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WHC Information Release Administration Specialist:


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June 5, 1995

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MASTER

**DEVELOPMENT TEST PROCEDURE
HIGH PRESSURE WATER JET SYSTEM**

1.0 TEST ITEM IDENTIFICATION

Development testing will be performed on the water jet cleaning fixture to determine the most effective arrangement of water jet nozzles to remove contamination from the surfaces of canisters and other debris.

The following debris may be stained with dye to simulate surface contaminants: Mark O, Mark I, and Mark II Fuel Storage Canisters (both stainless steel and aluminum), pipe of various size, (steel, stainless, carbon steel and aluminum). Carbon steel and stainless steel plate, channel, angle, I-beam and other surfaces, specifically based on the Scientific Ecology Group (SEG) inventory and observations of debris within the basin.

NOTE: The dye to be used is SLIDE ® Thin-Line Layout Blue

2.0 GENERAL DESCRIPTION

The overall objective of the development test is to develop and demonstrate a combined system. This includes associated tools and equipment to perform cleaning of canisters and other debris in the 105 K East (KE) Basin. The development testing shall achieve optimum reduction in the level of contamination/dose rate on debris, prior to removal from the basin and packaging for disposal. Repetitive tests may be necessary to achieve proper configuration and process control steps for the operations procedure for use at K Basins.

This development test procedure will define the performance testing of the High Pressure Water Jet System (HPWJS) fixture(s). This procedure will provide guidelines and instructions to control and evaluate the most effective arrangement of water jets for removing the contaminated surface layer from canisters and other debris presently identified in the KE Basin. Additionally, the desired result will be to deliver to K Basins a thoroughly tested and proven method for under water decontamination and dose reduction.

2.1 TEST OBJECTIVES

Utilizing the HPWJS connected to specially designed water jet fixture head(s):

- Clean surfaces of canisters coated with simulated contamination ensure the most safe and efficient process.
- Demonstrate a simulated controlled radiological environment for the decontamination of canisters, equipment and miscellaneous materials under water with minimal water surface disturbance.

- Demonstrate the best combination of nozzle configuration, water pressure, water flow rate and cleaning speed to clean canisters.
- Complete the testing of all variables and combinations of variables in the most effective and safe manner while maintaining complete development test records.
- Demonstrate the configuration of associated support tools and equipment required to perform decontamination and dose reduction tasks at the K Basins for the Debris Removal Program.
- Develop an operations work procedure for the implementation of this process at the K Basins (consistent with the development test report).
- Based on test report conclusions, develop the necessary training documents required to train and qualify support personnel in the safe and efficient performance of this process.

2.2 TEST METHOD

The test shall be performed under water within a mocked up controlled radiological environment to simulate normal work conditions at the KE Basin.

The development test will be repeated as many times as necessary to reach the expected results of removing most of the simulated contamination (dye coating) from the test items in an effective and efficient manner.

3.0 TEST CONDITION LIMITS

Personnel involved in these tests shall use, wear and employ required safety equipment and practices during the operation of the HPWJS and associated tools and equipment. Protective equipment shall be provided for the eyes, ears, face, head and feet.

At the start of each shift and before starting the HPWJS, the Safety Checklist (Attachment A) will be completed by the SEG Technical Advisor after a walkdown of the system is completed to ensure and verify that tools and equipment are safe to operate.

Only trained and qualified personnel shall start up and operate the HPWJS. During testing, SEG personnel shall be present and provide overall technical direction for the set up of fixtures and associated hardware. (See Section 9.0 for responsibilities)

The simulated coating material criteria is that 98% of the surfaces be coated with dye to simulate the contaminated surface.

3.1 FIXTURE DESIGN CRITERIA

The fixture design shall include the following features:

- As Low As Reasonably Achievable (ALARA), engineered into the process.
- Minimize handling of items to be cleaned.
- Minimize the moving parts of the special wands and water jet fixture heads.
- Ease of operation by the operators.
- Ease of maintenance; and replacement of degraded nozzles.
- Minimize cleaning time for each canister.

4.0 INSTRUMENTS AND CALIBRATION

Pressure gauges are calibrated by the vendor prior to shipping. No other calibration is required.

5.0 FACILITIES, EQUIPMENT AND MATERIALS

5.1 FACILITIES

The test basin in the 305 Cold Test Facility and the tank in the tent located outside at the east end of the building will be utilized for the test program.

5.2 EQUIPMENT

The HPWJS will provide water at the desired pressures and flow rates. The system can provide up to 15,000 psi water, with flow rate up to 15 gpm. The water jet skid will be located outside of the building on the south east corner. Electrical service to the skid will be provided by a portable diesel generator unit connected directly to the motor control panel and grounded to a building ground. Feed water will be pumped from the test basin to the water jet pump through a 2 inch PVC line from an auxiliary feed pump. Electrical service to the feed pump will be provided via a control panel from the 480 volt, 3 phase outlet near the test basin. The high pressure hose will be run to and be discharged either to one of the tanks in the tent or the test basin through a control valve to the fixtures and/or heads. Bypass water and drains will be routed back to the test basin.

A work station will be set up in the test basin on the south side hand rail within the 305 Cold Test Facility. The item to be cleaned will be placed into the test basin and a HPWJS with varying discharge pressures and flow rates will be directed at the surfaces to be cleaned through nozzles on the underwater jet fixtures. An assortment of tools and equipment will be utilized to lift, hold, place and manipulate items under water during the cleaning activities. Additionally, a work station may be set up in the tent located on the east side of the 305 facility to perform simulated cleaning of items in one of the tanks.

6.0 OPERATION PROCEDURE

The HPWJS operating procedure and/or vendor manuals shall be used for operation of the HPWJS in support of these test activities.

- 6.1 A Job Hazard Analysis (JHA) form specific to these tests will be required in accordance with WHC-CM-4-3, Standard A-3. Existing JHAs may be applicable.
- 6.2 Applicable JHAs and Material Safety Data Sheets (MSDS) shall be posted or located in the test facility test area.
- 6.3 Test area personnel shall observe safety precautions outlined in the JHA and MSDS.

WARNING!!!

If malfunction occurs, immediately stop all water jet cleaning activity and relieve system pressure per the operating procedure. Follow manufacturer's repair instructions.

7.0 MAINTENANCE AND FAILURES

Use only products intended for high pressure water jetting. DO NOT use damaged items. Inspect condition of all parts prior to use. Immediately inform test supervision of any water or oil leakages. Failure to do so may result in equipment damage.

A logbook will be kept by the operator of the HPWJS concerning all breakdowns, repairs, or leaks. The logbook will be located at or near the unit, reviewed and initialed each day by the SEG Technical Advisor to ensure proper maintenance is performed.

- Do not alter products. Products should be used only as intended.

- Do not touch water coming from weep holes on fittings and parts with bare hands or try to stop the leakage by plugging the holes. Water coming from the weep holes is at high pressure and will cause injury by penetrating the skin.
- Check condition of all high pressure threads. Use Teflon tape only on low pressure pipe and fittings male threads before connection. Do not let tape overlap and block end of tubing. Use "Never Seize" thread lubricant on high pressure pipe and fittings. Be sure there is a minimum engagement of four threads. Do not use pipe wrenches on high pressure pipe or fittings.
- Any protective shielding removed from high pressure tubing and hoses during servicing must be replaced when servicing is complete. Failure to replace shielding may result in serious injury to personnel or damage to the equipment.
- Prior to water jet cleaning, operate pump at low flow and low pressure (500 psi) to flush debris from system before attaching nozzle. Stop pump and relieve all pressure if adjustments are needed. If properly working, install nozzle and slowly increase flow and pressure until operating pressure is reached.
- Only trained personnel should perform maintenance or repair.
- In case of freezing conditions, drain water from all components.

8.0 TEST DATA

The test data recorded for each item cleaned shall include:

- Water Pressure
- Water Flow Rates
- Area Cleaned
- Time Required
- Fixture Configuration

8.1 TEST GOAL

The test goal is to remove at least 80% of the dye from the canister and other debris piece simulated.

9.0 PERSONNEL REQUIREMENTS

9.1 Qualifications/Training

Personnel performing these tests shall be trained and qualified by the HPWJS vendor representative or a vendor certified person for the safe start up, operation and shutdown of the HPWJS. Training records shall be maintained in the project files for those who have received training on operation of the HPWJS.

9.2 Responsibilities

9.2.1 Test Technician

The Test Technician (305 Facility Technician) is responsible for performing the physical hands on manipulation of tools, equipment and general facility support.

9.2.2 WHC Test Engineer

The WHC Test Engineer is responsible for ensuring that the test is performed per the development test procedure. He shall review each of the Test Data Sheets verifying the recorded information and write a test report summary and recommend final design of fixture and associated support equipment.

9.2.3 SEG Technical Advisor

The SEG Technical Advisor(s) are responsible for the overall coordination of the special fixtures and equipment including interfacing with equipment vendors for SEG procured equipment. One of the major responsibilities is to ensure proper equipment set up and safety of operation. Prior to each test run they shall perform the walk down of the system and complete the initial input to the Safety Checklist (Attachment A) and Development Test Data Sheet (Attachment B).

The SEG Technical Advisors are certified trainers and will provide equipment training to test technicians and designated Operations personnel who perform testing.

10.0 WITNESSES

Witnessing requirements for the development testing (only by the 305 Facility Test Technician (WHC Person)), shall be indicated by sign offs on the Development Test Data Sheet (Attachment B).

11.0 TEST EXECUTION

11.1 Safety Meeting

A pre-job safety meeting will be conducted with test personnel prior to starting acceptance testing.

11.2 Safety Walk Down

A Pre-test safety walk down will be performed by the SEG Technical Advisor and the 305 Facility Test Technician prior to starting and running each test configuration.

11.3 Water Jet Fixture Configuration

The water jet fixture shall be developed from the test configuration after the development test goal is achieved.

11.3.1 Purpose

This testing shall be documented by recording development test data. The steps may be reordered to provide the most efficient process. The Development Test Data Sheets (Attachment B) will be utilized to record specific test information. The water jet fixture/heads and associated support equipment configurations shall be recorded for each test using a single line sketch. The water pressures and water flows for each test configuration along with nozzle size, type and arrangement shall be recorded. Manifolds, control valve type and hose arrangement will also be included and recorded in the sketch.

11.4 Scope

Develop the most efficient configuration of fixtures for cleaning the simulated surface contamination under water. The testing is to be performed on each of the debris type of materials identified with varied configurations of the water jet fixtures and heads.

11.5 Set Up

The operations procedure for the HPWJS shall be utilized in conjunction with this test procedure. This skid mounted pump system provides water at various pressures and flow rates. The high pressure hose will be connected through a manifold to two foot control valves. High pressure hose/pipe will be connected to the underwater jet fixtures from the foot control valves.

Special handling tools and equipment will be used for positioning and manipulating of the debris to and through the cleaning water jet fixture. These fixtures may be supported from the hand rail of the test basin. A crane or jib may be used to manipulate the large items (canisters).

12.0 TEST STEPS

- 12.1 Connect hoses and place the water jet fixture into the test basin.
- 12.2 Place the test material into the test basin.
- 12.3 Start-up the HPWJS following the detailed steps in the HPWJS Operations Procedure.
- 12.4 Control flow to the fixture by operating the foot control valve(s).
- 12.5 Position and manipulate the test material and/or the cleaning fixture to clean until the surface of the material appears to be clean with at least 80% of the dye coating removed.
- 12.6 Time the cleaning duration and count the number of passes.
- 12.7 Remove item from the water and inspect.
- 12.8 Document level of "decontamination" on the Test Data Sheet as a percentage of paint/dye removed from the surface of the debris test item.
- 12.9 Repeat steps 11.2.1 through 11.2.8 as necessary.

13.0 DISPOSITION OF TEST ITEM

Save for reuse in future testing.

14.0 DATA SHEETS

Data will be recorded on the Development Test Data Sheet. An SEG Technical Advisor is responsible for initially filling out the Test Data Sheet. It is the responsibility of the SEG Technical Advisor to maintain the test records and a daily shift log of development test activities.

A Test Data Sheet Index Log (Attachment C) shall also be maintained by the SEG Technical Advisor starting with number 001. Test data shall be forwarded to the WHC Project Engineer for storage and control of official release as deemed necessary.

ATTACHMENT A
SAFETY CHECKLIST

* SAFETY CHECK LIST *		Test Log Number _____	
FOR HIGH PRESSURE WATER JETTING SYSTEM			
SEG Technical Advisor: _____		(print)	
DATE: _____	TIME: _____		
INSPECTION PERFORMED BY SIGNATURE: _____			
		YES	NO
1.	Has the Pre Job briefing been completed?	___	___
2.	Are personnel trained and qualified to operate the HPWJS?	___	___
3.	Is personnel safety equipment available at the job site?	___	___
4.	Have the work area and the skid area been roped off with proper signs posted?	___	___
5.	Have precautions been taken to protect electrical equipment?	___	___
6.	Is the area cleared of tripping hazards?	___	___
7.	Is the operating pressure of the fittings greater than the planned test pressure? (max test pressure is 15,000 psi)	___	___
8.	Are all hoses, lances, guns and foot control valves rated for the maximum operating pressure?	___	___
9.	Are all fittings, hoses, lances, guns and foot control valves in good working condition?	___	___
10.	Is the feed water pump ^{& return hose} properly placed in the basin and connected to the pump skid and has it been flushed?	___	___
11.	Have the Filter and Y-strainer been checked for cleanliness and in good operating condition?	___	___

	YES	NO
12. Are the skid drains, cooling water and dump water properly routed?	___	___
13. Are the safety shrouds on guns, valves and hoses?	___	___
14. Confirm electrical service connections are properly connected and power from the Portable Generator is available?	___	___
15. Has the high pressure hoses been flushed and all air removed prior to nozzle being installed?	___	___
16. Is the cooling water to the plungers operating properly?	___	___
17. Has the oil level been checked on the sight glass for the power end?	___	___
18. Has the Pressure Regulator been charged with nitrogen to the desired operating pressure?	___	___
19. Has hookup, including pipes, hoses and connections, been pressure tested with water at the maximum operating pressure?	___	___
20. Is the dump pressure regulator drain line connected properly?	___	___
21. Has Job site been examined for environmental considerations, with action as appropriate?	___	___
22. Are all control systems operational?	___	___
REMARKS:		

ATTACHMENT B
DEVELOPMENT TEST DATA SHEET

DEVELOPMENT TEST DATA SHEET

HIGH PRESSURE WATER JET SYSTEM

Test Log Number _____

PREPARED BY: _____ (Print)

SAFETY WALK DOWN COMPLETED

Signature of SEG Technical Advisor

Date _____ Time _____

Test Engineer _____ Test Technician _____

Test Item _____

Material Type _____

Water Jet Fixture Configuration Number _____

Nozzle Size and Type _____

Control Valve Configuration _____

Pressure _____ psi Flow _____ g.p.m.
Cleaning Time _____ minutes Number of Passes _____

Remarks On Cleanness _____

Other Remarks _____

Single Line Sketch of Fixture and Control Valve Arrangement

Sign Offs	Signature	Date
Witness (if required)		
Test Technician (305 Bldg.)		
SEG Technical Advisor		

ATTACHMENT C
*** DEVELOPMENT TEST DATA SHEET INDEX LOG ***

Test Log Number	Date	Test Engineer
001		
002		
003		
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015		
016		
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