OCT 04 1994
35 Station 21

# ENGINEERING DATA TRANSMITTAL

Page 1 of 1

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| **5. Proj./Prog./Dept./Div.:** | **6. Cog. Engr.:** | **7. Purchase Order No.:** |
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| 1 | WHC-SD-SNF-TP-008 | ALL | 0 | Gas Liquid Sampling for Closed Canisters in KW Basin-Test Plan | Q | 1 | 1 | 1 |
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**16. KEY**

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| 1 | 1 | Cog.Eng. C.C. Pitkoff | C C Pitkoff | 9/29/94 | R3-86 | | | | | | |
| 1 | 1 | Cog. Mgr. J.R. Frederickson | J.R. Frederickson | 10/3/94 | R3-86 | | | | | | |
| 1 | 1 | QA D.W. Smith | D W Smith | 9/29/94 | R3-85 | | | | | | |
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| 1 | 1 | R.P. Omberg | R P Omberg | 10/3/94 | R3-85 | | | | | | |
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## RELEASE AUTHORIZATION

| | |
|---|---|
| **Document Number:** | WHC-SD-SNF-TP-008, REV.0 |
| **Document Title:** | Gas Liquid Sampling for Closed Canisters in KW Basin-Test Plan |
| **Release Date:** | October 4, 1994 |

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**This document was reviewed following the procedures described in WHC-CM-3-4 and is:**

**APPROVED FOR PUBLIC RELEASE**

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**WHC Information Release Administration Specialist:**

Christine Willingham

Christine Willingham — 10/4/94

**(Signature)** — **(Date)**

# SUPPORTING DOCUMENT

1. Total Pages 12

2. Title

Gas Liquid Sampling for Closed Canisters in KW Basin-Test Plan

3. Number

WHC-SD-SNF-TP-008

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Name: C. C. Pitkoff

Carol C. Pitkoff HW

Signature

Organization/Charge Code 2C110/KK5PR

7. Abstract

Characterization of the Spent Nuclear Fuel (SNF) sealed in canisters at KW-Basin is needed to determine the state of storing SNF wet. Samples of the liquid and the gas in the closed canisters will be taken to gain characterization information.

Sampling equipment has been designed to retrieve gas and liquid from the closed canisters in KW Basin. This plan is written to outline the test requirements for this developmental sampling equipment.

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9. Impact Level N Q

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OFFICIAL RELEASE
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35 Station 21

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## 1.0 INTRODUCTION

Characterization of the Spent Nuclear Fuel, SNF, sealed in canisters at KW-Basin is needed to determine the state of storing SNF wet. Samples of the liquid and the gas in the closed canisters will be taken to gain characterization information.

Sampling equipment has been designed to retrieve gas and liquid from the closed canisters in KW basin. This plan is written to outline the test requirements for this developmental sampling equipment.

## 2.0 OBJECTIVE

Tests will be conducted on the sample equipment to verify that the design will retrieve clean (not contaminated with basin water) gas and liquid samples from closed canisters. The equipment must open and close the canisters with minimal interface of the canister contents and the basin contents. A minimum of 10 ml of liquid or gas must be retrieved each sample run. The equipment will have a 90% competency rate for the design to be considered useful to the characterization program.

## 3.0 SCOPE

The equipment tested will be used in a radioactive environment. Samples from closed canisters in KW-Basin hold spent nuclear fuel and the liquid and gas will contain fission products from corrosion of the fuel rods. The equipment will stay in K Basin Engineering Project/Process Systems control until all developmental testing has been completed. When the design has been determined "good", will obtain a clean sample 90 % of the time, the design will be released and the equipment will be fabricated and turned over to SNF Characterization group. Test procedures will be turned over to K-Basins operations to be reformatted into operating procedures. Training can be completed at the 305 test facility using the cold testing basin.

## 4.0 DESCRIPTION OF TEST

### 4.1 Test Item

The benchtop gas and liquid sampler (prototype) is about 8 inches in diameter by 24 inches tall. It consist of a long hollow pipe with a shaft that fits over the valve on the canister lids. There is a handle that attaches to the top section of the shaft and will twist the valve open or closed. Attached to the pipe is a track that the vacuum tube will ride down to the canister tops. A needle, inside a box, is attached to the side

at the bottom of the pipe. The needle is activated by an air driven valve that slides forward and pierces the vacuum tube end. The vacuum tube sucks the sample out of the canister. The sample is then brought to the top of the equipment and placed in a shipping container. The vacuum tubes will be incased in a non-breakable sleeve for protection and are disposable. The equipment is designed to be used over and over with certain moving parts including the needle replaceable.

The full size model is 18 foot 11 inches tall. The only difference between this model and the bench top is the length and the pipe (that houses the shaft) has holes to allow the basin water free flow. This is to eliminate the risk of water building up in the pipe and coming out of the top under pressure.

**4.2 Test Environment**

The equipment will be tested in the 305 building, 300 area. The first sampler will be a bench top model used to test the feasibility of the design. Once the sampler has been tested and functions to the test criteria, a full size model will be fabricated and tested.

The 305 building in the 300 area has a mock up of the K Basins. The cold test basin is designed for testing and training of new or modified equipment to be used in the K Basins.

**4.3 Equipment and Facilities**

The first series of testing on the sample equipment will be with the bench top model. A bench or table top space of approximately 16 $ft^2$ will be needed to run the test on the sampling equipment. A standard electrical plug for an oxygen meter will be required. One Mark II sealed canister with water and a Nitrogen purge will be required for testing.

The second series of test will be on a full scale model and will be tested in the cold test basin in 305 building. A sealed Mark I and a sealed Mark II canister will be required. Both canisters will contain colored water (food coloring will work) and a purge of Nitrogen. The oxygen meter will be required for this testing also.

**4.4 Data**

The sampling equipment will use 15 ml vacuum tubes that will pull at least 10 ml of sample. The needle and needle housing will be purged of contaminated gas/water with either an inert gas or deionized water after each sample is taken. The vacuum tubes

are for one time use, the needle is replaceable if broken or clogged.

**4.5 Criteria/Constraints**

Until the Data Quality Objectives are determined for the gas/liquid samples from KW basin the only constraints that will be in place for testing are criteria set by the system engineer. A copy of these constants will be kept in the master file located in a labeled three ring binder in room 138A, MO-285/200E. When the DQO's are determined they will be incorporated into the sampling criteria.

WHC-SD-SNF-FDC-001, Functional Design Criteria for Gas/Liquid Sampling Equipment gives the functions and requirements for this piece of equipment.

**5.0 EXPECTED RESULTS**

Test equipment will be determined "good" when the sampler retrieves at least 9 out of 10 samples of 10 ml of liquid and 9 out of 10 samples of 10 ml of gas in a series. Modifications will be made to the equipment until the equipment returned a 90 % proficiency rate. The final test design will be fabricated into a full size piece of equipment and tested in the 305 test basin.

**6.0 TEST PROCEDURE**

See attached test procedure.

**7.0 SAFETY**

There is no anticipated safety impact. A facility specific work plan has been prepared for the fabrication and testing of the gas/liquid sampling equipment.

**8.0 QUALITY ASSURANCE**

Quality control for all testing and document release will be per WHC-CM-4-2 Quality Assurance Manual. Test data will be recorded on data sheets located in 138A MO-285/200E in a master file. All data will be attached to a released copy test report.

**9.0 ORGANIZATION AND FUNCTIONAL RESPONSIBILITIES**

K Basin Engineering Project, Process Systems is responsible for all technical support and documentation required to design, fabricate, and test the developmental sampling equipment. The System Engineer from Process Systems shall supervise all testing

of the sampling equipment. All changes or modifications shall be approved by the System engineer prior to changes to the design.

Equipment Testing Laboratory will provide the bench space, compressed air and electrical outlet for testing the developmental sampling equipment. The personnel at the 305 facility are involved in fabrication of the sampling equipment and will help modify as required and per System Engineer.

Nuclear Fuels Evaluation, the customer, will witness testing of the developmental equipment as requested. All documentation associated with the sample equipment will be copied to this group.

**10.0 SCHEDULE**

Please see attached schedule.

**11.0 REPORTS**

A work plan, functional design requirements, test procedures, and this test plan will be prepared in accordance to the WHC-CM-6-1 Standard Engineering Practices. Data sheets as outlined in the test procedure are to be used for all testing of the developmental sampling equipment for KW Basin closed canisters. A test report will be prepared and released after all testing has been completed.

**13.0 DATA SHEETS**

Data sheet will be part of the test procedures. Test information will be recorded on the data sheet. Original copies of the data sheet will be located in the master file. All data sheets will become part of the final test report.

| canister number | attach to canister | purge | | open valve | operate cylinder | close valve |
|---|---|---|---|---|---|---|
| | | air | liq | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |

Signature of test personnel_____

Print name test personnel_____

Date of test _____

# Test Operating Procedures

## 1.0 Test Item Identification

Test equipment is fabricated to drawing number H-1-80392 Page 1, 2, and 3.

## 2.0 General Description

A. Test Objectives

Determine if sampling equipment will take both gas and liquid samples from closed canisters.

B. Test Method

Testing of the sample equipment will be done in the 305 building. Each test will consist of at least 5 samples of gas or liquid, depending on the sample type, taken from the closed canisters. The samples will be taken following this procedure.

## 3.0 Test Condition Limits

Prior to testing, at least 1 set of canisters will be filled with water and the gas space purged with nitrogen. After each test run the canisters will be emptied and refilled before the next test run is started. For test run in the cold test facility, the water will be colored with a food dye.

Bench top test will be run at least once with canisters sealed and sitting in a dry environment and at least once in a water bath.

## 4.0 Instruments and Calibration

The oxygen analyzer used to determine if a gas sample, nitrogen, has been taken will be calibrated using 100 % oxygen. The calibration will be completed before the first testy and between test if a two hour time frame has elapsed.

## 5.0 Facility, Equipment, and Materials

The 305 building will be the test site for the sample equipment. An air compressor will be required to supply air to the cylinder. Nitrogen (bottled) will be required for the closed canisters and a food dye (any color) will be needed when testing for liquid samples in a water field.

No safety issues have been determined at this time.

## 7.0 Maintenance and Failures

Test will be stopped if the equipment fails to take a sample. The equipment will be removed from the basin or off of the canister and inspected for broken parts. Repairs will be made and a evaluation done on reason(s) for the failed pieces.

## 8.0 Test Data

The information taken during the test runs will be used improve the design of the equipment. The information will also be used to write the operating procedures or instructions for operations in the KW Basin.

## 9.0 Personnel Requirements

This test equipment will not require any specially trained personnel. The system engineer of the project will perform or oversee all testing operations.

## 10.0 Witnesses

The first round of testing for the bench top model will be for casual observers. No special time frame has been set to allow observation of the equipment. Full size testing will be completed in the cold test facility and will require scheduling so as not to interfere with other cold test equipment testing. When the schedule has been set, a time will be determined to allow test observation. All parties who will be involved with the finial product will be given the chance to observe.

## 11.0 Procedure

Before testing can start a canister must be filled with water within approximately 1.5 inches from the top. A Mark two canister lid will be sealed to the canister and nitrogen blown through the vapor space. Dry testing, canister not submersed in water, will be done with the bench top model to determine if the sampler will draw either liquid or gas out of the sealed canister. After completion and verification of basic design, the sealed canister will be submerged in a pool of water and the bench top will be tested again. The full size test equipment will be tested in the cold test basin.

The following is the step by step procedure for running the sampling equipment.

1. Attach gear or motor to top of sample tube mover.

2. Attach purge line and compressed air lines.

3. Lower the sampler over the valve (center for liquid, side for gas) on the top of the closed canisters.

4. Apply a little downward pressure to insure a seal has been formed.

5. Attach handle to top of valve opener.

6. Slip the vacationer into the tube holder using a pair of tongs.

7. Lower the vacutainer all the way down to the bottom of the sampler.

8. Turn valve clock wise one full turn.

9. Open compressed air to the cylinder to initiate needle injection into the vacutainer.

10. Wait 30 seconds and close cylinder by redirecting compressed air.

11. Close the valve, turn counter-clockwise one full turn.

12. Return vacutainer to top of basin.

13. Rinse on the outside of the vacutainer with deionized water and remove using tongs.

14. Pump deionized water through the injection housing for 1 minute using the Masterflex pump.

15. Remove sampler from top of canister.

**NOTE:** If canister valve leaks (air bubbles) replace sampler and attach handle to valve opener. Turn counter clockwise to tighten and remove sampler. Repeat until air bubble stop releasing from valve.

Verify sample was taken by visual if liquid sample taken or running the gas sample through the oxygen analyzer. Return to steps 4 through 15 for another sample.

16. When sampling series is complete, remove the purge line, remove the compressed air lines, and remove handle from valve opener. Remove gear or motor from vacutainer mover.

17. Float sampler to storage area, and secure.

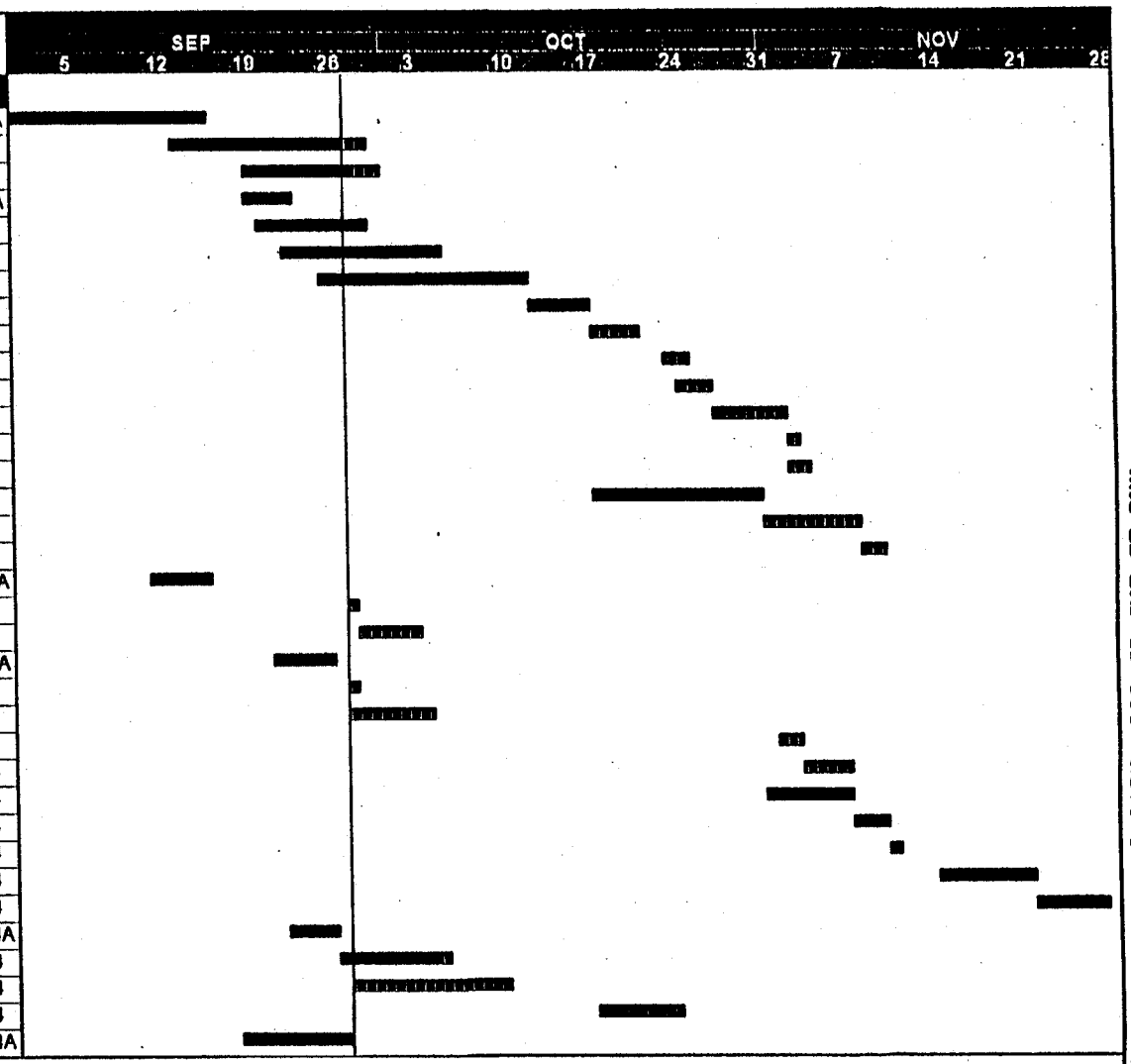
## 12.0 Disposition of Test Item

Bench top sampler will be stored with the system engineer. Full size unit will be dismantled and disposed of or complete the required testing to operate in the K-Basin.

## 13.0 Data Sheets

All data sheets will be kept by the system engineer with a duplicate copy placed in the project files for SNF.

| Activity ID | Activity Description | Orig Dur | Rem Dur | Early Start | Early Finish |
|---|---|---|---|---|---|
| **Engineering Support** | | | | | |
| BC2020100 | Test Table Top model | 5 | 0 | 01SEP94A | 16SEP94A |
| BC2020110 | Modifications Design | 5 | 2 | 14SEP94A | 29SEP94 |
| BC2020120 | Rerun Test | 3 | 2 | 20SEP94A | 30SEP94 |
| BC2020140 | Modify Test Procedues | 4 | 0 | 20SEP94A | 23SEP94A |
| BC2020150 | Incorporate Design Changes | 3 | 2 | 21SEP94A | 29SEP94 |
| BC2020160 | Procure Additional Materials | 6 | 5 | 23SEP94A | 05OCT94 |
| BC2020170 | Fab Full Size for Cold test | 7 | 5 | 26SEP94A | 12OCT94 |
| BC2020180 | Test Full Size in Cold Test | 3 | 3 | 13OCT94 | 17OCT94 |
| BC2020190 | Modifications to Design | 4 | 4 | 18OCT94 | 21OCT94 |
| BC2020200 | Rerun Test | 2 | 2 | 24OCT94 | 25OCT94 |
| BC2020220 | Modify Test Procedures | 3 | 3 | 25OCT94 | 27OCT94 |
| BC2020230 | Incorporate Design Changes | 4 | 4 | 28OCT94 | 02NOV94 |
| BC2020240 | Review Drawings, cheker | 1 | 1 | 03NOV94 | 03NOV94 |
| BC2020250 | Release Drawings | 2 | 2 | 03NOV94 | 04NOV94 |
| BC2020260 | Write Operating Proceures | 10 | 10 | 18OCT94 | 31OCT94 |
| BC2020270 | Review Operating Proceudes | 8 | 8 | 01NOV94 | 08NOV94 |
| BC2020280 | Release Operating Procedues | 2 | 2 | 09NOV94 | 10NOV94 |
| BC2020290 | Review Test Plan | 4 | 0 | 12SEP94A | 16SEP94A |
| BC2020300 | Release Test Plan | 1 | 1 | 28SEP94 | 28SEP94 |
| BC2020310 | Release Work Plan | 3 | 3 | 29SEP94 | 03OCT94 |
| BC2020320 | Review Function Design | 3 | 0 | 22SEP94A | 26SEP94A |
| BC2020330 | Release FDC | 1 | 1 | 28SEP94 | 28SEP94 |
| BC2020340 | Review Test Package | 5 | 5 | 28SEP94 | 04OCT94 |
| BC2020345 | Review Test Package | 2 | 2 | 02NOV94 | 03NOV94 |
| BC2020350 | Release Test Package | 2 | 2 | 04NOV94 | 07NOV94 |
| BC2020360 | Write Training Procedures | 5 | 5 | 01NOV94 | 07NOV94 |
| BC2020370 | Review Training Procedures | 3 | 3 | 08NOV94 | 10NOV94 |
| BC2020380 | Release Training Procedures | 1 | 1 | 11NOV94 | 11NOV94 |
| BC2020390 | Train Operators On Sampling | 6 | 6 | 15NOV94 | 22NOV94 |
| BC2020400 | Transport Sampling Equipment | 2 | 2 | 23NOV94 | 28NOV94 |
| BC2020410 | Receive Drawing of Shipping | 2 | 0 | 23SEP94A | 26SEP94A |
| BC2020420 | Modify Shipping "Pig" to Hold | 2 | 1 | 27SEP94A | 05OCT94 |
| BC2020430 | Procure Parts for Shipping | 9 | 9 | 28SEP94 | 10OCT94 |
| BC2020440 | Fab Shipping "Pig" | 5 | 5 | 18OCT94 | 24OCT94 |
| BC2020450 | Procure Vacutubes for | 15 | 0 | 19SEP94A | 27SEP94A |




Project Start 01SEP94
Project Finish 28NOV94
Data Date 29SEP94
Plot Date 29SEP94

Early Bar
Progress Bar
Critical Activity

Westinghouse Hanford Company
Spent Nuclear Fuel
Carol Pitkoff

WHC-SD-SNF-TP-008 Rev. 0

A-1