FINAL SAMPLING AND ANALYSIS PLAN AMENDMENT OPERABLE UNIT 10 (OU10) NAS PENSACOLA FL

11/24/1992

ENSAFE

C.L.E.A.N.
FINAL SAMPLING AND ANALYSIS PLAN AMENDMENT

NAS PENSACOLA
OPERABLE UNIT 10

CONTRACT N62467-89D-0318
CTO-048

Prepared by

Ensafe/Allen & Hoshall
5724 Summer Trees Drive
Memphis, Tennessee 38134
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November 24, 1992

INTRODUCTION

Since the Work Plan and Sampling and Analysis Plan (SAP) for Operable Unit 10 were written, several changes have occurred that require documentation. These changes include the addition of field work and the changes in analytical parameters. All of the changes have been made based on specific objectives that are detailed in the following text.

APPLICABLE DOCUMENTS

The following references should be consulted for specific methods or descriptions.

Ecology and Environment, Inc. (1992). *Contamination Assessment/Remedial Activities Investigation Work Plan - Group A Naval Air Station Pensacola, Pensacola, Florida; Waterfront Sediments (Site 2), Magazine Point Rubble Disposal Area (Site 13), and Dredge Spoil Fill Area (Site 14).* Ecology and Environment, Pensacola, FL.

Ecology and Environment, Inc. (1992). *Contamination Assessment/Remedial Activities Investigation Work Plan - Group O Naval Air Station Pensacola, Pensacola, Florida; IWTP Sludge Drying Beds (Site 32), IWTP Ponds (Site 33), and Miscellaneous IWTP SWMUs (Site 35).* Ecology and Environment, Pensacola, FL.

EnSafe/Allen & Hoshall (1992). *Sampling and Analysis Plan for Operable Unit 10, NAVAL AIR STATION PENSACOLA, Pensacola, Florida.* EnSafe/Allen & Hoshall, Memphis, Tennessee.

SPECIFIC CHANGES

Change 1: Site 13 Added to Operable Unit 10

Site 13 has been added to Operable Unit 10 because it is of its close proximity to the other sites in this operable unit. The investigation of Site 13 will be conducted in accordance with the Ecology and Environment-approved work plan and the SAP written for Operable Unit 10, with the following exceptions.

Exceptions to SAP for Investigation of Site 13

- The following analytical parameters have been deleted:
  - — RCRA Appendix IX analysis.
  - — Additional cyanide analysis.
  - — Sulfur.
  - — Total Organic Halides.

- Additional analytical parameters are required for the feasibility study. (See Attachment 1). The number of samples previously planned were insufficient or redundant because the investigation is CERCLA driven and not RCRA any longer.

- Offshore surface water and sediment sampling originally scheduled for Site 13 will be conducted in association with Operable Unit 17 (Site 42, Pensacola Bay).

- Hollow-stem augers will act as temporary casing during installation of intermediate depth wells which target the surficial aquifer just above the low permeability zone. Dual casing will only be used for the deep well installed in the main producing zone below the low permeability zone.

Change 2: Charcoal Filter Used with FID

A charcoal filter with a flame ionization detector will be used to screen ambient air for different classes of compounds. The charcoal filter differentially removes organic molecules from the media passing through it by trapping large organic molecules such as halogenated and non-halogenated alkyls, cyclic aromatics, and alkanes on the charcoal. Lighter molecules such as methane, ethane, and hydrogen pass through the filter, allowing the instrument to be used in two modes. Attachment 2 is provided for those unfamiliar with filter adapters.

In the first mode, the instrument is used to measure total ambient gases. In the second mode, the filter is installed to assess lighter gases that may be present. These screening results can then be used to determine if higher level screening such as Draeger or MSA gas sampling tubes will be necessary, not to select higher DQO level sampling. If the higher level screening with the gas sampling tubes indicates a need for qualitative and quantitative data as specified in the SAP, SUMMA canisters will be used to assess ambient air quality. None of the data from this survey will be used to assess soil or water quality.

Change 3: Groundwater samples associated with SOV

The soil organic vapor (SOV) survey will be supplemented by a heated headspace analysis of the groundwater in the vicinity of a SOV indicative of contamination. In order to assess the accuracy of the method, at least 5 percent of the groundwater samples will be submitted for DQO Level IV analysis for volatile organic analysis. This is in accordance with the EPA Region IV SOP/QAM Section 4.4.2 and the SAP.

ATTACHMENT 1

TABLE 1: CHANGES IN ANALYTICAL PARAMETERS

Table 1: Changes in Analytical Parameters*

Parameter	No. of Samples	Matrix	Method
5 day BOD	9	groundwater	EPA 405.1
COD	9	groundwater	EPA 410(.1 to .3)
Hardness	9	groundwater	EPA 200.7
Total Suspended Solids	12	groundwater	EPA 160.2
Alkalinity	9	groundwater	EPA 310.1
Total Phosphorus	9/12	soil/groundwater	EPA 365.3
Nitrate-N	9/12	soil/groundwater	EPA 352.1
Total Kjeldahl Nitrogen	9/12	soil/groundwater	EPA 351.4
Heterotrophic Plate Count	9/12	soil/groundwater	SM 9215B
Bulk density	12	soil	ASTM 4253
Porosity	12	soil	ASTM D4645
Particle size	12	soil	ASTM D 422
Total Organic Carbon	12	soil	SW846-9060
Permeability	12	soil	ASTM D2434
Percent moisture	12	soil	ASTM 2216
Specific gravity	12	soil	ASTM D 854

Note: BOD = Biological Oxygen Demand
COD = Chemical Oxygen Demand

* - BTW, ash content, TOX, S, ignitability are omitted (see E & E workplans previously referenced

FLORIDA PROFESSIONAL GEOLOGIST SEAL

I hereby affix my seal to the Final Sampling and Analysis Plan Amendment for Operable Unit 10, in accordance with Chapter 492 of the Florida Statutes and applicable rules and regulations developed pursuant thereto indicating that the related methods and procedures included in this plan are in accordance with standard, currently accepted geological practices.

Name:	Brian E. Caldwell
License Number:	1330
State:	Florida
Expiration Date:	July 31, 1994

Brian E Caldwell

Brian E. Caldwell

11/23/92

Date

ATTACHMENT 2

The Foxboro Company
Environmental Monitoring Operations

P.O. Box 500
600 North Bedford Street
East Bridgewater, MA 02333

Telephone: (508) 378-5477
Facsimile: (508) 378-5505

Message #: 1906 -SMH

Sent To: Henri Beiro

From: Sue Hennigan

Company: En-Safe

Date: 11-20-92

Fax #: 901-372-8930

Page # 01 of 8

Reference: Foxboro Charcoal Filter Adapter

Dear Henri,

Attached is the information you requested. It includes, the charcoal filter adapter information outlined in the OVA manual as well as test results from our applications laboratory on breakthrough times for various chemicals and concentrations with the filter.

Hope this helps. If not, don't hesitate to contact me.

Regards,

Sue H.

Susan Hennigan
Product Manager
Organic Vapor Analyzers

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Activated Charcoal Filter Accessory

The Activated Charcoal Filter Assembly is an accessory which can be installed on the OVA Readout Assembly or attached at the end of the telescoping probe. The filter is typically filled with activated charcoal which acts as an absorbent and effectively filters out organic vapors other than methane or ethane.

A screw cap on the probe end is removed for refilling the filter with activated charcoal or other filtering media.

Applications of the filter include:

1) Obtaining a clean air sample for zero baseline check and adjustment.

2) Running "blank" chromatograms to assess instrument contamination.

3) Rapid screening of methane and non-methane organic vapors.

4) Selective screening for natural gas surveys.

5) As a moisture filter when filled with a desiccant such as silica gel.

A press fit adapter on the back of the filter assembly is removed when installing the unit on the telescoping probe. When replacing the cap end after refilling, one wrap of ¼ inch teflon tape should be used to seal the threads.

The life of the filter will depend on the time in use and the concentrations of the compounds being filtered. Under typical industrial air monitoring conditions, the filter will last for many days of continuous sampling. See Figure 12.

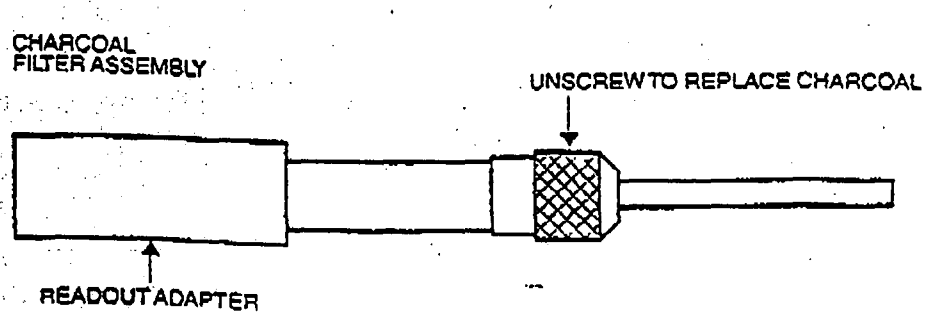

FIGURE 12
ACTIVATED CHARCOAL FILTER ASSEMBLY

To Paul Manahan

From Andrew J. Bramante

File American Optical Filter Cartridges

Subject Cartridge Evaluation

Date March 8, 1988

Copies Steve Day, Susan Dempster, Sue Hennigan

American Optical filter cartridges are presently being offered by Foxboro as zero air accessories for both MIRAN and OVA analyzers. Four filter cartridges are offered, each removing a specific class of contaminants. Listed below are the contaminants with the catalog number of the respective filter cartridge used for removal:

(1) Organic Vapors - #R51A/11720A
(2) NH_3/Amine - #R51A/11723A
(3) Formaldehyde - #R60A/11773
(4) Chlorine, Hydrogen Chloride, Sulfur Dioxide, Chlorine Dioxide - #53A/11722B

According to the *Mine Safety & Health Administration (MSHA) Title 30 Regulations* for the testing of chemical cartridges, recommended maximum use concentrations *(ppm)* have been established for each of the above contaminants. In a test atmosphere ranging from 500-1000 ppm, the minimum life has been determined for each filter cartridge. The minimum life is determined at an indicated penetration. Table 1. provides a summary of those items discussed in the MSHA Regulations.

CARTRIDGE/GAS	*MAXIMUM USE CONCENTRATION (PPM)*	*TEST ATM CONC (PPM)*	*MINIMUM LIFE (MIN)*	*PENETRATION (PPM)*
Ammonia (NH_3)	300	1000	50	50
Chlorine (Cl_2)	10	500	35	5
HCl	50	500	50	5
CH_3NH_2	100	1000	25	10
Organic Vapors	1000	1000	50	5
SO_2	50	500	30	5
Vinyl Chloride	10	--	--	-

Table 1. MSHA Title 30 Regulations Data

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A detailed investigation of filtering capability of the chemical cartridge for organic vapors *(#R51A/11720A)* was performed by Freedman, Ferber, and Hartstein. Their paper, entitled "*Service Lives of Respirator Cartridges versus Several Classes of Organic Vapors*[1]," describes an experiment where an input concentration of 1000 ppm was passed through two cartridges in parallel at a total flow of 64 liters/min. Under these conditions, cartridge breakthrough time or service life was defined as the time required to reach an organic effluent level of 5 ppm. Results from these experiments are shown below in Table 2.

Table 2. Service Lives of Organic Vapor Cartridge Against 1000 PPM Concentrations of Various Organics

COMPOUND	*SERVICE LIFE (MIN)*
Alkanes:	
Butane	10.7
Pentane	34.9
Hexane	55.3
Heptane	60.9
Octane	65.5
Alcohols:	
Methanol	2.2
Ethanol	10.9
Propanol	44.1
Butanol	92.1
Formates:	
Methyl formate	2.6
Ethyl formate	28.1
Propyl formate	52.5
Butyl formate	76.2
Acetates:	
Methyl acetate	22.4
Ethyl acetate	59.6
Propyl acetate	62.1
Butyl acetate	59.7
Aldehydes:	
Acetaldehyde	1.0
Propionaldehyde	8.2
Valeraldehyde	57.1
Halides:	
Bromides	
Methyl bromide	1.2
Ethyl bromide	17.3
Iodides	
Methyl iodide	22.1
Ethyl iodide	84.2
Miscellaneous:	
Benzene	63.0
Acetic Acid	105.1
Acetonitrile	16.1
Chloroform	23.5
Ethylene Oxide	0.5

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In an attempt to correlate the above results with our MIRAN and OVA analyzers, I designed an experiment that would evaluate the filtering capacity of organic vapors, namely alkanes, using the organic vapor cartridge. A closed-loop system was constructed using a MIRAN 1B Analyzer and a closed-loop calibration pump (*flow rate = 5 l/min.*). Once zeroed on ambient air, a known alkane concentration was introduced into the system. The sample was allowed to equilibrate throughout the system and the analyzer output (concentration) was recorded. Subsequently, the filter cartridge was quickly inserted into the closed-loop system (*see Figure 1.*), and the total removal/filtration time was observed. Injection concentration, as well as the total removal time, are listed in Table 2.

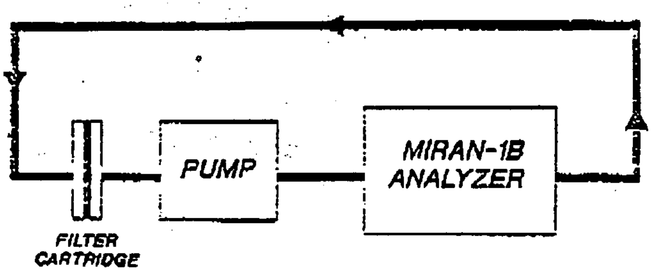

Figure 1. Filter Cartridge Closed-Loop System

CONTAMINANT	*INJECTION CONCENTRATION (PPM)*	*TOTAL REMOVAL TIME (MIN)*
Methane	300	7
Ethane	350	2
Propane	300	3
Butane	300	2
Pentane	300	2
Hexane	250	2

Table 2. *Organic Vapor Removal Times*

All gases tested were removed at a fast/steady rate, with the exception of methane. Initial removal of 300 ppm methane was fast, however rate of filtration dropped off as the analyzer output reached 60 ppm. This phenomenon is directly attributable to the molecular size/weight of methane.

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Change in configuration of the closed-loop filtering system was necessary to mimick use of the organic filtering cartridges in the field. Sample bags of methane, ethane, and propane were prepared, each with a concentration of 1000 ppm. Each 1000 ppm sample was pulled through the organic filter via an external pump *(flow rate = 5 l/min.)* into the MIRAN 1B analyzer *(see Figure 2. below)*.

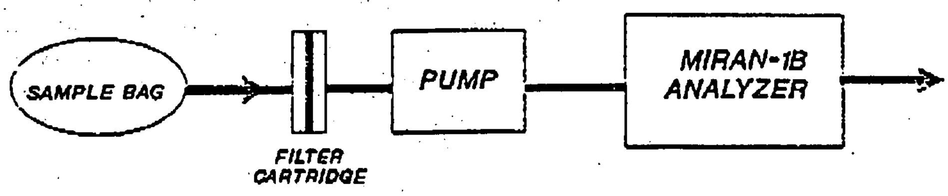

Figure 2. 1000 PPM Sample-Bag Cartridge System

At this flow rate, total exchange within the 3.5 liter MIRAN 1B cell would occur after 42 seconds. Change in output concentration from the ambient zero was observed at both 42 seconds and 300 seconds *(see Table 3.)*.

ORGANIC VAPOR	*TEST CONC (PPM)*	*CONCENTRATION 42 SEC (PPM)*	*CONCENTRATION 300 SEC (PPM)*
Methane	1000	59	171
Ethane	1000	0	0
Propane	1000	0	0

Table 3. 1000 PPM Sample-Bag Cartridge System Data

Results given above indicate acceptable removal of ethane and propane, with slight leakage of methane. The organic filter cartridge should not be recommended for use in removal of methane.

Search of the literature previously discussed reveals a lack of information regarding the performance of the formaldehyde specific filter cartridge *(# R60A/11773)*. Further search revealed an experiment performed by Henry in a paper entitled, "*Respirator Cartridge and Cannister Efficiency Studies with Formaldehyde.*[2]" Breakthrough times (minutes) were determined for the formaldehyde filter cartridge at 10% and 50% leakage by passing 1.4 ppm formaldehyde through a parallel cartridge pair. These values are listed below:

10% (0.14 ppm) *Breakthrough Time:* 2820 minutes
50% (0.70 ppm) *Breakthrough Time:* 4800 minutes

In a sample-bag cartridge system similar to that shown in Figure 2., I performed an experiment where 20 ppm of formaldehyde was pulled from a sample bag through a single filter cartridge. Continued sampling beyond the required full exchange time of 42 seconds revealed negligible deviation from the ambient zero. From this, I have concluded that the formaldehyde filter cartridge can successfully be used to zero an analyzer in the presence of up to 20 ppm formaldehyde during field usage.

Andrew J. Bramante

Andrew J. Bramante
Applications Chemist

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[1] **American Industrial Hygiene Association Monograph Series:** *Respiratory Protection*, p. 293, Akron, Ohio (1985)

[2] Ibid., p. 309

FOXBORO

To: Sue Hennigan

From: Ed Manke

Subject: Breakthrough Rates of Vinyl Chloride through the OVA Charcoal Filter Probe

Date: April 19, 1990

Copies: S. Day, Warren McGowan

An application request was received from Warren McGowan to determine the breakthrough rate of vinyl chloride through the charcoal filter probe adapter. Literature search indicates that vinyl chloride will pass through the filter probe un-retained due to the small size of the molecule. The filter is therefore ineffective.

If there are any comments or questions please let me know.

Ed Manke
Applications Chemist

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