Savannah River Remediation

We do the right thing.

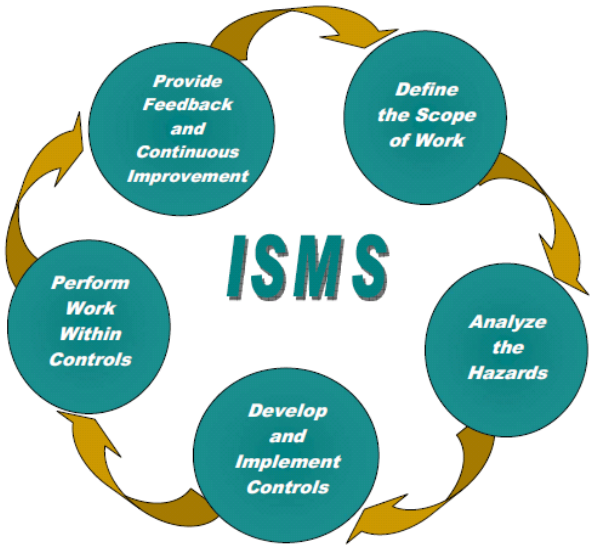
pathways to new missions

DOE 2010 ISM CHAMPIONS WORKSHOP

U.S. DEPARTMENT OF ENERGY

Safety Component of Design

Improvements in Waste Sampling Technologies



Presented by:
Keith Harp - SRR
Erich Keszler – NuVision Eng. (NVE)

September, 2010

Presentation By

Christopher Weston - SRR

Author – Savannah River Remediation (SRR) Began career with URS legacy company Morrison-Knudsen in 1974 on Alaska Pipeline Terminal Project in Valdez, Alaska. Has 26 years of experience on DOE Projects in seven different states including the Uranium Mill Tailings Remedial Action and Weldon Springs Site Remedial Action Projects. Located at SRS since 2003, currently serving as Sr. Project Engineer for Liquid Waste (LW) Design Authority supporting the Salt Waste Processing Facility and Salt Disposition Integration Projects in the LW Division.

Presenter – Savannah River Remediation (SRR) Began his career in Liquid Waste (LW) Division at Savannah River Site (SRS) in 1985. Experience in LW spans from Operations to Special Projects. Current member of the SRS Interface Management Team and serving as the Program Owner of Site Interface with the Salt Waste Processing Facility (SWPF) Project and modifications required for Salt Disposition Integration within the SRS LW division.

Keith Harp - SRR

Erich Keszler - NVE

Presenter – NuVision Engineering (NVE) Project Manager at NuVision Engineering Inc. APS Group as well as Operations Manager for the DOE International Agreement Program. Joined NuVision Engineering in 2006 managing several DOE projects across the complex including the Fluidic Sampler for Tank 50 at SRS. Licensed Professional Engineer in the states of California and North Carolina.

SRS Salt Waste Processing Mission

- **Liquid Waste Mission to close 22 High Level Waste Tanks in 8 years**
  - Process salt waste at unprecedented scale beginning in 2014
- **DOE presently constructing the Salt Waste Processing Facility (SWPF)**
  - SWPF to process up to 6 million gallons per year.

Aerial of SWPF – August 2010

Salt Waste Processing Mission
Continued

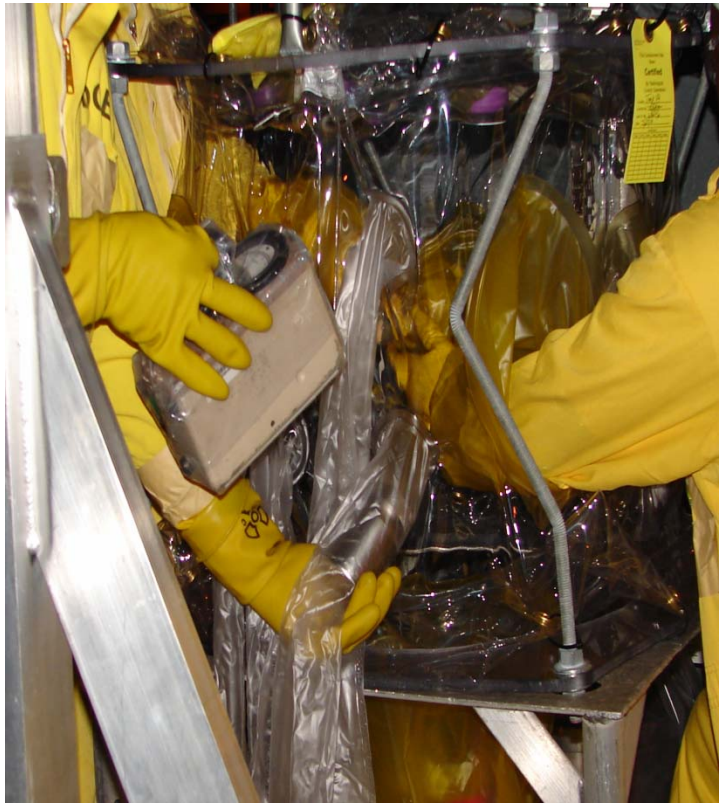
- **Prior to sending salt waste to SWPF for processing, SRR must validate through our sampling program that SWPF Waste Acceptance Criteria (WAC) is met.**
  - An estimated eighty-nine (89) 1.0 million gallon batches of waste will be processed during the operational life of the SWPF.
  - Approximately 350 waste samples will have to be obtained from the SWPF blend tanks.
  - For each sample obtained, approximately 150 constituents are verified to confirm alignment with the SWPF WAC.

Current Waste Sampling Method

- **The method currently being used to collect waste samples involves:**
  - **Personnel donning required personal protective equipment (PPE)**
  - **Positioning a glove bag over tank top opening (riser port)**
  - **Lowering of the sample vial through the waste tank top port opening**
  - **Submerging the vial in the waste until a sample has been collected**
    - **Due to limited visibility, sample confirmation can not occur until vial is removed from riser**
  - **Retrieving the sample vial, capping, flushing, obtaining exposure readings and placing in shielded carrier**

Current Method Waste Sampling
Continued

- Operators position themselves with arms outstretched to minimize whole body exposure from the radiological source.
- Although collection takes place within a glove bag, handling of the sample vial is required increasing the gamma dose rate exposure to extremities.
- Sample vial contact rates as high as 10 rem/hr with whole body dose rates at 6 rem/hr at 30cm



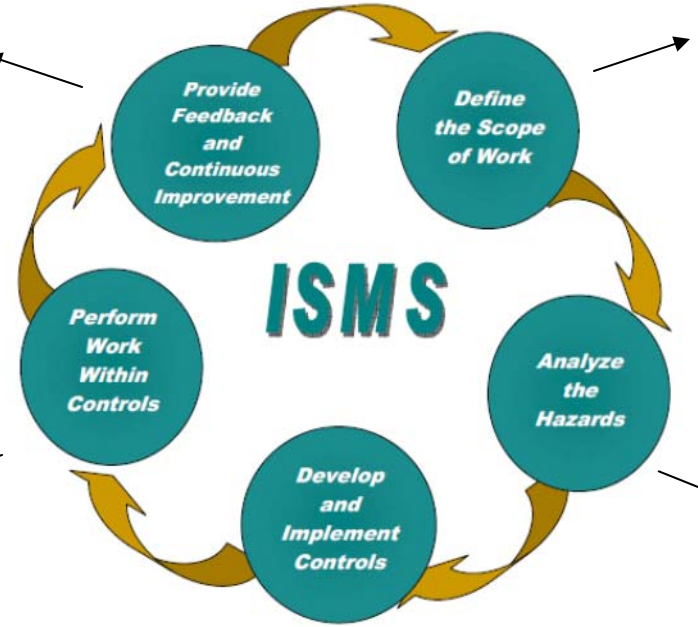
May through October, operators are exposed to greater potential for heat related problems. Extra measures are required at these times to prevent heat stress illness or injury.

ISM Guiding Principles

Provide Feedback & Continuous Improvement

Improve safety posture by taking ISM to the next level

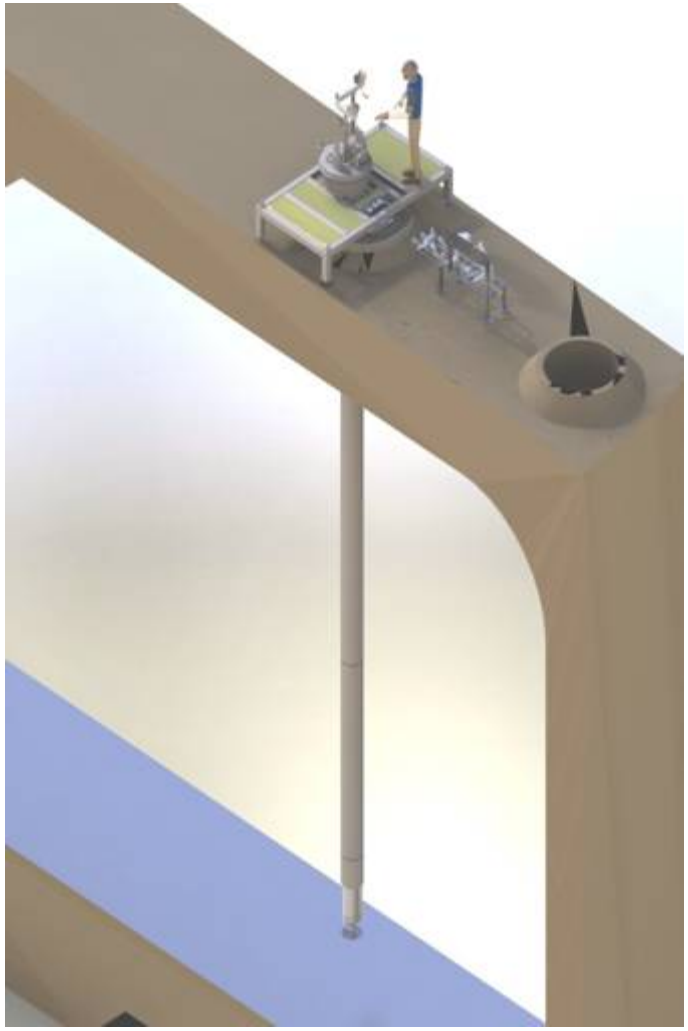
Obtain 350 samples from HLW Tanks



- **Heat (100+ degrees)**
- **Radiological (10 rem)**
- **Ergonomic (body position)**

Sampling Technology Improvement

- Funded by DOE-EM20 in 2009, the Single Point Fluidic Waste Sampler is being designed by NuVision Engineering.
- SRR is providing technical support for deployment in Tank 50, a Type IIIA waste tank, located in H-Tank Farm.
- Procurement of a Sample Station mock-up is underway.

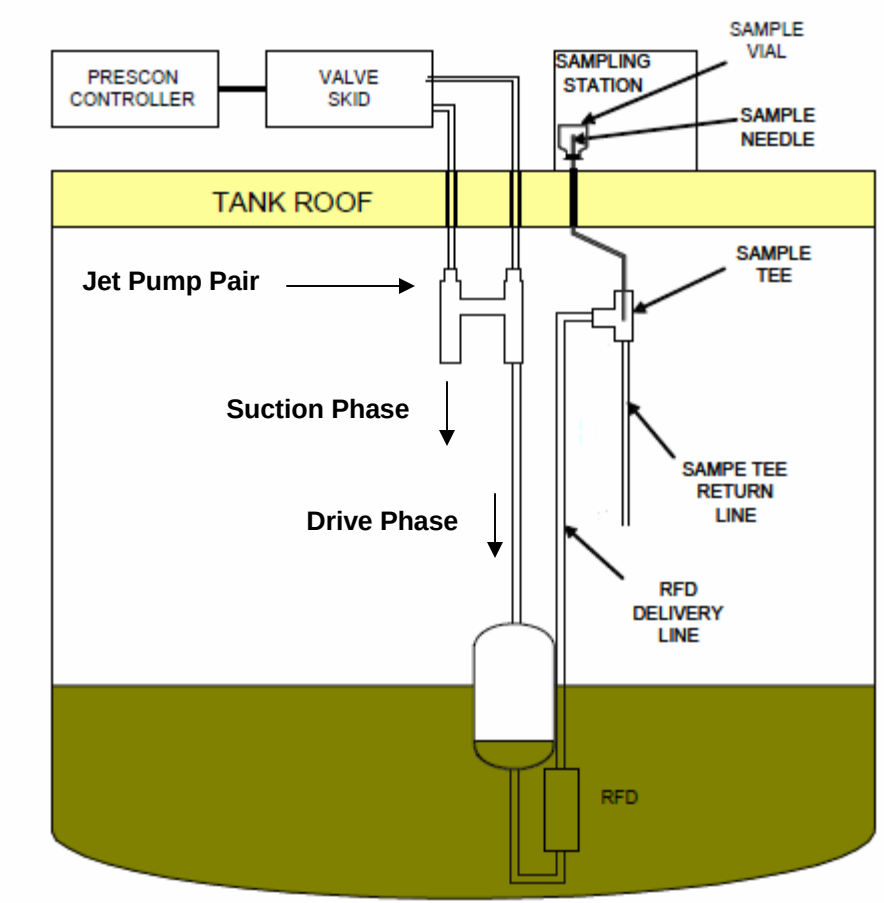


Fluidic Waste Sampler

- Sampler is installed through available tank riser.
- Waste Sampler is designed to collect sample in a 200 ml sample vial placed over a sample needle within the Sampling Station.
- Collects waste sample at single point elevation thru Reverse Flow Diverter (RFD).
- Sampler has no moving parts within the waste tank.

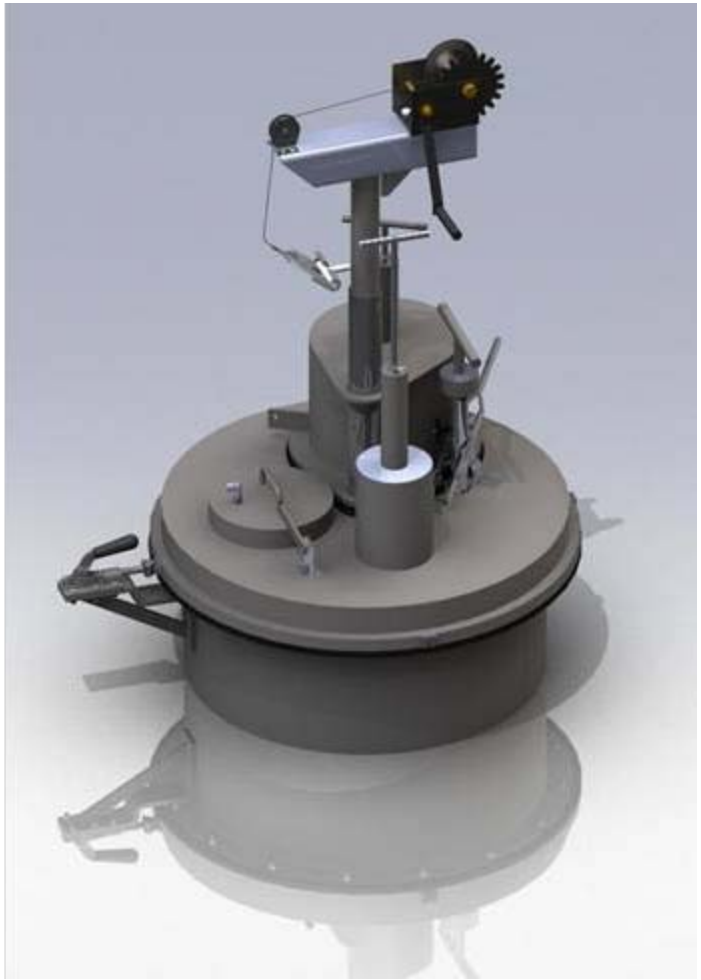
Fluidic Waste Sampler

- Sampler uses instrument air as motive force. Pump is cyclical completing approximately one cycle per minute.
- Suction Phase through left side of Jet Pump Pair creates the vacuum to bring waste through RFD, into pressure vessel.
- Drive Phase pushes the waste through the RFD and sample tee creating negative pressure in the sample vial, drawing fluid up through the sample needle.
- A 200 ml sample is collected in 6-7 minutes.



Fluidic Waste Sampler

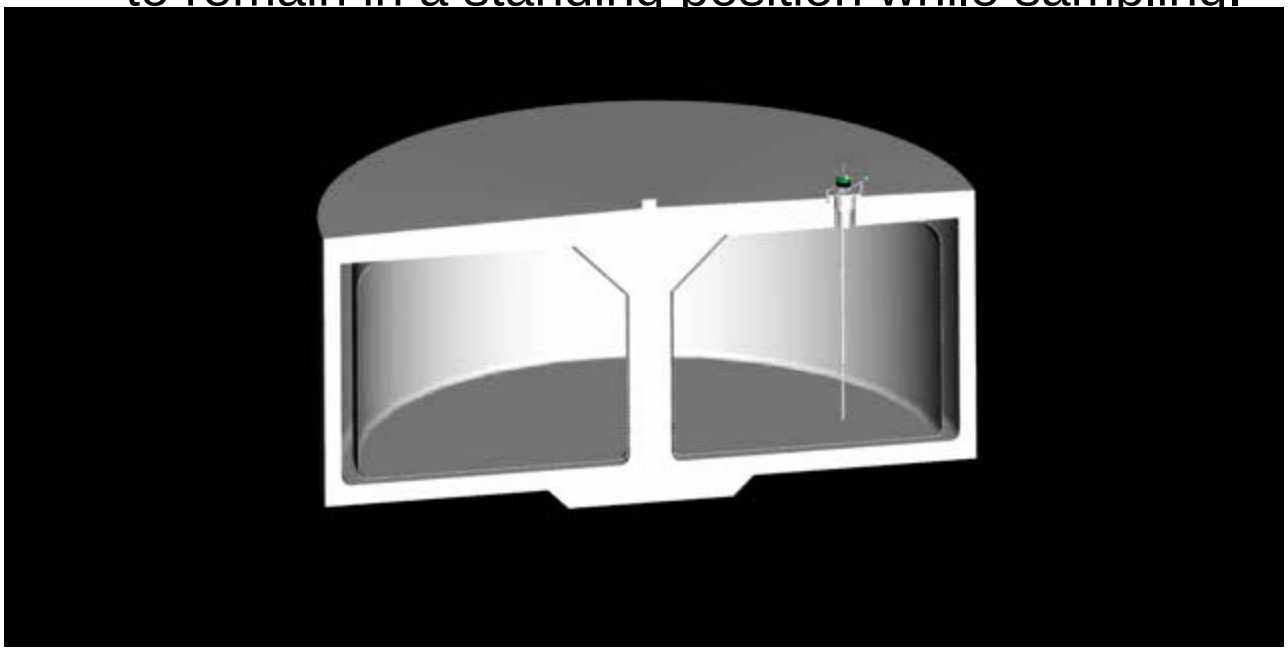
- The NuVision design for the Fluidic Waste Sampler has distinct advantages over the current sampling methodology:
  - Design aligns with SRR commitment to ISM, ALARA and Waste Minimization principles by incorporating safety into design.
  - Sample collection takes place within the shielded Sample Station. Radiological dose to employees is negligible. Sample Station is designed to reduce exposure to <5 mr at 30 cm.



Fluidic Waste Sampler

Advantages (continued)

Ergonomic improvement by allowing employees to remain in a standing position while sampling.

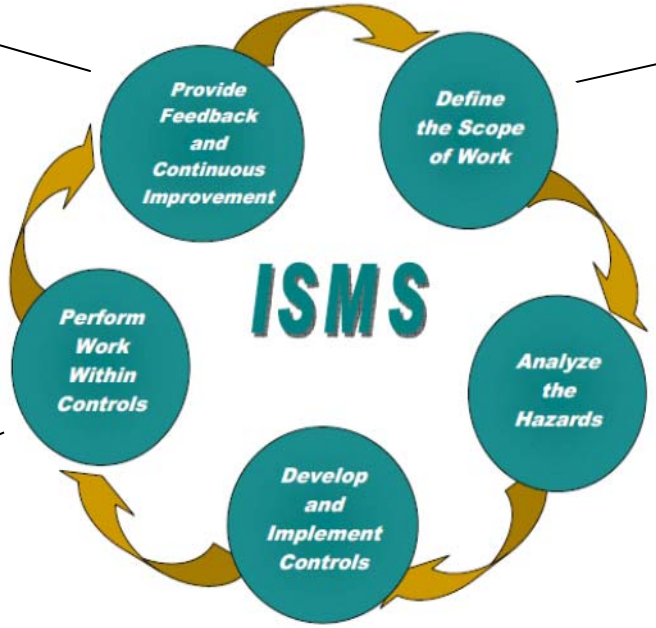


Tank internal waste blend pumps used for waste mixing can be operational during sampling, which ensures the sample collected is representative.

Implementing ISM

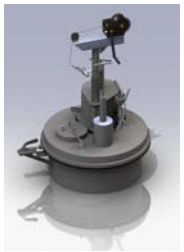
Improve safety posture by taking ISM to the next level

Obtain 350 samples from HLW Tanks



A 200 ml sample is collected in 6-7 minutes with a reduction of a factor of 1000 for dose at 30 cm

- Heat exposure reduced
- Radiological (<5 mrem)
- Ergonomic (improved)



Status

- Preliminary Hazards Analysis - Complete
- Review of sample station preliminary design drawings - Complete
- NVE detailed design - Initiated
- Sample Station Mockup design - Initiated
- Mockup ready for SRR evaluation - FY11

Results

- **With scope unchanged, it is anticipated significant improvement will be realized in the areas of heat and radiological exposures as well as ergonomics.**
  - A reduction by a factor of 1000 in radiological exposure
  - A reduction of 50% in exposure to ambient weather conditions
  - Recognized improvement in ergonomics for employees
- **Mockup results will be shared with the complex.**
  - Mockup will be maintained for future training of Operations, Maintenance and ESH personnel
- **Update to be provided at November 2010 Technology Exchange in Atlanta, GA**

Questions

- Questions regarding this topic can be directed to:
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  - Erich Keszler, NVE (704) 799-2707