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SAMPLING AND ANALYSIS PLAN ADDENDUM NO. 1

Additional Groundwater Sampling
NASA Crows Landing Flight Facility
Crows Landing, California

Environmental Remedial Action
Contract Number N62474-98-D-2076
Contract Task Order 0110

Document Control Number 8437
Revision 0

September 21, 2004

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FINAL SAMPLING AND ANALYSIS PLAN IS IN:

FINAL
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VERIFICATION ACTIVITIES AT VARIOUS SITES

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Acronyms and Abbreviations

DQO	data quality objective
EPA	U.S. Environmental Protection Agency
ID	identification
IT	IT Corporation
MDL	method detection limit
NASA	National Aeronautics Space Administration
QA	quality assurance
QC	quality control
SAP	Sampling and Analysis Plan
SIM	Selective Ion Monitoring
SOP	standard operating procedure
SVOC	semivolatile organic compound

1.0 Introduction

Shaw Environmental, Inc. has prepared this Sampling and Analysis Plan (SAP) Addendum No. 1 in support of additional groundwater sampling at the National Aeronautics Space Administration (NASA) Crows Landing Flight Facility. This SAP Addendum No. 1 is to be used in conjunction with the *Final Sampling and Analysis Plan, Verification Activities at Various Sites, NASA Crows Landing Flight Facility,* Contract Task Order 0086 (IT Corporation [IT], 2003).

Two new semivolatile compounds (SVOCs), acetophenone (CAS RN 98-86-2) and 2-phenyl-2-propanol (CAS RN 671-94-7) were recently identified in groundwater during groundwater extraction activities at Underground Storage Tank Cluster 1. Additional groundwater samples will be collected from existing wells and analyzed for SVOCs to evaluate the nature and extent of these two compounds within the Administration Area Plume.

The project data quality objectives (DQOs) are presented in the existing parent SAP (IT, 2003). Any changes to the existing SAP are addressed in this Addendum No. 1.

This new sampling task will be conducted under Contract Task Order 0110 of Naval Facilities Engineering Command Engineering Field Activity-West Environmental Remedial Action Contract Number N62474-98-D-2076.

1.1 Scope and Objectives

The purpose of this SAP Addendum No. 1 is to define sampling procedures that will be used during the groundwater sampling activities. Field personnel will use this SAP Addendum as a reference.

The scope of work for this project consists of the following tasks:

- Conduct groundwater sampling at 30 existing monitoring wells to determine the nature and extent of acetophenone and 2-phenyl-2-propanol within the Administration Area Plume

2.0 Data Quality Objectives

The project DQOs for basewide groundwater sampling and analysis are described in the parent SAP (IT, 2003).

3.0 Sampling Strategy

This section discusses the sampling and analysis strategy.

3.1 Additional Groundwater Sampling

A total of 30 groundwater samples will be collected from existing wells (identifications [IDs] shown below) and will be analyzed for acetophenone and 2-phenyl-2-propanol by U.S. Environmental Protection Agency (EPA) Method 8270C. The wells were selected to provide data to determine the nature and extent of contamination within the Administration Area Plume, at the site boundaries, and to identify the possible source area.

Well ID	Aquifer	Screen Interval Depth (feet)
17-MW-02(S)	shallow	49 - 74
17-MW-03(MS)	mid-shallow	97 - 107
17-MW-14(MD)	mid-deep	170 - 180
17-MW-21(MD)	mid-deep	170 - 180
17-MW-24(S)	shallow	42 - 62
17-MW-24(MS)	mid-shallow	89 - 109
17-MW-25(S)	shallow	50 - 70
17-MW-25(MS)	mid-shallow	89 - 109
17-MW-26(S)	shallow	45 - 65
17-MW-26(MS)	mid-shallow	86 - 106
17-MW-28(S)	shallow	49.5 - 74.5
17-MW-29(MS)	mid-shallow	105 - 115
17-MW-31(S)	shallow	49 - 74
17-MW-32(MS)	mid-shallow	94 - 109
17-MW-33(D)	deep	203 - 223
17-MW-34(D)	deep	202.8 - 222.8
117-MW-02(S)	shallow	50 - 75
117-MW-03(MS)	mid-shallow	97 - 107
117-MW-08(MD)	mid-deep	170 - 180
117-MW-11(MD)	mid-deep	185 - 195
117-MW-13(S)	shallow	47 - 72
117-MW-14(MS)	mid-shallow	93.5 - 108.5
CL1-MW-03(MS)	mid-shallow	104 - 114
CL1-MW-04(S)	shallow	50 - 75
CL1-MW-05(S)	shallow	50 - 75

Well ID	Aquifer	Screen Interval Depth (feet)
CL1-MW-06(S)	shallow	54 - 79
CL1-MW-09(S)	shallow	45 - 70
CL1-MW-14(MS)	mid-shallow	100.5 - 110.5
CL1-MW-17(MD)	mid-deep	157.8 - 177.8
CL1-MW-18(D)	deep	199 – 219

The well locations are shown in Figure 1, "Monitoring Well Location Map." Groundwater samples will be collected using low-flow sampling techniques following the procedures described in Section 5.1.1 of the parent SAP.

3.2 Investigation-Derived Waste Streams

The project investigative–derived waste will be handled according to the requirements in the *Final Project Plans, Verification Activities at Various Sites, NASA Crows Landing Flight Facility* (IT, 2003).

4.0 Analytical Requirements and Quality Control

This section describes analytical methods, container and preservative requirements, and field and laboratory quality control (QC) samples.

4.1 Analytical Methods

The following chemical and geotechnical methods will used for this project:

EPA, 1996, *Test Methods for Evaluating Solid Waste, SW-846,* Update III

- EPA Method 8270C or 8270C-Selective Ion Monitoring (SIM)

4.2 Sample Containers, Preservatives, and Holding Times

Sample containers, preservation, and holding time requirements will be performed according to the EPA methods listed in Table 1, "Sample Containers, Preservatives, and Holding Times."

Table 1
Sample Containers, Preservatives, and Holding Times

Analytes	Method	Container	Preservative	Holding Time
Water Samples				
Acetophenone, 2-phenyl-2-propanol	EPA 8270C / 8270CSIM	Two 1-Liter Amber glass jars, Teflon™-lined lid	Cool at 4±2°C	7 days to extraction 40 days for analysis

°C denotes degree(s) Celsius.

4.3 Field Quality Control Sample (Field Duplicate)

Field duplicate pairs consist of two samples of the same matrix (an original and a duplicate) collected at the same time and location to the extent possible, using the same sampling techniques. The purpose of field duplicate samples is to evaluate the homogeneity of contaminant distribution in the sampled matrix. Field duplicate samples will be collected at a frequency of 10 percent, and will be analyzed for the same analytes as their corresponding original samples.

4.3.1 Equipment Rinsate Samples

Equipment rinsate samples are used to evaluate the effectiveness of the decontamination procedure and to identify potential cross-contamination during sampling events. All samples will be collected using dedicated sampling equipment; therefore, no equipment rinsate samples will be collected.

4.3.2 Temperature Blanks

Each cooler will be shipped with a temperature blank. A temperature blank is a sample container filled with tap water and stored in the cooler during sample collection and transportation. The laboratory will record the temperature of the temperature blank immediately upon receipt of the samples.

5.0 Data Management

5.1 Project-Required Reporting Limits

Following the Navy requirements, the laboratory will determine the method detection limits (MDLs) for each method, instrument, analyte, and matrix by using the procedure described in 40 Code of Federal Regulation Part 136B. The MDL is defined as the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. The laboratory will select the practical quantitation limits for all analytes at concentration levels that exceed the calculated MDLs by a factor of two to ten. Proposed reporting limits for the two new analytes are shown in Table 2, "Proposed Reporting Limits."

Table 2
Proposed Reporting Limits

Analyte Name	Reporting Limit, 8270CSIM µg/L	Reporting Limit, 8270C µg/L
Acetophenone	5	10
2-phenyl-2- propanol	5	10

µg/L denotes microgram(s) per liter.

5.2 Laboratory Quality Assurance and Quality Control Program

Quality assurance (QA) is a set of operating principles that, if strictly followed during sample collection and analysis, will produce defensible data of known quality. Included in QA are QC and quality assessments. QC is a set of measures within a sample analysis methodology to ensure that the process is in control. Quality assessment consists of procedures for determining the quality of laboratory measurements by use of data from internal and external QC measures.

A properly designed and executed QC program will result in a measurement system operating in a state of statistical control, which means that errors have been reduced to acceptable levels. An effective QA program includes the following elements:

- Certification of operator competence
- Internal QC checks, such as recovery of known additions through use of surrogate standards, matrix spikes, and laboratory control samples
- Analysis of externally supplied standards
- Analysis of reagent blanks

- Calibration with standards using internal or external standard procedures
- Calibration verification with second source standard
- Analysis of duplicates
- Maintenance of control charts

Strict adherence to Good Laboratory Practices and consistent use of standard operating procedures (SOPs) are also essential for a successful QC program. The laboratory will have the current revisions of the SOPs readily available for all staff. At a minimum, SOPs will be written for the following procedures and methods:

- Sample receipt/control/disposal
- Sample preparation/extraction
- Sample analysis
- Results calculation
- Database management
- Health and safety
- Corrective action

The analytical laboratory will have written SOPs defining the instrument operation and maintenance, tuning, calibration, MDL determination, QC acceptance criteria, blank requirements, and stepwise procedures for each analytical method. The SOPs will be available to the analysts in the laboratory.

QA/QC requirements for EPA Method 8270C (specific to the new compound analysis) are in Table 3, "Summary of Calibration Requirements, Quality Control Procedures, and Corrective Action for EPA Methods 8270C – Miscellaneous Compound Analysis."

Table 3
Summary of Calibration Requirements, Quality Control Procedures, and Corrective Action for EPA Methods 8270C – Miscellaneous Compound Analysis

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
Five-point initial calibration for target analytes. Lowest standard must be at or below the PQL	Initial calibration prior to sample analysis	RSD is less than or equal to 15% for target analytes or correlation coefficient >0.99 [1]	Correct problem, then repeat initial calibration.
Second-source calibration verification	Once per five-point initial calibration	Less than 25% difference for all target analytes	Correct problem, then repeat initial calibration.
Daily calibration verification	Before sample analysis and every 12 hours of analysis time	Less than 20% difference for target analytes.	Correct problem, then repeat initial calibration.
Demonstrate ability to generate acceptable accuracy and precision using four replicate analyzes of a QC check sample	Once	QC acceptance criteria per method's requirements	Re-calculate results; locate and fix the problem, if exists, re-run demonstration of those analytes that did not meet acceptance criteria.
Check of mass spectral ion intensities (tuning procedure) using DFTPP (8270C)	Prior to initial calibration and calibration verification	Must meet the method's requirements before samples are analyzed	Re-tune instrument and verify the tune acceptability.
Internal standards	During data acquisition of calibration standard, samples and QC check samples	Areas within -50% to +100% of last calibration verification (12 hours) for each	Inspect mass spectrometer and GC for malfunctions; mandatory reanalysis of samples analyzed while system was malfunctioning.
Method blank	One per preparation batch (8270C)	No analytes detected above the RL	Correct problem, then re-extract and re-analyze method blank and all samples processed with the contaminated blank.
MS/MSD	One MS/MSD pair conducted on Navy samples per analytical/preparation batch	Advisory recovery limits: 70% to 130% or Laboratory statistically derived control limits	Identify problem. If not related to matrix interference, re-extract and re-analyze MS/MSD and all associated batch samples.
LCS or LCS/LCD pair if there is not enough sample for MS/MSD	One LCS or LCS/LCD per analytical/ preparation batch	Advisory recovery limits: 70% to 130% or Laboratory statistically derived control limits	Correct problem, then re-extract and re-analyze the LCS (LCS/ LCD) and all associated batch samples.
Surrogate standards	Every sample, spiked sample, standard, and method blank	Advisory recovery limits: 70% to 130% or Laboratory statistically derived control limits	Correct problem, then re-extract and re-analyze all affected samples.
MDL study	Once per 12-month period	Detection limits established will be below the RLs	Correct problem, repeat the MDL study.

1 If RSD for any analyte is >15%, regression fit may be used for the calibration curve for that analyte. Acceptance criteria for first order regression is $r^2 \geq 0.99$.

DFTPP denotes decafluorotriphenylphosphine.
GC denotes gas chromatography.
LCS denotes laboratory control sample.
MS denotes matrix spike.
MSD denotes matrix spike duplicates.
PQL denotes practical quantitation limit.
RL denotes reporting limit.
RSD denotes relative standard deviation.

5.3 Data Validation

An independent third party validation company will validate all analytical data collected under this Addendum No. 1. Data will be validated at 90 percent EPA Level III and 10 percent EPA Level IV. The validation will be in accordance with the, EPA *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (EPA, 1999). Data will be validated and flagged with the following data qualifiers:

- *J qualifier* denotes the analyte was positively identified, but the associated numerical value is estimated.
- *U qualifier* denotes the analyte was analyzed for, but not detected. The associated numerical value is at or below the reporting limit.
- *R qualifier* denotes the data are unusable due to deficiencies in the ability to analyze the sample and meet QC criteria.

6.0 References

IT Corporation, 2003, *Final Project Plans, Verification Activities at Various Sites, NASA Crows Landing Flight Facility, Crows Landing, California,* February 27.

U.S. Environmental Protection Agency, 1996, *Test Methods for Evaluating Solid Waste, EPA SW-846,* Update III.

U.S. Environmental Protection Agency, 1999, *EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review.*

Figures

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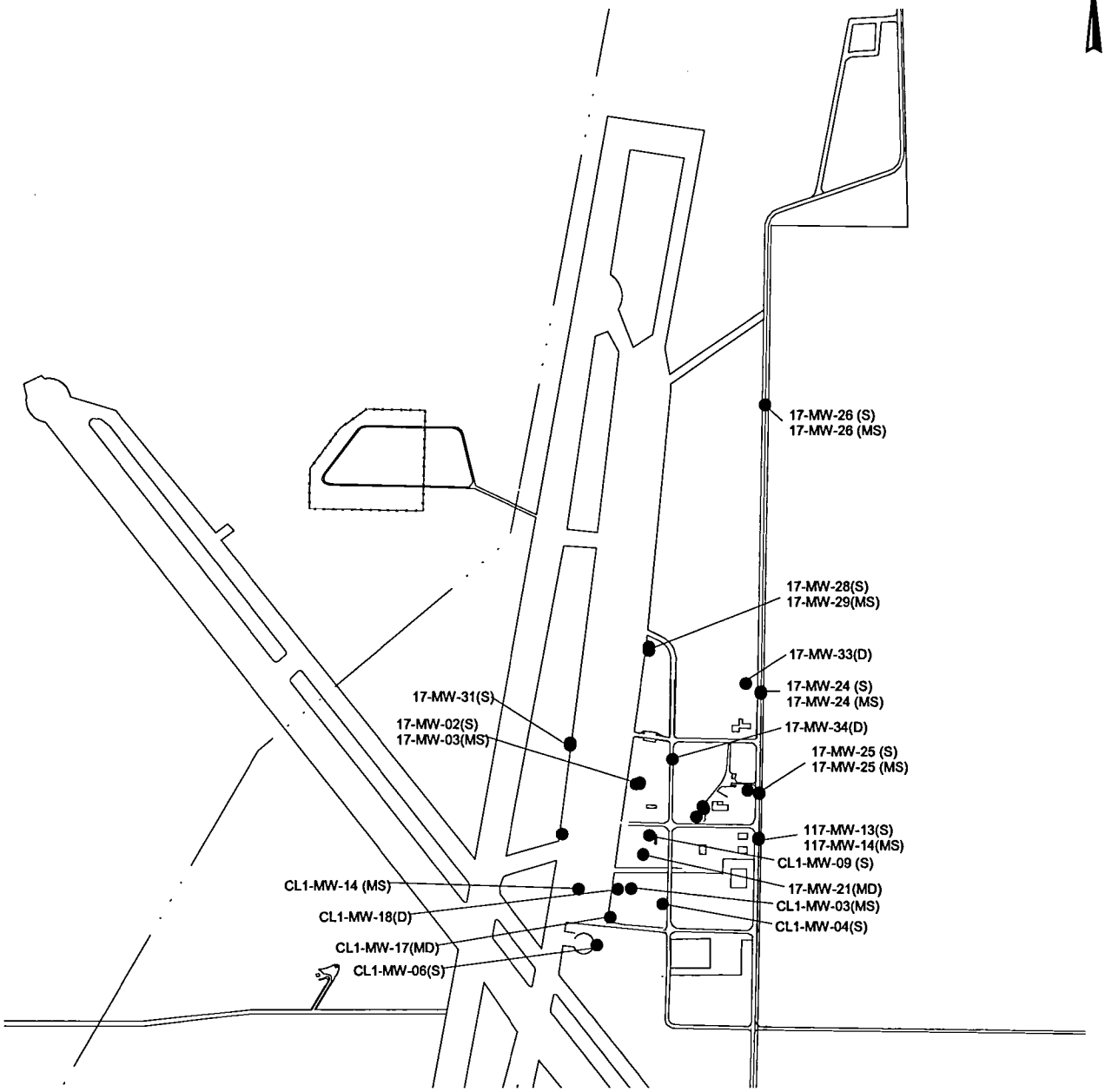
IMAGE	X-REF	OFFICE	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
— —	— —	CONCORD	TFB 12/02/02	TFB 09/08/2004	DHK	100358-A1-GIS



SCALE:
1000 0 1000 Feet

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NASA CROWS LANDING FLIGHT FACILITY
CROWS LANDING, CALIFORNIA

FIGURE 1

MONITORING WELL
LOCATION MAP