# ENGINEERING CHANGE NOTICE

JKE 1/19/95

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1. ECN 191392

Proj. ECN

| 2. ECN Category (mark one) | 3. Originator's Name, Organization, MSIN, and Telephone No. | | 4. Date |
|---|---|---|---|
| Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void [] | Carol C Pitkoff/ 2C110/ R3-86/ 376-7188 | | 1/9/95 |
| | 5. Project Title/No./Work Order No.: Gas/Liquid Sampling for KW Basin | 6. Bldg./Sys./Fac. No.: 305/300 Area | 7. Approval Designator: Q |
| | 8. Document Numbers Changed by this ECN (includes sheet no. and rev.): WHC-SD-SNF-TP-008 Rev 0 | 9. Related ECN No(s).: N/A | 10. Related PO No.: N/A |

| 11a. Modification Work | 11b. Work Package No. | 11c. Modification Work Complete | 11d. Restored to Original Condition (Temp. or Standby ECN only) |
|---|---|---|---|
| [] Yes (fill out Blk. 11b) [X] No (NA Blks. 11b, 11c, 11d) | N/A | N/A<br>Cog. Engineer Signature & Date | N/A<br>Cog. Engineer Signature & Date |

12. Description of Change

Testing procedures ,Attachment 1, has been updated.

| 13a. Justification (mark one) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Criteria Change | [] | Design Improvement | [X] | Environmental | [] | | |
| As-Found | [] | Facilitate Const. | [] | Const. Error/Omission | [] | Design Error/Omission | [] |

13b. Justification Details

Change in design, changed the test procedures.

14. Distribution (include name, MSIN, and no. of copies)

| | | | |
|---|---|---|---|
| CC Pitkoff | R3-86 | OSTI (2) | L8-07 |
| JR Fredericksion | R3-86 | | |
| DW Smith | R3-85 | STA 19 | X3-90 |
| RP Omberg | R3-85 | | |
| DJ Trimble | L5-01 | | |
| SNF Project File | N1-31 | | |
| Centeral Files (orig +2) | L8-04 | | |

RELEASE STAMP

OFFICIAL RELEASE BY WHC (13)

DATE JAN 19 1995

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A-7900-013-2 (06/94) GEF095

| ENGINEERING CHANGE NOTICE | Page 2 of 2 | 1. ECN (use no. from pg. 1) 191392 |
|---|---|---|

| 15. Design Verification Required | 16. Cost Impact | | | | 17. Schedule Impact (days) | |
|---|---|---|---|---|---|---|
| | ENGINEERING | | CONSTRUCTION | | | |
| [] Yes | Additional | [N] $ | Additional | [N] $ | Improvement | [N] |
| [X] No | Savings | [N] $ | Savings | [N] $ | Delay | [N] |

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

| | | | | | |
|---|---|---|---|---|---|
| SDD/DD | [N] | Seismic/Stress Analysis | [N] | Tank Calibration Manual | [N] |
| Functional Design Criteria | [N] | Stress/Design Report | [N] | Health Physics Procedure | [N] |
| Operating Specification | [N] | Interface Control Drawing | [N] | Spares Multiple Unit Listing | [N] |
| Criticality Specification | [N] | Calibration Procedure | [N] | Test Procedures/Specification | [N] |
| Conceptual Design Report | [N] | Installation Procedure | [N] | Component Index | [N] |
| Equipment Spec. | [N] | Maintenance Procedure | [N] | ASME Coded Item | [N] |
| Const. Spec. | [N] | Engineering Procedure | [N] | Human Factor Consideration | [N] |
| Procurement Spec. | [N] | Operating Instruction | [N] | Computer Software | [N] |
| Vendor Information | [N] | Operating Procedure | [N] | Electric Circuit Schedule | [N] |
| OM Manual | [N] | Operational Safety Requirement | [N] | ICRS Procedure | [N] |
| FSAR/SAR | [N] | IEFD Drawing | [N] | Process Control Manual/Plan | [N] |
| Safety Equipment List | [N] | Cell Arrangement Drawing | [N] | Process Flow Chart | [N] |
| Radiation Work Permit | [N] | Essential Material Specification | [N] | Purchase Requisition | [N] |
| Environmental Impact Statement | [N] | Fac. Proc. Samp. Schedule | [N] | Tickler File | [N] |
| Environmental Report | [N] | Inspection Plan | [N] | | [] |
| Environmental Permit | [N] | Inventory Adjustment Request | [N] | | [] |

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

| Document Number/Revision | Document Number/Revision | Document Number Revision |
|---|---|---|
| N/A | | |

20. Approvals

| Signature | Date | Signature | Date |
|---|---|---|---|
| OPERATIONS AND ENGINEERING | | ARCHITECT-ENGINEER | |
| Cog. Eng. CC Pitkoff CC Pitkoff | 1/19/95 | PE | |
| Cog. Mgr. JR Frederickson J.R. Frederickson | 1/19/95 | QA | |
| QA ~~DW Smith~~ RE Lacey RE Lacey ~~[illegible]~~ | 1/19/95 | Safety | |
| Safety | | Design | |
| Environ. | | Environ. | |
| Other RP Omberg 1/19/95 for RPO | ~~[illegible]~~ | Other | |
| | | | |
| | | | |
| | | DEPARTMENT OF ENERGY | |
| | | Signature or a Control Number that tracks the Approval Signature | |
| | | ADDITIONAL | |
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# RELEASE AUTHORIZATION

| | |
|---|---|
| **Document Number:** | WHC-SD-SNF-TP-008, . REV.1 |
| **Document Title:** | Gas Liquid Sampling for Closed Canisters in KW Basin -Test Plan |
| **Release Date:** | January 19, 1995 |

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

**APPROVED FOR PUBLIC RELEASE**

**WHC Information Release Administration Specialist:**

Kara M. Broz — January 19, 1995

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# SUPPORTING DOCUMENT

1. Total Pages 215

| 2. Title | 3. Number | 4. Rev No. |
|---|---|---|
| Gas Liquid Sampling for Closed Canisters in KW Basin -Test Plan | WHC-SD-SNF-TP-008 | 0 cel |

| 5. Key Words | 6. Author |
|---|---|
| Sampler<br>Procedures<br>Test<br>gas/liquid | Name: CC Pitkoff<br>Signature<br>Organization/Charge Code 2C110 / ~~L2110~~ L2601 |

7. Abstract

Test Procedures for the Gas/Liquid Sampler.

8. RELEASE STAMP

OFFICIAL RELEASE BY WHC
DATE JAN 19 1995
Sta 4

## DISCLAIMER

| RECORD OF REVISION | (1) Document Number<br>WHC-SD-SNF-TP-008<br>Rev0 | Page 1 |
|---|---|---|

(2) Title

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

CHANGE CONTROL RECORD

| (3) Revision | (4) Description of Change - Replace, Add, and Delete Pages | Authorized for Release | |
|---|---|---|---|
| | | (5) Cog. Engr. | (6) Cog. Mgr. Date |
| Rev 1 RS | (7) Revise attachment 1 Complete revisison of test procedures. ECN-191392 | [signature] 1/19/95 | [signature] 1/19/95 |
| | WHC-SD-SNF-TP-008 Rev 0 | | |
| | EDT # 606331 Oct 4, 1994 | | |

A-7320-005 (08/91) WEF168

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WHC-SD-TP-008
Rev. 1

# Gas/Liquid Sampling for Closed Canisters in KW Basin

## Test Plan

January 19, 1995

## 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 and/or a gas sample 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 liquid sample and an undeterminable amount of gas 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-008, Functional Design Cretiria for Gas/Liquid Sampling Equiment gives the functions and requriements 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 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, fab, 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 Rev. 0, Page 1, 2, and 3. The sample vial sleeves are fabricated to H-1-80402 Rev. 0.

## 2.0 General Description

A. Test Objectives

There are 4 objectives that must be met to determine if the sampler design is accepted for the use in the KW Basin.

1. Sampler mates up with a valve on a closed canister.

2. Sampler retrieves a liquid (10 ml) or gas sample from closed canister.

3. During sampling, contents of canister are not released to the basin.

4. Sampler uses existing trolley/crane system for positioning over top of canister for sampling and off of canister when sampling is completed.

Section 11.0 has hold points that will be initialed by sample operator during the testing for qualification to release to the KW Basin. These hold points will help determine if the sampler meets all objectives of the test procedure.

B. Test Method

Testing of the sample equipment will be done in the 305 building. Each test will consist of one sample retrieved 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. For test runs

in the cold test facility, the water will be colored with red food dye, approximately 56 grams per canister barrel. The barrels will be filled with approximately 21 liters of water.

Full system testing will have one set of canisters filled and placed in the canister rack/table in bottom of basin. Both canister barrels will be filled to eliminate the need to remove canister from basin and refill during the testing. The gas space will be purged with nitrogen gas for three minutes before the valves are closed.

**4.0 Instruments and Calibration**

The oxygen analyzer is used to determine if a gas sample, nitrogen, has been taken will be calibrated to 100% bottled oxygen. The calibration will be completed before the first test and between tests if a two hour down time 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 and the pneumatic drill. Nitrogen (bottled) will be required for the closed canisters and red food dye will be needed when testing for liquid samples.

**6.0 Safety**

The technicians and engineers operating the sample equipment and any observers shall follow the safety rules established in the 305 Building Cold Test Facility Management Plan, WHC-SD-SNF-PCP-001. Rev 0.

**7.0 Maintenance and Failures**

Test will be stopped if the equipment fails to take a sample in two consecutive tries. The equipment will be removed off of the canister or from the basin, if required, and inspected for broken parts. An evaluation will be performed on the reason(s) for the failure to draw a sample. Testing will proceed after corrections are complete.

**8.0 Test Data**

The information taken during the test runs will be used to 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.

Test data will be used from the last set of testing to qualify the equipment for the KW Basin. Quality Assurance, Spent Nuclear Fuel Safety, Engineering Projects, K Basins Operations, and Characterization will witness the final testing for both gas and liquid.

**9.0 Personnel Requirements**

Testing will be completed by the systems engineer and technicians in the 305 facility. Pending the determination of the documentation required to hot test the equipment in the KW Basin Operations personnel will be trained in the 305 facility on the equipment prior to movement out to the basin.

**10.0 Witnesses**

Full system 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 final product will be given the chance to observe.

The final testing for qualification to operate in the KW Basin, Quality Assurance, Spent Nuclear Fuel Safety, K Basins Operations, and Characterization will be present.

**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. The full system test equipment will be tested in the cold test basin with the canister barrels prepared above the water.

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

1. Attach sampler to the crane/trolley.

2. Using the crane or trolley move sampler from the sample tool holder to over the canister and lower until the sampler fits over a valve and comes to a stop (center for liquid, side for gas) on the top of the closed canisters. Do not remove

from the crane or trolley, this is used to help maintain the sampler in a vertical position over the canister.

***Hold*** Seal has been formed _____
Operator felt the sampler fit over the canister needle valve and come to a stop.

3. Attach flush line and compressed air lines.

*** At the start of each days testing, run the flush water through for two minutes.

4. Attach pneumatic drive drill to top of vacutainer transport.

5. Insert the vacutainer into the tube holder on vacutainer transport being sure that the peg is set into the hole.

6. Lower the vacutainer down to the bottom of the sampler.

7. Attach handle to top of canister valve operator.

***Hold*** Operator can feel valve with handle in a clock-wise motion _____

8. Turn canister valve operator handle counter-clock wise one full turn.

9. Open compressed air valve, by turning the air handle 1/4 turn counter-clock wise, to the cylinder to initiate needle injection into the vacutainer.

10. Wait 30 seconds and close cylinder by turning the air valve 1/4 turn clockwise. This stops the flow of compressed air and releases the pressure of the air in the line.

11. Close canister valve operator, turn clockwise one full turn, and valve is seated.

12. Return vacutainer to top of basin using the pneumatic drive drill.

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

***Hold*** Visual inspection _____
Verify-Gas sample less then 1 ml of liquid in vacutainer and when sample of gas passed through the oxygen analyzer reads

below 21% oxygen. Liquid sample color of dye placed in canister.

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

15. Remove sampler from top of canister using the trolley/crane.

***Hold*** Visual no colored water or air bubbles escaping from valve on closed canister. _____

**NOTE:** If canister valve leaks (air bubbles) replace sampler and attach handle to canister valve operator. 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 flush line

17. Remove the compressed air lines

18. Remove handle from canister valve operator.

19. Remove pneumatic drill from vacutainer transport.

20. Attach sampler to storage rack attached to the basin safety rails.

**QA Verification**_____
Quality Assurance has witnessed this test and agrees that the sampler operates as required in this test procedure and the Test Plan WHC-SD-SNF-TP-008.

**12.0 Disposition of Test Item**

Acceptance testing will determine the final disposition of the sampler. If the sampler is accepted out in the K Basin, that will be its final destination. If the sampler does not pass testing or a new one is requested for the KW Basin, the 17' 9" sampler will be used in the 305 facility for training. Once training is complete the equipment will be dismantled and disposed of.

**13.0 Data Sheets**

The Test procedure with the hold points will be used as data sheets. All data sheets will be kept by the system engineer with a duplicate copy placed in the project files for SNF.

Test report will have all data sheet copies attached from both bench top testing, full size testing and qualify testing completed in the cold test facility at 305 Building.

Signature Sheet for final testing of Gas/Liquid Sampler

The sample equipment has been tested and meets the objectives outlined in this test procedures.

| | |
|---|---|
| Systems Engineer | Date |
| Systems Engineering Management | Date |
| SNF Characterization | Date |
| K Basins Operations | Date |
| SNF Safety | Date |
| SNF Quality Assurance | Date |