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7. Abstract

This Engineering Task Plan defines engineering tasks and responsibilities for design and fabrication of an improved device for use in in situ sampling.

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**IN SITU SAMPLING DEVICE DEVELOPMENT
ENGINEERING TASK PLAN**

Approval Designator SQ

**David K. DeFord
July 1994**

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1.0 INTRODUCTION

This Engineering Task Plan (ETP) supports the development for facility use of an improved packaging method or device for the sorbent media used during in situ sampling of waste tanks. Improvement is being sought due to problems with internal and external radioactive contamination. "In situ" sampling refers to placing sample collection media (primarily sorbent tubes) directly into the tank headspace, then drawing tank gases through the collection media to obtain samples. Development for facility use, as defined in WHC-CM-6-1, EP 2.4, *Development Control Requirements*, includes design, fabrication, and formal documentation of the device. As the most important change to be made is addition of a High Efficiency Particulate Air (HEPA) filter, the device will be referred to in this ETP as "the Filter Device" or simply "the Device".

2.0 SCOPE

2.1 OBJECTIVES

This ETP is intended to be the management plan governing the design, fabrication, and formal documentation of the Filter Device.

At this time, several methods exist for packaging and protecting the collection media used during in situ sampling. An improved method is desired to reduce the probability of losing sample components due to water condensation, reduce or eliminate contamination to the inside or outside of the individual sorbent tubes, and reduce the time required to obtain the samples. It is anticipated that new drawings or drawing revisions will be issued to document the Device at the end of its development.

This plan identifies the engineering services and other resources to accomplish that purpose. The design basis for the development of the Device is presented in this ETP.

2.2 DELIVERABLES

Ultimately, the item to be delivered is the completed Filter Device, with adequate documentation to allow use of the equipment in sampling. In order to produce the hardware and use it, the following documents are required.

This Engineering Task Plan.

A "Change Safety Review (Screening)" (Appendix A of this ETP).

Prototype units will be developed from engineering sketches and tested informally by Sampling/Special Analytical Services (SAS) personnel. SAS will provide written acceptance criteria for the informal testing. If deemed acceptable in informal tests, prototypes will be used in actual sampling before formal acceptance and documentation.

H-2 drawings (new drawing or ECN(s)) issued at the end of development.

3.0 DESCRIPTION

3.1 PHYSICAL DESCRIPTION/DESIGN BASIS

The Filter Device is required to provide, as a minimum, the following elements.

The Filter Device shall be an improvement or refinement of the existing sample devices: it is not intended to produce any fundamentally new or different approach to in situ sampling. The Device shall work with the current sorbent trains and tubing, fit through the same size hole, etc. The existing sampling procedure should require no changes as a result of the new hardware.

HEPA filtration at the inlet to prevent radioactive particulates from contaminating the samples. The Device should be made of materials that will not cause detectable contamination of samples (corrosion resistant steel and/or low vapor emitting plastics).

A provision for heating the Device above the tank headspace temperature before inserting it into the tank. The heat source is required to be independent of the Device: it would not be placed in the tank.

Provisions for eight sample connections compatible with the eight sorbent tube bundle currently in use for in situ sampling.

Some form of protection for the outside of the sorbent tubes and the integrity of the "sorbent train" which consists of several tubes connected in series by lengths of flexible tubing pushed over the ends. Currently, the tubing can be loosened by handling which could cause the loss of the sample.

3.1.1 SAMPLING CONDITIONS AND REQUIREMENTS

In situ sampling is a method of obtaining samples for analysis of the vapor in the headspace of the chosen tank. Sorbent tubes are lowered into the tank headspace, then tank gases are drawn through them by means of a manifold which measures the amount of gas drawn. The sorbent tubes adsorb the specific vapors being sought for later analysis.

There may be a great deal of water vapor present in the headspace of some tanks. If allowed to condense at the sample device entry, the water can prevent some constituents from passing into the sorbent tubes. If the sample device is at or above the tank headspace temperature, this condensation will be eliminated. The headspace may also contain particulates which may be radioactive. A HEPA filter on the inlet will remove any particulates while allowing tank gases and vapors into the sample media.

The Hanford Site Tank Farm Facilities Interim Safety Basis, WHC-SD-WM-LSB-001, requires that sample devices used in waste tanks be electrically grounded, and that provisions be made to prevent dropping items into the tank.

3.2 ENGINEERING TASKS

The overall responsibility for design, fabrication, and documentation of the Filter Device belongs to Waste Tanks Design Engineering, Mechanical Equipment. [DeFord]

Preparation of prototype units, informal test apparatus, and conducting the actual sampling trial are assigned to SAS. Those who will operate the equipment have the responsibility of familiarizing the facility person in charge (PIC) with the equipment and procedures before sampling takes place. [McClellan/Pingel]

When an acceptable prototype has been tried in actual sampling and accepted, a determination will be made on how many sample Devices will be required for further sampling. Fabrication of the production units, if necessary, will be carried out by 200 Area Fabrication Services.

3.3 VERIFICATION

The initial design of any prototype to be used in actual sampling will undergo design verification through the use of independent reviewers. These independent reviews will be documented on the engineering sketches used in development. When formal documentation is prepared, the Engineering Data Transmittal issuing the drawings will record the new independent review of the final design.

3.4 PROCUREMENT TASKS

When the development process is terminated and documented, "production units" will be ordered and followed through the shops by Mechanical Equipment. [DeFord]

4.0 ORGANIZATION

This development effort is to be carried out in support of the Tank Vapor Issues Resolution Program. Jerry Osborne is the program manager. Organizations concerned with the scope of this ETP are assigned specific tasks in the "Engineering Tasks" section.

5.0 SCHEDULE

The schedule for all activities related to vapor sampling is maintained separately at the program level. The current plan is to perform in situ sampling on tanks 241C102 and 241C110 in July 1994. Every effort will be made to have a prototype unit ready for use on these tanks.

6.0 FUNDING

This development effort is funded under Task Package Control Number (TPCN) N28A2 for Mechanical Equipment's work, and under TPCN N28AX for SAS personnel. The hardware costs are not expected to be over \$2000.

7.0 QUALITY ASSURANCE

This document is assigned an approval designator of SQ. The formal documentation (drawing or ECN) of the Device will also be assigned an approval designator of SQ. The Safety Class of the equipment is 3.

As the prototype units are sketched, fabricated, and tested within SAS, the sketches will be maintained per EP 2.4 by the cognizant engineer, who will be responsible for obtaining appropriate independent reviews.

8.0 REFERENCES

- 8.1 WHC-CM-6-1, Standard Engineering Practices - EP 2.4, Development Control Requirements, Revision 3, May 27, 1994.
- 8.2 The Hanford Site Tank Farm Facilities Interim Safety Basis, WHC-SD-WM-ISB-001, Revision 0, August 1, 1993.

APPENDIX A

Unreviewed Safety Question - Changes Safety Review (Screening) Form

REFERENCE DOCUMENT: WHC-SD-WM-ETP-106

TITLE: IN SITU SAMPLING DEVICE DEVELOPMENT ENGINEERING TASK PLAN

Does the PROPOSED CHANGE:

A. Represent a change to the facility as described in the AUTHORIZATION BASIS documentation?

N/A_____ NO X Yes/Maybe_____

Basis: The authorization basis is The Hanford Site Tank Farm Facilities Interim Safety Basis, WHC-SD-WM-ISB-001, which requires waste tanks to be sampled, but has no specific information about the sampling equipment. Therefore a change to the sampling equipment would not be represented in the authorization basis. In situ sampling, including the Filter Device is addressed in USQ evaluation TF-94-0309, *Unreviewed Safety Question Evaluation for In Situ Sampling*.

B. Represent a change to procedures as described in the AUTHORIZATION BASIS?

N/A_____ NO X Yes/Maybe_____

Basis: The authorization basis requires that sampling equipment placed into certain tanks be electrically grounded, and provision be made to prevent dropping items into all tanks. The Filter Device will not cause any change to the sampling procedure, which meets these requirements, and has been evaluated in TF-94-0309.

C. Represent a test or experiment not described in the AUTHORIZATION BASIS documentation?

N/A_____ NO X Yes/Maybe_____

Basis: All in-tank testing of the Device will be carried out using the approved sampling procedure. The Device will not be a departure from the type of equipment now used with that procedure.

CONTINUED ON NEXT PAGE

D. Does the change impact:

• Implemented OSR's or IOSR's.

N/A_____

NO X_____

Yes/Maybe_____

• Approved IOSR Compliance implementation plans.

N/A X_____

NO_____

Yes/Maybe_____

Basis: The applicable IOSR is WHC-SD-WM-OSR-005. It requires a sampling program to be in place, but does not specifically describe any sampling apparatus or procedure. The Device will not affect the operation of any waste tank.

USQE #1: DAVID DEFORD
Print Name

USQE #2: GEOFF BARNES
Print Name

David Deford
Signature Date 10/7/94

Geoff Barnes
Signature Date 10/7/94