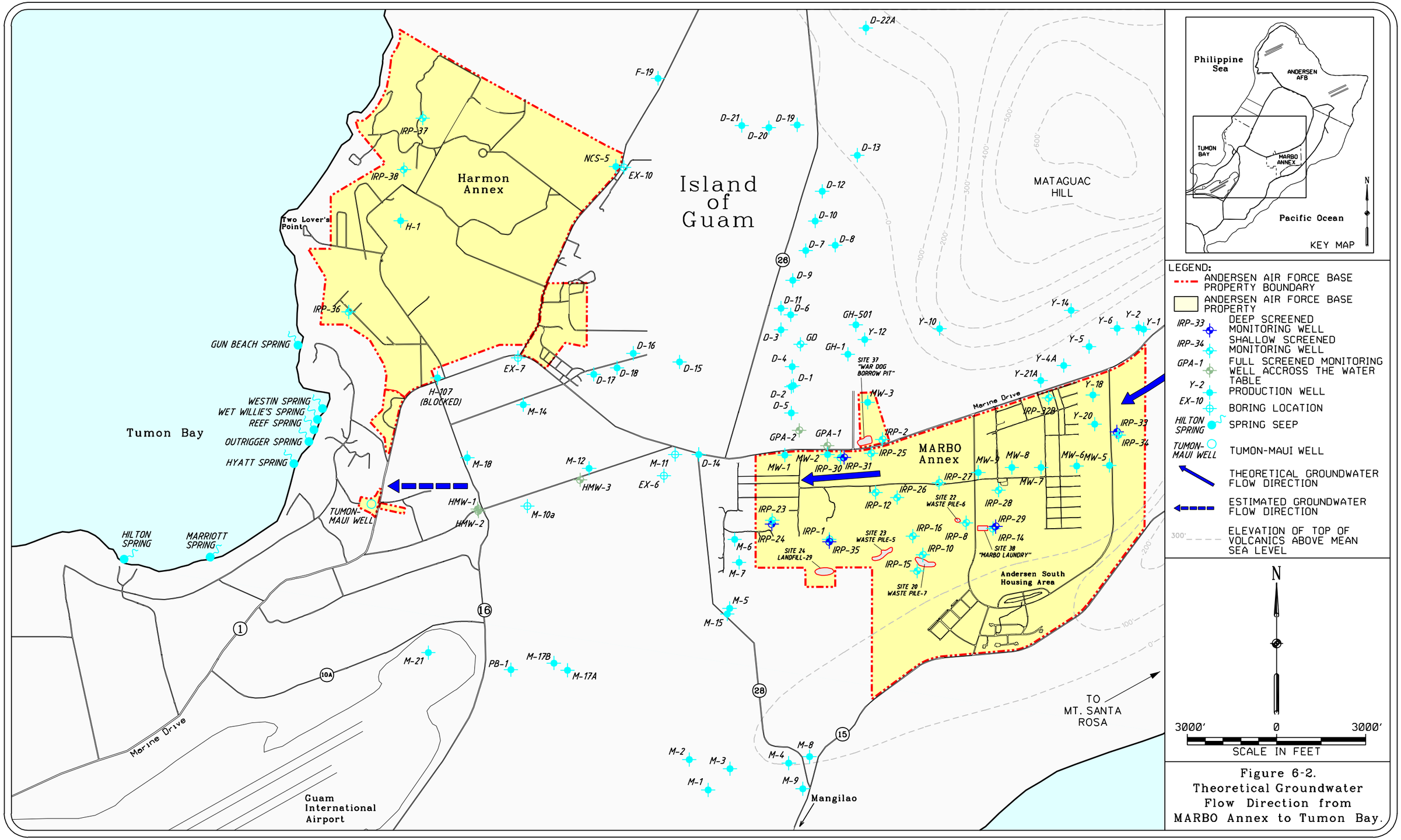


Figure 6-2.
Theoretical Groundwater Flow Direction from MARBO Annex to Tumon Bay.

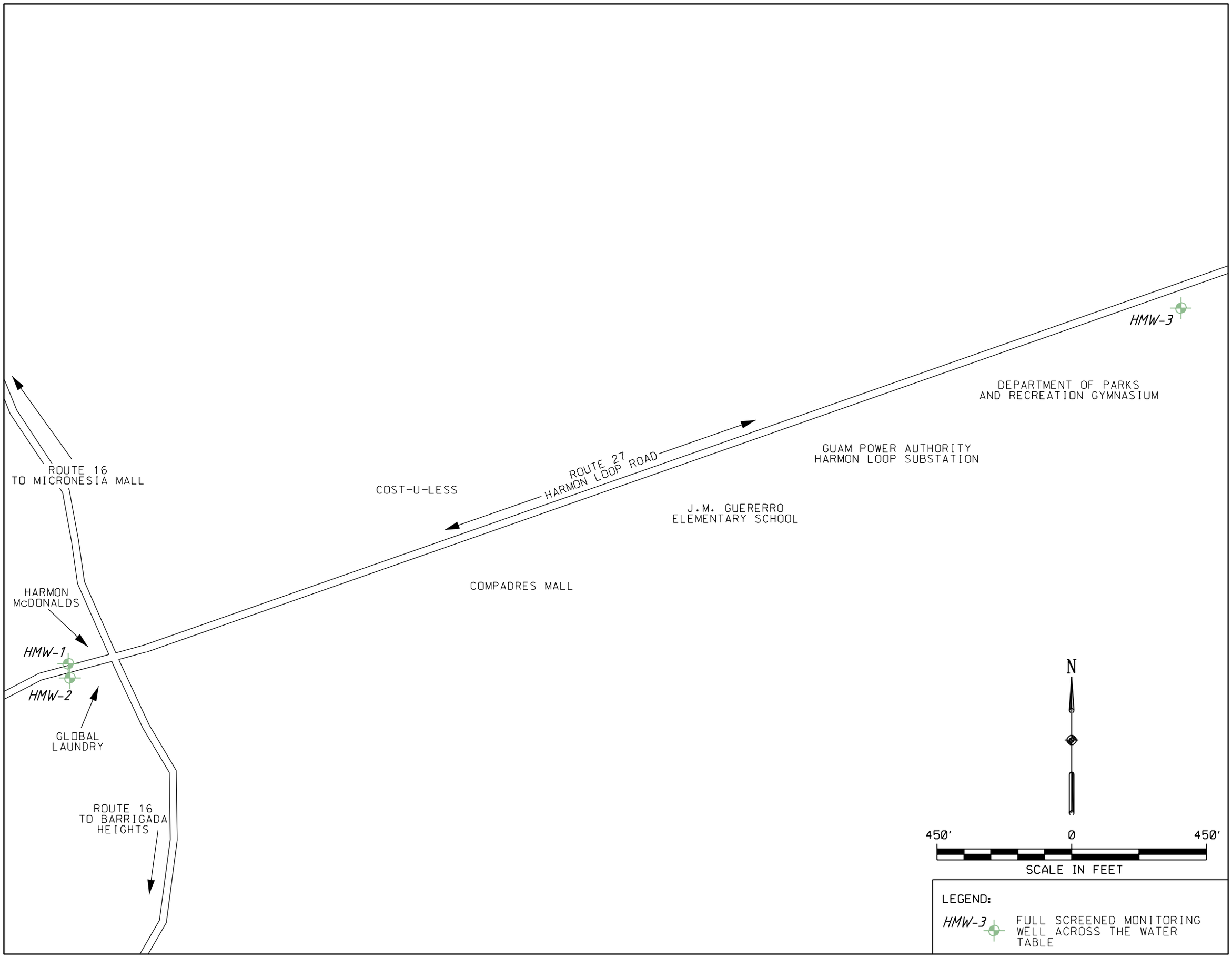


Figure 6-3. Location of Monitoring Wells HMW-1, HMW-2 and HMW-3.

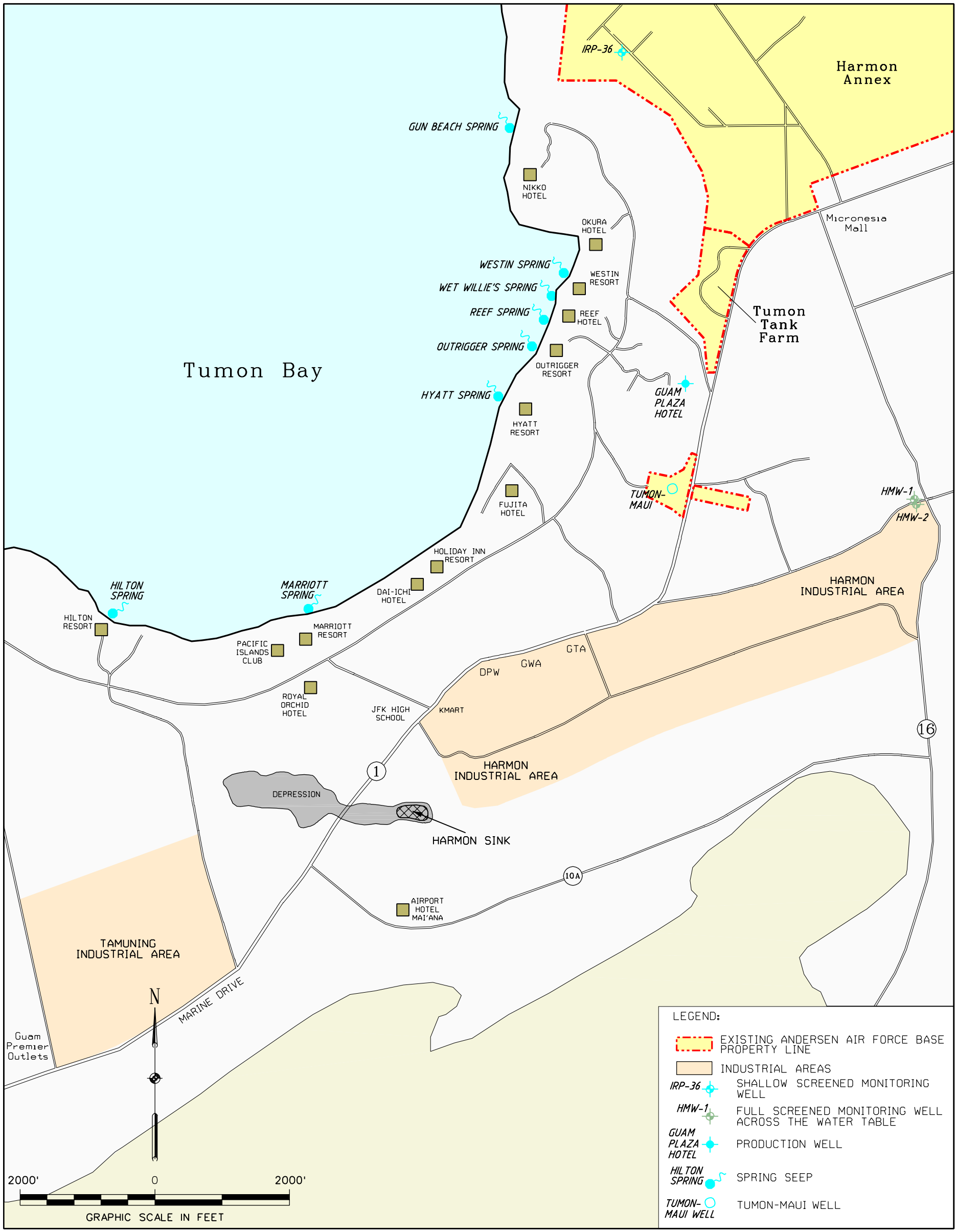


Figure 6-4. Groundwater Sampling Points in Tumon Bay and Surrounding Area.

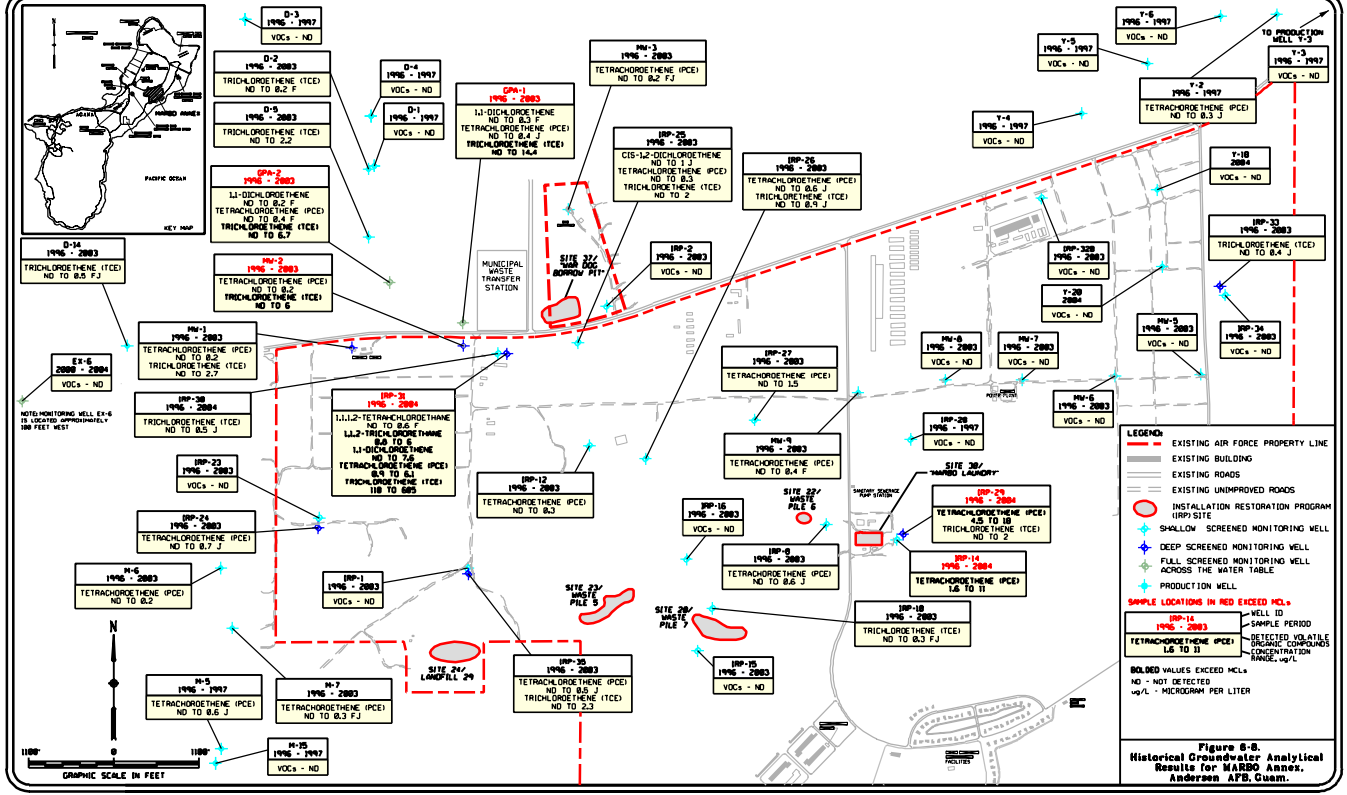
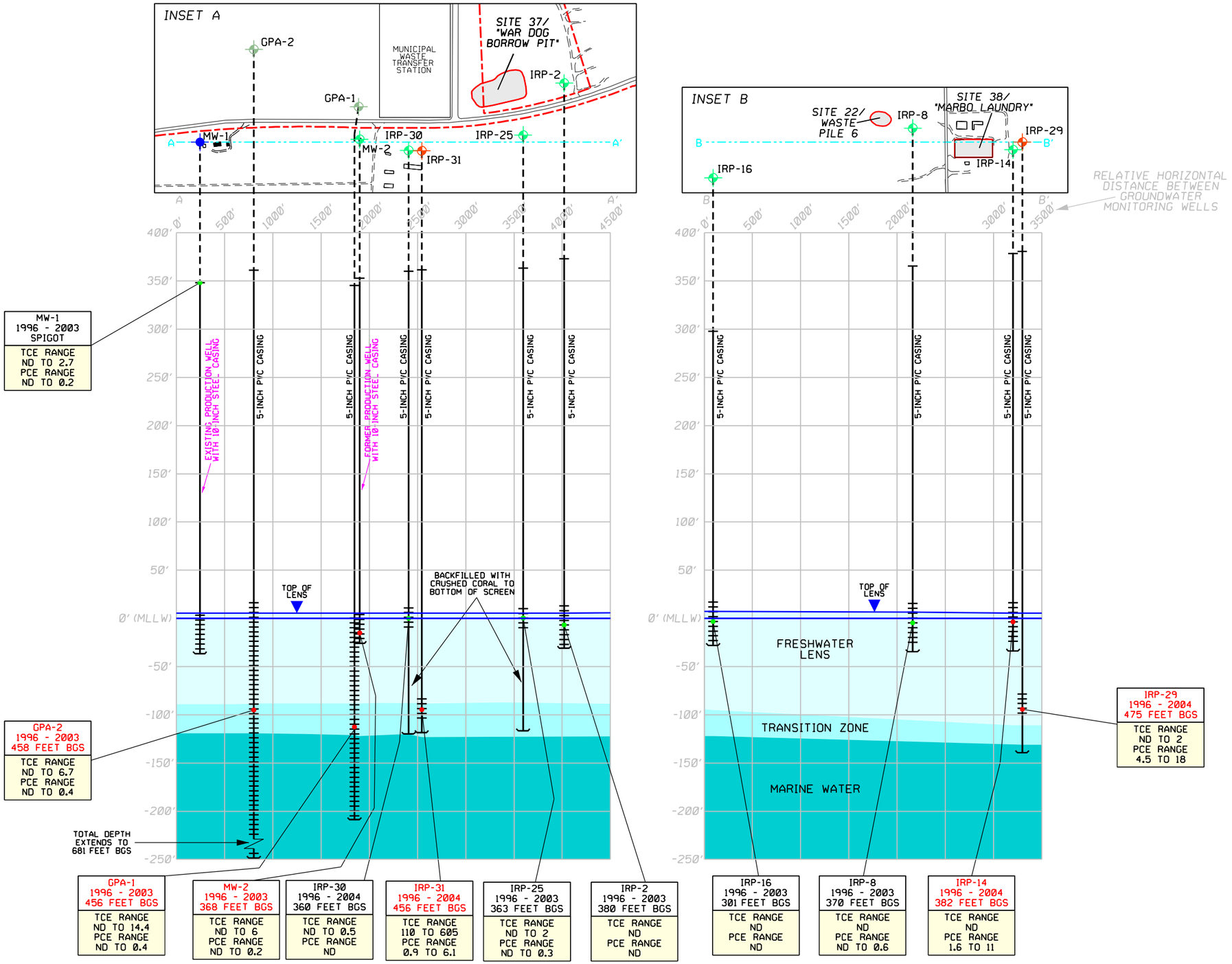
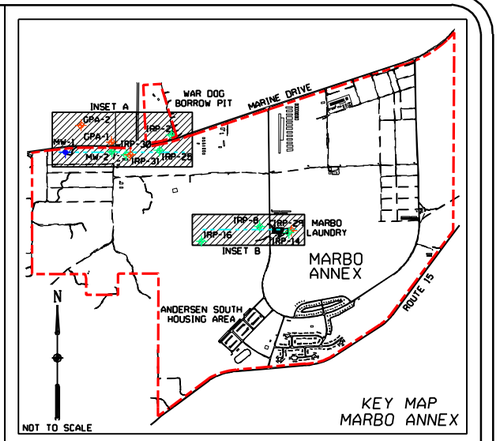


Figure 6-8.
Historical Groundwater Analytical Results for HARBO Annex, Andersen AFB, Guam.





LEGEND:

- EXISTING AIR FORCE PROPERTY LINE
- EXISTING BUILDING
- EXISTING ROADS
- INSTALLATION RESTORATION PROGRAM (IRP) SITE
- SHALLOW SCREENED MONITORING WELL
- DEEP SCREENED MONITORING WELL
- FULL SCREENED MONITORING WELL ACROSS THE WATER TABLE
- PRODUCTION WELL
- SAMPLE LOCATION
- SAMPLE LOCATION IN RED EXCEEDS MAXIMUM CONTAMINANT LEVELS
- THREADED END CAP
- SCREENED INTERVAL

SAMPLE LOCATIONS IN RED EXCEED MAXIMUM CONTAMINANT LEVELS

IRP-31 1996 - 2003 456 FEET BGS
TCE RANGE 110 TO 1880
PCE RANGE 0.9 TO 6

- WELL ID
- SAMPLING PERIOD
- SAMPLE DEPTH BGS
- TCE AND PCE IN ug/L

ND - NOT DETECTED

ug/L - MICROGRAM PER LITER

PCE - TETRACHLOROETHENE

TCE - TRICHLOROETHENE

BGS - BELOW GROUND SURFACE

MLLW - MEAN LOWER LOW WATER

TRANSITION ZONE - BASED ON CHLORIDE AND CONDUCTIVITY READINGS COLLECTED FROM GROUNDWATER SAMPLES AND GEOPHYSICAL LOGS DURING THE 1995 MONITORING WELL BOREHOLE INSTALLATION (ICF TECHNOLOGY INC. OPERABLE UNIT 2 REMEDIAL INVESTIGATION REPORT, MARBO ANNEX, APPENIDX B AND APPENDIX D, 1997.)

Figure 6-9.
Profile of Groundwater Monitoring Wells near TCE and PCE Impacted Groundwater at MARBO Annex, Andersen AFB, Guam.

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EA. 1998b. *Final Phase II Environmental Baseline Survey for MARBO Annex Part II, Andersen AFB, Guam*. October.

EA. 1998c. *Final Phase I Environmental Baseline Survey for Andersen South Housing Area, Andersen AFB, Guam*. April.

EA. 1998d. *Final Phase II Environmental Baseline Survey for Andersen South Housing Area, Andersen AFB, Guam*. April.

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Appendix A

Andersen Air Force Base
Administrative Record Index

TABLE A1. ANDERSEN AFB ADMINTRATIVE RECORDS RELATED TO MARBO OU.
Sorted by: Document Date and AR/IR File Number
Date of Report: May 2003

DOC. DATE	SUBJECT OR TITLE	AUTHOR or CORP. AUTHOR	FILE NUMBER
01-Jun-84	SOW, Phase I Records Search	HQ AFSEC/DEVP	2
01-Aug-84	GEPA Letter to Base Regarding Landfill Closure Plan for Sites 01, 02, 03, 29, and 35	Branch, James B Guam Environmental Protection Agency	3
01-Mar-85	**Phase I, Record Search Report**	**Environmental Science and Engineering, Inc.**	**4**
30-May-85	Base Letter to Governor of Guam Regarding Phase I Record Search	Sachse, Billy E, Col 43 CSG/CC	5
05-Jun-85	Newspaper Article, "Air Force Probes Waste Disposal Sites"	The Pacific Daily News	6
17-Jun-85	Newspaper Article, "Dump Site Study to Sample Water"	The Pacific Daily News	7
13-Aug-85	GEPA Letter to Base Regarding Comments on Phase I Record Search	Branch, James B Guam Environmental Protection Agency	8
18-Oct-85	Base Letter to GEPA Regarding Phase II Presurvey Conference	Sachse, Billy E, Col 43 CSG/CC	9
19-Mar-86	Congressman Letter to Secretary of the Air Force Regarding Phase I Record Search	Synar, Mike Guam House of Representatives	10
08-Apr-86	GEPA Letter to Base Regarding Landfill Closure Plan for Sites 01, 02, 03, 29, and 35	Branch, James B Guam Environmental Protection Agency	11
Sep-86	Phase II, Technical Operations Plan, Confirmation/Quantification Survey	Battelle	12
08-Oct-86	EPA Region IX Letter to US General Accounting Office Regarding DoD Management of IRP and Phase I Record Search Comments	Takata, Keith EPA Region IX	13
Dec-86	RCRA Facility Assessment Report, Solid Waste Management Units	Science Applications International Corp.	14
13-Mar-87	GEPA Letter to Base Regarding SOW, Stage 1 Comments	Crisostomo, Charles Guam Environmental Protection Agency	15
19-May-87	**GEPA Letter to Base Regarding Site 01 Monitoring Wells**	**Crisostomo, Charles Guam Environmental Protection Agency**	**16**
19-Jun-87	**GEPA Letter to OEHL Regarding Sites 01, 02, and 03 Monitoring Wells**	**Crisostomo, Charles Guam Environmental Protection Agency**	**17**
29-Feb-88	GEPA Letter to Base Regarding Landfill Closure Plan for Sites 01, 02, 03, 29, and 35	Crisostomo, Charles Guam Environmental Protection Agency	18
01-Jul-88	GEPA Letter to Guam Attorney General Regarding Legal Action for Landfill 5	Solivio, Rolando B Guam Environmental Protection Agency	19
11-Aug-88	GEPA Letter to Base Regarding Comments on Draft Final Report, Apr 88	Crisostomo, Charles Guam Environmental Protection Agency	20

DOC. DATE	SUBJECT OR TITLE	AUTHOR or CORP. AUTHOR	FILE NUMBER
17-Aug-88	GEPA Letter to Base Regarding Comments on Landfill Closure Plan Modification	Crisostomo, Charles Guam Environmental Protection Agency	21
30-Sep-88	GEPA Letter to Base Regarding Approval of Landfill Closure Plan Modification	Crisostomo, Charles Guam Environmental Protection Agency	22
30-Sep-88	GEPA Letter to Base Regarding Comments on Landfill Closure Plan Modification	Crisostomo, Charles Guam Environmental Protection Agency	23
01-Nov-88	Revised Landfill and Waste Pile Closure Plan	Battelle	24
01-Jan-89	Phase II Stage 1, Final Confirmation/Quantification Report, Volume I of VI	Battelle	25
01-Jan-89	Phase II Stage 1, Final Confirmation/Quantification Report, Volume I of VI, Appendices A-G	Battelle	26
01-Jan-89	Phase II Stage 1, Final Confirmation/Quantification Report, Volume II of VI, Appendix H-J	Battelle	27
01-Jan-89	Phase II Stage 1, Final Confirmation/Quantification Report, Volume III of VI, Appendices K1-K2a	Battelle	28
01-Jan-89	Phase II Stage 1, Final Confirmation/Quantification Report, Volume IV of VI, Appendix K2b	Battelle	29
01-Jan-89	Phase II Stage 1, Final Confirmation/Quantification Report, Volume V of VI, Appendix K2c	Battelle	30
01-Jan-89	Phase II Stage 1, Final Confirmation/Quantification Report, Volume VI of VI, Appendices L-N	Battelle	31
01-Jan-89	Phase II Stage 2, Quality Assurance Project Plan	Battelle	32
01-Jan-89	Phase II Stage 2, Work Plan	Battelle	33
09-Jan-89	GEPA Letter to Base Regarding Comments on Phase II Stage 2 Health and Safety Plan	Crisostomo, Charles Guam Environmental Protection Agency	34
09-Feb-89	GEPA Letter to Base Regarding Landfill Post Closure Permit	Castro, Fred M Guam Environmental Protection Agency	35
21-Feb-89	GEPA Letter to Base Regarding Comments on Landfill Modified Closure/Post Closure Plan	Castro, Fred M Guam Environmental Protection Agency	36
24-Feb-89	GEPA Letter to Base Regarding Comments on Landfill Post Closure Permit	Castro, Fred M Guam Environmental Protection Agency	37
24-Feb-89	Newspaper Article, "Notice to Public"	The Pacific Daily News	38
27-Mar-89	Base Letter to GEPA Regarding Modified Landfill Closure Plan	Green, Frederick L, Col 43 CSG/CC	39
03-Apr-89	GEPA Letter to Base Regarding Approval for Amended Modified Landfill Closure Plan	Castro, Fred M Guam Environmental Protection Agency	40
03-May-89	Base Letter to GEPA Regarding Exchange of Information and Comments on Landfill Closure Plan	Green, Frederick L, Col 43 CSG/CC	41
22-May-89	GEPA Letter to Base Regarding Comments in Base Letter of 3 May 89	Castro, Fred M Guam Environmental Protection Agency	42
25-May-89	GEPA Letter to Base Regarding Groundwater Monitoring Comments in Base Letter of 3 May 89	Castro, Fred M Guam Environmental Protection Agency	43
01-Jul-89	RCRA Post-Closure Permit Application, Sites 01, 02, 03, 29, and 35	Harding Lawson Associates	44

DOC. DATE	SUBJECT OR TITLE	AUTHOR or CORP. AUTHOR	FILE NUMBER
10-Aug-89	Base Letter to GEPA Regarding RCRA Post-Closure Permit Application	Green, Frederick L, Col 43 CSG/CC	45
20-Sep-89	GEPA Letter to Base Regarding Landfill Cover, Fence, and Test Results	Castro, Fred M Guam Environmental Protection Agency	46
31-Oct-89	Base Letter to GEPA Regarding Landfill Closure Cover and Test Results	Green, Frederick L, Col 633 ABW/CC	47
06-Nov-89	GEPA Letter to Base Regarding Comments for FTA and RCRA Landfill Closure Permit	Solivio, Rolando B Guam Environmental Protection Agency	48
22-Nov-89	GEPA Letter to Base Regarding Landfill Closure Plan	Solivio, Rolando B Guam Environmental Protection Agency	49
01-Dec-89	Phase II Stage 2, Informal Technical Information Report, Vol I of III, Analytical Data	Science Applications International Corp.	50
01-Dec-89	Phase II Stage 2, Informal Technical Information Report, Vol II of III, Analytical Data	Science Applications International Corp.	51
01-Dec-89	Phase II Stage 2, Informal Technical Information Report, Vol III of III, Analytical Data	Science Applications International Corp.	52
02-May-90	GEPA Letter to Base Regarding Fire Training Area 2	Castro, Fred M Guam Environmental Protection Agency	53
03-May-90	GEPA Letter to Base Regarding Comments on Approved Landfill Closure Plan	Castro, Fred M Guam Environmental Protection Agency	54
03-Aug-90	GEPA Letter to Base Regarding Fire Training Area 2 Concrete Cap	Castro, Fred M Guam Environmental Protection Agency	55
29-Aug-90	GEPA Letter to Base Regarding Landfill Closure Plan Deficiencies	Castro, Fred M Guam Environmental Protection Agency	56
13-Sep-90	Base Letter to GEPA Regarding Landfill Closure Plan Modification	DeGovanni, George, Col 633 ABW/CC	57
28-Sep-90	Base Letter to GEPA Regarding Landfill Closure Plan Modification	DeGovanni, George, Col 633 ABW/CC	58
03-Jan-91	GEPA Letter to Base Regarding Comments on Modified Landfill Closure Plan	Castro, Fred M Guam Environmental Protection Agency	59
04-Feb-91	EPA Region IX Letter to Base Regarding Comments on Comprehensive Groundwater Monitoring Evaluation	EPA Region IX	60
14-Mar-91	GEPA Letter to Base Regarding Comments on Fire Training Area 2, "Decision for Remedial Action"	Castro, Fred M Guam Environmental Protection Agency	61
22-Mar-91	Newspaper Article, "Air Force Continues Waste Sites Cleanup"	The Pacific Daily News	62
28-Mar-91	Modified Landfill Closure Plan	Science Applications International Corp.	63
15-Apr-91	News Release, "Public Hearing for Modified Closure Plan on Base Landfill"	633 ABW/DEV	64
30-Apr-91	Base Letter to GEPA Regarding Negotiations for Modified Closure Plan for Base Landfill	DeGovanni, George, Col 633 ABW/CC	65
15-May-91	Public Hearing Meeting Minutes, 14 May 91	Mackey, Gary W 633 ABW/DEV	66

DOC. DATE	SUBJECT OR TITLE	AUTHOR or CORP. AUTHOR	FILE NUMBER
20-May-91	Base Letter to GEPA Regarding Requirements of Public Notification for Modification of the Closure Plan	Schauz, William G, LtCol 633 ABW/DE	67
24-May-91	Base Letter to EPA Region IX Regarding Cover Design for Modified Landfill Closure Plan and Stage 3 SAP	Schauz, William G, LtCol 633 ABW/DE	68
28-May-91	Base Letter to US Fish and Wildlife Service Regarding Consultation on Endangered Species Act, Landfill 2	Nault, Gary S 633 ABW/DEV	69
31-May-91	Base Letter to US Fish and Wildlife Service Regarding Consultation on Endangered Species Act for Topographic Survey, Landfill 2	Nault, Gary S 633 ABW/DEV	70
03-Jun-91	US Fish and Wildlife Service Letter to Base Regarding Consultation for Clearing Vegetation, Landfill 2	Smith, Robert P US Fish and Wildlife Service	71
06-Jun-91	US Fish and Wildlife Service Letter to Base Regarding Consultation on Endangered Species Act, Landfill 2	Smith, Robert P US Fish and Wildlife Service	72
08-Jul-91	GEPA Letter to Base Regarding Negotiated Modified Landfill Closure Plan	Brown, Joanne M Guam Environmental Protection Agency	73
16-Jul-91	Base Letter to US Fish and Wildlife Service Regarding Consultation to Install 11 Boreholes	Nault, Gary S 633 ABW/DEV	74
18-Jul-91	GEPA Letter to Base Regarding Approved Modifications for Landfill Closure Plan	Castro, Fred M Guam Environmental Protection Agency	75
26-Jul-91	EPA Region VII Letter to EPA Region IX Regarding Review Comments for Stage 3, SAP	Baxter, Terry E EPA Region VII	76
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22-Aug-91	US Fish and Wildlife Service Letter to Base Regarding Consultation for Endangered Mariana Crow and Mariana Fruit Bat, Landfill 2	Kramer, William R US Fish and Wildlife Service	78
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01-Dec-98	Base Letter to USEPA Region IX Regarding Transmittal of the Draft EE/CA for IRP Site 10/LF-14	Poland, D. Joan 36 CES/CEVR	466
01-Dec-98	Base Letter to GEPA Regarding Transmittal of the Draft EE/CA for IRP Site 10/LF-14	Poland, D. Joan 36 CES/CEVR	467
08-Dec-98	Base Letter to USEPA Region IX Regarding Transmittal of the Project Memorandum for the Proposed Remediation Activities for P.L. 103-339 AOCs	Poland, D. Joan 36 CES/CEVR	468
08-Dec-98	Base Letter to GEPA Regarding Transmittal of the Project Memorandum for the Proposed Remediation Activities for P.L. 103-339 AOCs	Poland, D. Joan 36 CES/CEVR	469
10-Dec-98	Base Letter to USEPA Region IX Regarding Transmittal of the Draft EE/CA for IRP Site 31/Chemical Storage Area 4	Poland, D. Joan 36 CES/CEVR	470
10-Dec-98	Base Letter to USEPA Region IX Regarding Transmittal of the Draft EE/CA for IRP Site 16/LF-21	Poland, D. Joan 36 CES/CEVR	471
10-Dec-98	Base Letter to GEPA Regarding Transmittal of the Draft EE/CA for IRP Site 16/LF-21	Poland, D. Joan 36 CES/CEVR	472
10-Dec-98	Base Letter to GEPA Regarding Transmittal of the Draft EE/CA for IRP Site 31/Chemical Storage Area 4	Poland, D. Joan 36 CES/CEVR	473
16-Dec-98	Base Letter to GEPA Regarding Transmittal of Copies of the Final Community Relations Plan	Poland, D. Joan 36 CES/CEVR	474
16-Dec-98	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Final Community Relations Plan	Poland, D. Joan 36 CES/CEVR	475
16-Dec-98	Base Letter to GEPA Regarding Transmittal of the Draft Decision Summary Report for IRP Site 32/Drum Storage Area 1	Poland, D. Joan 36 CES/CEVR	476
28-Dec-98	GEPA Letter to Base Regarding Comments on the Draft EE/CA for IRP Site 31/Chemical Storage Area 4	Wuerch, H. Victor GEPA	477
29-Dec-98	GEPA Letter to Base Regarding Comments on the Draft EE/CA for IRP Site 34/PCB Storage Area	Wuerch, H. Victor GEPA	478
06-Jan-99	RAB Meeting Minutes, 15 Oct 98	EA Engineering	479
06-Jan-99	GEPA Letter to Base Regarding Comments on the Draft NFRAP for IRP Site 27/Hazardous Waste Storage Area 1	Wuerch, H. Victor GEPA	480
06-Jan-99	Base Letter to GEPA Regarding Transmittal of Copies of the Draft Decision Summary Report for IRP Site 33/ Drum Storage Area 2	Poland, D. Joan 36 CES/CEVR	481
06-Jan-99	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Draft Decision Summary Report for IRP Site 33/Drum Storage Area 2	Poland, D. Joan 36 CES/CEVR	482
15-Jan-99	USEPA Region IX Letter to Base Regarding Comments on Draft NFRAP Decision Document for IRP Site 27/ Hazardous Waste Storage Area 1	Ripperda, Mark USEPA Region IX	483

DOC. DATE	SUBJECT OR TITLE	AUTHOR or CORP. AUTHOR	FILE NUMBER
16-Jan-99	USEPA Letter to Base Regarding Comments on Agency Draft EE/CA for IRP Site 34/PCB Storage Area	Ripperda, Mark USEPA Region IX	484
01-Feb-99	Final Decision Document NFRAP for IRP Site 11/ LFs-15A& 15B	EA Engineering	485
13-Feb-99	USEPA Region IX Letter to Base Regarding Comments on Draft EE/CA for IRP Site 16/LF-21	Ripperda, Mark USEPA Region IX	486
13-Feb-99	USEPA Region IX Letter to Base Regarding Comments on Draft EE/CA for IRP Site 31/Chemical Storage Area 4	Ripperda, Mark USEPA Region IX	487
19-Feb-99	USEPA Region IX Letter to Base Regarding Comments on Draft EE/CA for IRP Site 10/LF-14	Ripperda, Mark USEPA Region IX	488
19-Feb-99	USEPA Region IX Letter to Base Regarding Concurrence of Sample Purge Field Change Request	Ripperda, Mark USEPA Region IX	489
19-Feb-99	USEPA Region IX Letter to Base Regarding Comments on Draft Decision Summary Report for IRP Site 32/ Drum Storage Area 1	Ripperda, Mark USEPA Region IX	490
19-Feb-99	GEPA Letter to Base Regarding Comments on the Draft Decision Summary Report for IRP Site 32/Drum Storage Area 1	Wuerch, H. Victor GEPA	491
19-Feb-99	Dept of Interior Letter to Base Regarding Review of the Proposed Work Plan for IRP Sites 28 & 12	Ritter, Michael Guam NWR	492
19-Feb-99	GEPA Letter to Base Regarding Comments on the Draft EE/CA for IRP Site 16/LF-21	Wuerch, H. Victor GEPA	493
01-Mar-99	Final Basewide Quality Assurance Project Plan, Revision 2.0	EA Engineering	494
08-Mar-99	Cover Letter & RAB Meeting Minutes, 21 Jan 99	EA Engineering	495
22-Mar-99	Base Letter to GWA Regarding Status of Tumon-Maui & MW-2 Water Wells & Possible Exploratory Activity at Harmon Annex	Gehri, Mark J.D. Colonel, USAF 36 ABW/CC	496
25-Mar-99	Base Letter to GEPA Regarding Transmittal of Copies of the Draft NFRAP for IRP Site 11/LFs 15A & 15B	Poland, D. Joan 36 CES/CEVR	497
01-Apr-99	Final NFRAP Decision Document for IRP Site 27/ Hazardous Waste Storage Area 1	EA Engineering	498
01-Apr-99	Final EE/CA for IRP Site 34/PCB Storage Area	EA Engineering	499
10-Apr-99	News Release, "Vacancy Announcement Andersen AFB Restoration Advisory Board Members"	36 CES/CEVR Pacific Daily News	500
11-Apr-99	News Release, "Vacancy Announcement Andersen AFB Restoration Advisory Board Members"	36 CES/CEVR Pacific Daily News	501
12-Apr-99	News Release, "Vacancy Announcement Andersen AFB Restoration Advisory Board Members"	36 CES/CEVR Pacific Daily News	502
15-Apr-99	RAB Meeting Minutes, 15 April 99	EA Engineering	503
20-Apr-99	News Article, "Officials Disagree on Wells"	SantoTomas, Jojo Pacific Daily News	504
27-Apr-99	Base Letter to Guam National Wildlife Refuge Regarding Conducting Environmental Investigations at IRP Site 36/Ritidian Dump Site	Larcher, Shawn D. Capt, USAF 36 CES/CEV	505
01-May-99	Final EE/CA for IRP Site 10/LF-14	EA Engineering	506
01-May-99	Final EE/CA Report for IRP Site 16/LF-21	EA Engineering	507
19-May-99	RPM Meeting Minutes, 19 May 99	EA Engineering	508
01-Jun-99	Decision Summary Report for IRP Site 33/Drum Storage Area 2	EA Engineering	509
01-Jun-99	Final EE/CA for IRP Site 31/Chemical Storage Area 4	EA Engineering	510

DOC. DATE	SUBJECT OR TITLE	AUTHOR or CORP. AUTHOR	FILE NUMBER
04-Jun-99	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Final Draft, EE/CA for IRP Site 34/ PCB Storage Area, Site 10/LF-14, Site 16/LF-21, & Site 31/Chemical Storage Area 4	Poland, D. Joan 36 CES/CEVR	511
04-Jun-99	Base Letter to GEPA Regarding Transmittal of Copies of the Final Draft, EE/CA for IRP Site 34/PCB Storage Area, Site 10/LF-14, Site 16/LF-21, & Site 31/Chemical Storage Area 4	Poland, D. Joan 36 CES/CEVR	512
09-Jun-99	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the NFRAP Decision Document for IRP Site 27/Hazardous Waste Storage Area	Poland, D. Joan 36 CES/CEVR	513
09-Jun-99	Base Letter to GEPA Regarding Transmittal of Copies of the NFRAP Decision Document for IRP Site 27/ Hazardous Waste Storage Area	Poland, D. Joan 36 CES/CEVR	514
12-Jun-99	News Article, "Notice of Availability for IRP Sites: LF-14, PCB Storage Area, Chemical Storage Area 4, & LF-21"	36 CES/CEVR Pacific Daily News	515
13-Jun-01	LF-14, PCB Storage Area, Chemical Storage Area 4, & LF-21"	36 CES/CEVR Pacific Daily News	516
14-Jun-99	News Article, "Notice of Availability for IRP Sites: LF-14, PCB Storage Area, Chemical Storage Area 4, & LF-21"	36 CES/CEVR Pacific Daily News	517
15-Jun-99	Base Letter to GEPA Regarding Transmittal of Copies of Memos Discussing the Discontinuation of Groundwater Monitoring at NWF and Harmon	Poland, D. Joan 36 CES/CEVR	518
15-Jun-99	Fax Letter to Base Authorizing Air Force Limited Right of Entry to IRP Site 36/Ritidian Dump Site to Conduct Environmental Survey	Artero, Tony Landowners Representative	519
01-Jul-99	Remediation Verification Report, IRP Site 19/LF-24	IT Corporation	520
01-Jul-99	Remediation Verification Report, IRP Site 39/Harmon Substation, Vol 1	IT Corporation	521
01-Jul-99	Remediation Verification Report, IRP Site 39/Harmon Substation, Vol 2	IT Corporation	522
06-Jul-99	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Draft EE/CA Reports for IRP Site 21/ LF-26	Poland, D. Joan 36 CES/CEVR	523
06-Jul-99	Base Letter to GEPA Regarding Transmittal of Copies of the Draft EE/CA Reports for IRP Site 21/LF-26 LF-26	Poland, D. Joan 36 CES/CEVR	524
21-Jul-99	Base Letter to USEPA Region IX Regarding Appointment of Mr. Gregg Ikehara as New AAFB Remedial Project Manager (RPM)	Poland, D. Joan 36 CES/CEVR	525
21-Jul-99	Base Letter to GEPA Regarding Appointment of Mr. Gregg Ikehara As New AAFB Remedial Project Manager	Poland, D. Joan 36 CES/CEVR	526
30-Jul-99	Base Letter to GEPA Regarding Notification of a New Project Laboratory with Columbia Analytical Services	Ikehara, Gregg N. 36 CES/CEVR	527
30-Jul-99	Base Letter to USEPA Region IX Regarding Notification of a New Project Laboratory with Columbia Analytical Services	Ikehara, Gregg N. 36 CES/CEVR	528
30-Jul-99	Base Letter to GEPA Regarding Transmittal of Copies of the Remediation Verification Reports for IRP Site 39/ Harmon Substation, Site 19/LF-24, & AOCs 1,2,3,4,5, 12, & 22 at Harmon Annex	Ikehara, Gregg N. 36 CES/CEVR	529

DOC. DATE	SUBJECT OR TITLE	AUTHOR or CORP. AUTHOR	FILE NUMBER
30-Jul-99	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Remediation Verification Reports for IRP Site 39/Harmon Substation, Site 19/LF-24, & AOCs 1,2,3,4,5,12, & 22 at Harmon Annex	Ikehara, Gregg N. 36 CES/CEVR	530
02-Aug-99	Base Letter to GEPA Regarding Transmittal of Copies of the Final Decision Summary Report for IRP Site 32/ Drum Storage Area 1 & the Basewide QAPP, Rev 2	Ikehara, Gregg N. 36 CES/CEVR	531
03-Aug-99	**Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Final Fall 1998 and Spring 1999 Groundwater Data Monitoring Reports**	**Ikehara, Gregg N. 36 CES/CEVR**	**532**
03-Aug-99	**Base Letter to GEPA Regarding Transmittal of Copies of the Final Fall 1998 and Spring 1999 Groundwater Data Monitoring Reports**	**Ikehara, Gregg N. 36 CES/CEVR**	**533**
06-Aug-99	Base Letter to GEPA Regarding Transmittal of the Final NFRAP Decision Documents for IRP Site 27/ Hazardous Waste Storage Area	Ikehara, Gregg N. 36 CES/CEVR	534
06-Aug-99	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Final NFRAP Decision Documents for IRP Site 27/Hazardous Waste Storage Area	Ikehara, Gregg N. 36 CES/CEVR	535
06-Aug-99	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Draft Project Work Plans for IRP Site 34/PCB Storage Area, IRP Site 10/LF-14, IRP Site 16/ LF-21 & IRP Site 31/Chemical Storage Area 4	Ikehara, Gregg N. 36 CES/CEVR	536
06-Aug-99	Base Letter to GEPA Regarding Transmittal of Copies of the Draft Project Work Plans for IRP Site 34/PCB Storage Area, IRP Site 10/LF-14, IRP Site 16/LF-21 & IRP Site 31/Chemical Storage Area 4	Ikehara, Gregg N. 36 CES/CEVR	537
06-Aug-99	USEPA Region IX Letter to Base Regarding Comments on the Draft Decision Summary NFRAP for IRP Site 21/LF-26	Ripperda, Mark USEPA Region IX	538
19-Aug-99	Base Letter to GEPA Regarding Proposed Variance Request for Columbia Analytical Services Laboratory	Ikehara, Gregg N. 36 CES/CEVR	539
19-Aug-99	Base Letter to USEPA Region IX Regarding Proposed Variance Request for Columbia Analytical Services Laboratory	Ikehara, Gregg N. 36 CES/CEVR	540
19-Aug-99	USEPA Region IX Letter to Base Regarding Approval of the Proposed Variance Request	Ripperda, Mark USEPA Region IX	541
19-Aug-99	USEPA Region IX Letter to Base Regarding Approval of the Remedial Verification Report for IRP Site 39/ Harmon Substation	Ripperda, Mark USEPA Region IX	542
19-Aug-99	USEPA Region IX Letter to Base Regarding Approval of the Remedial Verification Report for IRP Site 19/LF-24	Ripperda, Mark USEPA Region IX	543
24-Aug-99	USEPA Region IX Letter to Base Regarding Comments on the Draft Project Work Plans for IRP Site 34/PCB Storage Area, IRP Site 10/ LF-14 IRP Site 16/LF-21 & IRP Site 31/Chemical Storage Area 4	Ripperda, Mark USEPA Region IX	544
27-Aug-99	Base Letter to GEPA Regarding Transmittal of Copies of the Draft EE/CA for IRP Site 2/LF-2 & IRP Site 5/ LF-7	Ikehara, Gregg N. 36 CES/CEVR	545
01-Sep-99	Final Decision Summary NFRAP for IRP Site 21/LF-26	EA Engineering	546
09-Sep-99	Technical Document to Support NFRAP Declaration for IRP Site 21/LF-26	36 CES/CEVR	547
15-Sep-99	RPM Meeting Minutes, 9 Sep 99	EA Engineering	548

DOC. DATE	SUBJECT OR TITLE	AUTHOR or CORP. AUTHOR	FILE NUMBER
28-Sep-99	Base Letter to GEPA Regarding Transmittal of the Basewide QAPP Revision 2 & Final Reports for IRP Site 27/Hazardous Storage Area 1, Site 32/Drum Storage Area 1, & Site 33/Drum Storage Area 2	Ikehara, Gregg N. 36 CES/CEVR	549
6 Oct 99	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Draft RI Report for Harmon Annex OU	Ikehara, Gregg N. 36 CES/CEVR	550
6 Oct 99	Base Letter to GEPA Regarding Transmittal of Copies of the Draft RI Report for Harmon Annex OU	Ikehara, Gregg N. 36 CES/CEVR	551
12-Oct-99	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Final Decision Summary for IRP Site 21/LF-26	Ikehara, Gregg N. 36 CES/CEVR	552
12-Oct-99	Base Letter to GEPA Regarding Transmittal of Copies of the Final Decision Summary for IRP Site 21/LF26	Ikehara, Gregg N. 36 CES/CEVR	553
12-Oct-99	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Draft EE/CA for IRP Site 26/FTA-2	Ikehara, Gregg N. 36 CES/CEVR	554
12-Oct-99	Base Letter to GEPA Regarding Transmittal of Copies of the Draft EE/CA for IRP Site 26/FTA-2	Ikehara, Gregg N. 36 CES/CEVR	555
13-Oct-99	GEPA Letter to Base Regarding Comments on Draft EE/CA Report for IRP Site 2/LF-2	Wuerch, H. Victor GEPA	556
16-Oct-99	USEPA Region IX Letter to Base Regarding Comments on Draft EE/CA for IRP Site 5/LF-7 & IRP Site 2/LF-2	Ripperda, Mark USEPA Region IX	557
22-Oct-99	GEPA Letter to Base Regarding Comments on Draft Decision Summary NFRAP for IRP Site 21/LF-26	Wuerch, H. Victor GEPA	558
22-Oct-99	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Draft EE/CA for IRP Site 8/LF-10A, 10B, & 10C	Ikehara, Gregg N. 36 CES/CEVR	559
22-Oct-99	Base Letter to GEPA Regarding Transmittal of Copies the Draft EE/CA for IRP Site 8/LF-10A, 10B, & 10C & 10C	Ikehara, Gregg N. 36 CES/CEVR	560
26-Oct-99	GEPA Letter to Base Regarding Comments on Draft EE/CA Report for IRP Site 5/LF-7	Wuerch, H. Victor GEPA	561
10-Dec-99	GEPA Letter to Base Regarding Comments on Draft EE/CA for IRP Site 26/FTA-2	Salas, Jesus T. GEPA	562
10-Dec-99	Base Letter to GEPA Regarding Responses to Comments for RVR of IRP Site 39/Harmon Substation, IRP Site 19/LF-24 & AOCs 1, 2, 3, 4, 5, 12, & 22	Ikehara, Gregg N. 36 CES/CEVR	563
16-Dec-99	USEPA Region IX Letter to Base Regarding Comments on the Draft RI Report for Harmon Annex	Ripperda, Mark USEPA Region IX	564
23-Dec-99	GEPA Letter to Base Regarding Comments on the Draft EE/CA Report for IRP Site 8/LF-10A, 10B, & 10C	Salas, Jesus T. GEPA	565
01-Jan-00	Final EE/CA for IRP Site 5/LF-7	EA Engineering	566
01-Jan-00	Draft Proposed Plan, Harmon Annex OU	36 CES/CEVR	567
18-Jan-00	Base Letter to USEPA Region IX Regarding Transmittal of Copies of Action Memorandum for IRP Site 34/PCB Storage Area, IRP Site 16/LF-21, IRP Site 10/LF-14, & IRP Site 31/Chemical Storage Area 4	Ikehara, Gregg N. 36 CES/CEVR	568
18-Jan-00	Base Letter to GEPA Regarding Transmittal of Copies of Action Memorandum for IRP Site 34/PCB Storage Area, IRP Site 16/LF-21, IRP Site 10/LF-14, & IRP Site 31/Chemical Storage Area 4	Ikehara, Gregg N. 36 CES/CEVR	569
18-Jan-00	Action Memorandum to Request and Document Approval of the Proposed Removal Action for IRP Site 34/PCB Storage Area	Ikehara, Gregg N. 36 CES/CEVR	570

DOC. DATE	SUBJECT OR TITLE	AUTHOR or CORP. AUTHOR	FILE NUMBER
18-Jan-00	Action Memorandum to Request and Document Approval of the Proposed Removal Action for IRP Site 16/LF-21	Ikehara, Gregg N. 36 CES/CEVR	571
18-Jan-00	Action Memorandum to Request and Document Approval of the Proposed Removal Action for IRP Site 10/LF-14	Ikehara, Gregg N. 36 CES/CEVR	572
18-Jan-00	Action Memorandum to Request and Document Approval of the Proposed Removal Action for IRP Site 31/Chemical Storage Area 4	Ikehara, Gregg N. 36 CES/CEVR	573
27-Jan-00	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Draft Proposed Plan for IRP Sites in the Harmon Annexes	Ikehara, Gregg N. 36 CES/CEVR	574
27-Jan-00	Base Letter to GEPA Regarding Transmittal of Copies of the Draft Proposed Plan for IRP Sites in the Harmon Annexes	Ikehara, Gregg N. 36 CES/CEVR	575
27-Jan-00	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Draft Final RI Report for IRP Sites in the Harmon Annexes	Ikehara, Gregg N. 36 CES/CEVR	576
27-Jan-00	Base Letter to GEPA Regarding Transmittal of Copies of the Draft Final RI Report for IRP Sites in the Harmon Annexes	Ikehara, Gregg N. 36 CES/CEVR	577
27-Jan-00	Base Letter to GEPA Regarding Transmittal of Copies of the Draft Final EE/CA for IRP Site 5/LF-7	Ikehara, Gregg N. 36 CES/CEVR	578
28-Jan-00	RAB Meeting Minutes, 21 Oct 99	EA Engineering	579
31-Jan-00	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Draft Final EE/CA for IRP Site 2/LF-2	Ikehara, Gregg N. 36 CES/CEVR	580
31-Jan-00	Base Letter to GEPA Regarding Transmittal of Copies of the Draft Final EE/CA for IRP Site 2/LF-2	Ikehara, Gregg N. 36 CES/CEVR	581
01-Feb-00	Final EE/CA for IRP Site 2/LF-2	EA Engineering	582
03-Feb-00	USEPA Region IX Letter to Base Regarding Comments on the Draft EE/CA for IRP Site 8/LF-10	Ripperda, Mark USEPA Region IX	583
07-Feb-00	Base Letter to GEPA Regarding Transmittal of Copies of the Draft Final Decision Summary Document for IRP Site 1/LF1	Ikehara, Gregg N. 36 CES/CEVR	584
11-Feb-00	Base Letter to Mangilao Mayor Nonito Blas Regarding Termination of Mayor as a RAB Member	Schoeck, Edward Colonel, USAF 36 ABW/CV	585
11-Feb-00	Base Letter to RAB Members Regarding Quarterly RAB Meeting	Schoeck, Edward Colonel, USAF 36 ABW/CV	586
16-Feb-00	RPM Meeting Minutes, 16 Feb 00	EA Engineering	587
18-Feb-00	News Article, "$6M for Cleanup"	Loerzel, Adrienne Pacific Daily News	588
25-Feb-00	GEPA Letter to Base Regarding Comments on Draft RI Report for Harmon Annex OUs IRP Site 18/LF-23, IRP Site 19/LF-24 & IRP Site 39/Harmon Substation	Salas, Jesus T. GEPA	589
28-Feb-00	News Article, "GovGuam Seeks Quick End to Land-Return Issue"	Loerzel, Adrienne Pacific Daily News	590
29-Feb-00	Dept of Interior Letter to Base Regarding Formal Section 7 Consultation for IRP Site 9/LF-13, IRP Site 13/LF-18, IRP Site 14/LF-19, & IRP Site 15/LF-20	DiRosa, Roger GNWR	591
01-Mar-00	Final Groundwater Data Monitoring Transport Report, Fall 99, Marbo Annex	EA Engineering, Science, and Technology	592

DOC. DATE	SUBJECT OR TITLE	AUTHOR or CORP. AUTHOR	FILE NUMBER
01-Mar-00	**Final Groundwater Data Monitoring Report, Fall 99 Main Base Annex and Northwest Field Annex**	**EA Engineering, Science, and Technology**	**593**
22-Mar-00	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Draft Final NFRAP Report for IRP Site 28/Chemical Storage Area 1	Ikehara, Gregg N. 36 CES/CEVR	594
22-Mar-00	Base Letter to GEPA Regarding Transmittal of Copies of the Draft Final NFRAP Report for IRP Site 28/ Chemical Storage Area 1	Ikehara, Gregg N. 36 CES/CEVR	595
22-Mar-00	RAB Meeting Minutes, 17 Feb 2000	EA Engineering, Science and Technology	596
28-Mar-00	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Draft Final NFRAP Report for IRP Site 17/LF-22	Torres, Jess F. 36 CES/CEVR	597
28-Mar-00	Base Letter to GEPA Regarding Transmittal of Copies of the Draft Final NFRAP Report for IRP Site 17/LF-22	Torres, Jess F. 36 CES/CEVR	598
01-Apr-00	Final Decision Summary Document, Site 1	EA Engineering, Science and Technology	599
26-Apr-00	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Draft NFRAP for IRP Site 30/Waste Pile 4	Ikehara, Gregg N. 36 CES/CEVR	600
26-Apr-00	Base Letter to GEPA Regarding Transmittal of Copies of the Draft NFRAP for IRP Site 30/Waste Pile 4	Ikehara, Gregg N. 36 CES/CEVR	601
02-May-00	Base Letter to GEPA Regarding Transmittal of Copies of the Final Decision Summary Document of IRP Site1/LF1	Ikehara, Gregg N. 36 CES/CEVR	602
02-May-00	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Final Decision Summary Document of IRP Site1/LF1	Ikehara, Gregg N. 36 CES/CEVR	603
04-May-00	RAB Meeting Minutes, 04 May 2000	EA Engineering	604
09-Jun-00	Base Letter to GEPA Regarding Transmittal of Copies of the Draft Decision Summary NFRAP for IRP Site4/LF6	Ikehara, Gregg N. 36 CES/CEVR	605
09-Jun-00	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Draft Decision Summary NFRAP for IRP Site 4/LF6	Ikehara, Gregg N. 36 CES/CEVR	606
22-Jun-00	RPM Meeting Minutes, 22 June 00	EA Engineering	607
01-Aug-00	EE/CA, Final Report, Site 8	EA Engineering, Science and Technology	
01-Aug-00	NFRAP, Final Decision Document, Site 4	EA Engineering, Science and Technology	608
03-Aug-00	Base Letter to GEPA Regarding Transmittal of Copies of the Draft Decision Summary NFRAP for IRP Site 25/ Fire Training Area 1	Ikehara, Gregg N. 36 CES/CEVR	609
25-Aug-00	GEPA Letter to Base Regarding GEPA Comments on the Draft Decision NFRAP for IRP Site 4/LF 6	Salas, Jesus T. GEPA	610
29-Aug-00	Base Letter to GEPA Regarding Transmittal of Copies of the Draft Final EE/CA Report of IRP Site 8/ LFs 10A, 10B, 10C.	Ikehara, Gregg N. 36 CES/CEVR	611
31-Aug-00	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Draft Final EE/CA Decision Summary NFRAP Report for Site 4/LF 6	Ikehara, Gregg N. 36 CES/CEVR	612

DOC. DATE	SUBJECT OR TITLE	AUTHOR or CORP. AUTHOR	FILE NUMBER
31-Aug-00	Base Letter to GEPA Regarding Transmittal of Copies of the Draft Final Decision Summary NFRAP Report for for Site4/LF6	Ikehara, Gregg N. 36 CES/CEVR	613
31-Aug-00	Base Letter to USEPA Region IX Regarding Transmittal of Copies of Final NFRAP Dec. Summ. Rpt for Site 4/LF 6	Ikehara, Gregg N. 36 CES/CEVR	614
31-Aug-00	Base Letter to GEPA Regarding Transmittal of Copies of Final NFRAP Dec. Summ. Rpt for Site 4/LF 6	Ikehara, Gregg N. 36 CES/CEVR	615
01-Sep-00	**Final Groundwater Monitoring Report, Spring 00, MARBO Annex, Northwest Field Annex**	**EA Engineering, Science and Technology**	**616**
01-Sep-00	**RA, Quality Program Plan, Vol I of II, Main Base Annex, MARBO Annex, Site 2, 5, 24**	**IT Corp.**	**617**
01-Sep-00	RA, Environmental Cleanup Plan, Vol II of II, Main Base Annex, Site 5	IT Corp.	618
07-Sep-00	Newspaper Article, "Defense Bill May Include Call to Remove Unexploded Ordnance"	The Pacific Daily News	619
07-Sep-00	**Base Letter to GEPA Regarding Transmittal of Copies of the Final Spring Groundwater 2000 Monitoring Report for MARBO Annex & Northwest Field Operable Units**	**Ikehara, Gregg N. 36 CES/CEVR**	**620**
07-Sep-00	**Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Final Spring Groundwater 2000 Monitoring Report for MARBO Annex & Northwest Field Operable Units**	**Ikehara, Gregg N. 36 CES/CEVR**	**621**
15-Sep-00	**Base Letter to GEPA Regarding Transmittal of Copies of the Draft Quality Program Plan & Environmental Cleanup Plan for Site 24/LF 29 MARBO Operable Unit**	**Ikehara, Gregg N. 36 CES/CEVR**	**622**
15-Sep-00	**Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Draft Quality Program Plan & Environmental Cleanup Plan for Site 24/LF 29 MARBO Operable Unit**	**Ikehara, Gregg N. 36 CES/CEVR**	**623**
18-Sep-00	Newspaper Article, "Military Remnants Linger: Ordnance, Dumpsites Dot Island"	The Pacific Daily News	624
19-Sep-00	Newspaper Article, "GEPA Creating Hazard Search: Local Agency Wants Own System to Investigate Potential Sites"	The Pacific Daily News	625
22-Sep-00	Base Letter to GEPA Regarding Transmittal of Copies of the Draft Environmental Cleanup Plan for Site 2/LF 2 Main Base Operable Units	Ikehara, Gregg N. 36 CES/CEVR	626
22-Sep-00	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Draft Environmental Cleanup Plan for Site 2/LF 2 Main Base Operable Units	Ikehara, Gregg N. 36 CES/CEVR	627

DOC. DATE	SUBJECT OR TITLE	AUTHOR or CORP. AUTHOR	FILE NUMBER
01-Oct-00	Groundwater Monitoring Report, Spring, FY00, Main Base Annex	EA Engineering, Science and Technology	628
01-Oct-00	**Remediation Verification Report, MARBO Annex, Site 20**	**IT Corp.**	**629**
01-Oct-00	**Remediation Verification Report, MARBO Annex, Site 38**	**IT Corp.**	**630**
01-Oct-00	**ROD, Amendment, MARBO Annex, Site 24**	**36 CES/CEVR**	**631**
03-Oct-00	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Draft Environmental Cleanup Plan for Site 5/LF 7	Ikehara, Gregg N. 36 CES/CEVR	632
03-Oct-00	Base Letter to GEPA Regarding Transmittal of Copies of the Draft Environmental Cleanup Plan for Site 5/LF 7 Newspaper Article,	Ikehara, Gregg N. 36 CES/CEVR The Pacific	633
15-Oct-00	**"Notice of Availability: Amendment of ROD", MARBO Annex**	**Daily News**	**634**
26-Oct-00	**USEPA Region IX Letter Regarding EPA Comments on Draft Environmental Cleanup Plan for Site 24/LF 29 and Site 2/LF 2**	**Ikehara, Gregg N. 36 CES/CEVR**	**635**
01-Nov-00	Asphalt Recovery Status Report, Site 35	IT Corp.	636
01-Nov-00	Asphalt Recovery Status Report, Site 29	IT Corp.	637
01-Nov-00	RI, Final Report, Harmon Annex	EA Engineering, Science and Technology	638
01-Nov-00	RA, Environmental Cleanup Plan, Vol II of II, Marbo Annex, Site 24	IT Corp.	639
01-Nov-00	Base Letter to GEPA Regarding Transmittal of Copies of the Spring 2000 Groundwater Monitoring Report for Main Base Operable Units	Ikehara, Gregg N. 36 CES/CEVR	640
01-Nov-00	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Spring 2000 Groundwater Monitoring Report for Mainbase Operable Units	Ikehara, Gregg N. 36 CES/CEVR	641
06-Nov-00	**Base Letter to GEPA Regarding Transmittal of Copies of the Draft Remedial Verification Report for Site 38/MARBO Laundry Facility and Site 20/Waste Pile 7 AAFB**	**Ikehara, Gregg N. 36 CES/CEVR**	**642**
06-Nov-00	**Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Draft Remedial Verification Report for Site 38/MARBO Laundry Facility and Site 20/Waste Pile 7**	**Ikehara, Gregg N. 36 CES/CEVR**	**643**
06-Nov-00	Base Letter to RAB Members Regarding Next Quarterly Meeting	Schoeck, Edward Colonel, USAF 36 ABW/CV	644
15-Nov-00	RPM Meeting Minutes, 15 November 00	EA Engineering	645
16-Nov-00	RAB Meeting Minutes, 16 Nov 00	EA Engineering	646
16-Nov-00	GEPA Letter to Base Designating Walter Leon Guerrero as an EPA Representative	Salas, Jesus T. GEPA	647

DOC. DATE	SUBJECT OR TITLE	AUTHOR or CORP. AUTHOR	FILE NUMBER
22-Nov-00	Base Letter to GEPA Regarding Transmittal of Copies of the Final Asphalt Recovery Status Reports for Site 35/ Waste Pile 1 and Site 29/Waste Pile 2	Ikehara, Gregg N. 36 CES/CEVR	648
22-Nov-00	Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Final Asphalt Recovery Status Reports for Site 35/Waste Pile 1 and Site 29/Waste Pile 2	Ikehara, Gregg N. 36 CES/CEVR	649
22-Nov-00	Base Letter to GEPA Regarding Transmittal of Copies of the Sampling and Analysis Plan for Remedial Investigation/Feasibility Study for Urunao Dumpsites 1 & 2, Urunao Operable Unit, AAFB	Ikehara, Gregg N. 36 CES/CEVR	650
22-Nov-00	Base Letter to GEPA Regarding Transmittal of Copies of the Final Remedial Investigation Report for Harmon Annex Operable Unit, AAFB	Ikehara, Gregg N. 36 CES/CEVR	651
22-Nov-00	Base Letter to USEPA Region IX Regarding Transmittal of Copies for the Sampling and Analysis Plan for Remedial Investigation/Feasibility Study for Urunao Dumpsites 1 & 2, Urunao Operable Unit, AAFB	Ikehara, Gregg N. 36 CES/CEVR	652
30-Nov-00	**Base Letter to GEPA Regarding Transmittal of Copies of the Final Environmental Cleanup Plan Report for Site 24/ Landfill 29, MARBO Operable Unite, AAFB**	**Ikehara, Gregg N. 36 CES/CEVR**	**653**
30-Nov-00	**Base Letter to USEPA Region IX Regarding Transmittal of Copies of the Final Environmental Cleanup Report for Site 24/Landfill 29, MARBO Operable Unit, AAFB**	**Ikehara, Gregg N. 36 CES/CEVR**	**654**
01-Dec-00	**Final Management Action Plan (MAP)**	**EA Engineering, Science and Technology**	**655**
01-Dec-00	RA, Environmental Cleanup Plan, Vol II of II, Marbo Annex, Site 2	IT Corp.	656
05-Dec-00	**Base Letter to GEPA Regarding Transmittal of Copies of for the Amendment of the Record of Decision of the MARBO Operable Unit**	**Ikehara, Gregg N. 36 CES/CEVR**	**657**
05-Dec-00	**Base Letter to USEPA Region IX Regarding Transmittal of Copies for the Amendment of the Record of Decision of the MARBO Operable Unit**	**Ikehara, Gregg N. 36 CES/CEVR**	**658**
13-Dec-00	Base Letter to GEPA Regarding Variances for IRP IRP Basewide QAPP, 3/99 for AAFB	Ikehara, Gregg N. 36 CES/CEVR	659
13-Dec-00	Base Letter to USEPA Region IX Regarding Variances for IRP Basewide QAPP, 3/99 for AAFB	Ikehara, Gregg N. 36 CES/CEVR	660
13-Dec-00	Base Letter to USEPA Region IX Regarding Transmittal of Copies for the Draft Proposed Plan for the Harmon Operable Unit	Ikehara, Gregg N. 36 CES/CEVR	661
15-Dec-00	USEPA Region IX Letter to Base Regarding a Request for Variances (13 Dec 00) for IRP Basewide Quality Assurance Project Plan (3/99) for AAFB	Ripperda, Mark USEPA Region IX	662
15-Dec-00	Base Letter to GEPA Regarding Transmittal of Copies for the Final Environmental Cleanup Plan Report for Site 5/LF 7, Main Base Operable Unit, AAFB	Ikehara, Gregg N. 36 CES/CEVR	663
15-Dec-00	Base Letter to GEPA Regarding Transmittal of Copies for the Final Environmental Cleanup Plan Report for Site 2/Landfill 2	Ikehara, Gregg N.	664
15-Dec-00	Base Letter to USEPA Region IX Regarding Transmittal of Copies for the Final Environmental Cleanup Plan Report for Site 2/Landfill 2, AAFB	Ikehara, Gregg N. 36 CES/CEVR	665

DOC. DATE	SUBJECT OR TITLE	AUTHOR or CORP. AUTHOR	FILE NUMBER
15-Dec-00	Base Letter to GEPA Regarding Transmittal of Copies for the Final Environmental Cleanup Plan Report for Site 2/Landfill 2	Ikehara, Gregg N.	666
16-Jan-01	Base Letter to RAB Members Regarding Quarterly RAB Meeting	Schoeck, Edward Colonel, USAF ABW,CV	667
23-Jan-01	**GEPA Letter to Base Regarding Comments on the Record of Decision Amendment for the MARBO Annex OU Site 24/Landfill 29**	**Salas, Jesus T. GEPA**	**668**
23-Jan-01	GEPA Letter to Base Regarding Comments on the to the Sampling and Analysis Plan for Remedial Investigation/ Feasibility Study (RI/FS) for Urunao Dumpsites 1 & 2	Salas, Jesus T. GEPA	669
24-Jan-01	News Article, "Private Firm to Remove Unexploded Ordnance"	Duenas, Joseph E. Guam Variety	670
01-Feb-01	Asphalt Removal Status Report, Site 6	OHM Remediation Services Corp.	671
01-Feb-01	Fact Sheet, Final Proposed Plan, Harmon Annex	36 CES/CEVR	672
06-Feb-01	News Article, "Notice of Availability for Proposed Plan for the Harmon Annex Operable Unit"	36 CES/CEVR Pacific Daily News	673
07-Feb-01	News Article, "Notice of Availability for Proposed Plan for the Harmon Annex Operable Unit	36 CES/CEVR Pacific Daily News	674
08-Feb-01	News Article, "Notice of Availability for Proposed Plan for the Harmon Annex Operable Unit	36 CES/CEVR Pacific Daily News	675
08-Feb-01	Base Letter to GEPA Regarding Transmittal of Copies for the Final Asphalt Removal Report, Site 6/Landfill 8, AAFB	Ikehara, Gregg N. 36 CES/CEVR	676
08-Feb-01	Base Letter to USEPA Region IX Regarding Transmittal of Copies for the Final Asphalt Removal Report, Site 6/LF 8	Ikehara, Gregg N. 36 CES/CEVR	677
13-Feb-01	Base Letter to RAB Members Regarding the Proposed Plan for the Harmon Annex Operable Unit	Ikehara, Gregg N. 36 CES/CEVR	678
19-Feb-01	News Article, "Public Notice Announcement for the RAB Meeting and the Proposed Plan for the Harmon Annex Operable Unit Meeting	36 CES/CEVR Pacific Daily News	679
20-Feb-01	News Article, "Public Notice Announcement for the RAB Meeting and the Proposed Plan for the Harmon Annex Operable Unit Meeting	36 CES/CEVR Pacific Daily News	680
21-Feb-01	RPM Meeting Minutes, 21 Feb 01	EA Engineering	681
21-Feb-01	News Article, "Public Notice Announcement for the RAB Meeting and the Proposed Plan for the Harmon Annex Operable Unit Meeting	36 CES/CEVR Pacific Daily News	682
21-Feb-01	Base Letter to USEPA Region IX Regarding Transmittal of Copies for Draft EE/CA for Site 36/Ritidian Dump Site, Northwest Field Operable Unit	Ikehara, Gregg N. 36 CES/CEVR	683
21-Feb-01	Base Letter to GEPA Regarding Transmittal of Copies for the Draft EE/CA for Site 36/Ritidian Dump Site, Northwest Field Operable Unit	Ikehara, Gregg N. 36 CES/CEVR	684
21-Feb-01	Base Letter to GEPA Regarding Transmittal of Copies for the Revision for ARAR's in the MARBO ROD Amendment	Ikehara, Gregg N. 36 CES/CEVR	685
22-Feb-01	**Base Letter to USEPA Region IX Regarding Transmittal of the Revised MARBO ROD Amendment**	**Ikehara, Gregg N. 36 CES/CEVR**	**686**
00-Feb-01	**Final Quality Program Plan & Final Environmental Cleanup Plan for Site 24/Landfill 29 (CD-ROM)**	**Arnsfield, Chris IT Corporation**	**687**

DOC. DATE	SUBJECT OR TITLE	AUTHOR or CORP. AUTHOR	FILE NUMBER
00-Feb-01	Final Quality Program Plan & Final Environmental Cleanup Plan for Site2/Landfill 2 (CD-ROM)	Arnsfield, Chris IT Corporation	688
00-Feb-01	Final Quality Program Plan & Final Environmental Cleanup Plan for Site 5/Landfill 7 (CD-ROM)	Arnsfield, Chris IT Corporation	689
01-Mar-01	**Final Groundwater Monitoring Report, Fall 2000**	**URS Corp.**	**690**
01-Mar-01	RI/FS, Final SAP, Site 40	EA Engineering, Science and Technology	691
16-Mar-01	Base Letter to EA Engineering Regarding Site 15/LF 20 Natural Resources Clearance	Poland, D. Joan 36 CES/CEVR	692
26-Mar-01	Base Letter to GEPA Regarding Final SAP for RI/FS Urunao Dumpsites 1 & 2, Urunao OU	Ikehara, Gregg N. 36 CES/CEVR	693
27-Mar-01	Base Letter to GEPA Regarding Transmittal of Copies for the Final EE/CA report for Site 8/Landfills 10A, 10B, 10C, Main Base Operable Unit AAFB	Ikehara, Gregg N. 36 CES/CEVR	694
01-Apr-01	**ROD, Amendment, MARBO Annex, Site 24**	**36 CES/CEVR**	**695**
09-Apr-01	GEPA Letter to Base Concerning Comments on Draft Proposed Plan, Harmon Annex GEPA Letter to Base	Salas, Jesus T Guam Environmental Protection Agency Salas, Jesus T	696
09-Apr-01	**Concerning Approval of Remediation Verification Report, MARBO Annex, Site 2**	**Guam Environmental Protection Agency**	**697**
09-Apr-01	GEPA Letter to Base Concerning Comments on Remediation Verification Report, Site 38	Salas, Jesus T Guam Environmental Protection Agency	698
09-Apr-01	**GEPA Letter to Base Concerning Approval of Final Environmental Cleanup Plan, MARBO Annex, Site 24**	**Salas, Jesus T Guam Environmental Protection Agency**	**699**
09-Apr-01	GEPA Letter to Base Concerning Comments on Final RI, Harmon Annex	Salas, Jesus T Guam Environmental Protection Agency	700
09-Apr-01	GEPA Letter to Base Concerning Comments on Revisions to Analyte List	Salas, Jesus T Guam Environmental Protection Agency	701
09-Apr-01	GEPA Letter to Base Concerning Comments on Final Environmental Cleanup Plan, Main Base Annex, Site 2	Salas, Jesus T Guam Environmental Protection Agency	702
19-Apr-01	Newspaper Article, "Andersen Landfill Waiting for Cleanup"	The Pacific Daily News	703
01-May-01	Fact Sheet, Landfill 7, Site 5	36 CES/CEVR	704

DOC. DATE	SUBJECT OR TITLE	AUTHOR or CORP. AUTHOR	FILE NUMBER
17-May-01	RPM Meeting Minutes, 17 May 2001	EA Engineering, Science and Technology	705
17-May-01	RPM Meeting Minutes, dtd 17 May 01	EA Engineering	706
22-May-01	Base Letter to GEPA Regarding Transmittal of Copies for the Agency Draft Harmon Annex OU Record of Decision	Ikehara, Gregg N. 36 CES/CEVR	707
01-Jun-01	RPM Meeting Minutes, 21 February 2001	EA Engineering, Science and Technology	708
01-Jun-01	RPM Meeting Minutes, 15 Nov 2000	EA Engineering, Science and Technology	709
14-Jun-01	Newspaper Article, "Notice to Residents of Capehart Housing", Site 5	Tropic Topics Base Newspaper	710
10-Jul-01	**GEPA Letter to Base Concerning Groundwater Monitoring, MARBO Annex**	**Salas, Jesus T Guam Environmental Protection Agency**	**711**
27-Jul-01	Newspaper Article, "RAB Meeting Announcement"	The Pacific Daily News	712
31-Jul-01	RAB Meeting Minutes, 31 Jul 2001	EA Engineering, Science and Technology	713
01-Aug-01	NFRAP, Final Decision Document, Site 25	EA Engineering, Science and Technology	714
01-Aug-01	Quality Program Plan, Vol I of II, Addendum, Northwest Field Annex, Main Base Annex	IT Corp.	715
01-Aug-01	Environmental Cleanup Plan, Vol II of II, Northwest Field Annex, Site 16, 31	IT Corp.	716
01-Aug-01	EE/CA, Final Report, Site 36	URS Corp.	717
23-Aug-01	RPM Meeting Minutes, 23 August 2001	EA Engineering, Science and Technology	718
01-Sep-01	**Final Groundwater Monitoring Report, Spring 01**	**URS Corp.**	**719**
11-Sep-01	Newspaper Article, "Field Work in Federal Audit of DOD Records Completed: Nationwide Audit on Military Sites Starts with Guam"	The Pacific Daily News	720
01-Nov-01	Environmental Cleanup Plan, Vol II of II, Main Base Annex, Site 10, 34	IT Corp.	721

DOC. DATE	SUBJECT OR TITLE	AUTHOR or CORP. AUTHOR	FILE NUMBER
01-Dec-01	ROD, Final, Harmon Annex	EA Engineering, Science and Technology	722
02-Jan-02	SAP, Final Work Plan, Amendment, Site 6	EA Engineering, Science and Technology	723
05-Jul-02	**Administrative Record Index**	**LABAT-ANDERSON INCORPORATED**	**1**

Bolded/Shaded items indicate applicability to the MARBO OU Record of Decision

Appendix B

First Five-Year Interviews
For
MARBO Record of Decision

INTERVIEW DOCUMENTATION FORM

The following is a list of individuals interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

	Name	Title/Position	Organization	Date
1	**Joanne M. Salas Brown**	**Senator**	**GovGuam**	**27 October 2003**
2	**Fred M. Castro**	**Administrator**	**GEPA**	**07 November 2003**
3	**Larry F. Kasperbauer**	**Senator**	**GovGuam**	**10 November 2003**
4	**Victor Wuerch**	**Hydrogeologist**	**GEPA**	**05 December 2003**

INTERVIEW RECORD

Site Name: **MARBO Annex, Guam**	EPA ID No.:	
Subject: **5-Year Interview for MARBO ROD**	Time: **10:00 am**	Date: **27 October 2003**
Type: ☐ Telephone **X**☐ Visit ☐ Other Location of Visit: **Guam Legislator Building**	☐ Incoming ☐ Outgoing	

Contact Made By:

Names:	Titles:	Organizations:
1) Toraj Ghofrani	**1) Site Manger**	**1) EA Engineering Science and Technology, Inc.**
2) Gregg Ikehara	**2) IRP Project Manager**	**2) Andersen AFB 36 CES/CEVR**
3) Paul Dusenbury	**3) Contractor Oversight Manager**	**3) Booz-Allen Hamilton**

Individual Contacted:

Name: **Joanne M. Salas Brown**	Title: **Senator**	Organization: **GovGuam**
Telephone No.: **671-472-3450** Fax No.: **671-472-4090** E-mail Address:	Street Address: **GCIC Building, Suite 709** City, State, Zip: **414 W. Soledad Ave., Hagatna, Guam 96910**	

Summary of Conversation

1.0 What is your overall impression of the project? (general sentiment)

Senator Brown stated that: I first given a tour of MARBO Annex about 9 years ago, when some sites were under excavation. MARBO Annex is a sizable site. Overall, I feel we have been updated with the progress of MARBO quite regularly during Restoration Advisory Board (RAB) meetings. The communications have been open and very direct. Representative from Andersen Air Force Base (AFB) have done a fair job explaining all aspects of project status to general public.

I have never had the impression that Andersen AFB has tried to hide information. The RAB members are a good cross section of our community, including representatives from public, business sectors, landowners, and scientific community. RAB has been effective in sharing information and results have been very positive because we do not hear public hostile complain and mistrust that was once existed between the military and the civilian community.

2.0 Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.

Senator Brown stated that: As I explained earlier there has been routine communication with regard to the status of the Andersen AFB sites. In terms of site inspection, I think it will be effective if Andersen AFB can arrange another tour to show the progress of the cleanup sites at AMRBO Annex.

3.0 Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

Senator Brown stated that: Although I receive numerous complains to my office regarding the quality of groundwater as the source of potable water, and the fact that some landowners would like to have their land returned and cleaned, but I have not received any complain directly related to sites at MARBO Annex.

4.0 Do you feel well informed about the site's activities and progress?

Senator Brown stated that: Yes. Andersen AFB slide presentations are very clear and effective and we are always given a hard copy of the slide show where we can write our notes, questions, or comments. Andersen AFB may not have the answer to all questions during the meeting, but they do take notes and follow up during the next meeting.

5.0 Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Senator Brown stated that: I am concerned about the shutting down of the Maui Well treatment system knowing that Maui Well can be invaluable source of water for the island. I am equally concerned about the Guam Water Work authority to take over the operation of Tumon Maui Well when the well has TCE contamination. I understand that Andersen AFB may have other wells that can be utilized as a source of potable water, but we also expect the properties to be return to the community in its original condition.

INTERVIEW RECORD

Site Name: **MARBO Annex, Guam**	EPA ID No.:	
Subject: **5-Year Interview for MARBO ROD**	Time: **11:00 am**	Date: **07 November 2003**
Type: ☐ Telephone **X**☐ Visit ☐ Other Location of Visit: **GEPA Conference Room**	☐ Incoming ☐ Outgoing	

Contact Made By:

Names:	Titles:	Organizations:
1) Toraj Ghofrani	**1) Site Manger**	**1) EA Engineering Science and Technology, Inc.**
2) Gregg Ikehara	**2) IRP Project Manager**	**2) Andersen AFB 36 CES/CEVR**
3) Paul Dusenbury	**3) Contractor Oversight Manager**	**3) Booz-Allen Hamilton**
4) Michael Cruz	**4) Project Manager**	**4) GEPA**

Individual Contacted:

Name: **Fred M. Castro**	Title: **Administrator**	Organization: **GEPA**
Telephone No.: **671-475-1658** Fax No.: **671-477-9402** E-mail Address:	Street Address: **GEPA, P.O. Box 22439** City, State, Zip: **Barrigada, Guam 96921**	

Summary of Conversation

1.0 What is your overall impression of the project? (general sentiment)

Mr. Fred Castro stated that: Overall the MARBO Annex had a good progress. From regulatory point of view, w eare concern about the TCE and PCE in the groundwater at MARBO and that may affect the groundwater at Tumon Maui Well. However, for the most part the Installation Restoration Program (IRP) has been a good program. Mr. Castro asked if M. Cruz had any comments to add. M. Cruz said that he had none.

2.0 Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.

Mr. Fred Castro stated that: There has been routine and adequate communication regarding the MARBO Annex.

3.0 Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

Mr. Fred Castro stated that: I am not aware of any complaints or violation with regard to MARBO Annex, other than some public illegal dumping at the site. M. Cruz added that public illegal dumping at site is recurring incident dispite of Andersen AFB's limiting access to the site using fence and chains blocks.

4.0 Do you feel well informed about the site's activities and progress?

Mr. Fred Castro stated that: I feel I am well informed about projects at Andersen AFB especially because I my position as co-chair for the Restoration Advisory Board (RAB).

5.0 Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Mr. Fred Castro stated that: My only comment is with regard to the Maui. We need to come up with a consensus as to what to do with the Tumon Maui Well.

INTERVIEW RECORD

Site Name: **MARBO Annex, Guam**	EPA ID No.:	
Subject: **5-Year Interview for MARBO ROD**	Time: **4:00 pm**	Date: **10 November 2003**
Type: ☐ Telephone **X**☐ Visit ☐ Other Location of Visit: **Sinajana Office Conference Room**	☐ Incoming ☐ Outgoing	

Contact Made By:

Names:	Titles:	Organizations:
1) Toraj Ghofrani	**1) Site Manger**	**1) EA Engineering Science and Technology, Inc.**
2) Gregg Ikehara	**2) IRP Project Manager**	**2) Andersen AFB 36 CES/CEVR**
3) Paul Dusenbury	**3) Contractor Oversight Manager**	**3) Booz-Allen Hamilton**

Individual Contacted:

Name: **Larry F. Kasperbauer**	Title: **Senator**	Organization: **GovGuam**
Telephone No.: **671-475-5437** Fax No.: **671-475-2000** E-mail Address:	Street Address: **Sinajana Mall Phase II, Suite 16B** City, State, Zip: **777 Route 4, Sinajana, Guam 96926**	

Summary of Conversation

1.0 What is your overall impression of the project? (general sentiment)

Larry F. Kasperbauer stated that: I feel that Andersen AFB is upfront about the status of their projects and whenever I requested information, the information was provided to me. I would like to make sure that Andersen AFB continues to work with USEPA and GEPA to resolve some of the groundwater issues at MARBO. I was surprised to see how some of the sites at MARBO Annex expanded during the cleanup phase of the project, but I noted that the excavated soils were treated and transported to Andersen AFB landfill.

2.0 Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.

Larry F. Kasperbauer stated that: I have attended many of the Restoration Advisory Board (RAB) meetings and I always felt the information that was presented was adequate. But, that is my own impression and not that of the legislators, or public.

3.0 Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

Larry F. Kasperbauer stated that: I have not heard any complain with regard to MARBO Annex, specifically.

4.0 Do you feel well informed about the site's activities and progress?

Larry F. Kasperbauer stated that: Yes. Gregg Ikehara has been available to provide information I need in the past. I needed a copy of MARBO Record of Decision (ROD), and that was mailed to me a few days after I called.

5.0 Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Larry F. Kasperbauer stated that: As I said I would like to see Andersen AFB continue its cooperation with GEPA and USEPA and resolve the groundwater problem at MARBO Annex. I also would like to suggest holding some of the RAB meetings not hotel conference rooms where some public may feel intimidated about the ambiance. These meeting should be held in community environment to encourage public participations.

INTERVIEW RECORD

Site Name: **MARBO Annex, Guam**		EPA ID No.:
Subject: **5-Year Interview for MARBO ROD**		Time: **11:00 am** / Date: **05 December 2003**
Type: ☐ Telephone **X**☐ Visit ☐ Other Location of Visit: **GEPA Conference Room**		☐ Incoming ☐ Outgoing

Contact Made By:

Names:	Titles:	Organizations:
1) Toraj Ghofrani	**1) Site Manger**	**1) EA Engineering Science and Technology, Inc.**
2) Gregg Ikehara	**2) IRP Project Manager**	**2) Andersen AFB 36 CES/CEVR**
3) Paul Dusenbury	**3) Contractor Oversight Manager**	**3) Booz-Allen Hamilton**
4) Michael Cruz	**4) Project Manager**	**4) GEPA**

Individual Contacted:

Name: **Victor Wuerch**	Title: **Hydrogeologist**	Organization: **GEPA**
Telephone No.: **671-475-1630** Fax No.: **671-477-9402** E-mail Address:	Street Address: **GEPA, P.O. Box 22439** City, State, Zip: **Barrigada, Guam 96921**	

Summary of Conversation

1.0 What is your overall impression of the project? (general sentiment)

Mr. Victor Wuerch stated that: Overall the project is well run following the CERCLA protocol. The progress is as expected. The CERCLA protocols are long and at time convoluted. With regard to MARBO Annex, I had a major concern that was related how the TCE and PCE at MARBO groundwater impacts, or does not impact, the groundwater at Tumon Bay. I realized that Andersen AFB is in process of addressing these concerns as part of the 5-year review of the ROD, but it took a lot longer than I anticipated.

2.0 Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.

Mr. Victor Wuerch stated that: Our routine communications are via Remedial Project Manager (RPM) meetings, Restoration Advisory Board (RAB) meetings, and numerous telephone conversations with Andersen AFB. Federal Facility Agreement (FFA), allow us to inspect the Installation Restoration Program (IRP) Sites and have done so. The reporting comes from Andersen AFB and over the years, GEPA has missed many deadlines for review, but that is given when considering the level of support we had.

3.0 Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

Mr. Victor Wuerch stated that: I cannot recall any complains. Earlier in the program GEPA may have some concerns regarding the groundwater sampling techniques, but ever since we switch to low flow the groundwater sampling have been conducted satisfactory.

4.0 Do you feel well informed about the site's activities and progress?

Mr. Victor Wuerch stated that: As far as MARBO Annex project is concerned, yes, I feel I have been well informed. Ever since Gregg Ikehara has been the Project Manager of the IRP sites, I feel that there has been a market improvement in the communications. I felt the previous Project Manager with Andersen AFB were uptight and defensive when approached by GEPA to address some concerns. But, Gregg Ikehara is very forthcoming and the line of communication is open.

5.0 Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Mr. Victor Wuerch stated that: I have to add that Andersen AFB has done a good job with regard to MARBO Annex projects.

I am interested to receive and review the Work Plan for the three former Areas of Concern (AOCs) that have turned to IRP sites (former AOC-55, AOC-56, and AOC-54) and see if they relate to the source of the TCE and PCE in groundwater at AMRBO.

Appendix C

Historical Groundwater Monitoring Results for Long-Term Groundwater Monitoring (LTGM) Program at MARBO Annex

NOTES AND QUALIFIERS FOR APPENDIX C DATA TABLES

Notes

MCL = USEPA SDWA Maximum Contaminant Level
F = Final
P = Proposed
Bold & shaded = Concentration exceeds the MCL
‡ = Analyte detected in associated field or laboratory blank
--- = Not Analyzed
TT = USEPA SDWA Action Level
RL = Andersen QAPP Reporting Limit

Qualifiers for Validated Data

J = (nondetects) Value is estimated
J = (detected) Concentration is approximate
B = Blank contamination associated with result
R = Result rejected
NJ = Analyte is tentatively identified and concentration is approximate
F = Analyte positively identified at a concentration below the Reporting Limit
U = The analyte was analyzed for, but not detected.

USEPA Qualifiers

J = Estimated value.
B = (Organics) Value may be affected by laboratory contamination.
E = (Organics) Concentration exceeds the calibration range of the GC/MS.
D = Dilution required.
B = (Inorganics) Reported value is less than the Contract Required Detection Limit (CRDL), but greater than the Instrument Detection Limit (IDL).
E = (Inorganics) Reported value is estimated because the presence of interference.
N = Spiked sample recovery is not within the control limits.
W = Postdigestion spike for furnace AAS analysis is out of control limits (85%) and sample absorbence is less than 50% of spike absorbence.
* = Duplicate analysis is not within control limits.

TABLE C-1. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL D-1, MARBO ANNEX, GUAM

Sample Identifier				D-1	D-1	D-1
Sample Date				10/24/1996	4/14/1997	10/14/1997
Sampling Round			Jul-02	Round 3	Round 4	Round 5
Method	Analyte	Units	USEPA MCLs			
VOLATILE ORGANIC COMPOUNDS						
8260	CARBON DISULFIDE	µg/L	N/A	11	<1	<1
INORGANICS						
6010	ALUMINUM	µg/L	N/A	61 B	84 B	112 B
6010	CALCIUM	µg/L	N/A	64700	74500	72300 E
6010	MAGNESIUM	µg/L	N/A	10600	12100	11500 E
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.12 B
6010	POTASSIUM	µg/L	N/A	1740 B	1790 B	1740 B
6010	SILVER	µg/L	N/A	<3	<4	4.2 B
6010	SODIUM	µg/L	N/A	31000	34200	32800 E
WATER QUALITY PARAMETERS						
325.2	CHLORIDE	mg/L	N/A	53	79	63
375.4	SULFATE	mg/L	N/A	7.7	9.3	9.8
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	219	225	215
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	0.72
310.1	ALKALINITY, TOTAL	mg/L	N/A	219	225	215
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	258	308	389

TABLE C-2. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL D-2, MARBO ANNEX, GUAM

Sample Identifier				D-2	D-2	D-2	D-2	D-2	D-2
Sample Date				10/24/1996	4/14/1997	10/14/1997	4/8/1998	10/14/1998	4/6/1999
Sampling Round			Jul-02	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8
Method	Analyte	Units	USEPA MCLs						
VOLATILE ORGANIC COMPOUNDS									
8260	BROMODICHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1
8260	CARBON DISULFIDE	µg/L	N/A	17	<1	<1	<1	<1	<1
8260	CHLOROFORM	µg/L	N/A	<1	<1	<1	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	<1	<1	<1
8260	TOLUENE	µg/L	1,000 F	<1	<1	<1	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	<1	<1	<1	<1	<1	<1
8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	<1	0.4 J	<1	<1	<1	<1
INORGANICS									
6010	ALUMINUM	µg/L	N/A	99 B	98 B	122 B	---	---	---
6010/7060	ARSENIC	µg/L	10	<2	<2	1.8 BW	---	---	---
6010	CALCIUM	µg/L	N/A	66100	74400	73400 E	---	---	---
6010	MAGNESIUM	µg/L	N/A	9770	11100	10500 E	---	---	---
6010	MANGANESE	µg/L	N/A	<6	<6	47	---	---	---
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.11 B	---	---	---
6010	POTASSIUM	µg/L	N/A	1920 B	2010 B	2400 B	---	---	---
6010	SODIUM	µg/L	N/A	30200	33800	31100 E	---	---	---
WATER QUALITY PARAMETERS									
325.2	CHLORIDE	mg/L	N/A	56	82	59	---	---	---
375.4	SULFATE	mg/L	N/A	7	9.6	8.1	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	217	223	205	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	0.43	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	217	223	205	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	330	349	486	---	---	---

TABLE C-2. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL D-2, MARBO ANNEX, GUAM

Sample Identifier				D-2	D-2	D-2	D-2	D-2	D-2	D-2
Sample Date				10/14/1999	4/20/2000	4/12/2001	10/3/2001	4/18/2002	11/13/2002	4/3/2003
Sampling Round			Jul-02	Round 9	Round 10	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated	Validated					
VOLATILE ORGANIC COMPOUNDS										
8260	BROMODICHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	27	<1
8260	CARBON DISULFIDE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1
8260	CHLOROFORM	µg/L	N/A	<1	<1	<1	<1	<1	26	<1
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	0.5	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	0.2	0.5 J	<1	<1
8260	TOLUENE	µg/L	1,000 F	0.2	<1	<0.1	<1	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	0.1	0.2 F	<0.1	0.5	<1	<1	<1
8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	0.3	0.4 F	0.4 F	0.6	<1	<1	0.4
INORGANICS										
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---
6010/7060	ARSENIC	µg/L	10	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	MANGANESE	µg/L	N/A	---	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	---	60	42	---	---	---	---
375.4	SULFATE	mg/L	N/A	---	11	8.4	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	---	208	204	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	---	<2	<5.0	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	---	208	204	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	---	344	---	---	---	---	---

TABLE C-3. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL D-3, MARBO ANNEX, GUAM

Sample Identifier				D-3	D-3	D-3
Sample Date				10/24/1996	4/21/1997	10/14/1997
Sampling Round			Jul-02	Round 3	Round 4	Round 5
Method	Analyte	Units	USEPA MCLs			
VOLATILE ORGANIC COMPOUNDS						
8260	CARBON DISULFIDE	µg/L	N/A	17	<1	<1
INORGANICS						
6010	ALUMINUM	µg/L	N/A	74 B	88 B	125 B
6010	CALCIUM	µg/L	N/A	73900	83500	79500 E
6010/7421	LEAD	µg/L	15 TT	<1	<1	2.1 B
6010	MAGNESIUM	µg/L	N/A	6450	7470	6200 E
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.16
6010	POTASSIUM	µg/L	N/A	1980 B	1870 B	2310 B
6010	SODIUM	µg/L	N/A	17300	19900	16400 E
WATER QUALITY PARAMETERS						
325.2	CHLORIDE	mg/L	N/A	34	37	30
375.4	SULFATE	mg/L	N/A	4.7	4.1	5
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	222	224	221
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	0.5	0.55
310.1	ALKALINITY, TOTAL	mg/L	N/A	222	224	221
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	296	302	273

TABLE C-4. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL D-4, MARBO ANNEX, GUAM

Sample Identifier				D-4	D-4	D-4
Sample Date				10/24/1996	4/21/1997	10/14/1997
Sampling Round			Jul-02	Round 3	Round 4	Round 5
Method	Analyte	Units	USEPA MCLs			
VOLATILE ORGANIC COMPOUNDS						
8260	CARBON DISULFIDE	µg/L	N/A	9	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	2
INORGANICS						
6010	ALUMINUM	µg/L	N/A	75 B	83 B	140 B
6010/7041	ANTIMONY	µg/L	6 F	<2	<2	1.7 B
6010	ARSENIC	µg/L	10	<2	<2	1.4 BW
6010	CALCIUM	µg/L	N/A	71400	79800	74300 E
6010	MAGNESIUM	µg/L	N/A	8630	9810	8940 E
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.23 B
6010	POTASSIUM	µg/L	N/A	1880 B	1730 B	2000 B
6010	SODIUM	µg/L	N/A	20700	22400	20400 E
WATER QUALITY PARAMETERS						
325.2	CHLORIDE	mg/L	N/A	40	41	38
375.4	SULFATE	mg/L	N/A	4.8	5.6	5.5
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	220	228	216
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	0.48
310.1	ALKALINITY, TOTAL	mg/L	N/A	220	228	216
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	300	320	322

TABLE C-5. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL D-5, MARBO ANNEX, GUAM

Sample Identifier				D-5	D-5	D-5	D-5	D-5	D-5	D-5
Sample Date				10/24/1996	4/14/1997	10/14/1997	4/6/1998	10/14/1998	4/6/1999	10/14/1999
Sampling Round			Jul-02	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5
8260	CARBON DISULFIDE	µg/L	N/A	11	<1	<1	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	<1	<1	<1	0.1 F
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	2	1	0.9 J	0.8 J	<1	1 J	1.3
8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	0.2 J	0.4 J	<1	<1	<1	<1	0.4 F
INORGANICS										
6010	ALUMINUM	µg/L	N/A	65 B	94 B	124 B	---	---	---	---
6010/7041	ANTIMONY	µg/L	6 F	<2	<2	1.6 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	74100	74700	72600 E	---	---	---	---
6010/7421	LEAD	µg/L	15 TT	1.3 B	<1	1.4 B	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	5800	5640	5260 E	---	---	---	---
6010	POTASSIUM	µg/L	N/A	2360 B	2330 B	2250 B	---	---	---	---
6010	SODIUM	µg/L	N/A	33100	30600	27700 E	---	---	---	---
6010	ZINC	µg/L	N/A	16 B	26	35	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	56	57	53	---	---	---	---
375.4	SULFATE	mg/L	N/A	7.5	9.1	7.4	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	194	202	194	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	0.7	1.4	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	194	202	194	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	282	328	300	---	---	---	---

TABLE C-5. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL D-5, MARBO ANNEX, GUAM

Sample Identifier				D-5	D-5	D-5	D-5	D-5	D-5	D-5
Sample Date				4/20/2000	10/16/2000	4/12/2001	11/13/2001	4/18/2002	10/9/2002	4/3/2003
Sampling Round			Jul-02	Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated						
VOLATILE ORGANIC COMPOUNDS										
8260	ACETONE	µg/L	N/A	<5	<5	<5	1	<5	2.4 J	<5
8260	CARBON DISULFIDE	µg/L	N/A	<1	---	---	---	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<0.1	<1	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	2	2.2	1.9	2	1.4	1.9	1.7
8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	0.6 F	0.5 F	0.3 F	0.6	0.4 J	0.5 J	0.4
INORGANICS										
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---
6010/7041	ANTIMONY	µg/L	6 F	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---
6010/7421	LEAD	µg/L	15 TT	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	ZINC	µg/L	N/A	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	49	52 B	54	---	---	---	---
375.4	SULFATE	mg/L	N/A	14	16 B	16	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	204	210 B	246	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5.0	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	204	210 B	246	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	314	315.0	---	---	---	---	---

TABLE C-6. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL D-14, MARBO ANNEX, GUAM

Sample Identifier				D-14	D-14	D-14	D-14	D-14	D-14	D-14
Sample Date				10/24/1996	4/21/1997	10/14/1997	4/6/1998	10/13/1998	4/11/1999	10/12/1999
Sampling Round			Jul-02	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5
8260	BROMODICHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	1	<1 J
8260	BROMOMETHANE	µg/L	N/A	<1	<1	<1	<1	---	---	0.1 F‡
8260	CHLOROFORM	µg/L	N/A	<1	<1	<1	<1	<1	3 ‡	<1 J
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	0.1 F‡
8260	ETHYLBENZENE	µg/L	700	<1	<1	<1	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1
8260	TOLUENE	µg/L	1000	<1	<1	<1	<1	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	0.5 J	0.3 J	<1	<1	<1	<1	0.5 F
PESTICIDES/PCBs										
8080/8081	DIELDRIN	µg/L	N/A	0.051	0.064	0.06	---	---	---	---
INORGANICS										
6010	ALUMINUM	µg/L	N/A	84 B	92 B	121 B	---	---	---	---
6010/7041	ANTIMONY	µg/L	6 F	<2	<2	2.2 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	81100	91800	82900 E	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	4800	5010	4450 E	---	---	---	---
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.17 B	---	---	---	---
6010	POTASSIUM	µg/L	N/A	2330 B	2260 B	2100 B	---	---	---	---
6010	SODIUM	µg/L	N/A	36300	36600	31400 E	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	68	66	59	---	---	---	---
375.4	SULFATE	mg/L	N/A	11	8.7	9.5	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	203	228	217	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	0.51	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	203	228	217	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	499	360	332	---	---	---	---

TABLE C-6. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL D-14, MARBO ANNEX, GUAM

Sample Identifier				D-14	D-14	D-14	D-14	D-14	D-14	D-14
Sample Date				4/20/2000	10/16/2000	4/12/2001	10/3/2001	4/18/2002	10/10/2002	4/3/2003
Sampling Round			Jul-02	Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated						
VOLATILE ORGANIC COMPOUNDS										
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	2.5 J	<5
8260	BROMODICHLOROMETHANE	µg/L	N/A	<1	<1	<0.1	<1	<1	<1	<1
8260	BROMOMETHANE	µg/L	N/A	---	---	<0.1	---	<1	<1	<1
8260	CHLOROFORM	µg/L	N/A	0.1 F	<1	<0.1	<1	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	<1	1.1	<0.2	<1	<1	<1	<1
8260	ETHYLBENZENE	µg/L	700	<1	<1	<1	0.3	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	0.2	<1	0.2 J	<1
8260	TOLUENE	µg/L	1000	<1	<1	<1	0.5	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	0.4 F	0.4 F	0.3 F	0.3	<1	0.3 J	<1
PESTICIDES/PCBs										
8080/8081	DIELDRIN	µg/L	N/A	---	---	---	---	---	---	---
INORGANICS										
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---
6010/7041	ANTIMONY	µg/L	6 F	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	74	75 B	66	---	---	---	---
375.4	SULFATE	mg/L	N/A	12	13 B	13	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	214	222 B	226	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5.0	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	214	222 B	226	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	352	355	---	---	---	---	---

TABLE C-7. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL GPA-1, MARBO ANNEX, GUAM

Sample Identifier				GPA-1	GPA-1-D	GPA-1	GPA-1-D	GPA-1	GPA-1	GPA-1	GPA-1	GPA-1
Sample Date				10/22/1996	10/22/1996	4/21/1997	4/21/1997	10/22/1997	4/6/1998	10/25/1998	4/11/1999	10/18/1999
Sampling Round				Round 3	Round 3 Duplicate	Round 4	Round 4 Duplicate	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	Jul-02 USEPA MCLs									Validated
VOLATILE ORGANIC COMPOUNDS												
8260	1,1-DICHLOROETHENE	µg/L	7 F	<1	<1	<1	<1	<1	<1	<1	<1	0.2 F
8260	1,2,4-TRICHLOROBENZENE	µg/L	70 F	<1	<1	<1	<1	<1	<1	<1	<1	0.1 F
8260	2-HEXANONE	µg/L	N/A	---	---	---	---	---	---	---	---	---
8260	4-METHYL-2-PENTANONE	µg/L	N/A	---	---	---	---	---	---	---	---	---
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	63	<5	4 JB‡	<5	<1.2
8260	BROMODICHLOROMETHANE	µg/L	N/A	---	---	---	---	---	---	---	---	---
8260	BROMOMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	---	---	0.1 F‡
8260	CARBON DISULFIDE	µg/L	N/A	4	<1	<1	<1	<1	<1	<1	<1	<1
8260	CHLOROFORM	µg/L	N/A	<1	<1	<1	<1	---	<1	---	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	---	---	---	---	---	---	---	---	---
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	<1	0.7 J	<1	<1	<1	<1
8260	METHYL ETHYL KETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5	<5	<5
8260	NAPHTHALENE	µg/L	N/A	---	---	---	---	---	---	---	---	---
8260	TERT-BUTYL METHYL ETHER	µg/L	N/A	---	---	---	---	---	---	---	---	---
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	0.4 J	0.4 J	0.3 J	0.3 J	<1	<1	<1	<1	0.3 F
8260	TOLUENE	µg/L	1000	<1	<1	<1	<1	<1	<1	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	**10**	**9**	**9**	**9**	0.6 J	0.6 J	<1	0.6 J	0.3 F
8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	0.3 J	<1	<1	<1	<1	<1	<1	<1	0.2 F
INORGANICS												
6010	ALUMINUM	µg/L	N/A	126 B	123 B	112 B	102 B	104 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	84200	83400	82700	84600	80300 E	---	---	---	---
6010	IRON	µg/L	N/A	<40	<40	147	132	<52	---	---	---	---
6010/7421	LEAD	µg/L	15 TT	<1	<1	<1	<1	1.7 B	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	5850	3800	4990	5250	1730 E	---	---	---	---
6010	MANGANESE	µg/L	N/A	<6	<6	13 B	12 B	<8	---	---	---	---
7470	MERCURY	µg/L	2 F	<0.2	<0.2	<0.2	0.21 BN	<0.1	---	---	---	---
6010	NICKEL	µg/L	N/A	<15	<15	<15	<15	5.9 B	---	---	---	---
6010	POTASSIUM	µg/L	N/A	6350	5820	4340 B	4380 B	4370 B	---	---	---	---
6010/7740	SELENIUM	µg/L	50 F	1.2 B	<1	<1	<1	<0.7	---	---	---	---
6010	SODIUM	µg/L	N/A	44900	27200	27000	29100	9110 E	---	---	---	---
WATER QUALITY PARAMETERS												
325.2	CHLORIDE	mg/L	N/A	155	74	46	46	12	---	---	---	---
375.4	SULFATE	mg/L	N/A	23	10	6.2	6.6	2.5	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	218	216	217	213	215	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	<0.5	<0.5	0.62	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	218	216	217	213	215	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	482	352	312	313	241	---	---	---	---

TABLE C-7. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL GPA-1, MARBO ANNEX, GUAM

Sample Identifier				GPA-1	GPA-1	GPA-1	GPA-1	GPA-1	GPA-1	GPA-1	GPA-1-D	GPA-1	GPA-1-D
Sample Date				4/26/2000	10/11/2000	4/11/2001	10/18/2001	5/14/2002	10/7/2002	4/24/2003	4/24/2003	10/15/2003	10/15/2003
Sampling Round				Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16	Round 16 Duplicate	Round 17	Round 17 Duplicate
Method	Analyte	Units	Jul-02 USEPA MCLs	Validated									
VOLATILE ORGANIC COMPOUNDS													
8260	1,1-DICHLOROETHENE	µg/L	7 F	0.3 F	<1	<0.2	<1	<1	<1	<1	<1	<1	<1
8260	1,2,4-TRICHLOROBENZENE	µg/L	70 F	---	---	---	---	---	<1	<1	<1	<1	<1
8260	2-HEXANONE	µg/L	N/A	---	---	---	---	---	---	---	---	<5	3.1 J
8260	4-METHYL-2-PENTANONE	µg/L	N/A	---	---	---	---	---	---	---	---	<5	2.7 J
8260	ACETONE	µg/L	N/A	<1	<1	2.9 F	2.1	2.3 J	<5	<5	<5	<5	4.5 J
8260	BROMODICHLOROMETHANE	µg/L	N/A	---	---	0.3 F	0.9	0.7 J	0.7 J	0.6	0.6	0.7 J	0.6 J
8260	BROMOMETHANE	µg/L	N/A	---	---	<0.1	---	---	<0.1	<0.1	<0.1	--	--
8260	CARBON DISULFIDE	µg/L	N/A	0.1 UJ	---	---	---	<1	<1	<1	<1	<1	<1
8260	CHLOROFORM	µg/L	N/A	0.3 F	0.5 F	1.0	2.8	2.3	2.2	2.4	2.4	2.2	2
8260	CHLOROMETHANE	µg/L	N/A	---	2.0	0.7 F	0.2	0.3	<1	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<0.1	0.2	<1	<1	0.2	<1	<1	<1
8260	METHYL ETHYL KETONE	µg/L	N/A	<5	<5	<5	0.6	<5	<5	<5	<5	<5	3.4 J
8260	NAPHTHALENE	µg/L	N/A	---	---	---	---	---	---	---	---	<1	0.3 J
8260	TERT-BUTYL METHYL ETHER	µg/L	N/A	---	---	---	---	---	---	---	---	0.6 J	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	0.4 F	0.2 F	0.3 F	0.4	0.4 J	0.4 J	0.4 J	0.4 J	<1	<1
8260	TOLUENE	µg/L	1000	<1	<1	<1	0.2	<1	<1	<1	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	**8.6**	0.9 F	**9**	**9.1**	**14**	**6.6**	<1	0.4	1.9	1.6
8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	0.3 F	0.3 F	0.3 F	0.3	<1	0.3 J	0.4	0.4	0.3 J	0.3 J
INORGANICS													
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---	---
6010	IRON	µg/L	N/A	---	---	---	---	---	---	---	---	---	---
6010/7421	LEAD	µg/L	15 TT	---	---	---	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---	---
6010	MANGANESE	µg/L	N/A	---	---	---	---	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---	---	---	---	---
6010	NICKEL	µg/L	N/A	---	---	---	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---	---
6010/7740	SELENIUM	µg/L	50 F	---	---	---	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS													
325.2	CHLORIDE	mg/L	N/A	601	558 B	139	---	---	---	---	---	---	---
375.4	SULFATE	mg/L	N/A	80	83 B	139	---	---	---	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	231	228 B	230	---	---	---	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5.0	---	---	---	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	231	228 B	230	---	---	---	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	1370	1214 B	---	---	---	---	---	---	---	---

TABLE C-8. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL GPA-2, MARBO ANNEX, GUAM

Sample Identifier				GPA-2	GPA-2	GPA-2	GPA-2	GPA-2	GPA-2	GPA-2
Sample Date				10/22/1996	4/22/1997	10/21/1997	4/6/1998	10/25/1998	4/11/1999	10/18/1999
Sampling Round			Jul-02	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	1,1-DICHLOROETHENE	µg/L	7	---	---	---	---	---	---	---
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5
8260	BROMOMETHANE	µg/L	N/A	<1	<1	<1	<1	---	---	0.3 F‡
8260	CHLOROFORM	µg/L	N/A	<1	0.1 J	<1	0.6 J‡	<1	0.6 J‡	0.5 F
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	<1	<1	<1	0.2 F
8260	METHYL ETHYL KETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5
8260	TETRACHLOROETHENE (PCE)	µg/L	5	---	---	---	---	---	---	---
8260	TOLUENE	µg/L	1,000 F	<1	<1	<1	<1	<1	<1	0.1 F
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	0.8 J	1	0.5 J	<1	<1	<1	0.5 F
8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	0.7 J	<1	<1	<1	<1	<1	0.4 F
INORGANICS										
6010	ALUMINUM	µg/L	N/A	152 B	211 B	113 B	---	---	---	---
6010/7041	ANTIMONY	µg/L	6 F	<2	<2	1.5 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	90800	90100	84800 E	---	---	---	---
6010	CHROMIUM, TOTAL	µg/L	100 F	<6	6.3 B	<4	---	---	---	---
6010	IRON	µg/L	N/A	160	729	<52	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	18200	14000	13100 E	---	---	---	---
6010	MANGANESE	µg/L	N/A	<6	15.4 B	<8	---	---	---	---
6010	POTASSIUM	µg/L	N/A	5700	4550 B	4020 B	---	---	---	---
6010	SODIUM	µg/L	N/A	149000	118000	107000 E	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	284	212	206	---	---	---	---
375.4	SULFATE	mg/L	N/A	52	27	26	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	209	205	204	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	0.65	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	209	205	204	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	786	599	578	---	---	---	---

TABLE C-8. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL GPA-2, MARBO ANNEX, GUAM

Sample Identifier				GPA-2	GPA-2	GPA-2	GPA-2	GPA-2	GPA-2	GPA-2
Sample Date				4/26/2000	10/11/2000	4/11/2001	10/18/2001	5/14/2002	10/7/2002	4/24/2003
Sampling Round			Jul-02	Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated						
VOLATILE ORGANIC COMPOUNDS										
8260	1,1-DICHLOROETHENE	µg/L	7	---	0.2 F	<0.2	<1	<1	<1	<1
8260	ACETONE	µg/L	N/A	<5	<5	<5	3.8	3.1 J	<5	<5
8260	BROMOMETHANE	µg/L	N/A	---	---	<0.1	---	---	<0.1	<0.1
8260	CHLOROFORM	µg/L	N/A	0.5 F	0.7 F	0.4 F	0.5	0.5 J	0.4 J	0.4
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	0.5	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<0.1	<1	<1	<1	<1
8260	METHYL ETHYL KETONE	µg/L	N/A	<5	<5	<5	0.6	<5	<5	<5
8260	TETRACHLOROETHENE (PCE)	µg/L	5	---	0.4 F	0.1 F	0.2	<1	0.2 J	<1
8260	TOLUENE	µg/L	1,000 F	0.1 F	<1	<0.1	<1	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	0.9 F	**6.7**	1.0	1.6	1.7	0.8 J	<1
8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	0.4 F	0.3 F	0.2 F	0.4	<1	0.5 J	<1
INORGANICS										
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---
6010/7041	ANTIMONY	µg/L	6 F	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	CHROMIUM, TOTAL	µg/L	100 F	---	---	---	---	---	---	---
6010	IRON	µg/L	N/A	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	MANGANESE	µg/L	N/A	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	82	82 B	576	---	---	---	---
375.4	SULFATE	mg/L	N/A	29	56 B	74	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	224	224 B	230	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5.0	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	224	224 B	230	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	400	435	---	---	---	---	---

TABLE C-9. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-1, MARBO ANNEX, GUAM

Sample Identifier				IRP-1	IRP-1	IRP-1	IRP-1	IRP-1	IRP-1	IRP-1
Sample Date				10/3/1996	4/7/1997	10/15/1997	3/29/1998	10/18/1998	4/5/1999	10/13/1999
Sampling Round			Jul-02	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	CARBON DISULFIDE	µg/L	N/A	11	<1	<1	<1	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	1	<1	<1
8260	ETHYLBENZENE	µg/L	700	<1	<1	<1	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	<1	<1	<1	0.1 F
8260	TOLUENE	µg/L	1,000 F	<1	<1	<1	<1	<1	<1	0.3 F
INORGANICS										
6010	ALUMINUM	µg/L	N/A	<25	104 B	139 B	---	---	---	---
6010/7041	ANTIMONY	µg/L	6 F	<2	<2	1.4 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	75000	78100	74800 E	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	855 B	849 B	842 BE	---	---	---	---
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.19 B	---	---	---	---
6010	POTASSIUM	µg/L	N/A	3790 B	3180 B	1510 BE	---	---	---	---
6010	SODIUM	µg/L	N/A	6490	6300	5280 E	---	---	---	---
6010	ZINC	µg/L	N/A	14.3 B	24.3	19.5 B	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	5.7	5.6	6.5	---	---	---	---
9056	SULFATE	mg/L	N/A	---	---	---	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	217	213	214	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	0.47	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	217	213	214	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	223	242	230	---	---	---	---

TABLE C-9. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-1, MARBO ANNEX, GUAM

Sample Identifier				IRP-1	IRP-1	IRP-1	IRP-1	IRP-1	IRP-1	IRP-1
Sample Date				4/18/2000	10/2/2000	4/2/2001	10/1/2001	4/16/2002	10/2/2002	3/31/2003
Sampling Round			Jul-02	Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated						
VOLATILE ORGANIC COMPOUNDS										
8260	CARBON DISULFIDE	µg/L	N/A	<1	---	---	---	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	<1	1.0	9.0	<1	0.7 J	<1	0.3
8260	ETHYLBENZENE	µg/L	700	<1	<1	<1	0.3	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	0.2 F	<1	<1	<1	<1	<1
8260	TOLUENE	µg/L	1,000 F	<1	<1	<1	0.5	<1	<1	<1
INORGANICS										
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---
6010/7041	ANTIMONY	µg/L	6 F	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	ZINC	µg/L	N/A	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	6 B	6.7 B	7.2	---	---	---	---
9056	SULFATE	mg/L	N/A	---	2.0 B	1.9	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	218	214 B	213	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	218	214 B	213	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	233	231	---	---	---	---	---

TABLE C-10. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-2, MARBO ANNEX, GUAM

Sample Identifier				IRP-2	IRP-2-D	IRP-2	IRP-2	IRP-2	IRP-2	IRP-2	IRP-2
Sample Date				10/8/1996	10/8/1996	4/6/1997	10/19/1997	3/30/1998	10/18/1998	4/5/1999	10/13/1999
Sampling Round			Jul-02	Round 3	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs		Duplicate						Validated
VOLATILE ORGANIC COMPOUNDS											
8260	CARBON DISULFIDE	µg/L	N/A	2	<1	<1	<1	<1	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	---	---	---	---	---	---	---	---
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1	0.2 F‡
8260	TOLUENE	µg/L	1,000 F	<1	<1	<1	<1	<1	<1	<1	0.1 F‡
INORGANICS											
6010	ALUMINUM	µg/L	N/A	93	95	93 B	91 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	76200	75300	76100	69900 E	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	630	627	672 B	663 BE	---	---	---	---
7470	MERCURY	µg/L	2 F	<0.2	<0.2	<0.2	0.14 B	---	---	---	---
6010	POTASSIUM	µg/L	N/A	9210	9020	9310	9730 E	---	---	---	---
6010/7740	SELENIUM	µg/L	50 F	<1	<1	<1	1.4 BN	---	---	---	---
6010	SODIUM	µg/L	N/A	12500	12700	13100	12900 E	---	---	---	---
6010	ZINC	µg/L	N/A	14	16	<12	22	---	---	---	---
WATER QUALITY PARAMETERS											
325.2	CHLORIDE	mg/L	N/A	11	11	10	11	---	---	---	---
375.4	SULFATE	mg/L	N/A	2.6	2.4	5.6	8.1	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	210	210	213	196	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	<0.5	3.3	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	210	210	213	196	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	239	244	255	272	---	---	---	---

TABLE C-10. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-2, MARBO ANNEX, GUAM

Sample Identifier				IRP-2	IRP-2	IRP-2	IRP-2	IRP-2	IRP-2	IRP-2
Sample Date				4/18/2000	10/2/2000	4/2/2001	10/1/2001	4/15/2002	10/3/2002	4/1/2003
Sampling Round			Jul-02	Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated						
VOLATILE ORGANIC COMPOUNDS										
8260	CARBON DISULFIDE	µg/L	N/A	0.3 F	---	---	---	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	---	0.9 F	5.7	<1	0.3	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1
8260	TOLUENE	µg/L	1,000 F	<1	<1	<1	0.5	<1	<1	<1
INORGANICS										
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---
6010/7740	SELENIUM	µg/L	50 F	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	ZINC	µg/L	N/A	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	12 B	11 B	10	---	---	---	---
375.4	SULFATE	mg/L	N/A	5	5.1 B	5.5	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	182	202 B	197	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	182	202 B	197	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	228	229	---	---	---	---	---

TABLE C-11. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-8, MARBO ANNEX, GUAM

Sample Identifier				IRP-8	IRP-8	IRP-8-D	IRP-8	IRP-8	IRP-8	IRP-8	IRP-8
Sample Date				10/8/1996	4/14/1997	4/14/1997	10/21/1997	3/31/1998	10/20/1998	4/10/1999	10/14/1999
Sampling Round			Jul-02	Round 3	Round 4	Round 4 Duplicate	Round 5	Round 6	Round 7	Round 8	Round 9 Validated
Method	Analyte	Units	USEPA MCLs								
VOLATILE ORGANIC COMPOUNDS											
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5	<5
8260	CHLOROMETHANE	µg/L	N/A	---	---	---	---	---	---	---	---
8260	METHYLENE CHLORIDE	µg/L	N/A	---	---	---	---	---	---	---	---
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	0.2 J	<1	<1	0.6 J	<1	<1	<1	0.1 F
INORGANICS											
6010	ALUMINUM	µg/L	N/A	104	94.1 B	91.2 B	108 B	---	---	---	---
6010	CADMIUM	µg/L	5 F	<1	1.2 B	<1	<3	---	---	---	---
6010	CALCIUM	µg/L	N/A	78800	76900	77000	76500 E	---	---	---	---
6010	CHROMIUM, TOTAL	µg/L	100 F	10.5	<6	<6	<4	---	---	---	---
6010	IRON	µg/L	N/A	94	222	196	<52	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	1110	1050	1050	1250 E	---	---	---	---
7470	MERCURY	µg/L	2 F	1.4	<0.2	0.29 B	<0.1	---	---	---	---
6010	POTASSIUM	µg/L	N/A	3600	4550 B	4660 B	4090 B	---	---	---	---
6010	SODIUM	µg/L	N/A	12300	11900	11900	12300 E	---	---	---	---
WATER QUALITY PARAMETERS											
325.2	CHLORIDE	mg/L	N/A	18	17	17	18	---	---	---	---
375.4	SULFATE	mg/L	N/A	<2	2.3	2.7	2.9	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	209	213	211	205	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	<0.5	0.82	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	209	213	211	205	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	234	254	260	260	---	---	---	---

TABLE C-11. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-8, MARBO ANNEX, GUAM

Sample Identifier				IRP-8	IRP-8	IRP-8	IRP-8	IRP-8	IRP-8	IRP-8
Sample Date				4/19/2000	10/3/2000	4/3/2001	11/13/2001	5/8/2002	10/1/2002	4/17/2003
Sampling Round			Jul-02	Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated						
VOLATILE ORGANIC COMPOUNDS										
8260	ACETONE	µg/L	N/A	<5	<5	<5	0.9	<5	<5	<5
8260	CHLOROMETHANE	µg/L	N/A	---	2.2	2.6	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	---	0.2 F	<0.1	<1	<1	<1	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	0.2 F	0.2 F	<0.1	0.2	<1	<1	<1
INORGANICS										
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---
6010	CADMIUM	µg/L	5 F	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	CHROMIUM, TOTAL	µg/L	100 F	---	---	---	---	---	---	---
6010	IRON	µg/L	N/A	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	8	8.9 B	9.2	---	---	---	---
375.4	SULFATE	mg/L	N/A	3	2.7 B	2.6	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	201	200 B	204	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5.0	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	201	200 B	204	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	231	207	---	---	---	---	---

TABLE C-12. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-10, MARBO ANNEX, GUAM

Sample Identifier				IRP-10	IRP-10	IRP-10	IRP-10	IRP-10	IRP-10	IRP-10
Sample Date				10/7/1996	4/14/1997	10/15/1997	4/5/1998	10/19/1998	4/10/1999	10/14/1999
Sampling Round			Jul-02	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	CARBON DISULFIDE	µg/L	N/A	17	<1	<1	<1	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	0.8 J	<1	<1	<1
8260	DICHLORODIFLUOROMETHANE	µg/L	N/A	<1	<1	<1	<1	---	---	0.8 F
8260	METHYLENE CHLORIDE	µg/L	N/A	3 B	<1	<1	<1	<1	<1	0.1 F
8260	TOLUENE	µg/L	1,000 F	<1	<1	<1	<1	<1	<1	0.7 F
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	0.3 J	<1	<1	0.3 J	<1	<1	0.3 F
INORGANICS										
6010	ALUMINUM	µg/L	N/A	119 B	93.1 B	162 B	125 B	142 B	<56	61 F
6010/7041	ANTIMONY	µg/L	6 F	<2	<2	1.3 B	<1	<1	<1	<0.5 J
6010/7060	ARSENIC	µg/L	10	<2	<2	<1	<1	2.6 B	<2	<0.6 J
6010/7060	BARIUM	µg/L	2000	<100	<100	<100	<100	<100	<100	<100
6010	CALCIUM	µg/L	N/A	83300	85200	80200 E	88900	85600	83400 E	86100
6010	CHROMIUM, TOTAL	µg/L	100 F	<6	<6	<4	<4	<4	3.4 B	2.3 F
6010	COPPER	µg/L	1,300 TT	<6	<6	<5	<5	<5	<5	1.7 F
6010	IRON	µg/L	N/A	<40	<40	<52	<52	<52	<52	57
6010/7421	LEAD	µg/L	15 TT	<1	<1	<1	<1	1.5 B‡	1.6 B‡	<0.5
6010	MAGNESIUM	µg/L	N/A	2870	2930	3030 E	3330 E	3460	3230	3520
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.21 B	<0.1	0.15 B‡	<0.1	<0.1
6010	NICKEL	µg/L	N/A	<15	<15	<5	<5	5.2 B‡	<2	<8
6010	POTASSIUM	µg/L	N/A	14900	11400	10400 E	8280	6740	5140	4950 F
6010/7740	SELENIUM	µg/L	50 F	<1	<1	<0.7	1.8 B	<2	2.2 B	<0.6
6010	SILVER	µg/L	N/A	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	16800	17500	16800 E	16600	15600	13300	14900
6010	VANADIUM	µg/L	N/A	<8	<8	<3	<3	6.8 B‡	<3	<2
6010	ZINC	µg/L	N/A	<12	<12	<12	<12	<12	<12	9.2 F‡
901X/335.X/9010B	CYANIDE	µg/L	200 F	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	18	19	19	19	19	25	17 B
375.4	SULFATE	mg/L	N/A	2.5	4.1	4.6	5	9.3	2.7	7.1 B
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	251	250	238	242	238	237	240
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	0.54	<0.4	0.6	0.74	<3
310.1	ALKALINITY, TOTAL	mg/L	N/A	251	250	238	242	238	237	240
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	274	334	309	273	317	300	273

TABLE C-12. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-10, MARBO ANNEX, GUAM

Sample Identifier				IRP-10	IRP-10	IRP-10	IRP-10	IRP-10	IRP-10	IRP-10
Sample Date				4/18/2000	10/4/2000	4/4/2001	11/14/2001	4/17/2002	10/3/2002	4/3/2003
Sampling Round			Jul-02	Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated						
VOLATILE ORGANIC COMPOUNDS										
8260	CARBON DISULFIDE	µg/L	N/A	<1	---	---	---	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	<1	1.6	4.0	<1	0.5 J	<1	<1
8260	DICHLORODIFLUOROMETHANE	µg/L	N/A	<1	<1	<0.1	---	---	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	0.2 F	<0.1	<1	0.2 J	<1	<1
8260	TOLUENE	µg/L	1,000 F	<1	<1	<0.1	<1	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	0.3 F	0.2 F	0.2 F	<1	<1	<1	<1
INORGANICS										
6010	ALUMINUM	µg/L	N/A	18 F	19 F	28 F	36	27 B	<500	18 B
6010/7041	ANTIMONY	µg/L	6 F	---	---	---	---	0.5 B	<6	<6
6010/7060	ARSENIC	µg/L	10	---	---	<0.7 M	<5	<5	<5	<5
6010/7060	BARIUM	µg/L	2000	<100	<100	<100	<100	<100	1.4 B	3.2 B
6010	CALCIUM	µg/L	N/A	82900 J	85300 B	94100 M	96800	90600	87300	88800
6010	CHROMIUM, TOTAL	µg/L	100 F	---	<3	2.6 F	<50	<50	<50	<50
6010	COPPER	µg/L	1,300 TT	---	<2	<1.2	<50	<50	<50	3.4 B
6010	IRON	µg/L	N/A	7.0 U UJ	9.5 F	5.8 F	8.7	<50	<50	<50
6010/7421	LEAD	µg/L	15 TT	---	<1	0.3 F	<5	<5	0.6 BW	1.2 B
6010	MAGNESIUM	µg/L	N/A	3470 J	3390	4190	4120	4050	3710	3590
7470	MERCURY	µg/L	2 F	---	---	---	0.2	---	<2	<2
6010	NICKEL	µg/L	N/A	---	<1	<6.0	<100	<100	<100	<100
6010	POTASSIUM	µg/L	N/A	4000 F	4890 F	4020 F	4110	3240 B	3190 B	3130
6010/7740	SELENIUM	µg/L	50 F	---	---	---	<5	<5	<5	<5
6010	SILVER	µg/L	N/A	---	2.6 F	---	<50	1.3 B	<50	<50
6010	SODIUM	µg/L	N/A	13000 J	14000 J	15700	15200	14500	13800	12500
6010	VANADIUM	µg/L	N/A	2.2 F	2.1 F	3.4 F	1.7	<2	2.4 B	1.6 B
6010	ZINC	µg/L	N/A	2.6 F	---	---	<20	<1	6.5 B	3.4 B
901X/335.X/9010B	CYANIDE	µg/L	200 F	---	---	<0.004	<0.02	<0.02	0.004	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	17 B	16 B	16	<1	16	16	---
375.4	SULFATE	mg/L	N/A	8.1	6.3 B	7.7	<1	8.5	6.9	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	236	234 B	239	228	236	236	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5.0	<1	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	236	234 B	239	228	236	236	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	291	274	---	---	---	---	---

TABLE C-13. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-12, MARBO ANNEX, GUAM

Sample Identifier				IRP-12	IRP-12	IRP-12	IRP-12	IRP-12	IRP-12	IRP-12
Sample Date				9/30/1996	4/6/1997	10/26/1997	3/31/1998	10/24/1998	4/5/1999	10/13/1999
Sampling Round			Jul-02	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	CARBON DISULFIDE	µg/L	N/A	0.4 J	<1	<1	<1	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	---	---	---	---	---	---	---
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	1	<1	<1	0.1 F
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	0.2 J	<1	<1	<1	<1	<1	<1
8260	TOLUENE	µg/L	1,000 F	<1	<1	<1	<1	<1	<1	0.2 F
INORGANICS										
6010	ALUMINUM	µg/L	N/A	<25	93 B	106 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	69700	74800	75400	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	4080	5040	5640	---	---	---	---
6010	POTASSIUM	µg/L	N/A	1920 B	1590 B	1360 B	---	---	---	---
6010/7740	SELENIUM	µg/L	50 F	<1	<1	2 B	---	---	---	---
6010	SILVER	µg/L	N/A	6.7 B	<4	<3	---	---	---	---
6010	SODIUM	µg/L	N/A	11700	13400	13800	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	19	21	23	---	---	---	---
375.4	SULFATE	mg/L	N/A	4.3	5.8	8.9	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	228	202	202	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	0.7 J	<0.5	<0.4	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	228	202	202	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	215	253	216	---	---	---	---

TABLE C-13. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-12, MARBO ANNEX, GUAM

Sample Identifier				IRP-12	IRP-12	IRP-12	IRP-12	IRP-12	IRP-12	IRP-12
Sample Date				4/19/2000	10/3/2000	4/3/2001	10/2/2001	4/15/2002	10/12/2002	4/1/2003
Sampling Round			Jul-02	Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated						
VOLATILE ORGANIC COMPOUNDS										
8260	CARBON DISULFIDE	µg/L	N/A	<1	---	---	---	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	---	0.9 F	4.8	<1	0.3 J	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<0.1	<1	<1	<1	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	<1	<1	<0.1	<1	<1	<1	0.3
8260	TOLUENE	µg/L	1,000 F	0.5 F	<1	<0.1	0.5	<1	<1	<1
INORGANICS										
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---
6010/7740	SELENIUM	µg/L	50 F	---	---	---	---	---	---	---
6010	SILVER	µg/L	N/A	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	8	8 B	10	---	---	---	---
375.4	SULFATE	mg/L	N/A	7	7.1 B	6.8	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	210	198 B	204	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5.0	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	210	198 B	204	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	230	220	---	---	---	---	---

TABLE C-14. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-14, MARBO ANNEX, GUAM

Sample Identifier				IRP-14	IRP-14-D	IRP-14	IRP-14	IRP-14-D	IRP-14	IRP-14-D	IRP-14	IRP-14-D
Sample Date				10/2/1996	10/2/1996	4/2/1997	10/21/1997	10/21/1997	3/31/1998	3/31/1998	10/24/1998	10/24/1998
Sampling Round				Round 3	Round 3 Duplicate	Round 4	Round 5	Round 5 Duplicate	Round 6	Round 6 Duplicate	Round 7	Round 7 Duplicate
Method	Analyte	Units	Jul-02 SEPA MCL									
VOLATILE ORGANIC COMPOUNDS												
8260	ACETONE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1	<1	<1
8260	BROMODICHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1	<1	<1
8260	CARBON DISULFIDE	µg/L	N/A	3	0.7 J	<1	<1	<1	<1	<1	<1	<1
8260	CHLOROFORM	µg/L	N/A	<1	0.1 J	<1	<1	<1	<1	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1	<1	<1
8260	ETHYLBENZENE	µg/L	700	<1	<1	<1	<1	<1	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	<1	<1	0.7 J	<1	<1	<1
8260	M,P-XYLENES	µg/L	10,000	<1	<1	<1	<1	<1	<1	<1	<1	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	**9**	**10**	**11**	**7**	**7**	**7**	**8**	**6**	**7**
8260	TOLUENE	µg/L	1,000 F	<1	<1	<1	<1	<1	<1	<1	<1	<1
SEMIVOLATILE ORGANIC COMPOUNDS												
8270	BENZOIC ACID	µg/L	N/A	4 J	<50	<50	<50	<50	---	---	---	---
8270	N-NITROSODI-N-PROPYLAMINE	µg/L	N/A	9 J	<10	<10	<10	<10	---	---	---	---
INORGANICS												
6010	ALUMINUM	µg/L	N/A	<25	<25	96.6 B	116 B	97.5 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	76300	7600	77900	75800 E	78500 E	---	---	---	---
6010/7421	LEAD	µg/L	15 TT	1.4 B	<1	<1	3.3 B	<1	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	1310	1280	1250	1220 E	1260 E	---	---	---	---
6010	POTASSIUM	µg/L	N/A	4640 B	4420 B	5430	7350	7590	---	---	---	---
6010	SODIUM	µg/L	N/A	8080	8310	7100	6200 E	6210 E	---	---	---	---
WATER QUALITY PARAMETERS												
325.2	CHLORIDE	mg/L	N/A	11.9	12	10.3	8.9	9.1	---	---	---	---
375.4	SULFATE	mg/L	N/A	4.1	2.2	4.2	3.7	3.8	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	208	209	215	205	213	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	0.9 J	<0.5	<0.4	1.1	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	208	209	215	205	213	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	240	236	254	254	271	---	---	---	---

TABLE C-14. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-14, MARBO ANNEX, GUAM

Sample Identifier				IRP-14	IRP-14-D	IRP-14	IRP-14-D	IRP-14	IRP-14-D	IRP-14	IRP-14-D	IRP-14
Sample Date				4/11/1999	4/11/1999	10/13/1999	10/13/1999	4/17/2000	4/17/2000	10/3/2000	10/3/2000	4/3/2001
Sampling Round				Round 8	Round 8 Duplicate	Round 9 Validated	Round 9 Duplicate Validated	Round 10 Validated	Round 10 Duplicate Validated	Round 11	Round 11 Duplicate	Round 12
Method	Analyte	Units	Jul-02 SEPA MCL									
VOLATILE ORGANIC COMPOUNDS												
8260	ACETONE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1	<1	<1
8260	BROMODICHLOROMETHANE	µg/L	N/A	<1	<1	---	---	0.2 F	0.2 F	<1	<1	<0.1
8260	CARBON DISULFIDE	µg/L	N/A	<1	<1	<0.1	<1	<1	<1	---	---	---
8260	CHLOROFORM	µg/L	N/A	<1	<1	<0.1	<1	0.2 F	0.2 F	<1	<1	<0.1
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1	<1	3.8
8260	ETHYLBENZENE	µg/L	700	<1	<1	<1	<1	<1	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<0.1	0.2 F	<1	<1	0.2 F	<1	<0.1
8260	M,P-XYLENES	µg/L	10,000	<1	<1	<1	<1	<1	<1	<1	<1	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	**5**	**6**	**5.8**	**5.3**	4.6	4.6	4.5	4.4	3.3
8260	TOLUENE	µg/L	1,000 F	<1	<1	0.2 F	0.2 F	<1	<1	<1	<1	<0.1
SEMIVOLATILE ORGANIC COMPOUNDS												
8270	BENZOIC ACID	µg/L	N/A	---	---	---	---	---	---	---	---	---
8270	N-NITROSODI-N-PROPYLAMINE	µg/L	N/A	---	---	---	---	---	---	---	---	---
INORGANICS												
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---
6010/742	LEAD	µg/L	15 TT	---	---	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS												
325.2	CHLORIDE	mg/L	N/A	---	---	---	---	6 B	6 B	6.1 B	6.1 B	5.9
375.4	SULFATE	mg/L	N/A	---	---	---	---	5	5	5.2 B	2.7 B	5
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	---	---	---	---	214	214	208 B	208 B	200
310.1	ALKALINITY, CARBONATE	mg/L	N/A	---	---	---	---	<2	<2	<2	<2	<2
310.1	ALKALINITY, TOTAL	mg/L	N/A	---	---	---	---	214	214	208 B	208 B	200
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	---	---	---	---	230	236	217	207	---

TABLE C-14. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-14, MARBO ANNEX, GUAM

Sample Identifier				IRP-14-D	IRP-14	IRP-14-D	IRP-14	IRP-14-D	IRP-14	IRP-14-D	IRP-14	IRP-14-D	IRP-14	IRP-14
Sample Date				4/3/2001	10/2/2001	10/2/2001	4/16/2002	4/16/2002	10/2/2002	10/2/2002	4/1/2003	4/1/2003	10/13/2003	5/3/2004
Sampling Round				Round 12 Duplicate	Round 13	Round 13 Duplicate	Round 14	Round 14 Duplicate	Round 15	Round 15 Duplicate	Round 16	Round 16 Duplicate	Round 17	Round 18
Method	Analyte	Units	Jul-02 SEPA MCL											
VOLATILE ORGANIC COMPOUNDS														
8260	ACETONE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1	1.6	<1	<5	<5
8260	BROMODICHLOROMETHANE	µg/L	N/A	<.01	0.2	0.3	<1	<1	<1	<1	<1	<1	0.2 J	<1
8260	CARBON DISULFIDE	µg/L	N/A	---	---	---	<1	<1	<1	<1	<1	<1	<1	<1
8260	CHLOROFORM	µg/L	N/A	<0.1	0.2	0.2	<1	<1	<1	<1	<1	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	3.5	<1	<1	<1	0.6 J	<1	<1	<1	<1	<1	0.3 J
8260	ETHYLBENZENE	µg/L	700	<1	---	0.3	---	---	<1	<1	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<0.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
8260	M,P-XYLENES	µg/L	10,000	<1	---	0.8	---	---	<1	<1	<1	<1	<1	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	3.5	3.6	3.6	1.6	2.3	2.3	2.2	2.5	2.3	1.8	1.8
8260	TOLUENE	µg/L	1,000 F	<0.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
SEMIVOLATILE ORGANIC COMPOUNDS														
8270	BENZOIC ACID	µg/L	N/A	---	---	---	---	---	---	---	---	---	---	---
8270	N-NITROSODI-N-PROPYLAMINE	µg/L	N/A	---	---	---	---	---	---	---	---	---	---	---
INORGANICS														
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---	---	---
6010/7421	LEAD	µg/L	15 TT	---	---	---	---	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS														
325.2	CHLORIDE	mg/L	N/A	5.9	---	---	---	---	---	---	---	---	---	---
375.4	SULFATE	mg/L	N/A	5	---	---	---	---	---	---	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	201	---	---	---	---	---	---	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	---	---	---	---	---	---	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	201	---	---	---	---	---	---	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	---	---	---	---	---	---	---	---	---	---	---

TABLE C-15. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-15, MARBO ANNEX, GUAM

Sample Identifier				IRP-15	IRP-15	IRP-15	IRP-15	IRP-15	IRP-15	IRP-15
Sample Date				10/7/1996	4/13/1997	10/19/1997	4/5/1998	10/19/1998	4/10/1999	10/27/1999
Sampling Round			Jul-02	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	1.4 F‡
8260	CARBON DISULFIDE	µg/L	N/A	6	<1	<1	<1	<1	<1	0.5 F
8260	CHLOROMETHANE	µg/L	N/A	---	---	---	---	---	---	---
8260	METHYLENE CHLORIDE	µg/L	N/A	4 B	<1	<1	<1	<1	<1	<1
8260	METHYL ETHYL KETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5
SEMIVOLATILE ORGANIC COMPOUNDS										
8270	BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	10 RL	<10	<10	<10	<10	2 J	<10	<1.4 J
INORGANICS										
6010	ALUMINUM	µg/L	N/A	98 B	37 B	86 B	94 B	133 B	67 B	26 B
6010	BARIUM	µg/L	2000	<100	<100	<100	<100	<100	<100	<100
6010	CALCIUM	µg/L	N/A	76500	31500	70600 E	75800	74800	64100 E	73700
6010	CHROMIUM, TOTAL	µg/L	100 F	<6	<6	<4	<4	<4	4.4 B	<2
6010	IRON	µg/L	N/A	<40	<40	<52	<52	<52	<52	26 F
6010/7421	LEAD	µg/L	15 TT	1 BN	<1	<1	<1	1.2 B‡	<1	0.8 F
6010	MAGNESIUM	µg/L	N/A	1190	491 B	1070 E	1140 E	1190	1110	1180
6010	MANGANESE	µg/L	N/A	<6	<6	<8	<8	---	---	<1
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.11 B	<0.1	0.36 B‡	<0.1	<0.1
6010	NICKEL	µg/L	N/A	<15	<15	<5	<5	8.5 B‡	2.8 B	<8
6010	POTASSIUM	µg/L	N/A	1260 B	578 B	2010 BE	2190	1940 B	1290	1310 F
6010/7740	SELENIUM	µg/L	50 F	<1	<1	<0.7	1.5 BW	<2	<2	<0.6
6010/7761	SILVER	µg/L	N/A	<1	<4	<3	<1	<1	1.6 B	<2
6010	SODIUM	µg/L	N/A	5590	2650	7920 E	7660	7850	6890	6500 B
7841	THALLIUM	µg/L	2	---	---	<1	<1	---	---	---
6010	VANADIUM	µg/L	N/A	<8	<8	<3	<3	6.1 B‡	<3	2.1 F
6010	ZINC	µg/L	N/A	<12	<12	<12	<12	<12	<12	3.1 F
901X/335.X/9010B	CYANIDE	µg/L	200 F	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.002 F‡
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	10	9.3	14	12	12	17	10
375.4	SULFATE	mg/L	N/A	<2	2.5	2.7	2.9	2.5 ‡	<2	2.9 B
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	200	190	188	192	189	191	192
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	0.66	<0.4	0.5	0.84	<3
310.1	ALKALINITY, TOTAL	mg/L	N/A	200	190	188	192	190	192	192
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	60	208	257	197	233	236	213

TABLE C-15. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-15, MARBO ANNEX, GUAM

Sample Identifier				IRP-15	IRP-15	IRP-15	IRP-15	IRP-15	IRP-15	IRP-15
Sample Date				4/18/2000	10/4/2000	4/4/2001	11/1/2001	4/17/2002	10/9/2002	4/3/2003
Sampling Round			Jul-02	Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated						
VOLATILE ORGANIC COMPOUNDS										
8260	ACETONE	µg/L	N/A	<1	<2	1.5 F	2	<5	3.9 J	2.2
8260	CARBON DISULFIDE	µg/L	N/A	<1	---	---	---	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	---	---	4.0	0.5	<1	0.5 J	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<0.1	<1	<1	0.2 J	<1
8260	METHYL ETHYL KETONE	µg/L	N/A	<5	<5	<5	<5	<5	0.9 J	<5
SEMIVOLATILE ORGANIC COMPOUNDS										
8270	BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	10 RL	---	---	---	---	---	<0.2	<0.2
INORGANICS										
6010	ALUMINUM	µg/L	N/A	21 F	<17	16 F	<500	<500	<500	17 B
6010	BARIUM	µg/L	2000	<100	<100	<100	<100	<100	<100	3.2 B
6010	CALCIUM	µg/L	N/A	71500 J	73900 B	79100	84100	78900	80700	79400
6010	CHROMIUM, TOTAL	µg/L	100 F	---	4.3 F	3.1 F	<50	<50	<50	1.7 B
6010	IRON	µg/L	N/A	30 F	30 F	32 F	21	71	84	21 B
6010/7421	LEAD	µg/L	15 TT	---	<1	0.5 F	<5	<5	<5	<5
6010	MAGNESIUM	µg/L	N/A	1130 J	1170	1300	1320	1210	1230	1170
6010	MANGANESE	µg/L	N/A	1.5 F	1.8 F	<2.0	<20	4.2 B	4.2 B	1.8 B
7470	MERCURY	µg/L	2 F	---	---	---	<1	---	<0.2	<0.2
6010	NICKEL	µg/L	N/A	---	12 F	7.3 F	7.4	25 B	24 B	<100
6010	POTASSIUM	µg/L	N/A	1080 F	1820 F	1210 F	917	802 B	926 B	1130
6010/7740	SELENIUM	µg/L	50 F	---	---	---	<5	<5	<5	<5
6010/7761	SILVER	µg/L	N/A	---	2.1 F	---	<50	2 B	<50	<50
6010	SODIUM	µg/L	N/A	5810 J	6200 J	6800	6640	6460	6210	6100
7841	THALLIUM	µg/L	2	0.9 F	---	---	<2	<2	<2	<2
6010	VANADIUM	µg/L	N/A	2.5 F	---	1.8 F	<80	<80	<80	1.2 B
6010	ZINC	µg/L	N/A	3.5 F	---	---	<20	<1	1.8 B	<20
901X/335.X/9010B	CYANIDE	µg/L	200 F	---	---	<0.004	0.003	<0.02	<0.02	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	9.7 B	9.7 B	9.6	<1	9.4	9.6	---
375.4	SULFATE	mg/L	N/A	2.8	2.8 B	2.7	<1	2.8	2.8	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	202	190 B	193	192	194	193	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5.0	<1	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	202	190 B	193	192	194	193	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	218	209	---	---	---	---	---

TABLE C-16. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-16, MARBO ANNEX, GUAM

Sample Identifier				IRP-16	IRP-16	IRP-16	IRP-16	IRP-16	IRP-16	IRP-16	IRP-16
Sample Date				10/7/1996	4/13/1997	10/20/1997	4/5/1998	10/19/1998	4/13/1999	10/27/1999	10/27/1999
Sampling Round				Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9 Total	Round 9 Dissolved
Method	Analyte	Units	Jul-02 USEPA MCLs							Validated	Validated
VOLATILE ORGANIC COMPOUNDS											
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5	<5
8260	BROMOMETHANE	µg/L	N/A	<1	<1	<1	<1	---	---	0.4 F‡	---
8260	CARBON DISULFIDE	µg/L	N/A	<1	<1	<1	<1	<1	<1	0.4 F	---
8260	CHLOROMETHANE	µg/L	N/A	---	---	---	---	---	---	---	---
8260	DICHLORODIFLUOROMETHANE	µg/L	N/A	<1	<1	<1	<1	---	---	0.6 F	---
8260	METHYLENE CHLORIDE	µg/L	N/A	3 B	<1	<1	<1	<1	<1	0.1 F	---
8260	METHYL ETHYL KETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5	<5
8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	0.2 F	---
SEMIVOLATILE ORGANIC COMPOUNDS											
8270	BENZO(A)PYRENE	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
8270	BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	10 RL	<10	<10	<10	<10	3 J	<10	<1.4 J	---
INORGANICS											
6010	ALUMINUM	µg/L	N/A	108 B	97 B	155 B	161 B	145 B	117 B	48 F	61 F
6010/7041	ANTIMONY	µg/L	6 F	<2	<2	<1	1.3 B	1.6 B	<1	<0.5 J	6 J
6010/7060	ARSENIC	µg/L	10 *	<2	<2	<1	<1	4.1 B	<2	<0.6	<0.6
6010/7060	BARIUM	µg/L	2000	<100	<100	<100	<100	<100	<100	<100	<100
6010	CALCIUM	µg/L	N/A	88800	78200	80900 E	95600	91100	94100 E	99300	88200
6010	CHROMIUM, TOTAL	µg/L	100 F	<6	<6	<4	<4	<4	3.3 B	<2	<2
6010	COPPER	µg/L	1,300 TT	<6	<6	<5	<5	<5	<5	1.3 F	1.6 F
6010	IRON	µg/L	N/A	<40	<40	<52	<52	<52	<52	46 F	128
6010/7421	LEAD	µg/L	15 TT	<1	1.5 B	<1	<1	<1	1.5 B‡	0.9 F	<0.5
6010	MAGNESIUM	µg/L	N/A	1360	1230	1320 E	1410 E	1460	1400	1460	1450
6010	MANGANESE	µg/L	N/A	<6	<6	<8	<8	<8	<8	3.4 F	1.7 F
7470	MERCURY	µg/L	2 F	<0.2	<0.2	<0.1	<0.1	0.13 B‡	<0.1	<0.1	<0.1
6010	POTASSIUM	µg/L	N/A	1050 B	900 B	733 BE	649 B	607 B‡	437 B	<300	402 F
6010/7740	SELENIUM	µg/L	50 F	<1	<1	<0.7	0.94 B	4.6 B	<2	<0.6	<0.6
6010	SILVER	µg/L	N/A	<100	<100	<100	<100	<100	<100	<100	<100
6010	SODIUM	µg/L	N/A	6820	6480	6480 E	5960	6100	5540	5800 B	5930 B
6010	VANADIUM	µg/L	N/A	<8	<8	<3	<3	6 B	<3	2.2 F	2.2 F
6010	ZINC	µg/L	N/A	<12	<12	<12	<12	<12	<12	2.1 F	3.2 F
901X/335.X	CYANIDE	µg/L	200 F	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.002 F‡	---
WATER QUALITY PARAMETERS											
325.2	CHLORIDE	mg/L	N/A	11	10	11	10	10	16	11	---
375.4	SULFATE	mg/L	N/A	2.7	3.2	3.2	2.7	2.7 ‡	<2	3.6 B	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	232	223	222	214	226	245	254	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	0.59	<0.4	0.72	0.16	<3	---
310	ALKALINITY, TOTAL	mg/L	N/A	232	223	222	214	226	245	254	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	264	266	240	239	277	283	251	---

TABLE C-16. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-16, MARBO ANNEX, GUAM

Sample Identifier				IRP-16	IRP-16	IRP-16	IRP-16	IRP-16	IRP-16	IRP-16	IRP-16
Sample Date				4/18/2000	4/18/2000	10/4/2000	4/5/2001	11/14/2001	5/17/2002	10/3/2002	4/3/2003
Sampling Round				Round 10	Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	Jul-02 USEPA MCLs	Total Validated	Dissolved Validated						
VOLATILE ORGANIC COMPOUNDS											
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	3.3	<5	<5	<5
8260	BROMOMETHANE	µg/L	N/A	---	---	---	<0.1	---	---	<1	<1
8260	CARBON DISULFIDE	µg/L	N/A	<1	---	---	---	---	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	---	---	1.4	<0.2	0.6	<1	<1	<1
8260	DICHLORODIFLUOROMETHANE	µg/L	N/A	<1	---	0.2 F	0.2 F	---	---	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	---	<1	<0.1	<1	0.2 J	<1	<1
8260	METHYL ETHYL KETONE	µg/L	N/A	<5	<5	<5	<5	0.6	<5	<5	<5
8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	0.2 F	---	0.2 F	<0.1	0.2	<1	<1	<1
SEMIVOLATILE ORGANIC COMPOUNDS											
8270	BENZO(A)PYRENE	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	0.006	<0.2	<0.2	<0.2
8270	BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	10 RL	---	---	---	---	---	---	<10	<10
INORGANICS											
6010	ALUMINUM	µg/L	N/A	59 F	26 F	27 F	30 F	35	28 B	22 B	25 B
6010/7041	ANTIMONY	µg/L	6 F	---	5.9 F	---	---	---	<6	<6	<6
6010/7060	ARSENIC	µg/L	10 *	---	---	---	0.7 F	1.2	1.8 B	<5	<5
6010/7060	BARIUM	µg/L	2000	<100	<100	<100	<100	<100	<100	1.5 B	4.3 B
6010	CALCIUM	µg/L	N/A	98500	86000 J	92200	98800	99700	99200	96700	96900
6010	CHROMIUM, TOTAL	µg/L	100 F	---	---	<3	2.3 F	<50	5.1 B	<50	<50
6010	COPPER	µg/L	1,300 TT	---	---	2.8 F	2.5 F	<50	<50	<50	<50
6010	IRON	µg/L	N/A	48 F	52 J	23 F	31 F	20	64	27 B	8 B
6010/7421	LEAD	µg/L	15 TT	---	---	0.6 F	<0.3	<5	<5	0.8 BW	<5
6010	MAGNESIUM	µg/L	N/A	1390 J	1350 J	1340	1490	1480	1440	1420	1450
6010	MANGANESE	µg/L	N/A	4.1 F	1.6 F	2.3 F	2.5F	<20	3.7 B	2.2 B	<20
7470	MERCURY	µg/L	2 F	---	---	---	---	<1	---	<0.2	<0.2
6010	POTASSIUM	µg/L	N/A	917 F	861 F	945 F	854 F	726	658 B	<5000	873 B
6010/7740	SELENIUM	µg/L	50 F	---	---	---	---	<50	<5	<5	<5
6010	SILVER	µg/L	N/A	<100	<100	2.6 F	---	<1000	<50	<50	<50
6010	SODIUM	µg/L	N/A	5400 J	5420 J	5870 J	6460	6520	6780	6590	8820
6010	VANADIUM	µg/L	N/A	2.2 F	1.9 F	3.1 F	2.2 F	<80	<80	<80	1.5 B
6010	ZINC	µg/L	N/A	4.6 F	4 F	---	---	<20	2 B	3.7 B	<20
901X/335.X	CYANIDE	µg/L	200 F	---		---	<0.004	<0.02	<0.02	0.006	---
WATER QUALITY PARAMETERS											
325.2	CHLORIDE	mg/L	N/A	11 B	---	11 B	110	<1	12	12	---
375.4	SULFATE	mg/L	N/A	3.6	---	3.6 B	3.5	<1	3.6	3.5	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	234	---	232 B	228	214	230	230	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	---	<2	<5.0	<2	---	---	---
310	ALKALINITY, TOTAL	mg/L	N/A	234	---	232 B	228	214	230	230	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	252	---	234	234	---	---	---	---

TABLE C-17. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-23, MARBO ANNEX, GUAM

Sample Identifier				IRP-23	IRP-23	IRP-23	IRP-23	IRP-23	IRP-23	IRP-23
Sample Date				7/1/2002	4/7/1997	10/13/1997	3/30/1998	10/13/1998	4/4/1999	10/12/1999
Sampling Round			Jul-02	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	CARBON DISULFIDE	µg/L	N/A	2	<1	<1	<1	<1	<1	<1 J
8260	CHLOROMETHANE	µg/L	N/A	---	---	---	---	---	---	---
8260	NAPHTHALENE	µg/L	N/A	<1	<1	<1	<1	<1	<1	0.2 F
8260	TOLUENE	µg/L	1000	<1	<1	<1	<1	<1	<1	<1
INORGANICS										
6010	ALUMINUM	µg/L	N/A	<25	79 B	122 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	61100	62700	62300 E	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	823 B	800 B	733 BE	---	---	---	---
6010	POTASSIUM	µg/L	N/A	325 B	178 B	1450 BE	---	---	---	---
6010	SODIUM	µg/L	N/A	4310	5530	5220 E	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	6.7	6.1	6	---	---	---	---
375.4	SULFATE	mg/L	N/A	<2	3.6	2.4	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	170	182	172	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	0.8 J	<0.5	0.48	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	170	182	172	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	207	209	204	---	---	---	---

TABLE C-17. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-23, MARBO ANNEX, GUAM

Sample Identifier				IRP-23	IRP-23	IRP-23	IRP-23	IRP-23	IRP-23	IRP-23
Sample Date				4/17/2000	10/2/2000	4/2/2001	10/1/2001	4/16/2002	10/2/2002	3/31/2003
Sampling Round			Jul-02	Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated						
VOLATILE ORGANIC COMPOUNDS										
8260	CARBON DISULFIDE	µg/L	N/A	<1	---	---	---	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	---	0.5 F	6.5	<1	0.5 J	<1	<1
8260	NAPHTHALENE	µg/L	N/A	<1	---	---	<1	<1	<1	<1
8260	TOLUENE	µg/L	1000	<1	<1	<1	0.5	<1	<1	<1
INORGANICS										
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	5.4 B	5 B	4.8	---	---	---	---
375.4	SULFATE	mg/L	N/A	2.6	2.7 B	2.6	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	178	178 B	176	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5.0	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	178	178 B	176	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	169	194	---	---	---	---	---

TABLE C-18. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-24, MARBO ANNEX, GUAM

Sample Identifier				IRP-24	IRP-24	IRP-24	IRP-24	IRP-24	IRP-24	IRP-24
Sample Date				7/1/2002	4/7/1997	10/13/1997	3/30/1998	10/14/1998	4/4/1999	10/12/1999
Sampling Round			Jul-02	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	1,2,4-TRICHLOROBENZENE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1
8260	BROMOMETHANE	µg/L	N/A	<1	<1	<1	<1	---	---	0.1 F‡
8260	CARBON DISULFIDE	µg/L	N/A	7	<1	<1	<1	<1	<1	<1 J
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	0.2 F‡
8260	NAPHTHALENE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	0.5 J	0.5 J	0.4 J	0.4 J	<1	<1	0.3 F
8260	TOLUENE	µg/L	1000	<1	<1	<1	<1	<1	<1	<1
INORGANICS										
6010	ALUMINUM	µg/L	N/A	<25	89 B	93 B	---	---	---	---
6010/7041	ANTIMONY	µg/L	6 F	<2	<2	1.7 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	70400	66800	65900 E	---	---	---	---
6010	CHROMIUM, TOTAL	µg/L	100 F	6.7 B	<6	<4	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	9070	9680	9380 E	---	---	---	---
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.15 B	---	---	---	---
6010	POTASSIUM	µg/L	N/A	1260 B	1200 B	1220 BE	---	---	---	---
6010	SODIUM	µg/L	N/A	28800	28500	29600 E	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	52	55	58	---	---	---	---
375.4	SULFATE	mg/L	N/A	6.8	7.2	6.2	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	205	211	203	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<1	<0.5	0.56	---	---	---	---
310	ALKALINITY, TOTAL	mg/L	N/A	205	211	203	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	319	311	267	---	---	---	---

TABLE C-18. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-24, MARBO ANNEX, GUAM

Sample Identifier				IRP-24	IRP-24	IRP-24	IRP-24	IRP-24	IRP-24	IRP-24
Sample Date				5/23/2000	10/9/2000	4/9/2001	10/16/2001	5/7/2002	9/30/2002	4/16/2003
Sampling Round			Jul-02	Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated						
VOLATILE ORGANIC COMPOUNDS										
8260	1,2,4-TRICHLOROBENZENE	µg/L	N/A	<1	<1	<1	<1	<1	2.2	<1
8260	BROMOMETHANE	µg/L	N/A	---	---	<0.1	---	---	<1	<1
8260	CARBON DISULFIDE	µg/L	N/A	<1	---	---	---	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	<1	1.4	<0.2	<1	<1	<1	<1
8260	NAPHTHALENE	µg/L	N/A	<1	<1	<1	<1	<1	4	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	<1	0.4	0.4 F	0.5	0.5 J	0.7 J	0.6
8260	TOLUENE	µg/L	1000	<1	<1	<1	0.6	<1	<1	<1
INORGANICS										
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---
6010/7041	ANTIMONY	µg/L	6 F	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	CHROMIUM, TOTAL	µg/L	100 F	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	53 B	51 B	51	---	---	---	---
375.4	SULFATE	mg/L	N/A	8.6 B	8.6 B	8.1	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	214	210 B	205	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5.0	---	---	---	---
310	ALKALINITY, TOTAL	mg/L	N/A	214	210 B	205	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	302	315	---	---	---	---	---

TABLE C-19. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-25, MARBO ANNEX, GUAM

Sample Identifier				IRP-25	IRP-25	IRP-25	IRP-25	IRP-25	IRP-25	IRP-25
Sample Date				7/1/2002	4/13/1997	10/19/1997	3/29/1998	10/18/1998	4/10/1999	10/12/1999
Sampling Round			Jul-02	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	BROMOMETHANE	µg/L	N/A	<1	<1	<1	<1	---	---	0.1 F‡
8260	CARBON DISULFIDE	µg/L	N/A	8	<1	<1	<1	<1	<1	<1 J
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	0.3 F‡
8260	CIS-1,2-DICHLOROETHENE	µg/L	70 F	<1	<1	<1	1 J	<1	<1	<1 J
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	0.7 J	<1	<1	<1 J
8260	M,P-XYLENES	µg/L	10000	<1	<1	<1	<1	<1	<1	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	0.3 J	0.2 J	<1	<1	<1	<1	0.3 F
8260	TOLUENE	µg/L	1000	<1	<1	<1	<1	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	2	2	2	1	2	2	1.8 J
8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	<1	<1	<1	0.5 J	<1	<1	<1 J
INORGANICS										
6010	ALUMINUM	µg/L	N/A	<25	80 B	97 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	67400	65400	67600 E	---	---	---	---
6010	CHROMIUM, TOTAL	µg/L	100 F	30 B	<6	<4	---	---	---	---
6010	IRON	µg/L	N/A	733	132	<52	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	2880	2660	2300 E	---	---	---	---
6010	MANGANESE	µg/L	N/A	48	<6	<8	---	---	---	---
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.18 B	---	---	---	---
6010	NICKEL	µg/L	N/A	76 B	23 B	13 B	---	---	---	---
6010	POTASSIUM	µg/L	N/A	935 B	682 B	554 BE	---	---	---	---
6010	SODIUM	µg/L	N/A	7160	6700	6440 E	---	---	---	---
6010	ZINC	µg/L	N/A	<12	32.1	<12	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	12	10	12	---	---	---	---
375.4	SULFATE	mg/L	N/A	3.9	5.9	5	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	188	184	185	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	0.9 J	<0.5	0.79	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	189	184	185	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	229	236	227	---	---	---	---

TABLE C-19. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-25, MARBO ANNEX, GUAM

Sample Identifier				IRP-25	IRP-25	IRP-25	IRP-25	IRP-25	IRP-25	IRP-25
Sample Date				4/17/2000	10/2/2000	4/2/2001	10/1/2001	4/15/2002	10/3/2002	3/31/2003
Sampling Round			Jul-02	Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated						
VOLATILE ORGANIC COMPOUNDS										
8260	BROMOMETHANE	µg/L	N/A	---	---	0.4 F	---	---	<1	<1
8260	CARBON DISULFIDE	µg/L	N/A	<1	---	---	---	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	<1	0.9 F	3.2	<1	0.3	<1	<1
8260	CIS-1,2-DICHLOROETHENE	µg/L	70 F	<1	---	---	---	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<0.1	<1	<1	<1	<1
8260	M,P-XYLENES	µg/L	10000	<1	<1	<1	0.8	---	<1	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	0.3 F	0.3 F	<0.1	<1	0.2 J	<1	0.3
8260	TOLUENE	µg/L	1000	<1	<1	<1	0.5	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	1.4	1.4	1.2	<1	1.2 J	0.8 J	1.2
8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	<1	<1	<0.1	<1	<1	<1	<1
INORGANICS										
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	CHROMIUM, TOTAL	µg/L	100 F	---	---	---	---	---	---	---
6010	IRON	µg/L	N/A	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	MANGANESE	µg/L	N/A	---	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---	---
6010	NICKEL	µg/L	N/A	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	ZINC	µg/L	N/A	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	7 B	7.2 B	7.2	---	---	---	---
375.4	SULFATE	mg/L	N/A	4	4.27 B	4.17	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	192	192 B	192	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5.0	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	192	192 B	192	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	199	202	---	---	---	---	---

TABLE C-20. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-26, MARBO ANNEX, GUAM

Sample Identifier				IRP-26	IRP-26	IRP-26	IRP-26	IRP-26	IRP-26	IRP-26
Sample Date				9/30/96	5/13/97	10/15/97	4/5/98	10/14/98	4/5/99	10/12/99
Sampling Round			2002	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	1,2,4-TRICHLOROBENZENE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1
8260	BROMOMETHANE	µg/L	N/A	<1	<1	<1	<1	---	---	0.1 F‡
8260	CARBON DISULFIDE	µg/L	N/A	0.7 J	<1	<1	<1	<1	<1	<1 J
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	0.3 F‡
8260	NAPHTHALENE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	0.6 J	0.2 J	<1	0.4 J	<1	<1	0.2 F
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	<1	0.9 J	<1	<1	<1	<1	<1 J
INORGANICS										
6010	ALUMINUM	µg/L	N/A	<25	84 B	132 B	---	---	---	---
6010/7041	ANTIMONY	µg/L	6 F	<2	<2	1.8 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	69500	68200	67200 E	---	---	---	---
6010	CHROMIUM, TOTAL	µg/L	100 F	30 B	10 B	11 B	---	---	---	---
6010	IRON	µg/L	N/A	140	<40	<52	---	---	---	---
6010/7421	LEAD	µg/L	15 TT	<1	1.6 BN	1.1 B	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	10100	9390	8380 E	---	---	---	---
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.1 B	---	---	---	---
6010	NICKEL	µg/L	N/A	28 B	<15	<5	---	---	---	---
6010	POTASSIUM	µg/L	N/A	1830 B	14900	15600 E	---	---	---	---
6010/7740	SELENIUM	µg/L	50 F	1.1 BN	<1	<0.7	---	---	---	---
6010	SODIUM	µg/L	N/A	34800	24400	22700 E	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	61	33	22	---	---	---	---
375.4	SULFATE	mg/L	N/A	11	15	11	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	211	243	228	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	0.7 J	<0.5	0.66	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	211	243	228	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	282	308	293	---	---	---	---

TABLE C-20. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-26, MARBO ANNEX, GUAM

Sample Identifier				IRP-26	IRP-26	IRP-26	IRP-26	IRP-26	IRP-26	IRP-26
Sample Date				4/24/00	10/12/2000	4/16/2001	10/22/2001	5/8/2002	9/30/2002	4/16/2003
Sampling Round			2002	Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated						
VOLATILE ORGANIC COMPOUNDS										
8260	1,2,4-TRICHLOROBENZENE	µg/L	N/A	<1	<1	<1	<1	<1	1.9	<1
8260	BROMOMETHANE	µg/L	N/A	---	---	1.6	---	---	<1	<1
8260	CARBON DISULFIDE	µg/L	N/A	<1	---	---	---	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	<1	2.0	6.3	<1	<1	<1	<1
8260	NAPHTHALENE	µg/L	N/A	<1	<1	<1	<1	<1	3.6	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	0.2 F	0.2 F	0.1 F	0.2	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	<1	<1	<0.1	<1	<1	<1	<1
INORGANICS										
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---
6010/7041	ANTIMONY	µg/L	6 F	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	CHROMIUM, TOTAL	µg/L	100 F	---	---	---	---	---	---	---
6010	IRON	µg/L	N/A	---	---	---	---	---	---	---
6010/7421	LEAD	µg/L	15 TT	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---	---
6010	NICKEL	µg/L	N/A	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---
6010/7740	SELENIUM	µg/L	50 F	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	11 B	9.1 B	11	---	---	---	---
375.4	SULFATE	mg/L	N/A	4 B	3.2 B	3.6	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	229	222 B	216	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5.0	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	229	222 B	216	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	262	237	---	---	---	---	---

TABLE C-21. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-27, MARBO ANNEX, GUAM

Sample Identifier				IRP-27	IRP-27	IRP-27	IRP-27	IRP-27	IRP-27	IRP-27
Sample Date				9/30/1996	4/6/1997	10/20/1997	3/31/1998	10/20/1998	4/4/1999	10/13/1999
Sampling Round			2002	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	CARBON DISULFIDE	µg/L	N/A	1	<1	<1	<1	<1	<1	<1
8260	CARBON TERACHLORIDE	µg/L	5	<1	<1	<1	<1	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	---	---	---	---	---	---	---
8260	ETHYLBENZENE	µg/L	700	<1	<1	<1	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	2	<1	<1	<1	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	<1	1	1	1	1	1	1.1
8260	TOLUENE	µg/L	1,000 F	<1	<1	<1	<1	<1	<1	0.2 F
INORGANICS										
6010	ALUMINUM	µg/L	N/A	<25	87 B	73 B	---	---	---	---
6010/7041	ANTIMONY	µg/L	6 F	<2	2.8 B	<1	---	---	---	---
6010	CALCIUM	µg/L	N/A	63500	67900	60600 E	---	---	---	---
6010	CHROMIUM, TOTAL	µg/L	100 F	22 B	146	5.3 B	---	---	---	---
6010	COPPER	µg/L	1,300 TT	<6	11.1 B	<5	---	---	---	---
6010	IRON	µg/L	N/A	106	489	<52	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	9050	9390	9370 E	---	---	---	---
6010	MANGANESE	µg/L	N/A	<6	6.4 B	<8	---	---	---	---
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.16 B	---	---	---	---
6010	NICKEL	µg/L	N/A	43 B	66 B	15 B	---	---	---	---
6010	POTASSIUM	µg/L	N/A	1350 B	1530 B	2510 BE	---	---	---	---
6010	SODIUM	µg/L	N/A	20800	26400	22900 E	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	38	42	39	---	---	---	---
375.4	SULFATE	mg/L	N/A	5.6	7.8	6.9	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	193	203	197	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	1	<0.5	0.89	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	193	203	197	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	254	302	256	---	---	---	---

TABLE C-21. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-27, MARBO ANNEX, GUAM

Sample Identifier				IRP-27	IRP-27	IRP-27	IRP-27	IRP-27	IRP-27	IRP-27
Sample Date				4/19/2000	10/3/2000	4/3/2001	10/2/2001	4/16/2002	10/2/2002	4/1/2003
Sampling Round			2002	Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated						
VOLATILE ORGANIC COMPOUNDS										
8260	CARBON DISULFIDE	µg/L	N/A	<1	---	---	---	<1	<1	<1
8260	CARBON TERACHLORIDE	µg/L	5	<1	<1	<1	0.2	<1	<1	0.2
8260	CHLOROMETHANE	µg/L	N/A	---	0.9 F	4.4	<1	0.5 J	<1	0.4
8260	ETHYLBENZENE	µg/L	700	<1	<1	<1	0.3	---	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<0.1	<1	<1	<1	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	1	1.1	0.8 F	0.9	0.5 J	1.2	1.5
8260	TOLUENE	µg/L	1,000 F	<1	<1	<0.1	0.5	<1	<1	<1
INORGANICS										
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---
6010/7041	ANTIMONY	µg/L	6 F	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	CHROMIUM, TOTAL	µg/L	100 F	---	---	---	---	---	---	---
6010	COPPER	µg/L	1,300 TT	---	---	---	---	---	---	---
6010	IRON	µg/L	N/A	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	MANGANESE	µg/L	N/A	---	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---	---
6010	NICKEL	µg/L	N/A	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	23	23 B	22	---	---	---	---
375.4	SULFATE	mg/L	N/A	8	7.5 B	7.3	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	210	210 B	215	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	210	210 B	215	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	269	247	---	---	---	---	---

TABLE C-22. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-28, MARBO ANNEX, GUAM

Sample Identifier				IRP-28	IRP-28	IRP-28
Sample Date				10/8/1996	4/9/1997	10/22/1997
Sampling Round			2002	Round 3	Round 4	Round 5
Method	Analyte	Units	USEPA MCLs			
VOLATILE ORGANIC COMPOUNDS						
8260	CARBON DISULFIDE	µg/L	N/A	2	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	<1	<1	<1
INORGANICS						
6010	ALUMINUM	µg/L	N/A	114	72 B	115 B
6010/7060	ARSENIC	µg/L	10	<2	<2	1.6 BW
6010	BARIUM	µg/L	2,000 F	<22	<22	6.4 B
6010	CALCIUM	µg/L	N/A	73100	68700	72500 E
6010	MAGNESIUM	µg/L	N/A	3450	2770	2320 E
6010	POTASSIUM	µg/L	N/A	1030	758 B	808 B
6010	SODIUM	µg/L	N/A	8790	11700	10700 E
WATER QUALITY PARAMETERS						
325.2	CHLORIDE	mg/L	N/A	16	14	14
375.4	SULFATE	mg/L	N/A	2.1	3.9	3.6
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	195	203	186
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	0.73
310.1	ALKALINITY, TOTAL	mg/L	N/A	195	203	186
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	216	247	221

TABLE C-23. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-29, MARBO ANNEX, GUAM

Sample Identifier				IRP-29	IRP-29-D	IRP-29	IRP-29	IRP-29	IRP-29-D	IRP-29	IRP-29-D	IRP-29
Sample Date				11/4/1996	11/4/1996	5/14/1997	10/20/1997	4/8/1998	4/8/1998	10/18/1998	10/18/1998	4/5/1999
Sampling Round			2002 USEPA MCLs	Round 3	Round 3 Duplicate	Round 4	Round 5	Round 6	Round 6 Duplicate	Round 7	Round 7 Duplicate	Round 8
Method	Analyte	Units										
VOLATILE ORGANIC COMPOUNDS												
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5	<5	<5
8260	BENZENE	µg/L	5 F	<1	<1	<1	<1	<1	<1	<1	<1	<1
8260	BROMOMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	---	---	---
8260	CARBON TETRACHLORIDE	µg/L	5 F	<1	<1	0.7 J	0.7 J	0.7 J	0.7 J	<1	<1	<1
8260	CHLOROFORM	µg/L	N/A	---	---	<1	<1	<1	<1	---	---	<1
8260	CHLOROMETHANE	µg/L	N/A	---	---	---	---	---	---	---	---	---
8260	METHYL ETHYL KETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5	<5	<5
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	**8**	**8**	**14**	**8**	**13**	**13**	**14**	**15**	**9**
8260	TOLUENE	µg/L	1,000 F	<1	<1	<1	<1	<1	<1	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	<1	<1	0.4 J	0.6 J	0.4 J	0.4 J	2	1	<1
INORGANICS												
6010	ALUMINUM	µg/L	N/A	105 B	107 B	91 B	85 B	---	---	---	---	---
6010	CADMIUM	µg/L	5 F	<1	**5.4**	<4	<0.6	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	73700	73800	77300	68400 E	---	---	---	---	---
6010	CHROMIUM, TOTAL	µg/L	100 F	35 B	78	21 B	<4	---	---	---	---	---
6010	IRON	µg/L	N/A	117	248	64.7	<52	---	---	---	---	---
6010/7421	LEAD	µg/L	15 TT	<1	1.4 B	<1	<1	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	10900	11100	6360	5760 E	---	---	---	---	---
6010	NICKEL	µg/L	N/A	22 B	30 B	<15	<5	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	5040 E	5140 E	5730	5940 E	---	---	---	---	---
6010	SODIUM	µg/L	N/A	85000	89000	44800	38900 E	---	---	---	---	---
6010	ZINC	µg/L	N/A	22	31	<12	<12	---	---	---	---	---
WATER QUALITY PARAMETERS												
325.2	CHLORIDE	mg/L	N/A	188	189	84	73	---	---	---	---	---
375.4	SULFATE	mg/L	N/A	25	26	15	12	---	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	180	185	198	190	---	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	0.5	0.8	<0.5	0.68	---	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	180	184	198	190	---	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	552	543	372	346	---	---	---	---	---

TABLE C-23. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-29, MARBO ANNEX, GUAM

Sample Identifier				IRP-29-D	IRP-29	IRP-29-D	IRP-29	IRP-29-D	IRP-29	IRP-29-D	IRP-29	IRP-29-D
Sample Date				4/5/1999	10/13/1999	10/13/1999	4/25/2000	4/25/2000	10/10/2000	10/10/2000	4/10/2001	4/10/2001
Sampling Round			2002 USEPA MCLs	Round 8 Duplicate	Round 9 Validated	Round 9 Duplicate Validated	Round 10 Validated	Round 10 Duplicate Validated	Round 11	Round 11 Duplicate	Round 12	Round 12 Duplicate
Method	**Analyte**	**Units**										
VOLATILE ORGANIC COMPOUNDS												
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5	<5	<5
8260	BENZENE	µg/L	5 F	<1	0.1 F	0.1 F	<1	<1	---		---	---
8260	BROMOMETHANE	µg/L	N/A	---	<0.1	0.1 F‡	---	---	---		<0.1	0.5 F
8260	CARBON TETRACHLORIDE	µg/L	5 F	<1	0.5 F	0.4 F	1.1	1.2	0.5 F	0.5 F	0.4 F	0.4 F
8260	CHLOROFORM	µg/L	N/A	<1	<1	<1	0.3 F	0.3 F	<1	<1	<0.1	<0.1
8260	CHLOROMETHANE	µg/L	N/A	---	---	---	---	---	---	---	0.2 F	2.2
8260	METHYL ETHYL KETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5	<5	<5
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	**8**	**7.4**	**6.5**	**5.1**	**5.4**	**5.6 J**	**6.0 J**	4.5	4.9
8260	TOLUENE	µg/L	1,000 F	<1	0.2 F	0.3 F	0.1 F	0.1 F	<1	<1	<0.1	<0.1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	<1	0.2 F	0.2 F	0.4 F	0.4 F	0.2 F	0.2 F	1.0	0.9 F
INORGANICS												
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---	---	---
6010	CADMIUM	µg/L	5 F	---	---	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---
6010	CHROMIUM, TOTAL	µg/L	100 F	---	---	---	---	---	---	---	---	---
6010	IRON	µg/L	N/A	---	---	---	---	---	---	---	---	---
6010/7421	LEAD	µg/L	15 TT	---	---	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---
6010	NICKEL	µg/L	N/A	---	---	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---
6010	ZINC	µg/L	N/A	---	---	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS												
325.2	CHLORIDE	mg/L	N/A	---	---	---	224 B	221 B	192 B	203 B	220	219
375.4	SULFATE	mg/L	N/A	---	---	---	32 B	32 B	32 B	30 B	34	34
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	---	---	---	185	182	186 B	186 B	186	186
310.1	ALKALINITY, CARBONATE	mg/L	N/A	---	---	---	<2	<2	<2	<2	<5.0	<5.0
310.1	ALKALINITY, TOTAL	mg/L	N/A	---	---	---	185 B	182 B	186 B	186 B	186	186
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	---	---	---	626 B	628 B	576	561	---	---

TABLE C-23. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-29, MARBO ANNEX, GUAM

Sample Identifier				IRP-29	IRP-29-D	IRP-29	IRP-29-D	IRP-29	IRP-29-D	IRP-29	IRP-29-D	IRP-29	IRP-29
Sample Date				10/17/2001	10/17/2001	4/4/2002	4/4/2002	10/1/2002	10/1/2002	4/17/2003	4/17/2003	10/14/2003	5/11/2004
Sampling Round			2002 USEPA MCLs	Round 13	Round 13 Duplicate	Round 14	Round 14 Duplicate	Round 15	Round 15 Duplicate	Round 16	Round 16 Duplicate	Round 17	Round 18
Method	Analyte	Units											
VOLATILE ORGANIC COMPOUNDS													
8260	ACETONE	µg/L	N/A	---	3.6	<5	<5	<5	<5	<5	<5	<5	<5
8260	BENZENE	µg/L	5 F	---	---	<1	<1	<1	<1	<1	<1	<1	<1
8260	BROMOMETHANE	µg/L	N/A	---	---	---	---	<1	<1	<1	<1	---	---
8260	CARBON TETRACHLORIDE	µg/L	5 F	0.8	0.7	0.5 J	0.5 J	0.5 J	0.4 J	0.5	0.5	0.4 J	0.5 J
8260	CHLOROFORM	µg/L	N/A	0.3	0.2	<1	<1	0.2 J	0.2	<1	<1	<1	0.2 J
8260	CHLOROMETHANE	µg/L	N/A	0.3	0.4	<1	<1	<1	<1	<1	<1	<1	0.2 J
8260	METHYL ETHYL KETONE	µg/L	N/A	0.6	---	<5	<5	<5	<5	<5	<5	<5	<5
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	**5.8**	**5.3**	**5.4**	**5.5**	**9.4**	**9.3**	**16**	**15**	**14**	**18**
8260	TOLUENE	µg/L	1,000 F	0.2	0.2	<1	<1	<1	<1	<1	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	0.3	0.3	1.1	1.1	<1	<1	0.3	0.3	<1	0.5 J
INORGANICS													
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---	---	---	---
6010	CADMIUM	µg/L	5 F	---	---	---	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---	---
6010	CHROMIUM, TOTAL	µg/L	100 F	---	---	---	---	---	---	---	---	---	---
6010	IRON	µg/L	N/A	---	---	---	---	---	---	---	---	---	---
6010/7421	LEAD	µg/L	15 TT	---	---	---	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---	---
6010	NICKEL	µg/L	N/A	---	---	---	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---	---
6010	ZINC	µg/L	N/A	---	---	---	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS													
325.2	CHLORIDE	mg/L	N/A	---	---	---	---	---	---	---	---	---	---
375.4	SULFATE	mg/L	N/A	---	---	---	---	---	---	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	---	---	---	---	---	---	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	---	---	---	---	---	---	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	---	---	---	---	---	---	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	---	---	---	---	---	---	---	---	---	---

TABLE C-24. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-30, MARBO ANNEX, GUAM

Sample Identifier				IRP-30	IRP-30	IRP-30	IRP-30	IRP-30	IRP-30	IRP-30	IRP-30
Sample Date				10/2/1996	4/13/1997	10/15/1997	3/29/1998	10/20/1998	4/6/1999	10/12/1999	4/17/2000
Sampling Round			2002	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9	Round 10
Method	Analyte	Units	USEPA MCLs							Validated	Validated
VOLATILE ORGANIC COMPOUNDS											
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5	<5
8260	CARBON DISULFIDE	µg/L	N/A	6	<1	<1	<1	<1	<1	<1 J	<1
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	0.2 F‡	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	0.5 JB	<1	<1	<1	<1	<1 J	<1
8260	TOLUENE	µg/L	1000	<1	<1	<1	<1	<1	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	0.2 J	0.2 J	<1	<1	<1	0.5 J	0.1 F	<1
INORGANICS											
6010	ALUMINUM	µg/L	N/A	<25	99.5 B	130 B	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	76900	76200	74600 E	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	957 B	949 B	857 BE	---	---	---	---	---
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.23 B	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	302 B	231 B	2410 BE	---	---	---	---	---
6010	SODIUM	µg/L	N/A	5980	7080	8890 E	---	---	---	---	---
WATER QUALITY PARAMETERS											
325.2	CHLORIDE	mg/L	N/A	9.2	8.9	9.9	---	---	---	---	8 B
375.4	SULFATE	mg/L	N/A	31	5.2	8.3	---	---	---	---	6
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	201	204	203	---	---	---	---	210
310.1	ALKALINITY, CARBONATE	mg/L	N/A	0.5 J	<0.5	0.45	---	---	---	---	<2
310.1	ALKALINITY, TOTAL	mg/L	N/A	201	204	203	---	---	---	---	210
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	224	581	230	---	---	---	---	222

TABLE C-24. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-30, MARBO ANNEX, GUAM

Sample Identifier				IRP-30	IRP-30	IRP-30D	IRP-30	IRP-30	IRP-30	IRP-30	IRP-30	IRP-30
Sample Date				10/4/2000	4/5/2001	4/5/2001	10/2/2001	4/15/2002	10/10/2002	3/31/2003	10/13/2003	5/6/2004
Sampling Round			2002	Round 11	Round 12	Round 12	Round 13	Round 14	Round 15	Round 16	Round 17	Round 18
Method	Analyte	Units	USEPA MCLs			Duplicate						
VOLATILE ORGANIC COMPOUNDS												
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	2.4 J	<5	<5	2 J
8260	CARBON DISULFIDE	µg/L	N/A	---	---	---	---	<1	<1	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	<1	0.9 F	0.2 F	<1	0.3	<1	<1	<1	0.3 J
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<0.1	<0.1	<1	<1	<1	<1	<1	<1
8260	TOLUENE	µg/L	1000	<1	<1	<1	0.5	<1	<1	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	<1	<0.1	<0.1	<1	<1	0.2 J	<1	<1	0.2 J
INORGANICS												
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS												
325.2	CHLORIDE	mg/L	N/A	7.6 B	7.5	7.5	---	---	---	---	---	---
375.4	SULFATE	mg/L	N/A	6.21 B	6.17	6.14	---	---	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	204 B	212	212	---	---	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<5.0	<5.0	---	---	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	204 B	212	212	---	---	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	224	---	---	---	---	---	---	---	---

TABLE C-25 GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-31, MARBO ANNEX, GUAM

Sample Identifier				IRP-31	IRP-31-D	IRP-31	IRP-31-D	IRP-31	IRP-31-D	IRP-31	IRP-31-D	IRP-31	IRP-31-D
Sample Date				11/5/1996	11/5/1996	5/13/1997	5/13/1997	10/19/1997	10/19/1997	4/1/1998	4/1/1998	10/18/1998	10/18/1998
Sample Depth (bgs)													
Sampling Round			2002 USEPA MCLs	Round 3	Round 3 Duplicate	Round 4	Round 4 Duplicate	Round 5	Round 5 Duplicate	Round 6	Round 6 Duplicate	Round 7	Round 7 Duplicate
Method	**Analyte**	**Units**											
VOLATILE ORGANIC COMPOUNDS													
8260	1,1,1,2-TETRACHLOROETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	0.4 J	0.4 J	<1	<1
8260	1,1,2-TRICHLOROETHANE	µg/L	5 F	1	1	3	3	**5**	**5**	**6**	**6**	4	4
8260	1,1-DICHLOROETHENE	µg/L	7 F	0.3 J	0.7 J	2	2	3	3	4	4	3	3
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
8260	BENZENE	µg/L	5 F	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
8260	BROMOMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1	<1	---	---
8260	CARBON DISULFIDE	µg/L	N/A	<1	10	<1	<1	<1	<1	<1	<1	<1	<1
8260	CARBON TETRACHLORIDE	µg/L	5 F	<1	<1	<1	<1	<1	<1	<1	0.4 J	<1	<1
8260	CHLOROFORM	µg/L	N/A	0.3 J	0.3 J	0.5 J	0.5 J	0.9 J	0.9 J	1	1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
8260	CIS-1,2-DICHLORETHENE	µg/L	70	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	0.9 J	1	2	2	3	3	**6**	**5**	**5**	**5**
8260	TOLUENE	µg/L	1,000 F	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	**130 D**	**110**	**210 D**	**200 D**	**310 D**	**350 D**	**440 D**	**440 D**	**380 D**	**330 D**
INORGANICS													
6010	ALUMINUM	µg/L	N/A	87 B	84 B	80 B	89 B	113 B	80 B	---	---	---	---
6010/7041	ANTIMONY	µg/L	6 F	<2	**6.7 B**	<2	<2	<1	1.7 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	65000	64900	68600	69500	78800 E	76500 E	---	---	---	---
6010	CHROMIUM, TOTAL	µg/L	100 F	22.3 B	17.4 B	13 B	9 B	<4	<4	---	---	---	---
6010	IRON	µg/L	N/A	104	85.8	203	58.2	<52	<52	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	9490	9390	7930	7960	3760 E	3690 E	---	---	---	---
6010	NICKEL	µg/L	N/A	95 B	91 B	41 B	35 B	28 B	25 B	---	---	---	---
6010	POTASSIUM	µg/L	N/A	4530 BE	4440 BE	6890	7040	2890 BE	2920 BE	---	---	---	---
6010/7740	SELENIUM	µg/L	50 F	<1	<1	<1	<1	<0.7	1.2 BN	---	---	---	---
6010	SODIUM	µg/L	N/A	87200	82500	63300	64200	17900 E	17800 E	---	---	---	---
6010	ZINC	µg/L	N/A	14 B	<10	<12	24	<12	19 B	---	---	---	---
WATER QUALITY PARAMETERS													
325.2	CHLORIDE	mg/L	N/A	175	171	124	191	32	32	---	---	---	---
375.4	SULFATE	mg/L	N/A	17	28	11	10	5.9	3.8	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	159	164	176	174	197	198	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	0.7	1.7	<0.5	<0.5	1.6	0.85	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	159	162	176	174	197	198	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	419	420	394	405	294	301	---	---	---	---

TABLE C-25 GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-31, MARBO ANNEX, GUAM

Sample Identifier				IRP-31	IRP-31-D	IRP-31	IRP-31-D	IRP-31	IRP-31-D	IRP-31	IRP-31-D
Sample Date				4/6/1999	4/6/1999	10/13/1999	10/13/1999	4/25/2000	4/25/2000	10/10/2000	10/10/2000
Sample Depth (bgs)											
Sampling Round			2002 USEPA MCLs	Round 8	Round 8 Duplicate	Round 9	Round 9 Duplicate	Round 10	Round 10 Duplicate	Round 11	Round 11 Duplicate
Method	Analyte	Units				Validated	Validated	Validated	Validated		
VOLATILE ORGANIC COMPOUNDS											
8260	1,1,1,2-TETRACHLOROETHANE	µg/L	N/A	<1	<1	0.6 F	0.5 F	0.2 F	0.2 F	<1	<1
8260	1,1,2-TRICHLOROETHANE	µg/L	5 F	4	4	2.7	2.6	2.5	2.6	1.4	1.4
8260	1,1-DICHLOROETHENE	µg/L	7 F	4	4	0.5 F	3.2 J	3.6	3.8	2.0	2.0
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5	<5
8260	BENZENE	µg/L	5 F	<1	<1	2.2	2.3	1.9	2	---	---
8260	BROMOMETHANE	µg/L	N/A	---	---	0.1 F‡	0.2 F‡	---	---	---	---
8260	CARBON DISULFIDE	µg/L	N/A	<1	<1	<1	<1	<1	<1	---	---
8260	CARBON TETRACHLORIDE	µg/L	5 F	<1	<1	0.2 F	<1	0.2 F	0.3 F	<1	<1
8260	CHLOROFORM	µg/L	N/A	1 ‡	1 ‡	0.8 F	0.8 F	0.7 F	0.7 F	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1	<1
8260	CIS-1,2-DICHLORETHENE	µg/L	70	<1	<1	<1	<1	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	0.1 F	<1	<1	<1	0.2 F	0.2 F
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	**5**	**5**	4.4	4.3	2.7	2.9	1.8	1.8
8260	TOLUENE	µg/L	1,000 F	<1	<1	0.2 F	0.2 F	<1	0.8 F	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	**460 D**	**460 D**	**467 J**	**395 J**	**322**	**301**	**220**	**214**
INORGANICS											
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---	---
6010/7041	ANTIMONY	µg/L	6 F	---	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---	---
6010	CHROMIUM, TOTAL	µg/L	100 F	---	---	---	---	---	---	---	---
6010	IRON	µg/L	N/A	---	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---	---
6010	NICKEL	µg/L	N/A	---	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---	---
6010/7740	SELENIUM	µg/L	50 F	---	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---	---
6010	ZINC	µg/L	N/A	---	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS											
325.2	CHLORIDE	mg/L	N/A	---	---	---	---	114 B	122 B	160 B	159 B
375.4	SULFATE	mg/L	N/A	---	---	---	---	12 B	12 B	16 B	17 B
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	---	---	---	---	183	183	170 B	170 B
310.1	ALKALINITY, CARBONATE	mg/L	N/A	---	---	---	---	<2	<2	<2	<2
310.1	ALKALINITY, TOTAL	mg/L	N/A	---	---	---	---	183 B	183 B	170 B	170 B
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	---	---	---	---	401 B	418 B	449	460

TABLE C-25 GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-31, MARBO ANNEX, GUAM

Sample Identifier				IRP-31	IRP-31-D	IRP-31	IRP-31-D	IRP-31	IRP-31-D	IRP-31	IRP-31-D
Sample Date				4/10/2001	4/10/2001	10/17/2001	10/17/2001	4/4/2002	4/4/2002	10/10/2002	10/10/2002
Sample Depth (bgs)											
Sampling Round			2002 USEPA MCLs	Round 12	Round 12 Duplicate	Round 13	Round 13 Duplicate	Round 14	Round 14 Duplicate	Round 15	Round 15 Duplicate
Method	Analyte	Units									
VOLATILE ORGANIC COMPOUNDS											
8260	1,1,1,2-TETRACHLOROETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1	<1
8260	1,1,2-TRICHLOROETHANE	µg/L	5 F	1.2	1.2	1	1	0.8	0.9	1.3 DJ	1.4 DJ
8260	1,1-DICHLOROETHENE	µg/L	7 F	1.4	1.5	1.5	1.7	1.5	<10	3.2 DJ	3 DJ
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	2.4	2.4
8260	BENZENE	µg/L	5 F	---	---	---	---	<10	<10	0.4	0.4
8260	BROMOMETHANE	µg/L	N/A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
8260	CARBON DISULFIDE	µg/L	N/A	---	---	---	---	<10	<10	<10	<10
8260	CARBON TETRACHLORIDE	µg/L	5 F	<0.1	<0.1	<1	<1	<10	<10	<10	<10
8260	CHLOROFORM	µg/L	N/A	0.3 F	0.3 F	0.3	0.3	0.3	0.3	0.4	0.4
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	0.2	0.3	<10	<10	<10	<10
8260	CIS-1,2-DICHLORETHENE	µg/L	70	<1	<1	0.2	0.2	<10	<10	<10	<10
8260	METHYLENE CHLORIDE	µg/L	N/A	<0.1	<0.1	<1	1.2	<10	<10	<10	<10
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	1.4	1.5	1.4	1.4	1.1	1.0	1.8 DJ	1.7 DJ
8260	TOLUENE	µg/L	1,000 F	<0.1	<0.1	<1	<1	<10	<10	<10	<10
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	**175**	**172**	**129**	**138**	**153**	**150**	**197 D**	**205 D**
INORGANICS											
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---	---
6010/7041	ANTIMONY	µg/L	6 F	---	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---	---
6010	CHROMIUM, TOTAL	µg/L	100 F	---	---	---	---	---	---	---	---
6010	IRON	µg/L	N/A	---	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---	---
6010	NICKEL	µg/L	N/A	---	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---	---
6010/7740	SELENIUM	µg/L	50 F	---	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---	---
6010	ZINC	µg/L	N/A	---	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS											
325.2	CHLORIDE	mg/L	N/A	185	184	---	---	---	---	---	---
375.4	SULFATE	mg/L	N/A	18	18	---	---	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	175	176	---	---	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<5.0	<5.0	---	---	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	175	176	---	---	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	---	---	---	---	---	---	---	---

TABLE C-25 GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-31, MARBO ANNEX, GUAM

Sample Identifier				IRP-31	IRP-31-D	IRP-31	IRP-31-D	IRP-31	IRP-31	IRP-31
Sample Date				4/21/2003	4/21/2003	10/15/2003	10/15/2003	11/10/2003	11/10/2003	5/11/2004
Sample Depth (bgs)						456 feet	456 feet	456 feet	447 feet	480
Sampling Round			2002 USEPA MCLs	Round 16	Round 16 Duplicate	Round 17	Round 17 Duplicate	Round 17	Round 17	Round 18
Method	**Analyte**	**Units**								
VOLATILE ORGANIC COMPOUNDS										
8260	1,1,1,2-TETRACHLOROETHANE	µg/L	N/A	<1	<1	---	---	---	---	---
8260	1,1,2-TRICHLOROETHANE	µg/L	5 F	3.7	3.4	3.5	4.2	4	3.7	4.3
8260	1,1-DICHLOROETHENE	µg/L	7 F	**7.6**	**7.2**	5.7	6	5.4	4.9	5.3
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5
8260	BENZENE	µg/L	5 F	<1	<1	<1	<1	<1	<1	<1
8260	BROMOMETHANE	µg/L	N/A	<0.1	<0.1	---	---	---	---	---
8260	CARBON DISULFIDE	µg/L	N/A	<1	<1	<1	<1	<1	---	<1
8260	CARBON TETRACHLORIDE	µg/L	5 F	0.4	0.4	0.4 J	0.4 J	0.3 J	0.3 J	0.4 J
8260	CHLOROFORM	µg/L	N/A	1.2	1.2	1.1	1.2	1.1	1	1.3
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	0.3 J
8260	CIS-1,2-DICHLORETHENE	µg/L	70	<1	<1	<1	<1	<1	<1	0.2 J
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	<1	0.2 J	<1	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	**6**	**5.6**	**5.2**	**5.5**	4.9	4.5	**6.1**
8260	TOLUENE	µg/L	1,000 F	<1	<1	<1	<1	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	**605**	**589**	**470 D**	**469 D**	**450 D**	**419 D**	**567 D**
INORGANICS										
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---
6010/7041	ANTIMONY	µg/L	6 F	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	CHROMIUM, TOTAL	µg/L	100 F	---	---	---	---	---	---	---
6010	IRON	µg/L	N/A	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	NICKEL	µg/L	N/A	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---
6010/7740	SELENIUM	µg/L	50 F	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	ZINC	µg/L	N/A	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	---	---	---	---	---	---	---
375.4	SULFATE	mg/L	N/A	---	---	---	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	---	---	---	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	---	---	---	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	---	---	---	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	---	---	---	---	---	---	---

TABLE C-26. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-32B, MARBO ANNEX, GUAM

Sample Identifier				IRP-32B	IRP-32B	IRP-32B
Sample Date				10/3/1996	4/8/1997	10/21/1997
Sampling Round			2002	Round 3	Round 4	Round 5
Method	Analyte	Units	USEPA MCLs			
VOLATILE ORGANIC COMPOUNDS						
8260	CARBON DISULFIDE	µg/L	N/A	2	<1	<1
8260	CHLOROFORM	µg/L	N/A	0.3 J	<1	<1
INORGANICS						
6010	ALUMINUM	µg/L	N/A	<25	69 B	<56
6010	ANTIMONY	µg/L	6 F	<2	<2	1.8 B
6010	CALCIUM	µg/L	N/A	25200	25500	39600 E
6010	CHROMIUM, TOTAL	µg/L	100 F	74	43 B	63
6010	IRON	µg/L	N/A	<40	<40	83.3
6010	MAGNESIUM	µg/L	N/A	7070	7870	11200 E
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.13 B
6010	NICKEL	µg/L	N/A	<15	<15	20.5 B
6010	POTASSIUM	µg/L	N/A	149000	126000	60600
6010	SODIUM	µg/L	N/A	87800	76600	37800 E
6010	ZINC	µg/L	N/A	27	42	32
WATER QUALITY PARAMETERS						
325.2	CHLORIDE	mg/L	N/A	14	12	20
375.4	SULFATE	mg/L	N/A	30	23	11
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	458	400	284
310.1	ALKALINITY, CARBONATE	mg/L	N/A	1.5	0.9	1.2
310.1	ALKALINITY, TOTAL	mg/L	N/A	458	400	284
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	622	522	358

TABLE C-27. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-33, MARBO ANNEX, GUAM

Sample Identifier				IRP-33	IRP-33	IRP-33	IRP-33	IRP-33	IRP-33	IRP-33
Sample Date				9/26/1996	4/8/1997	10/20/1997	4/1/1998	10/20/1998	4/11/1999	10/14/1999
Sampling Round			2002	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5
8260	BROMOMETHANE	µg/L	N/A	<1	<1	<1	<1	---	---	0.3 F‡
8260	CARBON DISULFIDE	µg/L	N/A	18	<1	<1	<1	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	---	---	---	---	---	---	---
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	1	<1	<1	<1	0.2 F‡
8260	TOLUENE	µg/L	1,000 F	<1	<1	<1	<1	<1	<1	0.1 F
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	<1	<1	<1	0.4 J	<1	<1	<1
INORGANICS										
6010	ALUMINUM	µg/L	N/A	<25	76 B	201 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	63500	62300	64300 E	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	8690	11000	9080 E	---	---	---	---
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.19 B	---	---	---	---
6010	NICKEL	µg/L	N/A	21 B	43 B	15 B	---	---	---	---
6010	POTASSIUM	µg/L	N/A	2020 B	2570 B	2890 BE	---	---	---	---
6010	SODIUM	µg/L	N/A	26300	43700	27700 E	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	52	85	49	---	---	---	---
375.4	SULFATE	mg/L	N/A	2.9	12	5.7	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	199	211	195	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	1.2	<0.5	0.71	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	199	211	195	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	281	378	315	---	---	---	---

TABLE C-27. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-33, MARBO ANNEX, GUAM

Sample Identifier				IRP-33	IRP-33	IRP-33	IRP-33	IRP-33	IRP-33
Sample Date				4/19/2000	10/5/2000	4/5/2001	10/3/2001	10/10/2002	4/2/2003
Sampling Round			2002	Round 10	Round 11	Round 12	Round 13	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated					
VOLATILE ORGANIC COMPOUNDS									
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	2.4 J	<5
8260	BROMOMETHANE	µg/L	N/A	---	---	<0.1	---	<1	<1
8260	CARBON DISULFIDE	µg/L	N/A	<1	---	---	---	<1	0.5
8260	CHLOROMETHANE	µg/L	N/A	---	1.6	0.3 F	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	0.2 F	<0.1	<1	<1	<1
8260	TOLUENE	µg/L	1,000 F	<1	<1	<0.1	0.5	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	<1	<1	<0.1	<1	<1	<1
INORGANICS									
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---
6010	NICKEL	µg/L	N/A	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---
WATER QUALITY PARAMETERS									
325.2	CHLORIDE	mg/L	N/A	49	54 B	52	---	---	---
375.4	SULFATE	mg/L	N/A	8	7.7 B	8	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	198	204 B	202	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5.0	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	198	204 B	202	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	304	288	---	---	---	---

TABLE C-28 GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-34, MARBO ANNEX, GUAM

Sample Identifier				IRP-34	IRP-34	IRP-34	IRP-34	IRP-34	IRP-34	IRP-34
Sample Date				9/26/1996	5/5/1997	10/22/1997	4/1/1998	10/20/1998	4/11/1999	10/14/1999
Sampling Round			2002	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5
8260	CARBON DISULFIDE	µg/L	N/A	2	<1	<1	<1	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	0.2 F‡
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	<1	<1	<1	0.2 F‡
8260	TOLUENE	µg/L	1,000 F	<1	<1	<1	<1	<1	<1	0.1 F
8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	0.1 F
INORGANICS										
6010	ALUMINUM	µg/L	N/A	<25	83 B	104 B	---	---	---	---
010/706	ARSENIC	µg/L	10	<2	<1	1.2 BW	---	---	---	---
6010	CALCIUM	µg/L	N/A	72900	74700	72000 E	---	---	---	---
6010	CHROMIUM, TOTAL	µg/L	100 F	6.8 B	<6	<4	---	---	---	---
6010	IRON	µg/L	N/A	57	<40	<52	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	3200	2530	2110 E	---	---	---	---
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.11 B	---	---	---	---
6010	POTASSIUM	µg/L	N/A	862 B	440 B	641 B	---	---	---	---
6010	SODIUM	µg/L	N/A	8790	7880	7370 E	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	14	12	11	---	---	---	---
375.4	SULFATE	mg/L	N/A	5.3	11	7.8	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	194	181	190	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	0.6	<0.5	0.87	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	194	181	190	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	229	241	229	---	---	---	---

TABLE C-28 GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-34, MARBO ANNEX, GUAM

Sample Identifier				IRP-34	IRP-34	IRP-34	IRP-34	IRP-34	IRP-34
Sample Date				4/19/2000	10/5/2000	4/5/2001	10/3/2001	10/10/2002	4/2/2003
Sampling Round			2002	Round 10	Round 11	Round 12	Round 13	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated					
VOLATILE ORGANIC COMPOUNDS									
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	3.5 J	<5
8260	CARBON DISULFIDE	µg/L	N/A	<1	---	---	---	<1	0.6
8260	CHLOROMETHANE	µg/L	N/A	<1	1.5	2.8	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<0.1	<1	<1	0.2
8260	TOLUENE	µg/L	1,000 F	<1	<1	<0.1	0.5	<1	<1
8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	<1	0.1 F	<0.1	0.2	<1	<1
INORGANICS									
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---
010/706	ARSENIC	µg/L	10	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---
6010	CHROMIUM, TOTAL	µg/L	100 F	---	---	---	---	---	---
6010	IRON	µg/L	N/A	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---
WATER QUALITY PARAMETERS									
325.2	CHLORIDE	mg/L	N/A	9	10 B	10	---	---	---
375.4	SULFATE	mg/L	N/A	9	8.9 B	8.6	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	196	196 B	192	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5.0	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	196	196 B	192	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	231	218	---	---	---	---

TABLE C-29. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-35, MARBO ANNEX, GUAM

Sample Identifier				IRP-35	IRP-35	IRP-35	IRP-35	IRP-35	IRP-35	IRP-35
Sample Date				10/3/1996	5/14/1997	10/19/1997	4/5/1998	10/13/1998	4/10/1999	10/12/1999
Sampling Round			2002	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5
8260	BROMOMETHANE	µg/L	N/A	<1	<1	<1	<1	---	---	0.1 F‡
8260	CARBON TETRACHLORIDE	µg/L	5	---	---	---	---	---	---	---
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1
8260	DICHLORODIFLUOROMETHANE	µg/L	N/A	<1	<1	<1	<1	---	---	0.7 F
8260	METHYL ETHYL KETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	<1	0.4 J	0.4 J	0.4 J	<1	<1	0.3 F
8260	TOLUENE	µg/L	1000	<1	<1	<1	<1	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	0.8 J	0.5 J	<1	0.6 J	<1	<1	0.7 F
INORGANICS										
6010	ALUMINUM	µg/L	N/A	<25	91.9 B	104 B	---	---	---	---
6010/7041	ANTIMONY	µg/L	6 F	<2	<2	1 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	76200	78700	71200 E	---	---	---	---
6010	IRON	µg/L	N/A	96	48.7 B	<52	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	5830	5220	6110 E	---	---	---	---
6010	NICKEL	µg/L	N/A	21.3 B	<15	<5	---	---	---	---
6010	POTASSIUM	µg/L	N/A	2190 B	1130 B	1000 BE	---	---	---	---
6010	SODIUM	µg/L	N/A	19700	16400	19500 E	---	---	---	---
6010	ZINC	µg/L	N/A	57.9	47.4	26.5	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	32.4	31.3	37.1	---	---	---	---
375.4	SULFATE	mg/L	N/A	4.1	4.7	4.7	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	227	215	201	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	1.4	<0.5	1.8	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	227	215	201	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	285	301	293	---	---	---	---

TABLE C-29. GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL IRP-35, MARBO ANNEX, GUAM

Sample Identifier				IRP-35	IRP-35	IRP-35	IRP-35	IRP-35	IRP-35	IRP-35
Sample Date				4/24/2000	10/9/2000	4/9/2001	10/16/2001	5/9/2002	10/9/2002	4/21/2003
Sampling Round			2002	Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated						
VOLATILE ORGANIC COMPOUNDS										
8260	ACETONE	µg/L	N/A	<5	<5	<5	3.1	<5	<5	<5
8260	BROMOMETHANE	µg/L	N/A	---	---	0.2 F	---	---	<1	<1
8260	CARBON TETRACHLORIDE	µg/L	5	---	0.2 F	<0.1	0.2	<1	0.2 J	0.3
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	0.3	<1	<1	<1
8260	DICHLORODIFLUOROMETHANE	µg/L	N/A	<1	0.1 F	<0.1	---	---	<1	<1
8260	METHYL ETHYL KETONE	µg/L	N/A	<5	<5	<5	0.6	<5	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	<1	<1	0.2 J	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	0.3 F	0.3 F	0.3 F	0.3	<1	0.5 J	1.2
8260	TOLUENE	µg/L	1000	<1	<1	<1	0.3	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	1	1.1	1.0	1.1	0.9 J	0.8 J	2.3
INORGANICS										
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---
6010/7041	ANTIMONY	µg/L	6 F	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	IRON	µg/L	N/A	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	NICKEL	µg/L	N/A	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	ZINC	µg/L	N/A	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	50 B	35.91 B	44.6	---	---	---	---
375.4	SULFATE	mg/L	N/A	7 B	8.53 B	5.60	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	224	222 B	222	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5.0	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	224	222 B	222	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	333	297	---	---	---	---	---

TABLE C-30. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL M-5, MARBO ANNEX, GUAM

Sample Identifier				M-5	M-5	M-5
Sample Date				10/23/1996	4/27/1997	10/21/1997
Sampling Round			2002	Round 3	Round 4	Round 5
Method	Analyte	Units	USEPA MCLs			
VOLATILE ORGANIC COMPOUNDS						
8260	BROMOFORM	µg/L	N/A	<1	<1	4
8260	CARBON DISULFIDE	µg/L	N/A	22	<1	<1
8260	DIBROMOCHLOROMETHANE	µg/L	100 P	<1	<1	0.8 J
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	0.6 J	<1	<1
PESTICIDES/PCBs						
8080	DIELDRIN	µg/L	N/A	0.11	0.11	0.067
INORGANICS						
6010	ALUMINUM	µg/L	N/A	93 B	82 B	58 B
6010	CADMIUM	µg/L	5 F	1.8 B	<1	<3
6010	CALCIUM	µg/L	N/A	74800	70900	56800 E
6010	IRON	µg/L	N/A	41.3 B	<40	<52
6010/7421	LEAD	µg/L	15 TT	1.1 B	1.1 BN	1.3 B
6010	MAGNESIUM	µg/L	N/A	10700	9830	14400 E
6010	POTASSIUM	µg/L	N/A	1530 B	1340 B	2350 B
6010	SODIUM	µg/L	N/A	35600	31400	38100 E
6010	ZINC	µg/L	N/A	<12	12.6 B	<12
WATER QUALITY PARAMETERS						
325.2	CHLORIDE	mg/L	N/A	63	63	80
375.4	SULFATE	mg/L	N/A	8.8	6.4	8.7
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	216	223	182
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	1.5
310.1	ALKALINITY, TOTAL	mg/L	N/A	216	223	182
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	415	306	329

TABLE C-31. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL M-6, MARBO ANNEX, GUAM

Sample Identifier				M-6	M-6	M-6	M-6	M-6	M-6	M-6
Sample Date				10/23/1996	4/27/1997	10/19/1997	4/1/1998	11/9/1998	4/11/1999	10/14/1999
Sampling Round			2002	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	BROMOFORM	µg/L	N/A	---	---	---	---	---	---	---
8260	ETHYLBENZENE	µg/L	700	<1	<1	<1	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	<1	<1	<1	0.3 F‡
8260	NAPHTHALENE	µg/L	N/A	---	---	---	---	---	---	---
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	<1	<1	<1	<1	<1	<1	0.1 F
8260	TOLUENE	µg/L	1,000 F	<1	<1	<1	<1	<1	<1	0.3 F
INORGANICS										
6010	ALUMINUM	µg/L	N/A	89.5 B	83.9 B	97.9 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	78400	75000	70500 E	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	9980	7890	6220 E	---	---	---	---
7470	MERCURY	µg/L	2 F	0.25 B	<0.2	0.1 B	---	---	---	---
6010	POTASSIUM	µg/L	N/A	2760 B	2210 B	1770 BE	---	---	---	---
6010	SODIUM	µg/L	N/A	64400	47900	32400 E	---	---	---	---
6010	ZINC	µg/L	N/A	<12	<12	13.7 B	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	117	92.9	64	---	---	---	---
375.4	SULFATE	mg/L	N/A	17.7	9	8.7	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	200	203	203	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	1.3	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	200	203	203	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	369	307	337	---	---	---	---

TABLE C-31. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL M-6, MARBO ANNEX, GUAM

Sample Identifier				M-6	M-6	M-6	M-6	M-6	M-6
Sample Date				4/20/2000	10/16/2000	4/12/2001	10/3/2001	4/18/2002	4/3/2003
Sampling Round			2002	Round 10	Round 11	Round 12	Round 13	Round 14	Round 16
Method	Analyte	Units	USEPA MCLs	Validated					
VOLATILE ORGANIC COMPOUNDS									
8260	BROMOFORM	µg/L	N/A	---	1.5	---	---	---	<1
8260	ETHYLBENZENE	µg/L	700	<1	<1	<1	0.3	---	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<0.1	<1	0.5 J	<1
8260	NAPHTHALENE	µg/L	N/A	---	---	---	---	0.3 J	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	0.2 F	0.2 F	0.2 F	0.2	<1	<1
8260	TOLUENE	µg/L	1,000 F	<1	<1	<0.1	0.5	<1	<1
INORGANICS									
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---
6010	ZINC	µg/L	N/A	---	---	---	---	---	---
WATER QUALITY PARAMETERS									
325.2	CHLORIDE	mg/L	N/A	118	162.4 B	206.6	---	---	---
375.4	SULFATE	mg/L	N/A	16	22.27 B	30.57	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	200	208 B	208	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5.0	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	200	208 B	208	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	427	494	---	---	---	---

TABLE C-32. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL M-7, MARBO ANNEX, GUAM

Sample Identifier				M-7	M-7	M-7	M-7	M-7	M-7	M-7
Sample Date				10/23/1996	4/27/1997	10/19/1997	4/1/1998	10/13/1998	4/11/1999	10/14/1999
Sampling Round			Jun-05	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5
8260	BROMODICHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1
8260	BROMOFORM	µg/L	N/A	---	---	---	---	---	---	---
8260	CARBON DISULFIDE	µg/L	N/A	3	<1	<1	<1	<1	<1	0.6 F
8260	CHLOROMETHANE	µg/L	N/A	---	---	---	---	---	---	---
8260	DIBROMOCHLOROMETHANE	µg/L	N/A	---	---	---	---	---	---	---
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	<1	<1	<1	0.2 F‡
8260	M,P-XYLENES	µg/L	10000	<1	<1	<1	<1	<1	<1	<1
8260	NAPHTHALENE	µg/L	N/A	---	---	---	---	---	---	---
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	0.3 J	<1	<1	<1	<1	<1	0.2 F
8260	TOLUENE	µg/L	1,000 F	<1	<1	<1	<1	<1	<1	0.1 F
PESTICIDES/PCBs										
8080/8081	DIELDRIN	µg/L	N/A	0.031	0.046	0.035 P	---	---	---	---
INORGANICS										
6010	ALUMINUM	µg/L	N/A	91.3 B	70.7 B	63.3 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	73400	73700	69900 E	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	5530	5940	4880 E	---	---	---	---
7470	MERCURY	µg/L	2 F	0.3 B	<0.2	<0.1	---	---	---	---
6010	POTASSIUM	µg/L	N/A	1460 B	1380 B	1420 BE	---	---	---	---
6010	SODIUM	µg/L	N/A	21800	23000	19900 E	---	---	---	---
WATER QUALITY PARAMETERS										
325	CHLORIDE	mg/L	N/A	40.3	42.1	<1	---	---	---	---
375	SULFATE	mg/L	N/A	4.4	4	4.6	---	---	---	---
310	ALKALINITY, BICARBONATE	mg/L	N/A	203	196	194	---	---	---	---
310	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	0.87	---	---	---	---
310	ALKALINITY, TOTAL	mg/L	N/A	203	196	195	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	268	281	264	---	---	---	---

TABLE C-32. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL M-7, MARBO ANNEX, GUAM

Sample Identifier				M-7	M-7	M-7	M-7	M-7	M-7
Sample Date				4/20/2000	10/16/2000	10/3/2001	4/18/2002	10/9/2002	4/3/2003
Sampling Round			Jun-05	Round 10	Round 11	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated					
VOLATILE ORGANIC COMPOUNDS									
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	2.2 J	<5
8260	BROMODICHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	0.2
8260	BROMOFORM	µg/L	N/A	---	2.4	---	---	<1	<1
8260	CARBON DISULFIDE	µg/L	N/A	<1	---	---	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	---	0.5 F	<1	0.4	<1	<1
8260	DIBROMOCHLOROMETHANE	µg/L	N/A	---	0.2 F	---	---	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	0.4 J	<1	<1
8260	M,P-XYLENES	µg/L	10000	<1	<1	0.8	---	<1	<1
8260	NAPHTHALENE	µg/L	N/A	---	---	---	0.4	<1	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	0.3 F	0.3 F	0.3	<1	0.2 J	<1
8260	TOLUENE	µg/L	1,000 F	<1	<1	0.5	<1	<1	<1
PESTICIDES/PCBs									
8080/8081	DIELDRIN	µg/L	N/A	---	---	---	---	---	---
INORGANICS									
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---
WATER QUALITY PARAMETERS									
325	CHLORIDE	mg/L	N/A	36	61.3 B	---	---	---	---
375	SULFATE	mg/L	N/A	6	9.53 B	---	---	---	---
310	ALKALINITY, BICARBONATE	mg/L	N/A	202	210 B	---	---	---	---
310	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	---	---	---	---
310	ALKALINITY, TOTAL	mg/L	N/A	202	210 B	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	290	301	---	---	---	---

TABLE C-33. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL M-15, MARBO ANNEX, GUAM

Sample Identifier				M-15	M-15	M-15
Sample Date				10/24/1996	4/27/1997	10/21/1997
Sampling Round			2002	Round 3	Round 4	Round 5
Method	Analyte	Units	USEPA MCLs			
VOLATILE ORGANIC COMPOUNDS						
8260	CARBON DISULFIDE	µg/L	N/A	4	<1	<1
SEMIVOLATILE ORGANIC COMPOUNDS						
8270	BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	10 RL	<10	2 J	<10
PESTICIDES/PCBs						
8080	DIELDRIN	µg/L	N/A	0.055	0.034	<0.02
INORGANICS						
6010	ALUMINUM	µg/L	N/A	68 B	77 B	88 B
6010	CALCIUM	µg/L	N/A	72700	75400	73700 E
6010	CHROMIUM, TOTAL	µg/L	100 F	<6	<6	9.2 B
6010	MAGNESIUM	µg/L	N/A	7090	5520	9270 E
6010	NICKEL	µg/L	N/A	<15	<2	7.4 B
6010	POTASSIUM	µg/L	N/A	2020 B	1680 B	1270 B
6010	SODIUM	µg/L	N/A	36100	25400	27900 E
6010	ZINC	µg/L	N/A	<12	<12	14 B
WATER QUALITY PARAMETERS						
325	CHLORIDE	mg/L	N/A	66	46	50
375.4	SULFATE	mg/L	N/A	7.4	4.9	6.2
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	203	208	207
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	1.3	1
310.1	ALKALINITY, TOTAL	mg/L	N/A	203	208	207
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	12	300	335

TABLE C-34. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL MW-1, GUAM

Sample Identifier				MW-1	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1-D
Sample Date				10/9/1996	4/9/1997	10/14/1997	4/28/1998	11/7/1998	4/6/1999	4/6/1999
Sampling Round			2002	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 8
Method	Analyte	Units	USEPA MCLs							Duplicate
VOLATILE ORGANIC COMPOUNDS										
8260	2-HEXANONE	µg/L	N/A	---	---	---	---	---	---	---
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5
8260	BROMODICHLOROMETHANE	µg/L	N/A	4	1	<1	<1	<1	<1	<1
8260	BROMOMETHANE	µg/L	N/A	<1	<1	<1	---	---	---	---
8260	CARBON DISULFIDE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1
8260	CHLOROFORM	µg/L	N/A	2	<1	<1	0.3 J‡	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	---	---	---	---	---	---	---
8260	ETHYLBENZENE	µg/L	700	<1	<1	<1	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	1 J	<1	<1	<1	<1
8260	NAPHTHALENE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5	<1	<1	<1	<1	<1	<1	<1
8260	TOLUENE	µg/L	1,000 F	<1	<1	<1	<1	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	0.6 J	0.3 J	<1	0.6 J	1	0.8 J	0.8 J
INORGANICS										
6010	ALUMINUM	µg/L	N/A	129 B	72 B	141 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	72800	70600	72000 E	---	---	---	---
6010	IRON	µg/L	N/A	53	<40	<52	---	---	---	---
6010/7421	LEAD	µg/L	15 TT	1.1 B	<1	<1	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	8160	7800	7860 E	---	---	---	---
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.14 B	---	---	---	---
6010	POTASSIUM	µg/L	N/A	1050 B	1120 B	1050 B	---	---	---	---
6010	SODIUM	µg/L	N/A	25600 N	24500	22000 E	---	---	---	---
WATER QUALITY PARAMETERS										
325	CHLORIDE	mg/L	N/A	49	54	43	---	---	---	---
375.4	SULFATE	mg/L	N/A	6.6	8.1	6.1	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	215	220	209	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	0.9 J	<0.5	0.65	---	---	---	---
310	ALKALINITY, TOTAL	mg/L	N/A	215	220	209	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	333	323	303	---	---	---	---

TABLE C-34. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL MW-1, GUAM

Sample Identifier				MW-1	MW-1-D	MW-1	MW-1-D	MW-1	MW-1D	MW-1
Sample Date				10/18/1999	10/18/1999	4/20/2000	4/20/2000	10/5/2000	10/5/2000	4/12/2001
Sampling Round			2002	Round 9	Round 9 Duplicate	Round 10	Round 10 Duplicate	Round 11	Round 11 Duplicate	Round 12
Method	Analyte	Units	USEPA MCLs	Validated	Validated	Validated	Validated			
VOLATILE ORGANIC COMPOUNDS										
8260	2-HEXANONE	µg/L	N/A	---	---	---	---	---	---	---
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5
8260	BROMODICHLOROMETHANE	µg/L	N/A	<1	<1	0.3 F	0.3 F	<1	0.4 F	0.4 F
8260	BROMOMETHANE	µg/L	N/A	<1	0.1 F‡	---	---	---	---	1.7
8260	CARBON DISULFIDE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1
8260	CHLOROFORM	µg/L	N/A	<1	0.3 F	0.4 F	0.4 F	0.5 F	0.5 F	0.5 F
8260	CHLOROMETHANE	µg/L	N/A	---	---	---	---	---	---	4.4
8260	ETHYLBENZENE	µg/L	700	<1	<1	<1	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	<1	<1	0.2 F	<0.1
8260	NAPHTHALENE	µg/L	N/A	<1	0.7 F	---	---	---	---	---
8260	TETRACHLOROETHENE (PCE)	µg/L	5	<1	<1	<1	<1	<1	<1	<1
8260	TOLUENE	µg/L	1,000 F	0.2 F	<1	<1	0.5 F	<1	<1	<0.1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	0.8 F	0.8 F	1.2	1.2	1.9	1.9	<0.1
INORGANICS										
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	IRON	µg/L	N/A	---	---	---	---	---	---	---
6010/7421	LEAD	µg/L	15 TT	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS										
325	CHLORIDE	mg/L	N/A	---	---	40	40	37 B	37 B	40
375.4	SULFATE	mg/L	N/A	---	---	9	9	8.1 B	8.1 B	7.9
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	---	---	206	202	214 B	214 B	218
310.1	ALKALINITY, CARBONATE	mg/L	N/A	---	---	<2	<2	<2	<2	<5.0
310	ALKALINITY, TOTAL	mg/L	N/A	---	---	206	202	214 B	214 B	218
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	---	---	285	286	281	273	---

TABLE C-34. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL MW-1, GUAM

Sample Identifier				MW-1	MW-1D	MW-1	MW-1D	MW-1	MW-1D	MW-1	MW-1
Sample Date				10/4/2001	10/4/2001	5/22/2002	5/22/2002	10/8/2002	10/8/2002	4/2/2003	10/16/2003
Sampling Round			2002	Round 13	Round 13	Round 14	Round 14	Round 15	Round 15	Round 16	Round 17
Method	Analyte	Units	USEPA MCLs		Duplicate		Duplicate		Duplicate		
VOLATILE ORGANIC COMPOUNDS											
8260	2-HEXANONE	µg/L	N/A	---	---	<5	3.4 J	<1	<1	<1	<5
8260	ACETONE	µg/L	N/A	2.2	<5	<5	<5	<5	<5	<5	<5
8260	BROMODICHLOROMETHANE	µg/L	N/A	1.1	1.2	0.8 J	0.8 J	0.8 J	0.8 J	4.3	10.2
8260	BROMOMETHANE	µg/L	N/A	---	---	---	---	<1	<1	<1	---
8260	CARBON DISULFIDE	µg/L	N/A	<1	<1	<1	<1	<1	<1	0.5	<1
8260	CHLOROFORM	µg/L	N/A	1	1	0.6 J	0.6 J	0.7 J	0.7 J	3	9
8260	CHLOROMETHANE	µg/L	N/A	0.4	0.2	<1	<1	<1	<1	<1	<1
8260	ETHYLBENZENE	µg/L	700	---	0.3	---	---	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	0.4 J	0.3 J	0.2 J	<1	0.2	<1
8260	NAPHTHALENE	µg/L	N/A	<1	<1	0.4 J	0.4 J	<1	<1	<1	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5	0.2	0.2	<1	<1	0.2 J	0.2 J	<1	<1
8260	TOLUENE	µg/L	1,000 F	0.5	0.5	<1	<1	<1	<1	<1	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	2.6	2.7	0.9 J	0.9 J	1.1	1.1	0.4	<1
INORGANICS											
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---	---
6010	IRON	µg/L	N/A	---	---	---	---	---	---	---	---
6010/7421	LEAD	µg/L	15 TT	---	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS											
325	CHLORIDE	mg/L	N/A	---	---	---	---	---	---	---	---
375.4	SULFATE	mg/L	N/A	---	---	---	---	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	---	---	---	---	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	---	---	---	---	---	---	---	---
310	ALKALINITY, TOTAL	mg/L	N/A	---	---	---	---	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	---	---	---	---	---	---	---	---

TABLE C-35. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL MW-2, MARBO ANNEX, GUAM

Sample Identifier				MW-2	MW-2-D	MW-2	MW-2	MW-2-D	MW-2	MW-2-D	MW-2	MW-2-D
Sample Date				10/9/1996	10/9/1996	12/19/1996	4/9/1997	4/9/1997	10/20/1997	10/20/1997	4/28/1998	4/28/1998
Sampling Round			2002	Round 3	Round 3		Round 4	Round 4	Round 5	Round 5	Round 6	Round 6
Method	Analyte	Units	USEPA MCLs		Duplicate			Duplicate		Duplicate		Duplicate
VOLATILE ORGANIC COMPOUNDS												
8260	1,2,4-TRICHLOROBENZENE	µg/L	N/A	<1	<1		<1	<1	<1	<1	---	---
8260	ACETONE	µg/L	N/A	<5	<5		<5	<5	<5	<5	<5	<5
8260	BROMODICHLOROMETHANE	µg/L	N/A	---	---		---	---	---	---	---	---
8260	BROMOMETHANE	µg/L	N/A	<1	<1		<1	<1	<1	<1	---	---
8260	CHLOROFORM	µg/L	N/A	<1	<1		<1	<1	<1	<1	0.7 J‡	0.7 J‡
8260	CHLOROMETHANE	µg/L	N/A	<1	<1		<1	<1	<1	<1	<1	<1
8260	DIBROMOCHLOROMETHANE	µg/L	N/A	---	---		---	---	---	---	---	---
8260	METHYLENE CHLORIDE	µg/L	N/A	---	---		---	---	---	---	---	---
8260	NAPHTHALENE	µg/L	N/A	<1	<1		<1	<1	<1	<1	<1	<1
8260	TOLUENE	µg/L	1,000 F	<1	<1		<1	<1	<1	<1	<1	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5		---		---	---	---	---	---	---
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	4	**5**	4.6	4	4	0.8 J	0.8 J	0.4 J	0.4 J
524.2	1,1 - DICHLOROETHYLENE	µg/L	7			ND						
524.2	TRICHLOROETHYLENE	µg/L	5			1						
524.2	TETRACHLOROETHYLENE	µg/L	5			ND						
SEMIVOLATILE ORGANIC COMPOUNDS												
8270	BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	10 RL	<10	<10		**20 B**	<10	<10	<10	---	---
INORGANICS												
6010	ALUMINUM	µg/L	N/A	95 B	89 B		84 B	82 B	108 B	81 B	---	---
6010/7041	ANTIMONY	µg/L	6 F	<2	<2		<2	<2	1.2 B	<1	---	---
6010	CALCIUM	µg/L	N/A	71100	71400		70300	71300	70700 E	70500 E	---	---
6010	MAGNESIUM	µg/L	N/A	8410	8350		8790	8830	8100 E	8180 E	---	---
6010	POTASSIUM	µg/L	N/A	1420 B	1360 B		1550 B	1510 B	1050 BE	994 BE	---	---
6010/7740	SELENIUM	µg/L	50 F	1.3 B	1.2 B		<1	<1	<0.7	<0.7	---	---
6010	SODIUM	µg/L	N/A	39700 N	39000 N		42000	42800	21600 E	21600 E	---	---
6010	ZINC	µg/L	N/A	19.1 B	53.1		<12	22.3	<12	<12	---	---
WATER QUALITY PARAMETERS												
325	CHLORIDE	mg/L	N/A	67	67		65	65	37	37	---	---
375	SULFATE	mg/L	N/A	31	30		42	41	11	12	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	216	213		215	215	210	212	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5		<0.5	<0.5	0.82	0.55	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	216	213		215	215	210	212	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	393	396		402	394	308	319	---	---

TABLE C-35. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL MW-2, MARBO ANNEX, GUAM

Sample Identifier				MW-2
Sample Date				11/17/1998
Sampling Round			2002	Round 7
Method	Analyte	Units	USEPA MCLs	
VOLATILE ORGANIC COMPOUNDS				
8260	1,2,4-TRICHLOROBENZENE	µg/L	N/A	---
8260	ACETONE	µg/L	N/A	<5
8260	BROMODICHLOROMETHANE	µg/L	N/A	---
8260	BROMOMETHANE	µg/L	N/A	---
8260	CHLOROFORM	µg/L	N/A	<1
8260	CHLOROMETHANE	µg/L	N/A	<1
8260	DIBROMOCHLOROMETHANE	µg/L	N/A	---
8260	METHYLENE CHLORIDE	µg/L	N/A	---
8260	NAPHTHALENE	µg/L	N/A	<1
8260	TOLUENE	µg/L	1,000 F	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5	---
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	<1
524.2	1,1 - DICHLOROETHYLENE	µg/L	7	
524.2	TRICHLOROETHYLENE	µg/L	5	
524.2	TETRACHLOROETHYLENE	µg/L	5	
SEMIVOLATILE ORGANIC COMPOUNDS				
8270	BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	10 RL	---
INORGANICS				
6010	ALUMINUM	µg/L	N/A	---
6010/7041	ANTIMONY	µg/L	6 F	---
6010	CALCIUM	µg/L	N/A	---
6010	MAGNESIUM	µg/L	N/A	---
6010	POTASSIUM	µg/L	N/A	---
6010/7740	SELENIUM	µg/L	50 F	---
6010	SODIUM	µg/L	N/A	---
6010	ZINC	µg/L	N/A	---
WATER QUALITY PARAMETERS				
325	CHLORIDE	mg/L	N/A	---
375	SULFATE	mg/L	N/A	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	---

TABLE C-35. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL MW-2, MARBO ANNEX, GUAM

Sample Identifier				MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2
Sample Date				4/6/1999	10/14/1999	4/27/2000	10/12/2000	4/16/2001	10/4/2001	5/22/2002	10/8/2002	4/22/2003
Sampling Round			2002	Round 8	Round 9	Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs		Validated	Validated						
VOLATILE ORGANIC COMPOUNDS												
8260	1,2,4-TRICHLOROBENZENE	µg/L	N/A	---	0.1 F	---	---	---	---	---	<1	<1
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	1.6	1.2 J	<5	<5
8260	BROMODICHLOROMETHANE	µg/L	N/A	---	---	---	1.1	11	3.9	<1	<1	<1
8260	BROMOMETHANE	µg/L	N/A	---	0.2 F	---	---	0.5 F	---	---	<1	<1
8260	CHLOROFORM	µg/L	N/A	<1	<1	1.2	2.8	18.4	7.8	0.3 J	0.2 J	<1
8260	CHLOROMETHANE	µg/L	N/A	<1	0.5 F	<1	2.7	2.5	<1	<1	<1	<1
8260	DIBROMOCHLOROMETHANE	µg/L	N/A	---	---	---	---	0.2 F	---	---	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	---	---	---	0.2 F	0.1 F	<1	<1	0.2 J	<1
8260	NAPHTHALENE	µg/L	N/A	<1	0.8 F	---	---	---	<1	<1	<1	<1
8260	TOLUENE	µg/L	1,000 F	<1	0.2 F	0.6 F	<1	<0.1	<1	<1	<1	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5	---	---	---	0.2 F	<0.1	<1	<1	0.2 J	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	1	2.6	4.9	**5.4**	2.2	**5.8**	**5.7**	**6**	1.5
524.2	1,1 - DICHLOROETHYLENE	µg/L	7									
524.2	TRICHLOROETHYLENE	µg/L	5									
524.2	TETRACHLOROETHYLENE	µg/L	5									
SEMIVOLATILE ORGANIC COMPOUNDS												
8270	BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	10 RL	---	---	---	---	---	---	---	---	---
INORGANICS												
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---	---	---
6010/7041	ANTIMONY	µg/L	6 F	---	---	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---
6010/7740	SELENIUM	µg/L	50 F	---	---	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---	---	---
6010	ZINC	µg/L	N/A	---	---	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS												
325	CHLORIDE	mg/L	N/A	---	---	14 B	14 B	22	---	---	---	---
375	SULFATE	mg/L	N/A	---	---	5 B	5.1 B	6	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	---	---	213	210 B	210	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	---	---	<2	<2	<5.0	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	---	---	213	210 B	210	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	---	---	241	241	---	---	---	---	---

TABLE C-35. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL MW-2, MARBO ANNEX, GUAM

Sample Identifier				MW-2
Sample Date				10/16/2003
Sampling Round			2002	Round 17
Method	Analyte	Units	USEPA MCLs	
VOLATILE ORGANIC COMPOUNDS				
8260	1,2,4-TRICHLOROBENZENE	µg/L	N/A	<1
8260	ACETONE	µg/L	N/A	<5
8260	BROMODICHLOROMETHANE	µg/L	N/A	<1
8260	BROMOMETHANE	µg/L	N/A	---
8260	CHLOROFORM	µg/L	N/A	<1
8260	CHLOROMETHANE	µg/L	N/A	<1
8260	DIBROMOCHLOROMETHANE	µg/L	N/A	---
8260	METHYLENE CHLORIDE	µg/L	N/A	<1
8260	NAPHTHALENE	µg/L	N/A	<1
8260	TOLUENE	µg/L	1,000 F	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5	<1
8260	TRICHLOROETHENE (TCE)	µg/L	5 F	0.9 J
524.2	1,1 - DICHLOROETHYLENE	µg/L	7	
524.2	TRICHLOROETHYLENE	µg/L	5	
524.2	TETRACHLOROETHYLENE	µg/L	5	
SEMIVOLATILE ORGANIC COMPOUNDS				
8270	BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	10 RL	---
INORGANICS				
6010	ALUMINUM	µg/L	N/A	---
6010/7041	ANTIMONY	µg/L	6 F	---
6010	CALCIUM	µg/L	N/A	---
6010	MAGNESIUM	µg/L	N/A	---
6010	POTASSIUM	µg/L	N/A	---
6010/7740	SELENIUM	µg/L	50 F	---
6010	SODIUM	µg/L	N/A	---
6010	ZINC	µg/L	N/A	---
WATER QUALITY PARAMETERS				
325	CHLORIDE	mg/L	N/A	---
375	SULFATE	mg/L	N/A	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	---

TABLE C-36. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL MW-3, GUAM

Sample Identifier				MW-3	MW-3	MW-3	MW-3	MW-3	MW-3	MW-3
Sample Date				10/9/1996	4/22/1997	10/14/1997	4/28/1998	10/14/1998	4/6/1999	4/20/2000
Sampling Round			2002	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 10
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	BROMODICHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1
8260	CHLOROFORM	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5	---	---	---	---	---	---	---
8260	TOLUENE	µg/L	1000	<1	<1	<1	<1	<1	<1	<1
INORGANICS										
6010	ALUMINUM	µg/L	N/A	121 B	73 B	106 B	---	---	---	---
6010	ANTIMONY	µg/L	6 F	<2	<2	1.2 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	74100	80500	74700 E	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	7620	8380	7500 E	---	---	---	---
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.12 B	---	---	---	---
6010	POTASSIUM	µg/L	N/A	1210 B	1330 B	1400 B	---	---	---	---
6010	SODIUM	µg/L	N/A	15100 N	16400	15100 E	---	---	---	---
6010/7740	SELENIUM	µg/L	50 F	<1	<1	0.76 B	---	---	---	---
WATER QUALITY PARAMETERS										
325	CHLORIDE	mg/L	N/A	28	29	27	---	---	---	26
375.4	SULFATE	mg/L	N/A	5	4.8	4.5	---	---	---	6
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	228	229	222	---	---	---	216
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	0.57	---	---	---	<2
310.1	ALKALINITY, TOTAL	mg/L	N/A	228	229	222	---	---	---	216
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	312	282	288	---	---	---	266

TABLE C-36. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL MW-3, GUAM

Sample Identifier				MW-3	MW-3	MW-3	MW-3	MW-3	MW-3
Sample Date				10/5/2000	4/12/2001	10/4/2001	5/22/2002	10/8/2002	4/2/2003
Sampling Round			2002	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs						
VOLATILE ORGANIC COMPOUNDS									
8260	BROMODICHLOROMETHANE	µg/L	N/A	<1	<1	0.2	<1	0.2 J	<1
8260	CHLOROFORM	µg/L	N/A	<1	<1	0.2	<1	0.2 J	<1
8260	CHLOROMETHANE	µg/L	N/A	1.4	0.2 F	0.3	0.5 J	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	<1	0.2 J	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5	0.2 F	0.2 F	0.2	<1	0.2 J	<1
8260	TOLUENE	µg/L	1000	<1	<1	0.5	<1	<1	<1
INORGANICS									
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---
6010	ANTIMONY	µg/L	6 F	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---
6010/7740	SELENIUM	µg/L	50 F	---	---	---	---	---	---
WATER QUALITY PARAMETERS									
325	CHLORIDE	mg/L	N/A	24 B	25	---	---	---	---
375.4	SULFATE	mg/L	N/A	5.6 B	5.4	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	222 B	218	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<5.0	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	222 B	218	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	262	---	---	---	---	---

TABLE C-37. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL MW-5, MARBO ANNEX, GUAM

Sample Identifier				MW-5	MW-5	MW-5	MW-5	MW-5	MW-5	MW-5
Sample Date				10/9/1996	4/2/1997	10/14/1997	4/28/1998	10/14/1998	4/6/1999	10/18/1999
Sampling Round			2002	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	CARBON DISULFIDE	µg/L	N/A	4	<1	<1	<1	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	---	---	---	---	---	---	---
8260	ETHYLBENZENE	µg/L	700	<1	<1	<1	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	<1	<1	<1	0.1 F‡
8260	TOLUENE	µg/L	1,000 F	<1	0.3 J	<1	<1	<1	<1	0.1 F
8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1
INORGANICS										
6010	ALUMINUM	µg/L	N/A	72 B	65 B	120 B	---	---	---	---
6010	ANTIMONY	µg/L	6 F	<2	<2	1 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	55200	56100	56200 E	---	---	---	---
6010/7421	LEAD	µg/L	15 TT	<1	<1	2.2 B	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	10100	11200	11700 E	---	---	---	---
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.23 B	---	---	---	---
6010	POTASSIUM	µg/L	N/A	983 B	1030 B	1260 B	---	---	---	---
6010/7740	SELENIUM	µg/L	50 F	1.6 B	<1	1 B	---	---	---	---
6010	SODIUM	µg/L	N/A	25600 N	23600	30400 E	---	---	---	---
WATER QUALITY PARAMETERS										
325	CHLORIDE	mg/L	N/A	51	45	57	---	---	---	---
375.4	SULFATE	mg/L	N/A	5.9	7.9	8.1	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	193	186	178	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	0.49	---	---	---	---
310	ALKALINITY, TOTAL	mg/L	N/A	193	186	178	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	301	264	279	---	---	---	---

TABLE C-37. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL MW-5, MARBO ANNEX, GUAM

Sample Identifier				MW-5	MW-5	MW-5	MW-5	MW-5	MW-5	MW-5
Sample Date				4/20/2000	10/5/2000	4/12/2001	10/4/2001	4/18/2002	10/8/2002	4/2/2003
Sampling Round			2002	Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated						
VOLATILE ORGANIC COMPOUNDS										
8260	CARBON DISULFIDE	µg/L	N/A	<1	---	---	---	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	---	1.0	<0.2	0.2	<1	<1	<1
8260	ETHYLBENZENE	µg/L	700	<1	<1	<1	0.3	---	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<0.1	<1	<1	0.2 J	<1
8260	TOLUENE	µg/L	1,000 F	<1	<1	<0.1	0.5	<1	<1	<1
8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	<1	<1	<1	0.2	<1	<1	<1
INORGANICS										
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---
6010	ANTIMONY	µg/L	6 F	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---
6010/7421	LEAD	µg/L	15 TT	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---
6010/7740	SELENIUM	µg/L	50 F	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS										
325	CHLORIDE	mg/L	N/A	48	45 B	46	---	---	---	---
375.4	SULFATE	mg/L	N/A	8	7.4 B	7.7	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	174	190 B	186	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5.0	---	---	---	---
310	ALKALINITY, TOTAL	mg/L	N/A	174	190 B	186	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	264	255	---	---	---	---	---

TABLE C-38. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL MW-6, MARBO ANNEX, GUAM

Sample Identifier				MW-6	MW-6	MW-6	MW-6	MW-6	MW-6	MW-6
Sample Date				10/9/1996	4/2/1997	10/14/1997	4/26/1998	10/14/1998	4/6/1999	10/18/1999
Sampling Round			2002	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	BROMOMETHANE	µg/L	N/A	<1	<1	<1	---	---	---	0.2 F‡
8260	CARBON DISULFIDE	µg/L	N/A	3	<1	<1	<1	<1	<1	0.6 F
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	0.6 JB‡	<1	<1	0.2 F‡
8260	NAPHTHALENE	µg/L	N/A	---	---	---	---	---	---	---
8260	TOLUENE	µg/L	1,000 F	<1	0.4 J	<1	<1	<1	<1	0.1 F
8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	<1	<1	<1	0.2 J	<1	<1	0.1 F
INORGANICS										
6010	ALUMINUM	µg/L	N/A	81 B	66 B	100 B	---	---	---	---
6010	ANTIMONY	µg/L	6 F	<2	<2	1.5 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	62100	57700	57600 E	---	---	---	---
6010/7421	LEAD	µg/L	15 TT	<1	<1	1.6 B	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	9770	10200	10000 E	---	---	---	---
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.19 B	---	---	---	---
6010	POTASSIUM	µg/L	N/A	939 B	1050 B	1250 B	---	---	---	---
6010/7740	SELENIUM	µg/L	50 F	2.1 BW	<1	<0.7	---	---	---	---
6010	SODIUM	µg/L	N/A	23600 N	26300	31800 E	---	---	---	---
WATER QUALITY PARAMETERS										
325	CHLORIDE	mg/L	N/A	45	66	65	---	---	---	---
375	SULFATE	mg/L	N/A	6.1	10	8.4	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	207	186	182	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	0.49	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	207	186	182	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	214	293	279	---	---	---	---

TABLE C-38. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL MW-6, MARBO ANNEX, GUAM

Sample Identifier				MW-6	MW-6	MW-6	MW-6	MW-6	MW-6	MW-6
Sample Date				4/20/2000	10/5/2000	4/12/2001	10/4/2001	4/18/2002	10/8/2002	4/2/2003
Sampling Round			2002	Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated						
VOLATILE ORGANIC COMPOUNDS										
8260	BROMOMETHANE	µg/L	N/A	---	---	<0.1	---	---	<1	<1
8260	CARBON DISULFIDE	µg/L	N/A	<1	---	---	---	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	<1	0.8 F	<0.2	0.3	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<0.1	<1	0.3 J	0.2 J	<1
8260	NAPHTHALENE	µg/L	N/A	---	---	---	---	0.3 J	<1	<1
8260	TOLUENE	µg/L	1,000 F	<1	<1	<0.1	0.6	<1	<1	<1
8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	<1	<1	<0.1	<1	<1	<1	<1
INORGANICS										
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---
6010	ANTIMONY	µg/L	6 F	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---
6010/7421	LEAD	µg/L	15 TT	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---
6010/7740	SELENIUM	µg/L	50 F	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS										
325	CHLORIDE	mg/L	N/A	58	68 B	73	---	---	---	---
375	SULFATE	mg/L	N/A	10	10 B	11	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	186	186 B	190	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5.0	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	186	186 B	190	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	283	294	---	---	---	---	---

TABLE C-39. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL MW-7, MARBO ANNEX, GUAM

Sample Identifier				MW-7	MW-7	MW-7	MW-7	MW-7	MW-7	MW-7
Sample Date				10/9/1996	4/2/1997	10/14/1997	4/26/1998	10/14/1998	4/6/1999	10/18/1999
Sampling Round			2002	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	CARBON DISULFIDE	µg/L	N/A	16	<1	<1	<1	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	---	---	---	---	---	---	---
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<1	0.9 JB‡	<1	<1	<1
8260	TOLUENE	µg/L	1,000 F	<1	0.4 J	<1	<1	<1	<1	<1
8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	<1	<1	<1	0.1 J	<1	<1	<1
SEMIVOLATILE ORGANIC COMPOUNDS										
8270	BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	10 RL	3 J	<10	**71 B**	---	---	---	---
INORGANICS										
6010	ALUMINUM	µg/L	N/A	53 B	71 B	113 B	---	---	---	---
6010	CALCIUM	µg/L	N/A	46100	61100	59700 E	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	9640	11000	9770 E	---	---	---	---
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.14 B	---	---	---	---
6010	POTASSIUM	µg/L	N/A	850 B	1090 B	965 B	---	---	---	---
6010	SELENIUM	µg/L	50 F	1.5 B	<1	<0.7	---	---	---	---
6010	SODIUM	µg/L	N/A	20600 N	25400	24200 E	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	45	47	44	---	---	---	---
375.4	SULFATE	mg/L	N/A	6.6	16	3.2	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	185	184	186	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	0.61	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	185	184	186	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	276	276	223	---	---	---	---

TABLE C-39. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL MW-7, MARBO ANNEX, GUAM

Sample Identifier				MW-7	MW-7	MW-7	MW-7	MW-7	MW-7	MW-7
Sample Date				4/20/2000	10/5/2000	4/12/2001	10/4/2001	4/18/2002	10/8/2002	4/2/2003
Sampling Round			2002	Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated						
VOLATILE ORGANIC COMPOUNDS										
8260	CARBON DISULFIDE	µg/L	N/A	<1	---	---	---	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	---	---	---	---	0.3 J	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	<1	<1	<0.1	<1	<1	0.2 J	<1
8260	TOLUENE	µg/L	1,000 F	<1	<1	<0.1	<1	<1	<1	<1
8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	<1	<1	<0.1	<1	<1	<1	<1
SEMIVOLATILE ORGANIC COMPOUNDS										
8270	BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	10 RL	---	---	---	---	---	---	---
INORGANICS										
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---
6010	SELENIUM	µg/L	50 F	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	37	46 B	46	---	---	---	---
375.4	SULFATE	mg/L	N/A	7	8.3 B	8	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	184	192 B	192	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5.0	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	184	192 B	192	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	250	253	---	---	---	---	---

TABLE C-40. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL MW-8, MARBO ANNEX, GUAM

Sample Identifier				MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8
Sample Date				10/9/1996	4/2/1997	10/14/1997	4/28/1998	10/14/1998	4/6/1999	10/18/1999
Sampling Round			2002	Round 3	Round 4	Round 5	Round 6	Round 7	Round 8	Round 9
Method	Analyte	Units	USEPA MCLs							Validated
VOLATILE ORGANIC COMPOUNDS										
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5	<5
8260	BROMOMETHANE	µg/L	N/A	<1	<1	<1	---	---	---	0.1 F
8260	CARBON DISULFIDE	µg/L	N/A	9	<1	<1	<1	<1	<1	<0.1
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	---	---	---	---	---	---	---
8260	TOLUENE	µg/L	1,000 F	<1	<1	<1	<1	<1	<1	0.2 F
INORGANICS										
6010	ALUMINUM	µg/L	N/A	77 B	92 B	129 B	---	---	---	---
6010	ANTIMONY	µg/L	6 F	3.6 B	<2	<1	---	---	---	---
6010	CALCIUM	µg/L	N/A	56200	63100	64100 E	---	---	---	---
6010/7421	LEAD	µg/L	15 TT	<1	<1	1.2 B	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	10400	10200	9760 E	---	---	---	---
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.22 B	---	---	---	---
6010	POTASSIUM	µg/L	N/A	1180 B	1080 B	1100 B	---	---	---	---
6010/7740	SELENIUM	µg/L	50 F	1.5 B	<1	<0.7	---	---	---	---
6010	SODIUM	µg/L	N/A	32600 N	26800	23100 E	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	71	46	43	---	---	---	---
375.4	SULFATE	mg/L	N/A	7.6	9.7	6.1	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	186	192	201	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	0.88	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	186	192	201	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	327	284	241	---	---	---	---

TABLE C-40. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL MW-8, MARBO ANNEX, GUAM

Sample Identifier				MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8
Sample Date				4/20/2000	10/5/2000	4/12/2001	10/4/2001	4/18/2002	10/8/2002	4/2/2003
Sampling Round			2002	Round 10	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs	Validated						
VOLATILE ORGANIC COMPOUNDS										
8260	ACETONE	µg/L	N/A	<5	<5	<5	1.5	<5	<1	<1
8260	BROMOMETHANE	µg/L	N/A	<1	---	<0.1	---	---	<1	<1
8260	CARBON DISULFIDE	µg/L	N/A	<1	---	---	---	<1	<1	<1
8260	CHLOROMETHANE	µg/L	N/A	<1	0.9 F	<0.1	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	---	---	---	---	0.3 J	0.2 J	<1
8260	TOLUENE	µg/L	1,000 F	<1	---	<0.1	<1	<1	<1	<1
INORGANICS										
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---	---
6010	ANTIMONY	µg/L	6 F	---	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---	---
6010/7421	LEAD	µg/L	15 TT	---	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---	---
6010/7740	SELENIUM	µg/L	50 F	---	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---	---
WATER QUALITY PARAMETERS										
325.2	CHLORIDE	mg/L	N/A	39	42 B	44	---	---	---	---
375.4	SULFATE	mg/L	N/A	7	7.7 B	7.6	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	196	204 B	208	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<5.0	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	196	204 B	208	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	264	255	---	---	---	---	---

TABLE C-41. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL MW-9, MARBO ANNEX, GUAM

Sample Identifier				MW-9	MW-9	MW-9	MW-9	MW-9	MW-9
Sample Date				10/8/1996	4/2/1997	10/14/1997	4/28/1998	4/13/1999	4/20/2000
Sampling Round			2002	Round 3	Round 4	Round 5	Round 6	Round 8	Round 10
Method	Analyte	Units	USEPA MCLs						Validated
VOLATILE ORGANIC COMPOUNDS									
8260	ACETONE	µg/L	N/A	<5	<5	<5	<5	<5	<5
8260	CHLOROMETHANE	µg/L	N/A	<1	<1	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	---	---	---	---	---	---
8260	TETRACHLOROETHENE (PCE)	µg/L	5	<5	<5	<5	<5	<5	<5
INORGANICS									
6010	ALUMINUM	µg/L	N/A	82	79 B	127 B	---	---	---
6010	CALCIUM	µg/L	N/A	64900	63300	62500 E	---	---	---
6010	MAGNESIUM	µg/L	N/A	12000	11700	11300 E	---	---	---
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.19 B	---	---	---
6010	POTASSIUM	µg/L	N/A	1130	1280 B	1030 B	---	---	---
6010	SODIUM	µg/L	N/A	26900	31600	24200 E	---	---	---
WATER QUALITY PARAMETERS									
325.2	CHLORIDE	mg/L	N/A	47	47	44	---	---	53
375.4	SULFATE	mg/L	N/A	3.3	8.4	6.2	---	---	8
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	202	200	188	---	---	192
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	0.56	---	---	<2
310.1	ALKALINITY, TOTAL	mg/L	N/A	202	200	188	---	---	192
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	271	279	287	---	---	276

TABLE C-41. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL MW-9, MARBO ANNEX, GUAM

Sample Identifier				MW-9	MW-9	MW-9	MW-9	MW-9	MW-9
Sample Date				10/5/2000	4/12/2001	10/4/2001	4/18/2002	10/8/2002	4/2/2003
Sampling Round			2002	Round 11	Round 12	Round 13	Round 14	Round 15	Round 16
Method	Analyte	Units	USEPA MCLs						
VOLATILE ORGANIC COMPOUNDS									
8260	ACETONE	µg/L	N/A	<5	<5	1.9	<5	1.7	<5
8260	CHLOROMETHANE	µg/L	N/A	0.8 F	0.3 F	<1	<1	<1	<1
8260	METHYLENE CHLORIDE	µg/L	N/A	---	---	---	0.3 J	0.2	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5	0.4 F	0.4 F	---	<1	<1	<1
INORGANICS									
6010	ALUMINUM	µg/L	N/A	---	---	---	---	---	---
6010	CALCIUM	µg/L	N/A	---	---	---	---	---	---
6010	MAGNESIUM	µg/L	N/A	---	---	---	---	---	---
7470	MERCURY	µg/L	2 F	---	---	---	---	---	---
6010	POTASSIUM	µg/L	N/A	---	---	---	---	---	---
6010	SODIUM	µg/L	N/A	---	---	---	---	---	---
WATER QUALITY PARAMETERS									
325.2	CHLORIDE	mg/L	N/A	48 B	46	---	---	---	---
375.4	SULFATE	mg/L	N/A	8.3 B	7.7	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	196 B	196	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<5.0	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	196 B	196	---	---	---	---
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	266	---	---	---	---	---

TABLE C-42. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL Y-2, MARBO ANNEX, GUAM

Sample Identifier				Y-2	Y-2	Y-2
Sample Date				10/31/1996	4/20/1997	10/20/1997
Sampling Round			2002	Round 3	Round 4	Round 5
Method	Analyte	Units	USEPA MCLs			
VOLATILE ORGANIC COMPOUNDS						
8260	CARBON DISULFIDE	µg/L	N/A	13	<1	<1
8260	TETRACHLOROETHENE (PCE)	µg/L	5 F	0.3 J	<1	<1
INORGANICS						
6010	ALUMINUM	µg/L	N/A	91 B	86 B	84 B
6010	ANTIMONY	µg/L	6 F	<2	<2	1.2 B
6010	CALCIUM	µg/L	N/A	81200	85300	78300 E
6010/7421	LEAD	µg/L	15 TT	1.5 BW	<1	<1
6010	MAGNESIUM	µg/L	N/A	6790	6910	5750 E
7470	MERCURY	µg/L	2 F	<0.2	0.2 BN	<0.1
6010	POTASSIUM	µg/L	N/A	1410 BE	1290 B	1510 BE
6010	SODIUM	µg/L	N/A	13300	13700	14000 E
6010	ZINC	µg/L	N/A	11.5 B	<12	<12
WATER QUALITY PARAMETERS						
325	CHLORIDE	mg/L	N/A	22	23	24
375.4	SULFATE	mg/L	N/A	4.9	4.8	4.8
310	ALKALINITY, BICARBONATE	mg/L	N/A	212	235	225
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	0.5
310.1	ALKALINITY, TOTAL	mg/L	N/A	212	235	225
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	336	296	285

TABLE C-43. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL Y-3, MARBO ANNEX, GUAM

Sample Identifier				Y-3	Y-3	Y-3
Sample Date				10/23/1996	4/22/1997	10/14/1997
Sampling Round			2002	Round 3	Round 4	Round 5
Method	Analyte	Units	USEPA MCLs			
VOLATILE ORGANIC COMPOUNDS						
8260	CARBON DISULFIDE	µg/L	N/A	12	<1	<1
PESTICIDES/PCBs						
8080	DIELDRIN	µg/L	N/A	0.022	0.023	<0.02
INORGANICS						
6010	ALUMINUM	µg/L	N/A	116 B	87 B	144 B
6010	ANTIMONY	µg/L	6 F	<2	<2	2.1 B
6010/7060	ARSENIC	µg/L	10	<2	<2	1.3 B
6010	CALCIUM	µg/L	N/A	86900	88500	81100 E
6010	MAGNESIUM	µg/L	N/A	4890	5210	4040 E
7470	MERCURY	µg/L	2 F	<0.2	<0.2	0.17 B
6010	POTASSIUM	µg/L	N/A	1670 B	1630 B	1410 B
6010	SODIUM	µg/L	N/A	10900	11900	10800 E
6010	ZINC	µg/L	N/A	13 B	25	18 B
WATER QUALITY PARAMETERS						
325	CHLORIDE	mg/L	N/A	17	17	18
375.4	SULFATE	mg/L	N/A	5.1	4.6	4.6
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	231	231	215
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	0.6	0.72
310	ALKALINITY, TOTAL	mg/L	N/A	231	231	215
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	265	277	273

TABLE C-44. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL Y-4, MARBO ANNEX, GUAM

Sample Identifier					Y-4	Y-4	Y-4
Sample Date					10/23/1996	4/21/1997	10/14/1997
Sampling Round			2002		Round 3	Round 4	Round 5
Method	Analyte	Units	USEPA MCLs				
VOLATILE ORGANIC COMPOUNDS							
8260	CARBON DISULFIDE	µg/L	N/A		11	<1	<1
INORGANICS							
6010	ALUMINUM	µg/L	N/A		95 B	134 B	155 B
6010	ANTIMONY	µg/L	6	F	<2	<2	1.8 B
6010/7060	ARSENIC	µg/L	10		<2	<2	1.7 BW
6010	CALCIUM	µg/L	N/A		82400	84500	75800 E
6010	IRON	µg/L	N/A		<40	763	<52
6010	MAGNESIUM	µg/L	N/A		9110	10700	8130 E
7470	MERCURY	µg/L	2	F	<0.2	<0.2	0.11 B
6010	POTASSIUM	µg/L	N/A		1400 B	1420 B	1400 B
6010	SODIUM	µg/L	N/A		14300	15000	14900 E
WATER QUALITY PARAMETERS							
325	CHLORIDE	mg/L	N/A		26	24	27
375.4	SULFATE	mg/L	N/A		3.6	4.5	4.6
310	ALKALINITY, BICARBONATE	mg/L	N/A		230	234	226
310.1	ALKALINITY, CARBONATE	mg/L	N/A		<0.5	<0.5	0.83
310	ALKALINITY, TOTAL	mg/L	N/A		230	234	226
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A		286	294	284

TABLE C-45. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL Y-5, MARBO ANNEX, GUAM

Sample Identifier				Y-5	Y-5	Y-5
Sample Date				10/23/1996	4/20/1997	10/21/1997
Sampling Round			2002	Round 3	Round 4	Round 5
Method	Analyte	Units	USEPA MCLs			
VOLATILE ORGANIC COMPOUNDS						
8260	CARBON DISULFIDE	µg/L	N/A	9	<1	<1
INORGANICS						
6010	ALUMINUM	µg/L	N/A	91 B	83 B	91 B
6010/7060	ARSENIC	µg/L	10	<2	<2	1.3 BW
6010	CALCIUM	µg/L	N/A	81100	84200	80600 E
6010	MAGNESIUM	µg/L	N/A	6910	7080	6880 E
7470	MERCURY	µg/L	2 F	0.29 B	<0.2	0.1 B
6010	POTASSIUM	µg/L	N/A	2210 B	2040 B	2230 B
6010	SILVER	µg/L	N/A	<3	<4	9.3 B
6010	SODIUM	µg/L	N/A	32500	32900	33100 E
WATER QUALITY PARAMETERS						
325	CHLORIDE	mg/L	N/A	57	59	16
375.4	SULFATE	mg/L	N/A	6.7	6.5	6.2
310	ALKALINITY, BICARBONATE	mg/L	N/A	215	214	204
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<0.5	<0.5	0.86
310	ALKALINITY, TOTAL	mg/L	N/A	215	214	204
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A	335	343	333

TABLE C-46. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL Y-6, MARBO ANNEX, GUAM

Sample Identifier					Y-6	Y-6	Y-6
Sample Date					10/23/1996	4/22/1997	10/20/1997
Sampling Round			2002		Round 3	Round 4	Round 5
Method	Analyte	Units	USEPA MCLs				
VOLATILE ORGANIC COMPOUNDS							
8260	CARBON DISULFIDE	µg/L	N/A		14	<1	<1
INORGANICS							
6010	ALUMINUM	µg/L	N/A		91 B	77 B	77 B
6010	ANTIMONY	µg/L	6	F	<2	<2	1.1 B
6010	CADMIUM	µg/L	5	F	1.3 B	<1	<0.6
6010	CALCIUM	µg/L	N/A		81400	83000	77800 E
6010	IRON	µg/L	N/A		80.8	<40	<52
6010	MAGNESIUM	µg/L	N/A		4400	4530	4150 E
7470	MERCURY	µg/L	2	F	0.24 B	<0.2	0.14 B
6010	POTASSIUM	µg/L	N/A		1630 B	1700 B	1770 BE
6010	SODIUM	µg/L	N/A		12600	13000	12900 E
6010	ZINC	µg/L	N/A		14 B	<12	24
WATER QUALITY PARAMETERS							
325	CHLORIDE	mg/L	N/A		22	20	20
375.4	SULFATE	mg/L	N/A		3.9	3.6	3.7
310	ALKALINITY, BICARBONATE	mg/L	N/A		215	222	216
310.1	ALKALINITY, CARBONATE	mg/L	N/A		<0.5	<0.5	0.52
310	ALKALINITY, TOTAL	mg/L	N/A		215	222	216
160	TOTAL DISSOLVED SOLIDS	mg/L	N/A		250	275	277

TABLE C-47. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL Y-18, MARBO ANNEX, GUAM

Sample Identifier				Y-18
Sample Date				5/19/2004
Sampling Round			2002	Round 18
Method	Analyte	Units	USEPA MCLs	
VOLATILE ORGANIC COMPOUNDS				
8260	ACETONE	µg/L	N/A	2.6 J
8260	BROMODICHLOROMETHANE	µg/L	N/A	0.4 J
8260	CHLOROMETHANE	µg/L	N/A	0.2 J

TABLE C-48. GROUNDWATER ANALYTICAL RESULTS FOR PRODUCTION WELL Y-20, MARBO ANNEX, GUAM

Sample Identifier				Y-20
Sample Date				5/19/2004
Sampling Round			2002	Round 18
Method	Analyte	Units	USEPA MCLs	
VOLATILE ORGANIC COMPOUNDS				
8260	BROMODICHLOROMETHANE	µg/L	N/A	1.7
8260	CHLOROFORM	µg/L	N/A	0.7 J

TABLE D-1. GROUNDWATER ANALYTICAL RESULTS FOR EX-6, HARMON, GUAM.

				Well ID	EX-6	EX-6 Shallow	EX-6 Deep	EX-6	EX-6	EX-6	EX-6
				Sample ID				02GX6L66F	02GX6L69F	02GX6L67F	02GX6L68F
				Sample Date	4/27/2000	10/16/2000	10/16/2000	5/17/2004	5/18/2004	5/18/2004	5/18/2004
				Sampling Round	Round 10	Round 11	Round 11	Round 18	Round 18	Round 18	Round 18
				Sample Depth (feet)	320	320	415	325	446	448 (Sample 1)	448 (Sample 2)
				Sampling Method	Piston Pump	Piston Pump	Piston Pump	Piston Pump	Piston Pump	Piston Pump	Piston Pump
Method	Analyte	Units	2002 MCL								
VOLATILE ORGANIC COMPOUNDS											
SW8260	CHLOROMETHANE	µg/L	N/A	ND	ND	ND	<1	0.2 J	---	<1
SW8260	1,1-DICHLOROETHENE	µg/L	7	< 1	< 1	< 1	<1	<1	---	<1
SW8260	CIS-1,2-DICHLOROETHENE	µg/L	70	< 1	< 1	< 1	<1	<1	---	<1
SW8260	TETRACHLOROETHENE (PCE)	µg/L	5	< 1	< 1	< 1	<1	<1	---	<1
SW8260	TRICHLOROETHENE (TCE)	µg/L	5	< 1	< 1	< 1	<1	<1	---	<1
WATER QUALITY PARAMETERS											
325.2	CHLORIDE	mg/L	N/A	8 B	8.07 B	9.44 B	11	119	3460	1500
375.4	SULFATE	mg/L	N/A	3 B	3.17 B	2.93 B	---	---	---	---
310.1	ALKALINITY, BICARBONATE	mg/L	N/A	160	154 B	166 B	---	---	---	---
310.1	ALKALINITY, CARBONATE	mg/L	N/A	<2	<2	<2	---	---	---	---
310.1	ALKALINITY, TOTAL	mg/L	N/A	160	154 B	166 B	---	---	---	---
160.1	TOTAL DISSOLVED SOLIDS	mg/L	N/A	181	178	196	---	---	---	---

Notes:

MCL = EPA Maximum Contaminant Level

µg/L = micrograms per liter

mg/L = milligrams per liter

Bold/Shaded = Exceeds MCL

N/A = Not Applicable

B = Value may be affected by Laboratory contamination

J = Estimated value.

--- = Not Analyzed

TABLE D-2. GROUNDWATER ANALYTICAL RESULTS FOR GEPA HARMON MONITORING WELL (HMW) #1.

				Well ID	HMW-1	HMW-1	HMW-1	HMW-1
				Sample ID	HMW102301001	HMW010202001	02GH1L16D	02GH1L17D
				Sample Date	10/23/01	01/02/02	05/22/02	05/22/02
				Sample Depth (feet)	180.0	180.0	184.0	260.0
				Sample Method	Bailer	Bailer	Piston Pump	Piston Pump
Method	Analyte	Units	2002 MCL					
VOLATILE ORGANIC COMPOUNDS (VOCs)								
SW8260	1,1-DICHLOROETHENE (1,1-DCE)	µg/L	7		<5	<5	< 1	< 1
SW8260	CIS-1,2-DICHLOROETHENE (CIS 1,2-DCE)	µg/L	70		<5	<5	< 1	< 1
SW8260	TETRACHLOROETHENE (PCE)	µg/L	5		<5	<5	**0.4 J**	< 1
SW8260	TRICHLOROETHENE (TCE)	µg/L	5		<5	<5	< 1	< 1
WATER QUALITY PARAMETERS								
SW9056	CHLORIDE	mg/L	N/A		---	---	---	---

Notes:

MCL = EPA Maximum Contaminant Level

µg/L = micrograms per liter

mg/L = milligrams per liter

Bold/Shaded = Exceeds MCL

N/A = Not Applicable

B = Value may be affected by Laboratory contamination

J = Estimated value.

--- = Not Analyzed

PDB = Passive Diffusion Bag

TABLE D-2. GROUNDWATER ANALYTICAL RESULTS FOR GEPA HARMON MONITORING WELL (HMW) #1.

			Well ID	HMW-1	HMW-1	HMW-1	HMW-1
			Sample ID	02GH1L58F	02GH1L59F	02GH1L60F	02GH1L61F
			Sample Date	05/12/04	05/12/04	05/12/04	05/12/04
			Sample Depth (feet)	195.0	225.0	260.0	275.0
			Sample Method	Piston Pump	Piston Pump	Piston Pump	Piston Pump
Method	Analyte	Units	2002 MCL				
VOLATILE ORGANIC COMPOUNDS (VOCs)							
SW8260	1,1-DICHLOROETHENE (1,1-DCE)	µg/L	7	<1	<1	<1	<1
SW8260	CIS-1,2-DICHLOROETHENE (CIS 1,2-DCE)	µg/L	70	<1	<1	<1	<1
SW8260	TETRACHLOROETHENE (PCE)	µg/L	5	0.2 J	<1	<1	<1
SW8260	TRICHLOROETHENE (TCE)	µg/L	5	0.5 J	0.4 J	0.4 J	0.3 J
WATER QUALITY PARAMETERS							
SW9056	CHLORIDE	mg/L	N/A	126	203	257	286

Notes:

MCL = EPA Maximum Contaminant Level

µg/L = micrograms per liter

mg/L = milligrams per liter

Bold/Shaded = Exceeds MCL

N/A = Not Applicable

B = Value may be affected by Laboratory contamination

J = Estimated value.

--- = Not Analyzed

PDB = Passive Diffusion Bag

TABLE D-3. GROUNDWATER ANALYTICAL RESULTS FOR GEPA HARMON MONITORING WELL (HMW) #2.

				Well ID	HMW-2	HMW-2	HMW-2	HMW-2	HMW-2	HMW-2	HMW-2
				Sample ID		AAFB02GH220F	AAFB02GH221F	AAFB02GH222F	AAFB02GH223F	AAFB02GH224F	AAFB02GH225F
				Sample Date	6/4/2002	11/17/03	11/17/03	11/17/03	11/17/03	11/17/03	11/17/03
				Sample Horizon	Surface	A	B	C	D	E	F
				Sample Depth (feet)	180	191.4	211.4	231.4	251.4	271.4	291.4
				Sample Method	Bailer	PDB	PDB	PDB	PDB	PDB	PDB
Method	Analyte	Units	2002 MCL								
VOLATILE ORGANIC COMPOUNDS (VOCs)											
SW8260	1,1-DICHLOROETHENE (1,1-DCE)	µg/L	7	< 5	< 1	< 1	< 1	< 1	< 1	< 1
SW8260	CIS-1,2-DICHLOROETHENE (CIS 1,2-DCE)	µg/L	70	< 5	< 1	< 1	< 1	< 1	< 1	< 1
SW8260	TETRACHLOROETHENE (PCE)	µg/L	5	<5	<1	<1	<1	<1	<1	<1
SW8260	TRICHLOROETHENE (TCE)	µg/L	5	<5	<1	<1	**0.4 F**	<1	<1	<1
WATER QUALITY PARAMETERS											
SW9056	CHLORIDE	mg/L	N/A	---	0.2 F	0.2 F	0.19 F	0.24 F	0.23 F	0.19 F

Notes:

MCL = EPA Maximum Contaminant Level

µg/L = micrograms per liter

mg/L = milligrams per liter

N/A = Not Applicable

Bold/Shaded = Exceeds MCL

F = Analyte positively identified at a concentration below the Reporting Limit

B = Value may be affected by Laboratory contamination

J = Estimated value.

--- = Not Analyzed

PDB = Passive Diffusion Bag

TABLE D-4. GROUNDWATER ANALYTICAL RESULTS FOR GEPA HARMON MONITORING WELL #3 (HMW-3).

			Well ID	HMW-3	HMW-3	HMW-3	HMW-3	HMW-3	HMW-3	HMW-3
			Sample ID	AAFB02GH313F	AAFB02GH314F	AAFB02GH315F	AAFB02GH316F	AAFB02GH317F	AAFB02GH318F	AAFB02GH319F
			Sample Date	11/17/03	11/17/03	11/17/03	11/17/03	11/17/03	11/17/03	11/17/03
			Sample Horizon	A	B	C	D	E	E Dup	F
			Sample Depth (feet)	258.9	288.9	318.9	348.9	358.9	358.9	368.9
			Sample Method	PDB	PDB	PDB	PDB	PDB	PDB	PDB
Method	**Analyte**	**Units**	**2002 MCL**							
VOLATILE ORGANIC COMPOUNDS (VOCs)										
SW8260	ACETONE	µg/L	N/A	2.7 F	<5	6.5	4.3 F	2.7 F	<5	8.5
SW8260	CHLOROMETHANE	µg/L	N/A	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SW8260	1,1-DICHLOROETHENE (1,1-DCE)	µg/L	7	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SW8260	CIS-1,2-DICHLOROETHENE (CIS 1,2-DCE)	µg/L	70	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SW8260	TETRACHLOROETHENE (PCE)	µg/L	5	<1	<1	<1	<1	<1	<1	<1
SW8260	TERT-BUTYL METHYL ETHER	µg/L	20	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SW8260	TRICHLOROETHENE (TCE)	µg/L	5	<1	<1	<1	<1	<1	<1	<1
WATER QUALITY PARAMETERS										
SW9056	CHLORIDE	mg/L	N/A	0.3 F	0.2 F	<1	0.2 F	0.2 F	0.2 F	0.2 F

Notes:

MCL = EPA Maximum Contaminant Level

µg/L = micrograms per liter

mg/L = milligrams per liter

N/A = Not Applicable

Bold/Shaded = Exceeds MCL

F = Analyte positively identified at a concentration below the Reporting Limit

B = Value may be affected by Laboratory contamination

J = Estimated value.

--- = Not Analyzed

PDB = Passive Diffusion Bag

TABLE D-4. GROUNDWATER ANALYTICAL RESULTS FOR GEPA HARMON MONITORING WELL #3 (HMW-3).

			Well ID	HMW-3	HMW-3	HMW-3	HMW-3
			Sample ID	AAFB02GH3L62F	AAFB02GH3L63F	AAFB02GH3L64F	AAFB02GH3L65F
			Sample Date	05/13/04	05/13/04	05/13/04	05/13/04
			Sample Horizon	N/A	N/A	N/A	N/A
			Sample Depth (feet)	270.0	345.0	366.0	372.0
			Sample Method	Piston Pump	Piston Pump	Piston Pump	Piston Pump
Method	**Analyte**	**Units**	**2002 MCL**				
VOLATILE ORGANIC COMPOUNDS (VOCs)							
SW8260	ACETONE	µg/L	N/A	<5	<5	<5	2 J
SW8260	CHLOROMETHANE	µg/L	N/A	<1	<1	0.2 J	0.2 J
SW8260	1,1-DICHLOROETHENE (1,1-DCE)	µg/L	7	<1	<1	<1	<1
SW8260	CIS-1,2-DICHLOROETHENE (CIS 1,2-DCE)	µg/L	70	<1	<1	<1	<1
SW8260	TETRACHLOROETHENE (PCE)	µg/L	5	<1	0.3 J	<1	<1
SW8260	TERT-BUTYL METHYL ETHER	µg/L	20	0.2 J	<1	<1	<1
SW8260	TRICHLOROETHENE (TCE)	µg/L	5	0.2 J	0.2 J	<1	<1
WATER QUALITY PARAMETERS							
SW9056	CHLORIDE	mg/L	N/A	9.8	133	6,050	3,160

Notes:

MCL = EPA Maximum Contaminant Level

µg/L = micrograms per liter

mg/L = milligrams per liter

N/A = Not Applicable

Bold/Shaded = Exceeds MCL

F = Analyte positively identified at a concentration below the Reporting Limit

B = Value may be affected by Laboratory contamination

J = Estimated value.

--- = Not Analyzed

PDB = Passive Diffusion Bag

TABLE D-5 GROUNDWATER ANALYTICAL RESULTS FOR TUMON BAY SPRINGS.

Method	Analyte	Units	MCL	Sample Location / Sample Date	Hilton Onshore Spring	Marriott Onshore Spring	Reef Onshore Spring	Westin Onshore Spring	Outrigger Offshore Spring	Hyatt Offshore Spring	Wet Willie's Onshore Spring	Gun Beach Onshore Spring
VOLATILE ORGANIC COMPOUNDS (VOCs)												
SW8260	TETRACHLOROETHENE (PCE)	µg/L	5	Aug 2000	<1	<1	**4.3**	**1.1**	**5.2**	**1.2**	**4.9**	<1
				Feb/Mar 2001	<5	<5	<5	<5	<5	<5	<5	<5
				June 2001	<5	<5	<5	<5	<5	<5	<5	<5
				Aug 2001	<5	<5	**5.4**	<5	**5.0**	<5	<5	<5
SW8260	TRICHLOROETHENE (TCE)	µg/L	5	Aug 2000	<1	<1	**1.6**	**3.9**	**3.9**	<1	**3.0**	<1
				Feb/Mar 2001	<5	<5	<5	<5	<5	<5	<5	<5
				June 2001	<5	<5	<5	**5.2**	<5	<5	<5	<5
				Aug 2001	<5	<5	<5	<5	<5	<5	<5	<5
WATER QUALITY PARAMETERS												
SW9056	CHLORIDE	mg/L	250	Aug 2000	1,300	1,160	1,770	1,790	3,730	5,450	2,000	3,320
				Feb/Mar 2001	2,300	1,800	760	2,900	1,400	9,200	2,600	4,300
				June 2001	1,500	2,300	1,200	6,200	1,200	9,100	1,700	3,900
				Aug 2001	1,100	1,400	1,900	1,700	1,800	3,200	1,400	7,800

Notes: MCL = EPA Maximum Contaminant Level; µg/L = micrograms per liter; mg/L = milligrams per liter.

Bold/Shaded = Exceeds MCL

TABLE D-6 HISTORICAL ANALYTICAL RESULTS FOR TUMON-MAUI WELL.

Method	Analyte	Units	MCL	Sample Date																
				Mar-78	Apr-78	Aug-78	May-81	Feb-82	Sep-82	Feb-83	Jul-83	Dec-83	Mar-84	Jul-84	Jan-85	Apr-85	Oct-87	Jan-88	Nov-88	Feb-89
VOLATILE ORGANIC COMPOUNDS (VOCs)																				
SW8260	1,1-DICHLOROETHENE (1,1-DCE)	µg/L	**7**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA
SW8260	CIS-1,2-DICHLOROETHENE (CIS 1,2-DCE)	µg/L	**70**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA
SW8260	TRANS-1,2-DICHLOROETHENE (TRANS 1,2-DCE)	µg/L	**100**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA
SW524.2/ SW8260	TETRACHLOROETHENE (PCE)	µg/L	**5**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	**0.5**	**0.7**	**1.8**	**2.7**
SW524.2/ SW8260	TRICHLOROETHENE (TCE)	µg/L	**5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**0.5**	<0.5	**0.2**	<0.5	**2.7**	<0.5	<0.5	DNA	DNA	DNA	DNA
SW8260	ACETONE	µg/L	**5**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA
SW502.2/SW8260	CHLOROMETHANE	µg/L	**N/A**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA
SW524.2	1,1,1-TRICHLOROETHANE (1,1,1-TCA)	µg/L	**200**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA
SW601	1,1,1-TRICHLOROETHENE (1,1,1-TCE)	µg/L	**N/A**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA
SW502.2/ 524	BROMOFORM	µg/L	**N/A**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA
SW502.2/ 524	CHLORODIBROMOMETHANE	µg/L	**N/A**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA
SW502.2	BROMODICHLOROMETHANE	µg/L	**N/A**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA
WATER QUALITY PARAMETERS																				
SW9056	CHLORIDE	mg/L	**250**	SNA	SNA	SNA	SNA	SNA	SNA	SNA	SNA	SNA	SNA	SNA	SNA	48	DNA	DNA	DNA	DNA

Notes:

MCL = EPA Maximum Contaminant Level

µg/L = micrograms per liter

mg/L = milligrams per liter

N/A = Not Applicable

J = Estimated value.

SNA = Sample not analyzed for particular parameter

DNA = Data Not Available or analyte not requested

Bold/Shaded = Exceeds MCL

TABLE D-6 HISTORICAL ANALYTICAL RESULTS FOR TUMON-MAUI WELL.

Method	Analyte	Units	MCL	Sample Date																
				May-89	Sep-89	Apr-90	Aug-90	Oct-90	Jan-91	Apr-91	Jul-91	Oct-91	Jan-92	Sep-92	Oct-92	Jun-93	Aug-93	Oct-93	Mar-94	Sep-94
VOLATILE ORGANIC COMPOUNDS (VOCs)																				
SW8260	1,1-DICHLOROETHENE (1,1-DCE)	µg/L	**7**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	<0.5
SW8260	CIS-1,2-DICHLOROETHENE (CIS 1,2-DCE)	µg/L	**70**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	<0.5
SW8260	TRANS-1,2-DICHLOROETHENE (TRANS 1,2-DCE)	µg/L	**100**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	<0.5
SW524.2/ SW8260	TETRACHLOROETHENE (PCE)	µg/L	**5**	**3.7**	**5**	**4.7**	**9**	**4.4**	**6.1**	**8.3**	**4.8**	**1.7**	**2.77**	**1.5**	**0.94**	**3.1**	**2.7**	**4.58**	**7.6**	**0.9**
SW524.2/ SW8260	TRICHLOROETHENE (TCE)	µg/L	**5**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	<0.5
SW8260	ACETONE	µg/L	**5**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA
SW502.2/SW8260	CHLOROMETHANE	µg/L	**N/A**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	**1.7**
SW524.2	1,1,1-TRICHLOROETHANE (1,1,1-TCA)	µg/L	**200**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	**1.3**
SW601	1,1,1-TRICHLOROETHENE (1,1,1-TCE)	µg/L	**N/A**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA
SW502.2/ 524	BROMOFORM	µg/L	**N/A**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	**7**	**0.65**
SW502.2/ 524	CHLORODIBROMOMETHANE	µg/L	**N/A**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	**3.3**	**0.66**
SW502.2	BROMODICHLOROMETHANE	µg/L	**N/A**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	**1.1**	**DNA**
WATER QUALITY PARAMETERS																				
SW9056	CHLORIDE	mg/L	**250**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	**83**

Notes:

MCL = EPA Maximum Contaminant Level

µg/L = micrograms per liter

mg/L = milligrams per liter

N/A = Not Applicable

J = Estimated value.

SNA = Sample not analyzed for particular parameter

DNA = Data Not Available or analyte not requested

Bold/Shaded = Exceeds MCL

TABLE D-6 HISTORICAL ANALYTICAL RESULTS FOR TUMON-MAUI WELL.

Method	Analyte	Units	MCL	Sample Date															
				Dec-94	Mar-95	Apr-95	May-95	May-95	Sep-95	Sep-95	Sep-95	Dec-96	Feb-97	Feb-97	Feb-97	Feb-97	Mar-97	Oct-03	May-04
VOLATILE ORGANIC COMPOUNDS (VOCs)																			
SW8260	1,1-DICHLOROETHENE (1,1-DCE)	µg/L	**7**	**2.02**	**1.07**	**1.1**	<0.5	**1.5**	NA	NA	NA	**3**	**0.9**	**1.2**	**1.4**	**2.1**	<0.5	<1	<1
SW8260	CIS-1,2-DICHLOROETHENE (CIS 1,2-DCE)	µg/L	**70**	<0.5	DNA	<0.5	<0.5	DNA	<0.5	<0.5	<0.5	DNA	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
SW8260	TRANS-1,2-DICHLOROETHENE (TRANS 1,2-DCE)	µg/L	**100**	<0.5	DNA	<0.5	<0.5	DNA	<0.5	<0.5	<0.5	DNA	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	DNA
SW524.2/ SW8260	TETRACHLOROETHENE (PCE)	µg/L	**5**	**14.6**	**11.6**	**11.6**	**12.9**	**13.1**	**13.4**	**2.1**	**9.4**	**11**	**11.2**	**18.2**	**19.9**	**19.5**	**22.4**	0.7	0.6 J
SW524.2/ SW8260	TRICHLOROETHENE (TCE)	µg/L	**5**	<0.5	DNA	<0.5	<0.5	**0.5**	<0.5	<0.5	<0.5	DNA	**2.3**	<0.5	<0.5	<0.5	<0.5	<1	<1
SW8260	ACETONE	µg/L	**5**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	2.1 J
SW502.2/SW8260	CHLOROMETHANE	µg/L	**N/A**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	0.4 J
SW524.2	1,1,1-TRICHLOROETHANE (1,1,1-TCA)	µg/L	**200**	**7.14**	**5.22**	DNA	DNA	DNA	DNA	DNA	DNA	**1.5**	DNA	DNA	DNA	DNA	DNA	DNA	DNA
SW601	1,1,1-TRICHLOROETHENE (1,1,1-TCE)	µg/L	**N/A**	DNA	DNA	DNA	DNA	**3.7**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA
SW502.2/ 524	BROMOFORM	µg/L	**N/A**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA
SW502.2/ 524	CHLORODIBROMOMETHANE	µg/L	**N/A**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA
SW502.2	BROMODICHLOROMETHANE	µg/L	**N/A**	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA
WATER QUALITY PARAMETERS																			
SW9056	CHLORIDE	mg/L	**250**	SNA	DNA	SNA	SNA	DNA	SNA	SNA	SNA	DNA	SNA	SNA	SNA	SNA	SNA	SNA	DNA

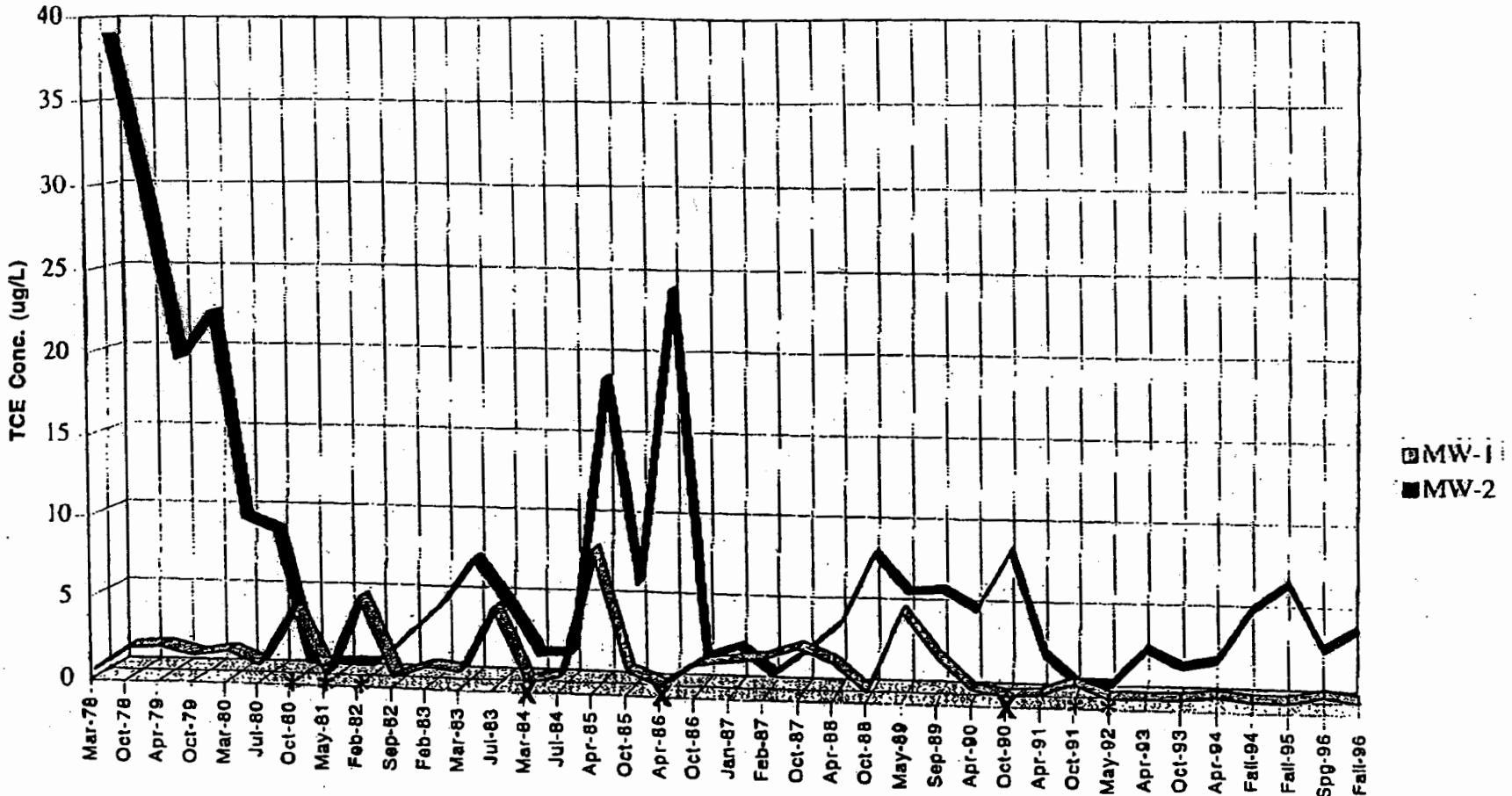
Notes:
MCL = EPA Maximum Contaminant Level
µg/L = micrograms per liter
mg/L = milligrams per liter
N/A = Not Applicable

J = Estimated value.
SNA = Sample not analyzed for particular parameter
DNA = Data Not Available or analyte not requested
Bold/Shaded = Exceeds MCL

Appendix D

Historical Groundwater Analytical Results for Sampling Points Downgradient of MARBO Annex

FIGURE D-1
TCE CONCENTRATIONS FOR MW-1, MW-2



Legend

X Sample not obtained for MW-1

* Sample not obtained for MW-2

Note: All non-detected and not sampled results are plotted as <0.5 ug/L

Appendix E

Long-Term Groundwater Monitoring Program Technical Memoranda

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

Memo

To: Joan Poland, Andersen AFB

From: Joel Lazzeri, EA Pacific

CC: Victor Wuerch, Guam EPA
Mark Ripperda, USEPA Region IX
John Q. Hill, AFCEE COR
John Sullivan, PACAF
Jim Rosacker, Booz-Allen Hamilton

Date: February 16, 1998

Re: Long-Term Groundwater Monitoring at MARBO

As per the 22 October 1997 Andersen AFB RPM Meeting please find an attached map that identifies which monitoring and production wells will remain in and which ones will be removed from the long-term groundwater monitoring program. The IRP will no longer sample the following production and monitoring wells: MW-1 through MW-3, MW-5 through MW-9, M-5, M-15, D-1, D-4, all Y-series, IRP-28 and IRP-32B. The wells that the IRP will continue to sample semi-annually, for volatile organic compounds (VOCs) will include: D-2, D-5, D-14, M-6, M-7, GPA-1, GPA-2, IRP-1, IRP-2, IRP-8, IRP-12, IRP-14, IRP-23 through IRP-27, IRP-29 through IRP-31, and IRP-33 through IRP-35. The monitoring wells around Waste Pile 7 (IRP-10, IRP-15, and IRP-16) will be sampled for VOCs, pesticides, polychlorinated biphenols (PCBs), and metals. In the event that any other constituents of concern (COCs) are detected during sampling of the Air Force (MW series) or Guam Waterworks Authority (D, M and Y-series) production wells the long-term monitoring target analyte list will be changed accordingly. If TCE or PCE concentrations increase in any of the wells, some of the wells may be added back into the long-term monitoring program. Additionally, although some of the monitoring wells will not be sampled as part of the long-term monitoring program, they will remain in place in the event that groundwater samples need to be collected from them in the future.

jjl:JJL

Encl:

MEMO

To: Gregg Ikehara, Andersen AFB
Cc: John Hill, AFCEE
Mike Knight, URS
Mike Bone, Foster Wheeler
Jim Rosacker, Unitech
From: Joel Lazzeri, EA
Subject: Variance Request to the Long Term Groundwater Monitoring Program (LTGMP) at the Main Base, Northwest Field, and MARBO Operable Units, Andersen AFB, Guam.
Date: June 5, 2001

Gregg,

Pursuant to the 17 May 2001 Remedial Project Managers (RPM) meeting in Honolulu, herein is a revised variance request to discontinue specific groundwater parameters that are analyzed as part of the Long Term Groundwater Monitoring Program (LTGMP) at Andersen AFB, Guam. After completion of the Fall 2000 groundwater sampling event at the Main Base, Northwest Field and MARBO historical data for 11 biannual groundwater sampling events were reviewed and indicated that the following parameters should be removed from the LTGMP: polychlorinated biphenyls (PCBs) by method SW8082, semivolatile organic compounds (SVOCs) by method SW8270, and total dissolved solids (TDS) by method 160.1.

As presented in the 07 May 2001 Variance Request to the LTGMP at the Main Base, Northwest Field, and MARBO Operable Units, since October 1995, the Air Force has completed 11 biannual groundwater sampling events. The complete historical records of the groundwater sampling results are presented in Appendix A of the binannual groundwater monitoring reports that are submitted to Guam Environmental Protection Agency (GEPA). The supporting rationale are summarized in the following sections:

PCBs (8082)

Since October 1995, approximately 840 discrete groundwater samples have been collected and analyzed for PCBs as part of the Andersen AFB LTGMP. To date no PCB aroclors have been detected in a single groundwater sample. It is recommended that PCBs be removed from the LTGMP.

TDS (160.1)

Since October 1995, approximately 900 discrete groundwater samples were collected and analyzed for TDS as part of the Andersen AFB LTGMP. As none of the TDS data has been used in any meaningful way it is recommended that TDS be removed from the LTGMP.

SVOCs (8270)

Since October 1995, approximately 844 discrete groundwater samples have been collected and analyzed as part of the Andersen AFB LTGMP. Approximately 400 of these groundwater samples were collected at the Main Base Operable Unit and analyzed for SVOCs by method SW8270. To date only the following three SVOC analytes have been detected in the SW8270 analyses of Main Base groundwater samples: bis(2-ethylhexyl) phthalate, naphthalene, and pyrene (Table 1).

Naphthalene was only detected in a single groundwater sample (USGS-150 duplicate), during Sample Round 5, at a concentration of 8 micrograms per liter (μg/L). Pyrene was detected in two groundwater samples (USGS-150 and USGS-150 duplicate) during Sample Round 1 (5J μg/L each) and in one groundwater sample (USGS-150) during Sample Round (2 μg/L). Naphthalene and pyrene are commonly associated with each other and other polynuclear aromatic hydrocarbons (PAHs), such as benzo(a)pyrene. The lower detection limits provided by method SW8310 versus method SW8270 make it the preferred method for analyzing PAHs.

Bis(2-ethylhexyl) phthalate was the only non-PAH analyte detected in any of the Main Base groundwater samples analyzed by method SW8270. Bis(2-ethylhexyl) phthalate was detected in groundwater samples collected during Rounds 3, 4, 5, 6, 7, 8, 9, and 10 (Table 1), but in a random arrangement. As bis(2-ethylhexyl) phthalate is used as a plasticizer it is readily available from plastic and rubber products, and is a common field or lab contaminant. In particular the bis(2-ethylhexyl) phthalate detected in samples IRP 4 and IRP 9 during Sample Round 7 (Table 1) were positively attributed to lab contamination.

Given that naphthalene and pyrene are more amenable to analysis by method SW8310 versus method SW8270, and that the occurrence of bis(2-ethylhexyl) is likely attributable to field and lab contamination, it is recommended that analysis of SVOCs by SW8270 be removed from the LTGMP.

TABLE 1. HISTORICAL
GROUNDWATER ANALYTICAL RESULTS FOR MAIN BASE SVOCs (8270) AND PAHs (8310), ANDERSEN AFB, GUAM

Sampling Event	Method	Analyte		Units	MCL 1996		USEPA Region IX PRG (1999)		IRP 3 Conc.	IRP 3Dup Conc.	IRP 4 Conc.	IRP 4 Dup Conc.	IRP 5 Conc.	IRP 6 Conc.	IRP 6 Dup Conc.	IRP 7 Conc.	IRP 9 Conc.	IRP 9 Dup Conc.
Semivolatile Organic Compounds (SVOCs) by 8270																		
Round 3	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Round 4	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	<10	<10	—	<10	<10	—	<10	<10	—
Round 5	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	**11**	<10	<10	—	<10	**3**	—	**3**	**33**	—
Round 6	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	<10	<10	—	<10	<10	—	<10	<10	—
Round 7	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	<10	**3 JB‡**	—	<10	<10	—	<10	**2 JB‡**	—
Round 8	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	<10	<10	—	**3 J**	**6 J**	—	<10	<10	—
Round 9	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	<10	<10	—	<10	<10	—	<10	<10	—
Round 10	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	<10	<10	—	**10**	<10	—	<10	<10	—
Round 5	SW8270	Naphthalene	**Also PAHs**	µg/L	—		6.2	nc	<10	<10	<10	—	<10	<10	—	<10	<10	—
Round 1	SW8270	Pyrene	**Also PAHs**	µg/L	—		180	nc	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Round 6	SW8270	Pyrene	**Also PAHs**	µg/L	—		180	nc	<10	<10	<10	—	<10	<10	—	<10	<10	—
Rounds 2 &11	SW8270	All non-detects		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Polynuclear Aromatic Hydrocarbons (PAHs) by 8310																		
Round 6	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	<0.2	<0.2	—	<0.2	<0.2	—	<0.2	<0.2	—
Round 7	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	<0.2	<0.2	—	<0.2	<0.2	—	<0.2	<0.2	—
Round 8	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	<0.2	<0.2	—	<0.2	<0.2	—	<0.2	<0.2	—
Round 9	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	<0.2	<0.2	—	<0.2	<0.2	—	<0.2	<0.2	—
Round 10	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	<0.2	<0.2	—	<0.2	<0.2	—	<0.2	<0.2	—
Round 11	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	<0.2	<0.2	—	<0.2	<0.2	—	<0.2	<0.2	—

Notes: nc=non cancerous ca=cancerous F=final ‡ = detected in blanks

TABLE 1. HISTORICAL
GROUNDWATER ANALYTICAL RESULTS FOR MAIN BASE SVOCs (8270) AND PAHs (8310), ANDERSEN AFB, GUAM

Sampling Event	Method	Analyte		Units	MCL 1996		USEPA Region IX PRG (1999)		IRP 11 Conc.	IRP 13 Conc.	IRP 17 Conc.	IRP 17 Dup Conc.	IRP 18 Conc.	IRP 19 Conc.	IRP 20 Conc.	IRP 39 Conc.	IRP 39Dup Conc.	IRP 40 Conc.	IRP 41 Conc.	IRP 41 Dup Conc.
Semivolatile Organic Compounds (SVOCs) by 8270																				
Round 3	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	<10	<10	<10	**15**	<10	<10	<10	—	<10	<10	<10
Round 4	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	<10	<10	—	**38**	**10 J**	<10	<10	—	<10	<10	<10
Round 5	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	—
Round 6	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	<10	<10	—	<10	<10	<10	<10	<10	<10	<10	—
Round 7	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	<10	<10	—	<10	**21**	<10	<10	<10	<10	<10	**4 J**
Round 8	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	**44**	**7 J**	—	<10	**4 J**	<10	<10	<10	**410 D**	**13**	**8 J**
Round 9	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	<10	<10	—	<10	**9 J**	<10	<10	<10	<10	<10	—
Round 10	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	<10	<10	—	<10	<10	<10	<10	<10	<10	<10	—
Round 5	SW8270	Naphthalene	**Also PAHs**	µg/L	—		6.2	nc	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	—
Round 1	SW8270	Pyrene		µg/L	—		180	nc	<10	<10	<10	<10	<10	<10	<10	—	—	—	—	—
Round 6	SW8270	Pyrene		µg/L	—		180	nc	<10	<10	<10	—	<10	<10	<10	<10	<10	<10	<10	—
Rounds 2 &11	SW8270	All non-detects		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Polynuclear Aromatic Hydrocarbons (PAHs) by 8310																				
Round 6	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	<0.2	<0.2	—	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	—
Round 7	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	<0.2	<0.2	—	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Round 8	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	<0.2	<0.2	—	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Round 9	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	<0.2	<0.2	—	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	—
Round 10	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	<0.2	<0.2	—	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	—
Round 11	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	<0.2	<0.2	—	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	—

Notes: nc=non cancerous ca=cancerous F=final ‡ = detected in blanks

TABLE 1. HISTORICAL
GROUNDWATER ANALYTICAL RESULTS FOR MAIN BASE SVOCs (8270) AND PAHs (8310), ANDERSEN AFB, GUAM

Sampling Event	Method	Analyte		Units	MCL 1996		USEPA Region IX PRG (1999)		IRP 42 Conc.	IRP 42 Dup Conc.	IRP 48 Conc.	IRP 48 Dup Conc.	IRP 49 Conc.	IRP 49 Dup Conc.	IRP 50 Conc.	IRP 51 Conc.	IRP 51Dup Conc.	IRP 52 Conc.
Semivolatile Organic Compounds (SVOCs) by 8270																		
Round 3	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	**4 J**	**4 J**	<10	<10	<10	<10	<10	<10	—	<10
Round 4	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	<10	<10	<10	<10	<10	<10	<10	—	<10
Round 5	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	—	<10	<10	<10	—	<10	<10	—	<10
Round 6	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	—	<10	—	<10	—	<10	<10	<10	<10
Round 7	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	—	<10	—	<10	—	<10	**58**	<10	<10
Round 8	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<11	—	<10	—	<10	—	**9 J**	<10	—	<10
Round 9	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	—	**2.5**	—	<10	—	<10	<10	<10	<10
Round 10	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	—	<10	—	<10	—	<10	<10	<10	**9**
Round 5	SW8270	Naphthalene	**Also PAHs**	µg/L	—		6.2	nc	<10		<10	<10	<10	—	<10	<10	—	<10
Round 1	SW8270	Pyrene	**Also PAHs**	µg/L	—		180	nc	—	—	—	—	—	—	—	—	—	—
Round 6	SW8270	Pyrene	**Also PAHs**	µg/L	—		180	nc	<10	—	<10	—	<10	—	<10	<10	<10	<10
Rounds 2 &11	SW8270	All non-detects		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Polynuclear Aromatic Hydrocarbons (PAHs) by 8310																		
Round 6	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	—	<0.2	—	<0.2	—	<0.2	<0.2	<0.2	<0.2
Round 7	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	—	<0.2	—	<0.2	—	<0.2	<0.2	<0.2	<0.2
Round 8	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	—	<0.2	—	<0.2	—	<0.2	<0.2	—	<0.2
Round 9	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	—	<0.2	—	<0.2	—	<0.2	<0.2	<0.2	<0.2
Round 10	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	—	<0.2	—	<0.2	—	<0.2	<0.2	<0.2	<0.2
Round 11	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	—	<0.2	—	<0.2	—	<0.2	<0.2	<0.2	<0.2

Notes: nc=non cancerous ca=cancerous F=final ‡ = detected in blanks

TABLE 1. HISTORICAL
GROUNDWATER ANALYTICAL RESULTS FOR MAIN BASE SVOCs (8270) AND PAHs (8310), ANDERSEN AFB, GUAM

Sampling Event	Method	Analyte		Units	MCL 1996		USEPA Region IX PRG (1999)		IRP 52 Dup Conc.	IRP 53 Conc.	IRP 54 Conc.	IRP 55 Conc.	IRP 56 Conc.	IRP 56 Dup Conc.	IRP 57 Conc.	IRP 57 Dup Conc.	IRP 58 Conc.	IRP 59 Conc.
Semivolatile Organic Compounds (SVOCs) by 8270																		
Round 3	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	<10	<10	<10	<10	<10	<10	—	<10	<10
Round 4	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	<10	<10	<10	<10	<10	<10	—	<10	<10
Round 5	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	<10	**5**	<10	<10	—	**3**	—	**7**	<10
Round 6	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	—	<10	<10	<10	<10	—	<10	—	<10	<10
Round 7	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	—	<10	<10	<10	<10	—	<10	—	<10	<10
Round 8	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	—	<10	<10	<10	**8 J**	—	<10	—	**4 J**	<10
Round 9	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	—	<10	<10	<10	<10	—	<10	—	<10	<10
Round 10	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	—	<10	<10	<10	<10	—	<10	—	<10	<10
Round 5	SW8270	Naphthalene	**Also PAHs**	µg/L	—		6.2	nc	<10	<10	<10	<10	<10	—	<10	—	<10	<10
Round 1	SW8270	Pyrene	**Also PAHs**	µg/L	—		180	nc	—	—	—	—	—	—	—	—	—	—
Round 6	SW8270	Pyrene	**Also PAHs**	µg/L	—		180	nc	—	<10	<10	<10	<10	—	<10	—	<10	<10
Rounds 2 &11	SW8270	All non-detects		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Polynuclear Aromatic Hydrocarbons (PAHs) by 8310																		
Round 6	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	—	<0.2	<0.2	<0.2	<0.2	—	<0.2	—	<0.2	<0.2
Round 7	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	—	<0.2	<0.2	<0.2	<0.2	—	<0.2	—	<0.2	<0.2
Round 8	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	—	<0.2	<0.2	<0.2	<0.2	—	<0.2	—	<0.2	<0.2
Round 9	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	—	<0.2	<0.2	<0.2	<0.2	—	<0.2	—	<0.2	<0.2
Round 10	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	—	<0.2	<0.2	<0.2	<0.2	—	<0.2	—	<0.2	<0.2
Round 11	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	—	<0.2	<0.2	<0.2	<0.2	—	<0.2	<0.2	<0.2	<0.2

Notes: nc=non cancerous ca=cancerous F=final ‡ = detected in blanks

TABLE 1. HISTORICAL
GROUNDWATER ANALYTICAL RESULTS FOR MAIN BASE SVOCs (8270) AND PAHs (8310), ANDERSEN AFB, GUAM

Sampling Event	Method	Analyte		Units	MCL 1996		USEPA Region IX PRG (1999)		IRP 60 Conc.	IRP 60 Dup Conc.	LF1-1 Conc.	LF1-2 Conc.	LF1-2 Dup Conc.	LF1-3 Conc.	LF1-3 Dup Conc.	LF1-4 Conc.	USGS 75 Conc.	USGS 150 Conc.	USGS 150 Dup Conc.	USGS 128 Conc.
Semivolatile Organic Compounds (SVOCs) by 8270																				
Round 3	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	––	<10	<10	<10	<10	<10	<10	<10	<10	––	<10
Round 4	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	––	<10	<10	<10	**2 J**	<10	<10	<10	<10	––	<10
Round 5	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	––	<10	<10	**14**	<10	––	<10	<10	<10	**6**	––
Round 6	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	––	<10	<10	––	<10	––	**52**	**7**	<10	<10	<10
Round 7	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	––	<10	<10	––	<10	<10	<10	<10	<10	<10	<10
Round 8	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	––	<10	<10	––	<10	––	<10	**7 J**	<10	<10	<10
Round 9	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	––	<10	**1.6 J**	––	<10	––	<10	<10	<10	<10	<10
Round 10	SW8270	Bis(2-ethylhexyl) phthalate		µg/L	6.0	F	4.8	ca	<10	<10	<10	<10	––	<10	––	<10	<10	<10	––	<10
Round 5	SW8270	Naphthalene	**Also PAHs**	µg/L	–––		6.2	nc	<10	––	<10	<10	<10	<10	––	<10	<10	<10	**8**	––
Round 1	SW8270	Pyrene	**Also PAHs**	µg/L	–––		180	nc	––	––	––	––	––	––	––	––	<10	**5 J**	**5 J**	<10
Round 6	SW8270	Pyrene	**Also PAHs**	µg/L	–––		180	nc	<10	––	<10	<10	––	<10	––	<10	<10	**2**	<10	<10
Rounds 2 &11	SW8270	All non-detects		–––	–––	––	–––	––	––	––	––	––	––	––	––	––	––	––	––	––
Polynuclear Aromatic Hydrocarbons (PAHs) by 8310																				
Round 6	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	––	<0.2	<0.2	––	<0.2		<0.2	<0.2	**1.2**	**0.93**	<0.2
Round 7	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	––	<0.2	<0.2	––	<0.2	<0.2	<0.2	<0.2	**0.21**	<0.2	<0.2
Round 8	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	––	<0.2	<0.2	––	<0.2	––	<0.2	<2	**0.55**	**0.48**	<0.2
Round 9	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	––	<0.2	<0.2	––	<0.2	––	<0.2	<0.2	**0.263**	**0.242**	<0.2
Round 10	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	<0.2	<0.2	<0.2	––	<0.2	––	<0.2	<0.2	**0.44**	––	<0.2
Round 11	SW8310	Benzo(a)pyrene		µg/L	0.2	F	0.2	ca	<0.2	<0.2	<0.2	<0.2	––	<0.2	––	<0.2	<0.2	**0.116**	––	<0.2

Notes: nc=non cancerous ca=cancerous F=final ‡ = detected in blanks

Technical Memorandum

30 July 2003

To: John Hill, AFCEE
Gregg Ikehara, Andersen AFB
Jim Rosacker, Booz-Allen Hamilton
Mark Ripperda, Region IX EPA
Victor Wuerch, GEPA

cc: Pam Moss, TTFWI
Joel Lazzeri, EA
Toraj Ghofrani, EA

From: Jeff Morrell, EA

Subject: Reduction of Monitoring Points, Sampling Frequency, and Analytical Parameters for Long-term Groundwater Monitoring at MARBO Annex Operable Unit

Pursuant to the 09 April and 10 July 2003 Remedial Program Manager (RPM) meetings, this memorandum proposes a reduction of the number of monitoring points, sampling frequency, and selected analytical parameters for the Long-term Groundwater Monitoring (LTGM) Program at the MARBO Annex Operable Unit (OU).

BACKGROUND

Groundwater monitoring was initiated in October 1995 in accordance with the approved Groundwater Monitoring Plan (GWMP) (EA, 1995). The goals of the GWMP were to:

- establish baseline groundwater elevation and water quality data at monitoring and production wells,
- evaluate the baseline data and identify critical sampling locations, install new monitoring wells in those critical sampling locations, determine monitoring frequency, and select analytical methods for a Long-term Groundwater Monitoring (LTGM) Program, and
- implement the LTGM Program.

Initially 46 monitoring and production wells were sampled on a semiannual basis and analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), pesticides, polychlorinated biphenyls (PCBs), metals, cyanide, and water quality parameters (total dissolved solids, alkalinity, chlorides, and sulfate).

In 1997, these 46 monitoring and production wells were evaluated according to criteria established

in the GWMP (EA, 1995) to determine whether they should be retained in the LTGM Program. Wells meeting the following criteria were recommended for retention:

- wells with detected target analyte concentrations at or above Applicable or Relevant and Appropriate Requirements (ARARs), including the most current *Drinking Water Standards and Health Advisories* Maximum Contaminant Levels (MCLs),
- wells located down-gradient of a potential source area, and
- wells that provide a strategic monitoring location.

A February 1998 memorandum for the MARBO Annex OU (EA, 1998), requested that 12 monitoring and production wells be removed from the LTGM Program based on a review of the trends observed from four groundwater sampling events (Fall 1995 through Spring 1997). This memorandum also requested that the analytical parameters for the remaining 34 wells (Table 1 and Figure 1) be reduced to VOCs, only, with the exception of three wells (IRP-10, IRP-15, and IRP-16) located near Waste Pile 7. In support of the remedial action (a soil cover) for Waste Pile 7, IRP-10, IRP-15, and IRP-16 were to be monitored for VOCs, PAHs, pesticides, metals, cyanide, SVOCs, PCBs, and water quality parameters. The United States Environmental Protection Agency (USEPA) and Guam Protection Agency (GEPA) approved this request. A subsequent memorandum (EA, 2001), based on the evaluation of additional data, recommended that SVOCs and PCBs be removed as analytical parameters from IRP-10, IRP-15, and IRP-16. The USEPA and GEPA approved this request.

Upon completion of the Fall 2002 groundwater sampling event there are 15 rounds of historical groundwater analytical data available for evaluation. Historical groundwater data trends support an additional reduction of total number of wells, sampling frequency, and analytical parameters at the MARBO Annex OU as outlined in the following paragraphs.

LTGM PROGRAM RECOMMENDATIONS

IRP Monitoring Wells

Five IRP monitoring wells (IRP-1, IRP-2, IRP-12, IRP-23, and IRP-26) are recommended for removal from the LTGM program. The remaining 14 IRP monitoring wells (IRP-8, IRP-10, IRP-14, IRP-15, IRP-16, IRP-24, IRP-25, IRP-27, IRP-29, IRP-30, IRP-31, IRP-33, IRP-34, and IRP-35) are recommended for retention in the LTGM program. As presented in Table 2, concentrations of VOCs in groundwater samples collected from IRP-1, IRP-2, IRP-12, IRP-23, and IRP-26 have either been non detect (ND), or have been detected at concentrations below action level (BAL). Continued sampling of these wells does not advance the current understanding of groundwater quality and dynamics at the MARBO Annex OU. Tetrachloroethene (PCE) and trichloroethene (TCE) have been detected consistently, at concentrations exceeding the MCL, in groundwater samples collected from IRP-14, IRP-29, and IRP-31. These wells are recommended for retention in the LTGM Program. VOC concentrations in groundwater samples collected from IRP-8, IRP-30, IRP-33, and IRP-34 have either been ND or BAL however, due to their strategic locations they are recommended for retention in the LTGM Program. IRP-8 is upgradient and IRP-27 is downgradient of Site 38/MARBO Laundry (PCE source). IRP-25 and IRP-30 are located adjacent to IRP-31 (TCE > MCL). IRP-24 and IRP-35 are both deep-screened groundwater monitoring wells, and IRP 33 and

IRP-34 provide upgradient monitoring points along the MARBO property. The remaining IRP monitoring wells IRP-10, IRP-15, and IRP-16 are recommended for retention due to their proximity to IRP Site 20/Waste Pile 7. Groundwater samples collected from IRP-10, IRP-15, and IRP-16 have been analyzed for VOCs, PAHs, pesticides, metals, cyanide, and water quality parameters. As presented in Table 5, concentrations of PAHs and cyanide in groundwater samples collected from IRP-10, IRP-15 and IRP-16 have been ND. Therefore only VOCs, pesticides, and metals are proposed for analysis of groundwater samples collected from IRP-10, IRP-15, and IRP-16.

Guam Waterworks Authority Production Wells

Four of the five Guam Waterworks Authority (GWA) production wells (D-2, D-5, M-6, and M-7) are recommended for removal from the LTGM program. GWA production well D-14 is recommended for retention due to its downgradient location from MARBO Annex. As presented in Table 3, VOC concentrations in groundwater samples collected from (D-2, D-5, M-6, and M-7) wells have either been ND, or have been detected at concentrations BAL. Continued sampling of these wells does not advance the current understanding of groundwater quality and dynamics at the MARBO Annex OU.

Andersen AFB Production Wells

Five of the eight Andersen AFB production wells (MW-3, MW-5, MW-6, MW-7, and MW-8) are recommended for removal from the LTGM program and three production wells (MW-1, MW-2, and MW-9) are recommended for retention. As presented in Table 4, VOC concentrations in groundwater samples collected from (MW-3, MW-5, MW-6, MW-7, and MW-8) have either been ND, or have been detected at concentrations BAL. Continued sampling of these wells does not advance the current understanding of groundwater quality and dynamics at the MARBO Annex OU. TCE has been detected consistently, at concentrations exceeding the MCL, in groundwater samples collected from MW-2. MW-9 is located downgradient of Site 38/MARBO Laundry (PCE source) and MW-1 is located adjacent to IRP-31 (TCE > MCL).

Guam Power Authority Monitoring Wells

Guam Power Authority (GPA) monitoring wells GPA-1 and GPA-2 are recommended for retention in the LTGM Program. TCE has been detected at concentrations above the MCL; seven times in GPA-1 and once in GPA-2.

Sampling Frequency

A reduction in sampling frequency from a semiannual to annual basis is recommended for the wells remaining in the LTGM Program: D-14, GPA-1, GPA-2, IRP-8, IRP-10, IRP-14, IRP-15, IRP-16, IRP-24, IRP-25, IRP-27, IRP-29, IRP-30, IRP-31, IRP-33, IRP-34, IRP-35, MW-1, MW-2, and MW-9. A review of historical groundwater elevation and analytical data indicate that there is minimal variation in between wet and dry season data. However, based on GEPA's recommendation during 10 July 2003 RPM meeting, the annual sampling will be performed in fall.

REFERENCES

EA (EA Engineering, Science and Technology, Inc.), 1995. *Final Groundwater Monitoring Plan, Andersen Air Force Base, Guam.* October 1995.

EA (EA Engineering, Science, and Technology, Inc.), 1997. *Technical Memorandum on Groundwater Pump Corrosion, Andersen AFB, Guam.* June 1997.

EA (EA Engineering, Science, and Technology, Inc.), 1998. *Long-Term Groundwater Monitoring at MARBO.* February 1998.

EA (EA Engineering, Science, and Technology, Inc.), 2001. *Variance Request to the Long Term Groundwater Monitoring Program (LTGM Program) at the Main Base, Northwest Field, and MARBO Operable Units, Andersen AFB, Guam.* June 2001.

TABLE 1. RECOMMENDED LONG-TERM GROUNDWATER MONITORING POINTS FOR MARBO ANNEX, ANDERSEN AFB, GUAM.

Well Identification	Location	Sampling Method	Well Type	Screened Interval (feet below ground surface)	Borehole Total Depth (feet below ground surface)	Concentrations Exceeding ARARs	Upgradient IRP Site Under Investigation	Downgradient Well Location Relative to IRP Site	Parameter List					
									VOCs (+MTBE)	PAHs	Pesticides	Metals	Cyanide	Water Quality
D-2	MARBO Annex	Well-head/Spigot	Production	383-418	418	No			X	-	-	-	-	-
D-5	MARBO Annex	Well-head/Spigot	Production	372-412	412	No			X	-	-	-	-	-
D-14	MARBO Annex	Well-head/Spigot	Production	330-370	375	No			X	-	-	-	-	-
GPA-1	MARBO Annex	Portable Pump	Full	Unknown	Unknown	Yes		No	X	-	-	-	-	-
GPA-2	MARBO Annex	Portable Pump	Full	Unknown	Unknown	No			X	-	-	-	-	-
IRP-1	MARBO Annex	Dedicated Pump	Shallow	276-316	320	No			X	-	-	-	-	-
IRP-02	MARBO Annex	Dedicated Pump	Shallow	360-400	404	No			X	-	-	-	-	-
IRP-08	MARBO Annex	Portable Pump	Shallow	350-390	400	No	Downgradient from Site 38/ MARBO Laundry	Yes	X	-	-	-	-	-
IRP-10	MARBO Annex	Dedicated Pump	Shallow	292-331	338	Yes	Site 20/ Waste Pile 7	Yes	X	X	X	X	X	X
IRP-12	MARBO Annex	Dedicated Pump	Shallow	329-369	376	No			X	-	-	-	-	-
IRP-14	MARBO Annex	Dedicated Pump	Shallow	362-402	412	Yes	Site 38/ MARBO Laundry	No	X	-	-	-	-	-
IRP-15	MARBO Annex	Dedicated Pump	Shallow	294-334	338	Yes	Site 20/ Waste Pile 7	Yes	X	X	X	X	X	X
IRP-16	MARBO Annex	Dedicated Pump	Shallow	281-321	326	Yes	Site 20/ Waste Pile 7	Yes	X	X	X	X	X	X
IRP-23	MARBO Annex	Dedicated Pump	Shallow	307-327	460	No			X	-	-	-	-	-
IRP-24	MARBO Annex	Portable Pump	Deep	410-430	445	No			X	-	-	-	-	-
IRP-25	MARBO Annex	Dedicated Pump	Shallow	353-373	480	No			X	-	-	-	-	-
IRP-26	MARBO Annex	Portable Pump	Shallow	310-330	460	No			X	-	-	-	-	-
IRP-27	MARBO Annex	Dedicated Pump	Shallow	324-344	460	No			X	-	-	-	-	-
IRP-29	MARBO Annex	Portable Pump	Deep	459-479	520	Yes	Site 38/ MARBO Laundry	No	X	-	-	-	-	-
IRP-30	MARBO Annex	Dedicated Pump	Shallow	349-369	480	No	Site 38/ MARBO Laundry	Yes	X	-	-	-	-	-
IRP-31	MARBO Annex	Portable Pump	Deep	445-465	480	Yes	Site 38/ MARBO Laundry	Yes	X	-	-	-	-	-
IRP-33	MARBO Annex	Dedicated Pump	Shallow	472-492	520	No	Upgradient Boundary Wells	No	X	-	-	-	-	-
IRP-34	MARBO Annex	Dedicated Pump	Deep	392-412	520	No	Upgradient Boundary Wells	No	X	-	-	-	-	-
IRP-35	MARBO Annex	Portable Pump	Deep	380-400	412	No			X	-	-	-	-	-
M-6	MARBO Annex	Well-head/Spigot	Production	320-405	405	No			X	-	-	-	-	-
M-7	MARBO Annex	Well-head/Spigot	Production	290-340	340	No			X	-	-	-	-	-
MW-1	MARBO Annex	Well-head/Spigot	Production	345-385	385	No			X	-	-	-	-	-
MW-2	MARBO Annex	Portable Pump	Production	349-379	379	Yes	Site 38/ MARBO Laundry	Yes	X	-	-	-	-	-
MW-3	MARBO Annex	Well-head/Spigot	Production	408-428	428	No			X	-	-	-	-	-
MW-5	MARBO Annex	Well-head/Spigot	Production	Unknown	475	No			X	-	-	-	-	-
MW-6	MARBO Annex	Well-head/Spigot	Production	Unknown	497	No			X	-	-	-	-	-
MW-7	MARBO Annex	Well-head/Spigot	Production	Unknown	408	No			X	-	-	-	-	-
MW-8	MARBO Annex	Well-head/Spigot	Production	Unknown	390	No			X	-	-	-	-	-
MW-9	MARBO Annex	Well-head/Spigot	Production	Unknown	472	No			X	-	-	-	-	-

Well or Analyte proposed for removal from LTGM Program

Metals - Andersen specific target analyte list

TABLE 2. HIGHEST DETECTED GROUNDWATER ANALYTICAL RESULTS FOR INSTALLATION RESTORATION PROGRAM MONITORING WELLS AT MARBO ANNEX, ANDERSEN AFB, GUAM.

Sampling Event	Method	Analyte	Units	MCL 2002	IRP-1	IRP-2	IRP-12	IRP-23	IRP-26
Volatile Organic Compounds (VOCs) by SW8260									
Round 15	SW8260	1,2,4-TRICHLOROBENZENE	µg/L	N/A					1.9
Round 9	SW8260	BROMOMETHANE	µg/L	N/A					
Round 12	SW8260	BROMOMETHANE	µg/L	N/A					
Round 3	SW8260	CARBON DISULFIDE	µg/L	N/A	11	2	0.4 J	2	0.7 J
Round 10	SW8260	CARBON DISULFIDE	µg/L	N/A		0.3 F			
Round 9	SW8260	CHLOROMETHANE	µg/L	N/A	1.0				0.3 F‡
Round 11	SW8260	CHLOROMETHANE	µg/L	N/A	9.0	0.9 F	0.9 F	0.5 F	2.0
Round 12	SW8260	CHLOROMETHANE	µg/L	N/A		5.7	4.8	6.5	6.3
Round 13	SW8260	CHLOROMETHANE	µg/L	N/A					
Round 14	SW8260	CHLOROMETHANE	µg/L	N/A	0.7 J	0.3	0.3 J	0.5 J	
Round 6	SW8260	CIS-1,2-DICHLOROETHENE	µg/L	70 F					
Round 9	SW8260	DICHLORODIFLUOROMETHANE	µg/L	N/A					
Round 11	SW8260	DICHLORODIFLUOROMETHANE	µg/L	N/A					
Round 13	SW8260	ETHYLBENZENE	µg/L	700					
Round 13	SW8260	M,P-XYLENES	µg/L	10000					
Round 13	SW8260	METHYL ETHYL KETONE	µg/L	N/A					
Round 5	SW8260	METHYLENE CHLORIDE	µg/L	N/A					
Round 6	SW8260	METHYLENE CHLORIDE	µg/L	N/A			1		
Round 9	SW8260	METHYLENE CHLORIDE	µg/L	N/A	0.1 F	0.2 F‡	0.9 F		
Round 11	SW8260	METHYLENE CHLORIDE	µg/L	N/A	0.2 F				
Round 13	SW8260	METHYLENE CHLORIDE	µg/L	N/A					
Round 15	SW8260	METHYLENE CHLORIDE	µg/L	N/A					
Round 9	SW8260	NAPHTHALENE	µg/L	N/A				0.2 F	
Round 15	SW8260	NAPHTHALENE	µg/L	N/A					3.6
Round 3	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F			0.2 J		0.6 J
Round 4	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F					0.2 J
Round 5	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F					
Round 6	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F					0.4 J
Round 7	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F					
Round 8	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F					
Round 9	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F					0.2 F
Round 10	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F					0.2 F
Round 11	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F					0.2 F
Round 12	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F					0.1 F
Round 13	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F					0.2
Round 14	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F					
Round 15	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F					
Round 9	SW8260	TOLUENE	µg/L	1,000 F	0.3 F	0.1 F‡	0.2 F		
Round 10	SW8260	TOLUENE	µg/L	1,000 F			0.5 F		
Round 13	SW8260	TOLUENE	µg/L	1,000 F	0.5	0.5	0.5	0.5	
Round 3	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 4	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					0.9 J
Round 5	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 6	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 7	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 8	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 9	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 10	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 11	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 12	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 13	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 14	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 15	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 6	SW8260	TRICHLOROFLUOROMETHANE	µg/L	N/A					

Bold/Shaded values exceeds MCL

Notes: MCL=Maximum Contaminant Level; µg/L=micrograms per liter; N/A=Not Applicable; F(MCL)=Final; J=Value is estimated; F=Analyte positively identified at a concentration below the Reporting Limit; ‡ = detected in blanks; B=Blank contamination associated with result.

TABLE 3. HIGHEST DETECTED GROUNDWATER ANALYTICAL RESULTS FOR GUAM WATERWORKS AUTHORITY PRODUCTION WELLS AT MARBO ANNEX, ANDERSEN AFB, GUAM.

Sampling Event	Method	Analyte	Units	MCL 2002	D-2	D-5	M-6	M-7
Volatile Organic Compounds (VOCs) by SW8260								
Round 13	SW8260	ACETONE	µg/L	N/A		1		
Round 15	SW8260	ACETONE	µg/L	N/A		2.5 J		2.2 J
Round 8	SW8260	BROMODICHLOROMETHANE	µg/L	N/A				
Round 15	SW8260	BROMODICHLOROMETHANE	µg/L	N/A	27.1			
Round 9	SW8260	BROMOMETHANE	µg/L	N/A				
Round 11	SW8260	BROMOFORM	µg/L	N/A			1.5	2.4
Round 3	SW8260	CARBON DISULFIDE	µg/L	N/A	17	11		3
Round 9	SW8260	CARBON DISULFIDE	µg/L	N/A				0.6 F
Round 8	SW8260	CHLOROFORM	µg/L	N/A				
Round 10	SW8260	CHLOROFORM	µg/L	N/A				
Round 15	SW8260	CHLOROFORM	µg/L	N/A	26.2			
Round 9	SW8260	CHLOROMETHANE	µg/L	N/A				
Round 11	SW8260	CHLOROMETHANE	µg/L	N/A				0.5 F
Round 14	SW8260	CHLOROMETHANE	µg/L	N/A				0.4
Round 15	SW8260	CHLOROMETHANE	µg/L	N/A	0.5			
Round 13	SW8260	ETHYLBENZENE	µg/L	700			0.3	
Round 9	SW8260	METHYLENE CHLORIDE	µg/L	N/A		0.1 F	0.3 F‡	0.2 F‡
Round 13	SW8260	METHYLENE CHLORIDE	µg/L	N/A	0.2			
Round 14	SW8260	METHYLENE CHLORIDE	µg/L	N/A	0.5 J		0.5 J	0.4 J
Round 15	SW8260	METHYLENE CHLORIDE	µg/L	N/A				
Round 14	SW8260	NAPHTHALENE	µg/L	N/A			0.3 J	0.4
Round 3	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F				0.3 J
Round 9	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F			0.1 F	0.2 F
Round 10	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F			0.2 F	0.3 F
Round 11	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F			0.2 F	0.3 F
Round 12	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F			0.2 F	
Round 13	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F			0.2	0.3
Round 15	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F				0.2 J
Round 9	SW8260	TOLUENE	µg/L	1,000 F	0.2		0.3 F	0.1 F
Round 13	SW8260	TOLUENE	µg/L	1,000 F			0.5	0.5
Round 3	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F		2		
Round 4	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F		1		
Round 5	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F		0.9 J		
Round 6	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F		0.8 J		
Round 8	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F		1 J		
Round 9	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F	0.1	1.3		
Round 10	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F	0.2 F	2		
Round 11	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F		2.2		
Round 12	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F		1.9		
Round 13	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F	0.5	2		
Round 14	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F		1.4		
Round 15	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F		1.9		
Round 3	SW8260	TRICHLOROFLUOROMETHANE	µg/L	N/A		0.2 J		
Round 4	SW8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	0.4 J	0.4 J		
Round 9	SW8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	0.3	0.4 F		
Round 10	SW8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	0.4 F	0.6 F		
Round 11	SW8260	TRICHLOROFLUOROMETHANE	µg/L	N/A		0.5 F		
Round 12	SW8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	0.4 F	0.3 F		
Round 13	SW8260	TRICHLOROFLUOROMETHANE	µg/L	N/A	0.6	0.6		
Round 14	SW8260	TRICHLOROFLUOROMETHANE	µg/L	N/A		0.4 J		
Round 15	SW8260	TRICHLOROFLUOROMETHANE	µg/L	N/A		0.5 J		

Bold/Shaded values exceeds MCL

Notes: MCL=Maximum Contaminant Level; µg/L=micrograms per liter; N/A=Not Applicable; F(MCL)=Final; J=Value is estimated; F=Analyte positively identified at a concentration below the Reporting Limit; ‡ = detected in blanks; B=Blank contamination associated with result.

TABLE 4. HIGHEST DETECTED GROUNDWATER ANALYTICAL RESULTS FOR ANDERSEN AFB PRODUCTION WELLS AT MARBO ANNEX, ANDERSEN AFB, GUAM.

Sampling Event	Method	Analyte	Units	MCL 2002	MW-3	MW-5	MW-6	MW-7	MW-8
Volatile Organic Compounds (VOCs) by SW8260									
Round 14	SW8260	2-HEXANONE	µg/L	N/A					
Round 13	SW8260	ACETONE	µg/L	N/A					1.5
Round 3	SW8260	BROMODICHLOROMETHANE	µg/L	N/A					
Round 4	SW8260	BROMODICHLOROMETHANE	µg/L	N/A					
Round 10	SW8260	BROMODICHLOROMETHANE	µg/L	N/A					
Round 11	SW8260	BROMODICHLOROMETHANE	µg/L	N/A					
Round 12	SW8260	BROMODICHLOROMETHANE	µg/L	N/A					
Round 13	SW8260	BROMODICHLOROMETHANE	µg/L	N/A	0.2				
Round 14	SW8260	BROMODICHLOROMETHANE	µg/L	N/A					
Round 15	SW8260	BROMODICHLOROMETHANE	µg/L	N/A	0.2 J				
Round 9	SW8260	BROMOMETHANE	µg/L	N/A			0.2 F‡		0.1 F
Round 12	SW8260	BROMOMETHANE	µg/L	N/A					
Round 3	SW8260	CARBON DISULFIDE	µg/L	N/A		4.0	3.0	16.0	9.0
Round 9	SW8260	CARBON DISULFIDE	µg/L	N/A			0.6 F		
Round 3	SW8260	CHLOROFORM	µg/L	N/A					
Round 6	SW8260	CHLOROFORM	µg/L	N/A					
Round 9	SW8260	CHLOROFORM	µg/L	N/A					
Round 10	SW8260	CHLOROFORM	µg/L	N/A					
Round 11	SW8260	CHLOROFORM	µg/L	N/A					
Round 12	SW8260	CHLOROFORM	µg/L	N/A					
Round 13	SW8260	CHLOROFORM	µg/L	N/A	0.2				
Round 14	SW8260	CHLOROFORM	µg/L	N/A					
Round 15	SW8260	CHLOROFORM	µg/L	N/A	0.2 J				
Round 11	SW8260	CHLOROMETHANE	µg/L	N/A	1.4	1.0	0.8 F		0.9 F
Round 12	SW8260	CHLOROMETHANE	µg/L	N/A	0.2 F				
Round 13	SW8260	CHLOROMETHANE	µg/L	N/A	0.3	0.2	0.3		
Round 14	SW8260	CHLOROMETHANE	µg/L	N/A	0.5 J			0.3 J	
Round 13	SW8260	ETHYLBENZENE	µg/L	700		0.3			
Round 5	SW8260	METHYLENE CHLORIDE	µg/L	N/A					
Round 6	SW8260	METHYLENE CHLORIDE	µg/L	N/A				0.9 JB‡	
Round 9	SW8260	METHYLENE CHLORIDE	µg/L	N/A		0.1 F‡			
Round 11	SW8260	METHYLENE CHLORIDE	µg/L	N/A					
Round 14	SW8260	METHYLENE CHLORIDE	µg/L	N/A			0.3 J		0.3 J
Round 15	SW8260	METHYLENE CHLORIDE	µg/L	N/A	0.2 J	0.2 J	0.2 J	0.2 J	0.2 J
Round 9	SW8260	NAPHTHALENE	µg/L	N/A					
Round 14	SW8260	NAPHTHALENE	µg/L	N/A			0.3 J		
Round 11	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F	0.2 F				
Round 12	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F	0.2 F				
Round 13	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F	0.2				
Round 15	SW8260	TETRACHLOROETHENE(PCE)	µg/L	5 F	0.2 J				
Round 4	SW8260	TOLUENE	µg/L	1,000 F		0.3 J	0.4 J	0.4 J	
Round 9	SW8260	TOLUENE	µg/L	1,000 F		0.1 F	0.1 F		0.2 F
Round 10	SW8260	TOLUENE	µg/L	1,000 F					
Round 13	SW8260	TOLUENE	µg/L	1,000 F	0.5	0.5	0.6		
Round 3	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 4	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 6	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 7	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 8	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 9	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 10	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 11	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 13	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 14	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 15	SW8260	TRICHLOROETHENE (TCE)	µg/L	5 F					
Round 6	SW8260	TRICHLOROFLUOROMETHANE	µg/L	N/A			0.2 J	0.1 J	
Round 9	SW8260	TRICHLOROFLUOROMETHANE	µg/L	N/A			0.1 F		
Round 13	SW8260	TRICHLOROFLUOROMETHANE	µg/L	N/A		0.2			

Bold/Shaded values exceeds MCL

Notes: MCL=Maximum Contaminant Level; µg/L=micrograms per liter; N/A=Not Applicable; F(MCL)=Final; J=Value is estimated; F=Analyte positively identified at a concentration below the Reporting Limit; ‡ = detected in blanks; B=Blank contamination associated with result.

TABLE 5. GROUNDWATER ANALYTICAL RESULTS FOR INSTALLATION RESTORATION PROGRAM MONITORING WELLS ASSOCIATED WITH SITE 20/WASTE PILE 7 AT MARBO ANNEX, ANDERSEN AFB, GUAM.

Sampling Event	Method	Analyte	Units	MCL 2002	IRP-10	IRP-15	IRP-16
Polycyckic Arimatic Hydrocarbons (PAHs) by SW8310							
Rounds 3 to 15	8310	ALL ANALYTES	µg/L	N/A	ND	ND	ND
Cyanide by SW9012							
Rounds 3 to 15	9012	CYANIDE	µg/L	200 F	ND	ND	ND

Notes: MCL=Maximum Contaminant Level; µg/L=micrograms per liter; N/A=Not Applicable; F(MCL)=Final; ND=Not Detected.

Appendix F

Cross Sectional Information and Contaminant Migration Pathways

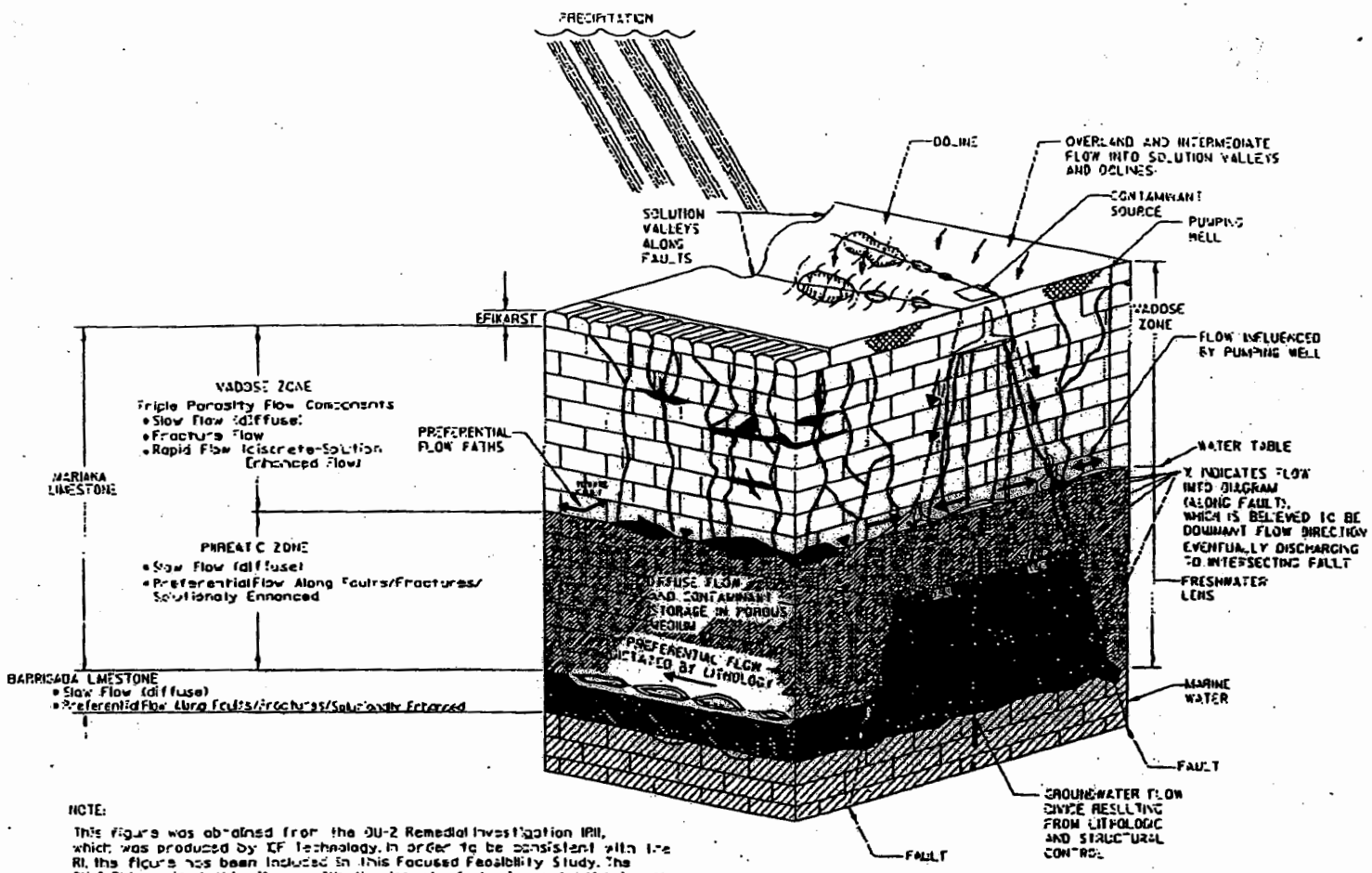


FIGURE F-4. CONCEPTUAL SITE MODEL GROUNDWATER FLOW AND CONTAMINANT TRANSPORT AT MARBO ANNEX.

Appendix G

Public Comments on the First Five-Year Review

Mr. John Jocson asked what is the next step with regards to remediation? Mr. Torres replied, that the issues at MARBO are Waste Pile 7 and the groundwater. The fate and transport of groundwater are not fully understood and the source for TCE and PCE has not been located. The AF is developing a plan to investigate the TCE and PCE source, and to expand the investigation to more areas to better understand how the groundwater flows out of the MARBO area. The next five-year review will determine if the plan implemented is effective. Mr. Jocson asked if a dye trace study will be used. Mr. Torres replied, it is one of the recommendations and the AF will address the dye trace study in the plan.

Mr. Fred Castro inquired whether there has been consideration in examining the fluctuations of the TCE and PCE detection levels? Mr. Ikehara explained that fluctuations of the TCE and PCE at particular wells were compared to atmospheric conditions, rainfall, and drought periods. Since the source of TCE and PCE have not been located, it is difficult to understand the mechanics that drive it and where to find it, which is deep in the aquifer. Part of the problem deep in the aquifer is the movement is slower in occurrence and not as quick as on top of the freshwater lens.

Mr. Mike Gawel questioned if one of the recommendations is to bore for migration through the freshwater lens and what would the difference be between a production well that captures at the top of the freshwater lens versus getting to the bottom of the lens? Also, how deep would these wells be to the lens and how much deeper to get to the bottom of the lens? Mr. Ikehara said, typically the production wells drilled in the Dededo/Yigo area are in the uppermost layer of the freshwater lens. There are probably 20-foot screened intervals at the top of the freshwater lens and the thickness of the lens depends on the height of the water above the sea level. In this case, a water table about three to four feet above mean sea level, roughly equates to about 100 to 120 feet to the transition zone. The AF does sample the production wells to determine if there is any problem or vertical migration occurring. What has been noted is that the highest concentrations are at depth. Mr. Ikehara assured the audience that the AF is intent on being protective of the groundwater production sources that are in the uppermost part of the water column.

Senator Kasperbauer requested clarification on the contaminants buried 11-feet under and not knowing where the contaminants were located that are showing up. Also, where is this in relation to the Laundry Facility? Mr. Torres clarified that the buried contamination was at Waste Pile 7. He described Waste Pile 7 as a large quarry that was filled with metal debris. The average depth of the debris and soil was about 11-feet and the contaminants that were found in this soil were pesticides, PCBs, and lead. Rather than excavate and remove the soil, the protective measure was to construct a soil cover. By constructing the soil cover, the potential for human exposure was eliminated. Because the contaminants are still in place, groundwater wells in the area are monitored to ensure contaminants are not getting into the groundwater. *Senator Kasperbauer then asked if there is any plan for future removal?* Mr. Torres said the site is approximately 1.8 acres with an average depth of about 11-feet and that a substantial amount of soil would need to be removed. At the time of the implementation the soil cover was the most economically and feasible remedy agreed upon by the regulatory agencies. Colonel Wolborsky commented that the whole rationale behind the five-year review is because the AF did not take a

more permanent measure and at the time the AF did not have the resources to implement a more permanent measure. By constructing the soil cover, the five-year review process was imposed.

Ms. Lucrina Concepcion inquired if the AF considered capping it like how a landfill would be capped to minimize contaminant migrations during heavy rainfall? Mr. Ikehara stated that the AF did consider the implementation of an impervious cap, but it was too expensive of an option. The primary risk factor was dermal exposure and not infiltration to the groundwater. He reiterated that there is groundwater sampling in and around the area that indicated there was no leaching of the contaminants into the groundwater. The soil cover option was most viable.

Mr. Castro asked what it would cost for complete removal, and what impact would it have on other cleanup projects that were funded? Mr. Ikehara explained that it would cost approximately $4M to $8M, which would probably have taken up one full year of study and remediation funding for other sites. *Mr. Castro asked if it would have impacted the Urunao project.* Mr. Ikehara agreed that it would affect Urunao and other projects. In this case, the AF believes it would be wiser to deal with the remediation of this site by covering it with soil and perhaps reconsider an alternative at a future date when funds become available.

Mrs. Chris Camacho, landowner, commented that she understands the cost consideration for a cleanup of this size. However pesticides, PCB, and lead are contaminants that concern her and other citizens. She urged the AF to consider complete removal seriously. Mr. Ikehara assured her that the AF does share her concerns as well, and it is the AF's intention to do the right thing. The AF will continue to address this issue.

Mr. Gawel asked what pesticides were found and what the potential is to leach at that site, and if it was bio-degradable in the years? Mr. Toraj Ghofrani, EA Engineering contractor, clarified that pesticides, such as DDTs are contaminants that do not migrate. The AF has been monitoring the groundwater for the past decade and have not had any hits of DDT. The pesticides at Waste Pile 7 consist of 4,4- DDE at 6.7 ppm, 4,4-DDT at 6.2 ppm, dieldrin at 0.12 ppm, alpha chlordane at 0.44 ppm, and gamma chlordane at 0.38 ppm.

Mr. Tom Camacho asked if the contaminants would affect any development to adjacent properties other than drilling the wells and tapping the lens. Would there be any restrictions? Mr. Ikehara informed him that there would be no significant impact to land use near those areas. The distance to the groundwater is about 300-feet or more and does not pose any risk to surface activity.

Mr. Camacho asked what concentrations of contaminants are present in the groundwater and if there been any time related studies based on population growth and use of the water lens. Mr. Ikehara estimated that at the bottom of freshwater lens it will take some time before the contaminants would disperse, either by physical or chemical means. The important fact is the highest contamination level is found at the bottom of the freshwater lens, which is non-potable water. In order for the AF to remediate it at that depth, it could possibly cause problems for the freshwater lens that overlays it.

Mr. Castro had two questions. First, is there is any data that could characterize the groundwater age in the MARBO area, and secondly, in the five-year report is there any reference of the risk assessment study? Mr. Ikehara stated that, there have been hydrologic studies for the cycling of the groundwater on Guam, and it was estimated that it takes 7-10 years for recycling of the system, at least in the upper portion of the freshwater lens. For the deeper portion no data is available to suggest the longevity of that water because it moves at a much slower pace under different hydrodynamic forces. The seepage rate is dependant upon how much water is loaded on the freshwater lens. The challenge to make water available to the public is to intercept that recharge water and not cause degradation to the lens from saltwater intrusion. With regards to the risk assessment study, the AF always considers the risk assessment aspect when evaluating the remedial systems and protectiveness of human health and the environment.

Mrs. Camacho asked where she would be able to obtain copies of the MARBO ROD. Mr. Ikehara informed her that the documents were available at both information repositories, the RFK Memorial Library at UOG and the Nieves Flores Library in Hagatna.

Mr. Gawel inquired as to whether the pesticide listing for Landfill 2 and some information on the removal of the underground storage tanks at Tumon would be available tonight. Mr. Ikehara informed him that all the information would be provided at the next scheduled RAB.

Mr. Castro questioned if there was a plan in effect to the upcoming wet/dry groundwater sampling round. Mr. Ikehara said the AF has attempted to pare away the wells that no longer provide useful data. The AF is focusing on the wells that show significant changes and things that can compare to other wells to try and determine a cause and effect. There will be new well locations added to the groundwater sampling that should provide more meaningful data. A dye trace study combined with historical water table elevation data could determine the actual groundwater flow direction.

Mr. Frank Palomo asked how close is the contaminated site to private properties, and is there a possibility of releasing the property? Mr. Torres indicated on the slide that the next private property is approximately located about 1 to 2 miles away. Mr. Ikehara stated that as long as the contamination is present in the ground, it will not be released. The AF would have to determine if the contamination can be removed and the land made available for unrestricted use. In order to excess the property, all the contamination would need to be removed. Colonel Wolborsky commented that is one criteria that is considered, but there are also other factors that affect excessing property as well.