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We Put Science To Work

The Retrieval Knowledge Center (RKC)

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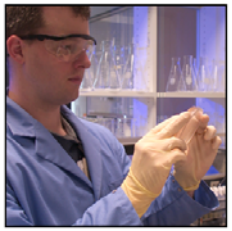
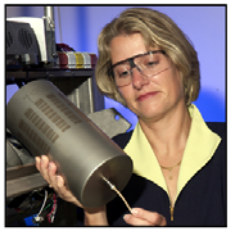
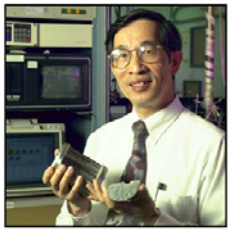
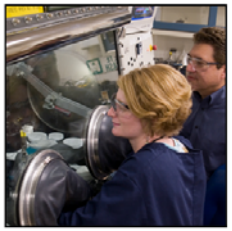
5/20/2009

U.S. DOE-EM Office of Waste Processing Technical Exchange

May 19 - 21, 2009 Denver, Colorado

SRNL-STI-2009-00335

Agenda

HOW DID WE GET HERE?

Overview

Background

Why a Retrieval Knowledge Center

Initial Objectives / Goals

"Building the Foundation"

Collaboration and Teaming

What are we calling "Knowledge"

The Challenges that lead to Gaps in Retrieval

WHERE ARE WE GOING?

What's Next

Addressing the Challenges

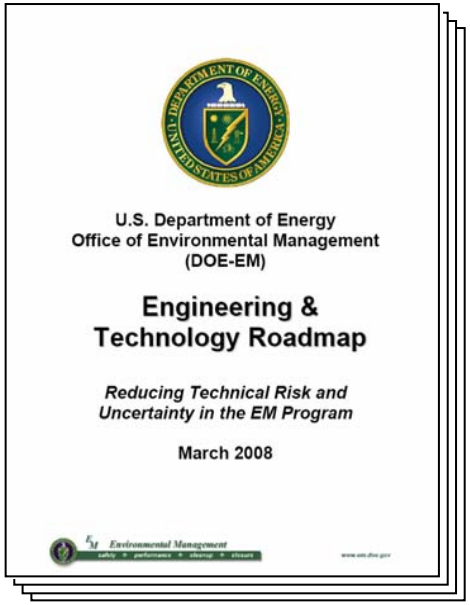
Managing the Knowledge

Technology Demonstrations

The Practicing Community aka. "Community of Practice"

Background – Waste Retrieval Strategic Initiative

DOE-EM Engineering & Technology Roadmap issued to Congress in 2008 outlined programmatic risks and uncertainties to the cleanup mission.


U.S. Department of Energy
Office of Environmental Management
(DOE-EM)

Engineering & Technology Roadmap

Reducing Technical Risk and Uncertainty in the EM Program

March 2008

Engineering & Technology Roadmap

- **Waste Processing Program Area**
  - Identifies Technical Risk & Uncertainty in Waste Retrieval
    - **Reliable & Efficient Waste Retrieval Technologies Strategic Initiative**
      - *To develop optimization strategies & technologies that lead to successful processing & tank closure, and,*
      - *Develops a suite of demonstrated cleaning technologies that can be readily deployed to achieve required levels of waste removal*

E&T Roadmap Strategic Initiatives developed with input from appropriate EM sites, projects and programs

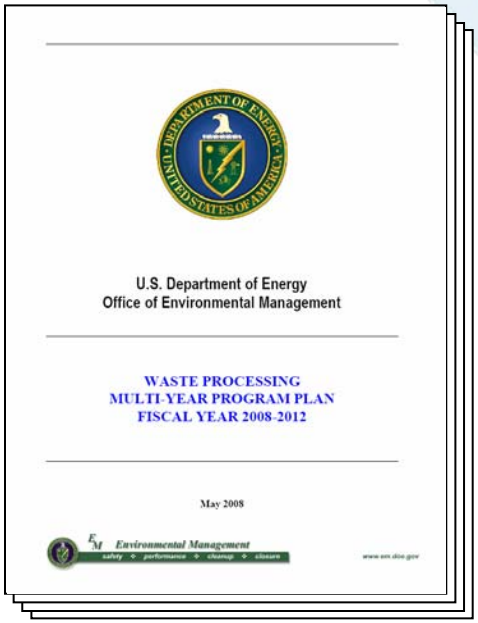
Background – Genesis of the Retrieval Knowledge Center

March 2008 DOE-EM Office of Waste Processing issued a plan (MYPP) to reduce the technical risk and uncertainty outlined in the E&T Roadmap.

- **identifies activities to enhance, develop and demonstrate technologies in the strategic initiatives**
- **resulted in identification of 17 key areas of risk in Waste Processing**
- **and supporting tasks within the key area portfolios**
- **ultimately tasks assigned priority and individual tasks approved**

"… to reduce technical risk and uncertainty of EM waste processing … through the identification and timely development of solutions to technical issues."

- DOE-EM WP Multi-Year Program Plan


U.S. Department of Energy
Office of Environmental Management

WASTE PROCESSING
MULTI-YEAR PROGRAM PLAN
FISCAL YEAR 2008-2012

May 2008

Environmental Management

- *Mid-year funding approved to start Retrieval Knowledge Center (RKC) task in April 2008*

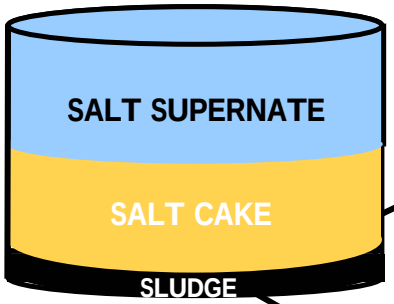
Why a Retrieval Knowledge Center

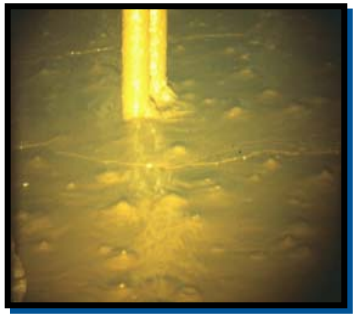
Our sites are working to process over 80M gallons of waste from aging underground tanks

Retrieval is the act of removing the waste material from the tank

The wastes constituents and properties have been described as unique to the tank

There are over 200 tanks that will to be retrieved over the life of the mission





RETRIEVAL REQUIRES REMOVAL OF THIS MATERIAL ...

… AND THE MATERIAL LEFT AFTER WE DO.

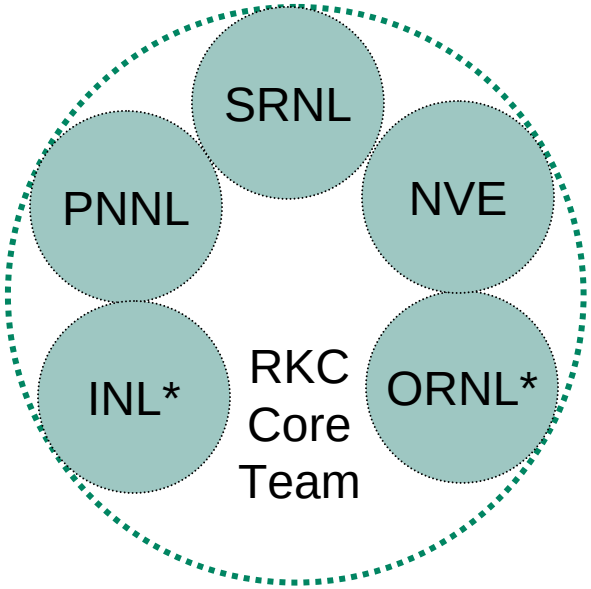
Retrieval Knowledge Center (RKC) Initial Objectives

- **Form a cross-discipline, multi-organizational team to evaluate retrieval lessons learned and requirements**
- **Develop an approach and tools needed to share information**
- **Collect data (and documentation) on retrieval efforts and technologies**
- **Communicate lessons and technology maturity**

- **Co-PIs named from SRNL and PNNL, and added NuVision Engineering to developed "core team"**
- **Developed FY2009 strategy to address;**
  - centralizing technical information on retrieval
  - documenting technical requirements, challenges and lessons of retrieval
  - analyzing technical gaps to retrieval
  - Develop plans to address the gaps

The RKC Team and Goals

RKC Core Team
Savannah River National Laboratory (Co-Lead)
Pacific Northwest National Laboratory (Co-Lead)
NuVision Engineering
Oak Ridge National Laboratory (added 5/2009)
Idaho National Laboratory (added 5/2009)



* Added in May 2009

Team Near-term Goals

(1) What is the most beneficial "Knowledge Tool"?

- Set direction and approach for "knowledge tools"
- NVE lead to re-constitute & improve document database functionality
- Provide all "retrieval users" access

(2) What are near term technical gaps in retrieval?

- Planned, arranged and led two "requirements" working meetings
- Recent lessons in retrieval
- Technologies in use

What are we calling "Knowledge"

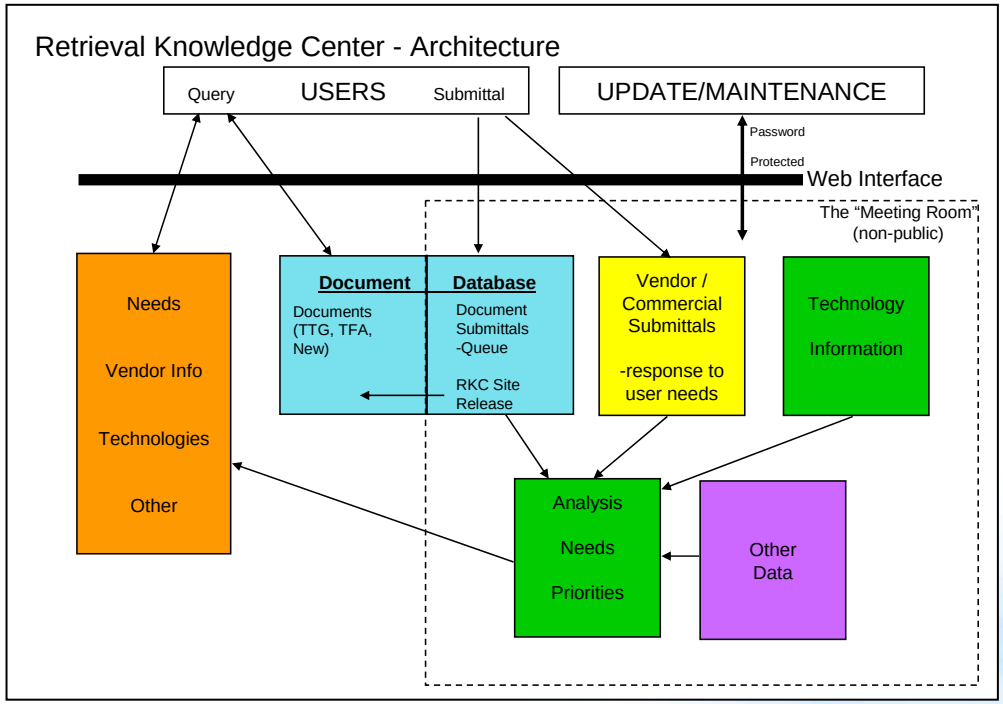
Re-constitute (and update) contents of TFA database

Improve search-ability

Add modern features

Add cyber "meeting room"

CONCEPT



Knowledge Results …

… Knowledge Results …

Knowledge Status and Next Steps in Knowledge

Status

- **Improved Web Pages and database final review is complete for temporary hosting on PNNL external server**
- **Successfully ported contents of existing TFA retrieval documents**
- **Initiated collection of recent retrieval data and documents**

Next Steps

- **Is there more to knowledge?**
- **“Manage the Knowledge”**
- **RKC support to a “Community of Practice”**
- **Longer term hosting and maintenance**

Defining the Gaps in Retrieval

Determine the challenges to retrieval

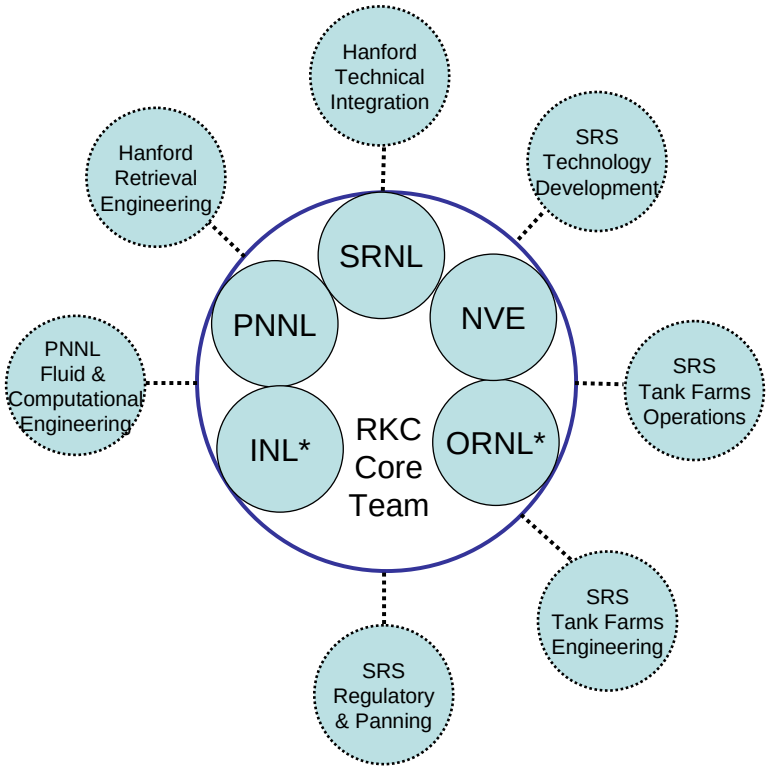
- What have been the most recent technical challenges to retrieval?

- What are the anticipated challenges over the next several years?

- **What are the lessons we've learned**

RKC Core Team hosted and ran facilitated working meetings in late 2008 to answer these questions.

RKC Working Meetings



* Added in May 2009

Team member surge to ensure "user" needs were included

Excellent engaged participation by tank farms personnel at Hanford and SRS

Both meetings were one (long) day and professionally facilitated

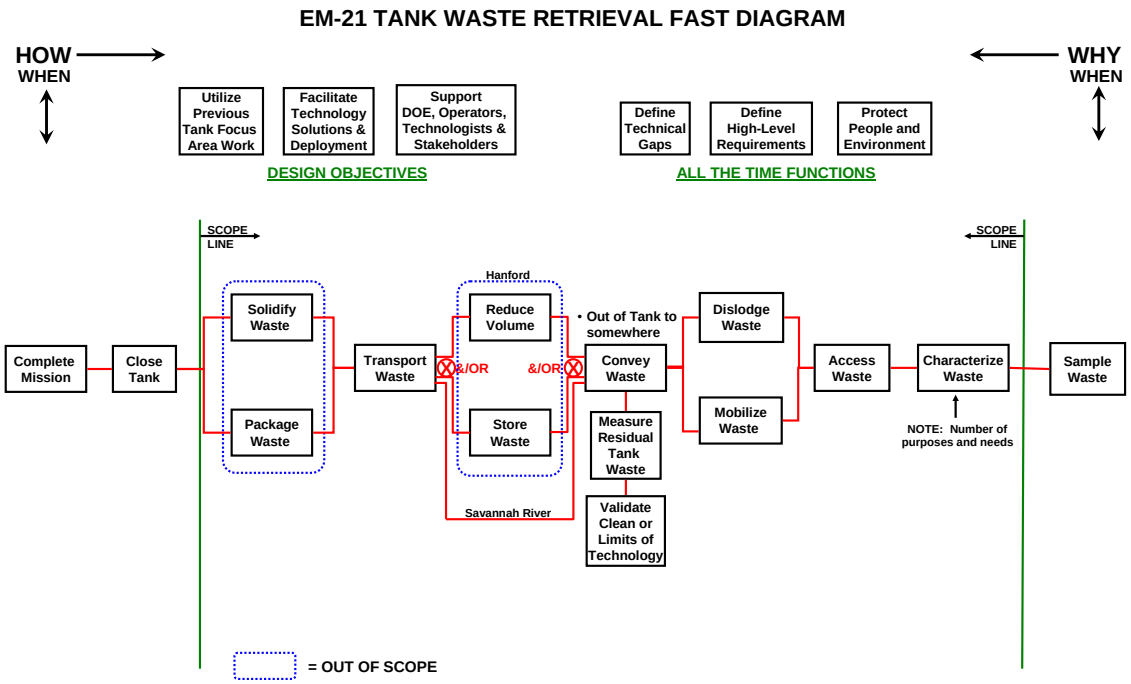
Essence of HLW tank "retrieval" captured in FAST diagram resulting in functions

Getting to the Technical Gaps

Results of the meeting showed technical (as well as some non-technical) challenges in all of the functional areas discussed

Retrieval Functions

Characterize
Access
Dislodge / Mobilize
Convey
Transport



High Level Technical Challenges

Characterization Challenges

- **Equipment / Instrumentation For Waste Characterization**
- **Turnaround Of Sample Analyses (increased throughput)**
- **Inadequate Detection Limits For Species Of Interest**
- **Cross-Contamination Of Samples**

Access Challenges

- **Installing New Access Locations**
- **Cleaning Waste Tank Components (Ancillary Systems)**
- **Remote Equipment To Limit Personnel Exposures**
- **Equipment to Access Large Tank Areas and Work around Internal Obstacles**
- **Equipment To Contain/Ventilate Tank Gases**
- **Equipment That Maintains The Structural Integrity Of The Waste Tank**
- **Robust Equipment That Can Be Removed From Tank When Work Completes**

More High Level Technical Challenges

Dislodge/Mobilize Waste Challenges

- **Minimization of Secondary Waste Streams**
- **Matching The Dislodge/Mobilize Output With The Waste Conveyance System**
- **Compatibility Of Dislodged/Mobilized Waste With Existing Waste In Receiver Tank**
- **Robust Equipment To Survive Harsh In-Tank Environment**

Convey Waste Challenges

- **Locating Equipment To Reach In-Tank Conveyance Location(s)**
- **Robust Equipment To Survive Harsh In-Tank Environment With Limited Maintenance**
- **Determining Remaining Waste Volume In Tank For Retrieval Completion**
- **Variance In Tank Waste Solid Loading From Dislodge/Mobilize Waste Function**
- **Quantifying Waste Properties Being Conveyed**

Transport Waste Challenges

- **Unplugging Of Waste Transfer Lines**
- **Waste Compatibility During/At Transport Destination (Handoff/Interface)**

Recommendations & Response from Working Meeting's

RKC response to recommendations

- **Consolidation of Retrieval Documentation** – Update and reorganize previous tanks focus area (TFA) and newer information to include developments since 2002 to provide a single source tool to evaluate and communicate waste retrieval evolutions and applicability.

Started listing & collection of "new" documents in mid-April

- **Incremental Development of Retrieval Technologies** – Develop and deploy waste retrieval technologies commensurate with the need, simple and inexpensive; progressing to more capable (and costly) technologies as needed based on the application.
- **Perform Cold Mock-Up Of Retrieval Technologies** – Develop a strategy that allows collection of relevant data with a minimal impact of site operations (through field observation and mock-up of equipment performance under controlled conditions).

Funded and approved to support 1st demonstration and evaluation of vendor technologies in area of dislodge / mobilize waste

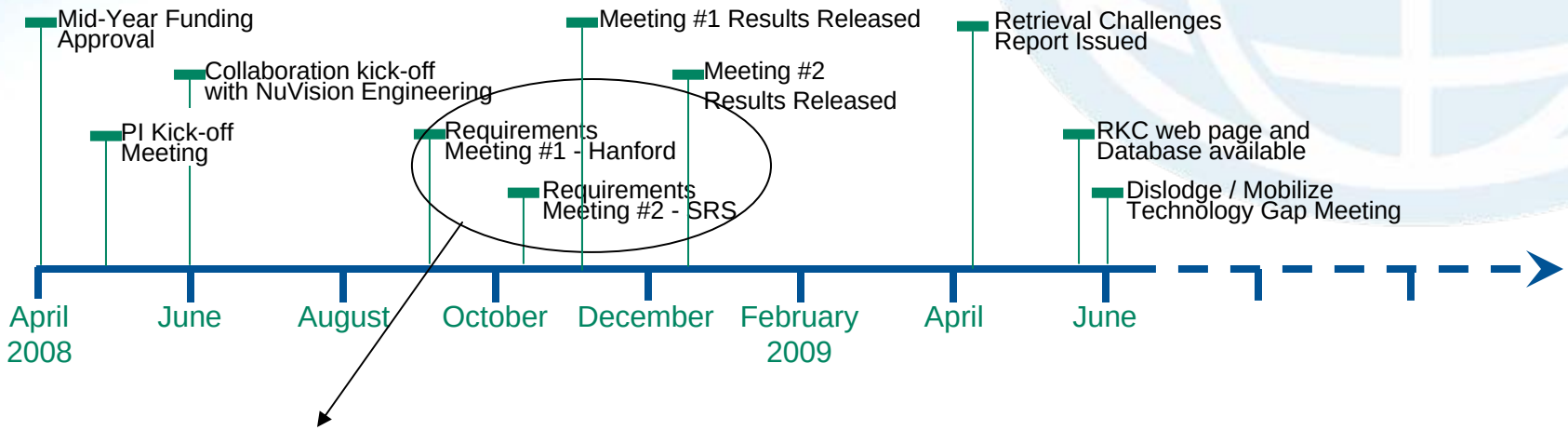
- **Define Technology Gaps** – Define specific technology gaps and strategies to place new tools in waste retrieval tool box that will cover the spectrum of waste forms (soft, hard, soluble, etc.) and tank conditions (internal obstructions, small access ports, leaking tanks, etc.).

1st of gap meetings planned for 6/3

- **Remove Barriers To Technology** – Provide a communication mechanism to resolve technological (and programmatic) barriers to waste retrieval technologies.
- **Waste Retrieval Workshops** – Perform waste retrieval technology workshops and exchanges between DOE sites, retrieval function interfaces, and commercial vendors.

RKC enlisted to help establish Retrieval COP

RKC Timeline since April of last year



Tank Farm and Laboratory participation at both facilitated meetings. Resulted in development of document describing the high level challenges to retrieval

And for reference;

(1) The RKC web pages and database is accessible at http://rkc.pnl.gov

(2) The challenges are documented in "EM-21 Retrieval Knowledge Center: Waste Retrieval Challenges (PNNL-18356 and SRNL-STI-2009-00231)

RKC Moving Forward

Immediate (30-day Window)

- **5/26 RKC web page and database release**
- **6/3 RKC 1st Technology Gap Meeting on Dislodge / Mobilize Waste**

Near Term (Over next 6 Months)

- **Define and start roll-out of "Knowledge Management" Tools**
- **Help establish a Retrieval "Community of Practice"**
- **Complete 1st of technology demonstrations**
- **Complete data/document collection**

Longer Term (beyond 6 months)

- **Establish protocol for specific technology development & demonstration through RKC**
- **How do retrieval technologies (bulk and heel) need to change to support throughput**

Questions ?

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