



**Savannah River
Remediation**

AECOM | BECHTEL | CH2M | B&W | AREVA

December 15, 2015

USING PERFORMANCE ASSESSMENTS TO FOCUS RESEARCH AND DEVELOPMENT ACTIVITIES

Kent Rosenberger

Performance and Risk Assessment Community of Practice Annual
Technical Exchange



We do the right thing.

- **Performance Assessments (PAs) are analyses of the fate and transport of contaminants from disposal or closure facilities.**
- **PAs are required for three SRR LWO facilities:**
 - Saltstone Disposal Facility (SDF)
 - F-Area Tank Farm (FTF)
 - H-Area Tank Farm (HTF)

We do the right thing.

- **PAs rely heavily on complex, forward looking analyses**
- **SRR LWO initiatives are in place to**
 - Reduce uncertainty in the inputs and assumptions
 - Provide greater confidence in results used to inform closure and disposal decisions
- **Disciplined process in place to address potential changes**

We do the right thing.

- **PA Maintenance Plan**
- **Unreviewed Waste Management Question (UWMQ) Program**
- **Special Analyses**
- **PA Monitoring Activities**
- **Regulator/Stakeholder Interactions and Reviews**

We do the right thing.

- **A strong facet of the DOE PA Program is continuous improvement through PA Maintenance Program**
- **Maintenance Plan details the individual tasks scheduled to improve the PAs**
 - Research and development
 - Comment resolution
- **Disciplined process to allocate resources considering lessons learned**

- **Structured process for evaluating facility changes and new data**
- **UWMQ Program in place to meet the requirements of DOE Manual 435.1-1 regarding PA change control**
- **Ensures that new data and proposed activities are reviewed**
- **Some UWMQ Evaluations lead to Special Analyses**

We do the right thing.

- **Special Analyses (SAs) supplement the PAs by using new information to:**
 - Evaluate the potential impact of new information on PA inputs and assumptions
 - Update the PA fate and transport modeling
- **SAs can include targeted sensitivity and uncertainty analyses**
- **SAs aid in evaluating the significance of a proposed activity**

We do the right thing.

- **FY2014 Saltstone Disposal Facility SA was prepared to evaluate a new disposal unit design**
 - Previous disposal units were 150-feet in diameter and held approximately 3 million gallons
 - The new design is 375-feet in diameter and holds approximately 35 million gallons
- **The new SA**
 - Assessed impact on SDF PA assumptions/inputs
 - Updated the SDF fate and transport modeling
 - Included additional sensitivity analyses
 - Informed waste disposal decisions

We do the right thing.

- **PA Monitoring activities take place periodically to:**
 - Validate PA inputs
 - Better understand input variability

- **PA Monitoring carried out through:**
 - Documented PA Monitoring Plans
 - Inspections driven by facility procedures

We do the right thing.

■ Examples

- Inspection of disposal facilities
- Review of relevant technical literature
- Groundwater monitoring



- **Regulator/stakeholder meetings and document reviews**
 - Provide feedback on the PAs
 - Identify areas of interest and/or concern
- **Clear, open and frequent communications are critical to success**
- **PA results and approaches should be presented in a manner that allows for common understanding by all**

We do the right thing.

■ Examples

- Scoping Meetings on PA Technical Approaches
- Public Information Meetings
- Public Document Reviews



The Savannah River Site (SRS) H-Area Tank Farm Performance Assessment (HTF PA) is Available for Public Information

The Department of Energy (DOE) is providing the Savannah River Site (SRS) H-Area Tank Farm Performance Assessment (HTF PA) for information to the South Carolina Department of Health and Environmental Control (SCDHEC) and the Environmental Protection Agency. The HTF PA evaluates the long term potential human health impacts associated with the closure of HTF following waste removal for treatment and disposal, cleaning tank and systems and stabilizing the tanks with reducing grout. Currently, DOE is drafting a General Closure Plan for the HTF which is expected to be finalized in 2012 following review and approval by SCDHEC. A briefing to the SRS Citizen's Advisory Board Waste Management Committee and the public explaining the analysis performed and results documented in the HTF PA is planned for April 26, 2011, starting at 7:30 pm at the DOE conference room located at 230 Village Green Blvd in Aiken, SC 29801. The HTF PA is provided for information at http://srs.gov/f_htanfarmsdocuments.htm. The HTF PA is provided for information and any concerns or questions should be provided by June 30, 2011 to:

Sherri Ross, Lead Engineer
Waste Removal and Tank Closure
Waste Disposition Programs Division
DOE-SR Operations Office
Bldg 704-S, Room 43
Aiken, SC 29802
Phone (803)208-6078; Fax (803) 208-7414
sherr.ross@srs.gov

Public Meeting Scheduled for the Saltstone Disposal Facility at SRS

The Department of Energy (DOE) and Nuclear Regulatory Commission (NRC) are hosting a public meeting to discuss NRC's second request for additional information on DOE's revised Saltstone Performance Assessment. The Saltstone Performance Assessment evaluates the long term potential human health impacts associated with disposal of processed low level radioactive waste (solidified decontaminated salt solution) in disposal vaults and cells at the Saltstone Disposal Facility. The Saltstone Disposal Facility is operated under a permit issued by the South Carolina Department of Health and Environmental Control (SCDHEC). In accordance with Section 3116 of the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005, NRC in coordination with SCDHEC monitors DOE disposal actions at the Saltstone Disposal Facility. The topics to be discussed between the agencies will include:

Clarification questions related to NRC's second request for additional information on DOE's revised Saltstone Performance Assessment.

DOE's proposed approach to resolve the request for additional information including grouping of the responses, schedule, and proposed modeling runs(s).

Public comment periods before lunch and at the end of the day.

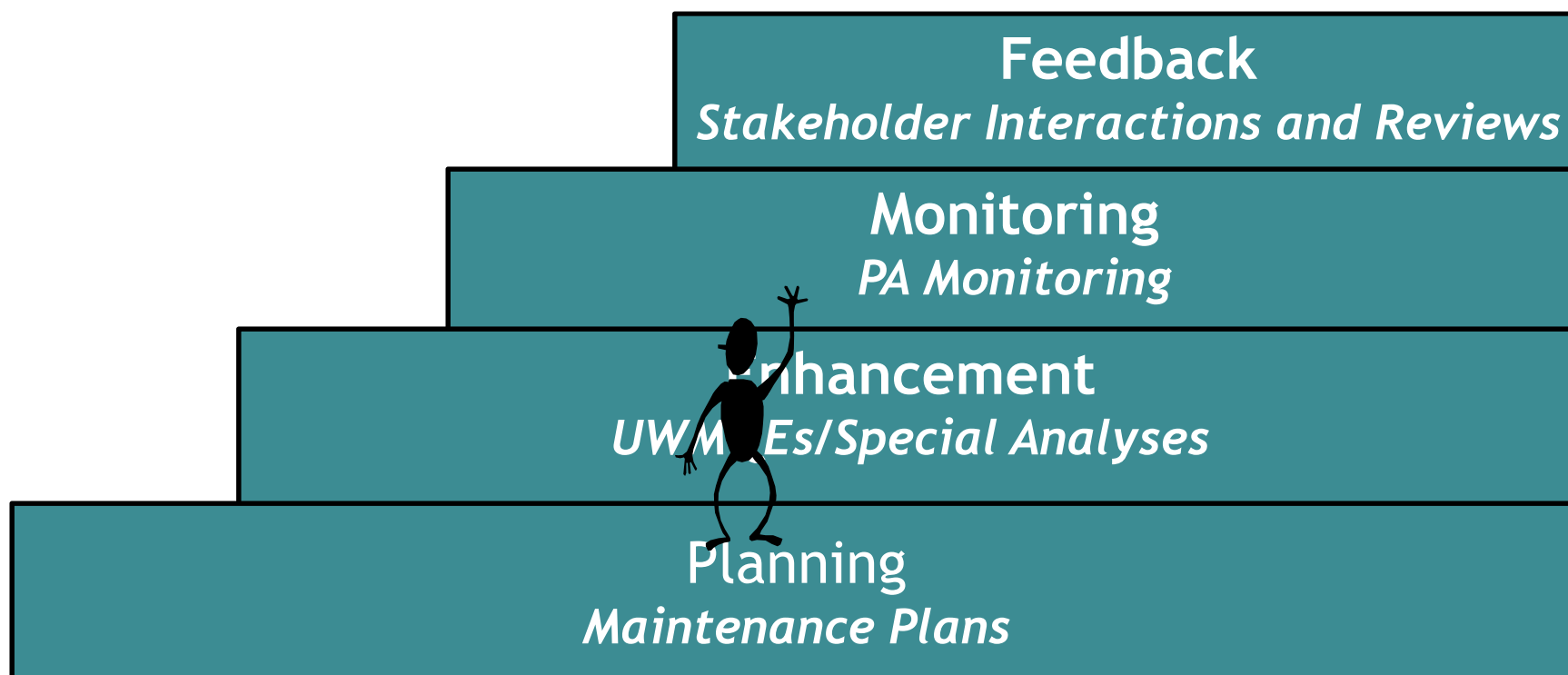
The meeting is scheduled between 8:30 am and 3:30 pm on Wednesday, April 27, 2011 at the Aiken Design Center, DOE Suite 220, 230 Village Green Blvd, Aiken, SC 29803. There will be a 1 1/2 hours lunch break where participants are responsible for their own lunch. The public is invited to participate in person at the above location or by calling into a conference phone line at 1-800-369-1809, pass code 37097.

Additional information is available by contacting Pat Suggs, DOE-SR/WDPD at 803-208-6804, patricia.suggs@srs.gov or Nishka Devaser, USNRC/FSME/DWMEP at 301-415-5196, Nishka.Devaser@nrc.gov.

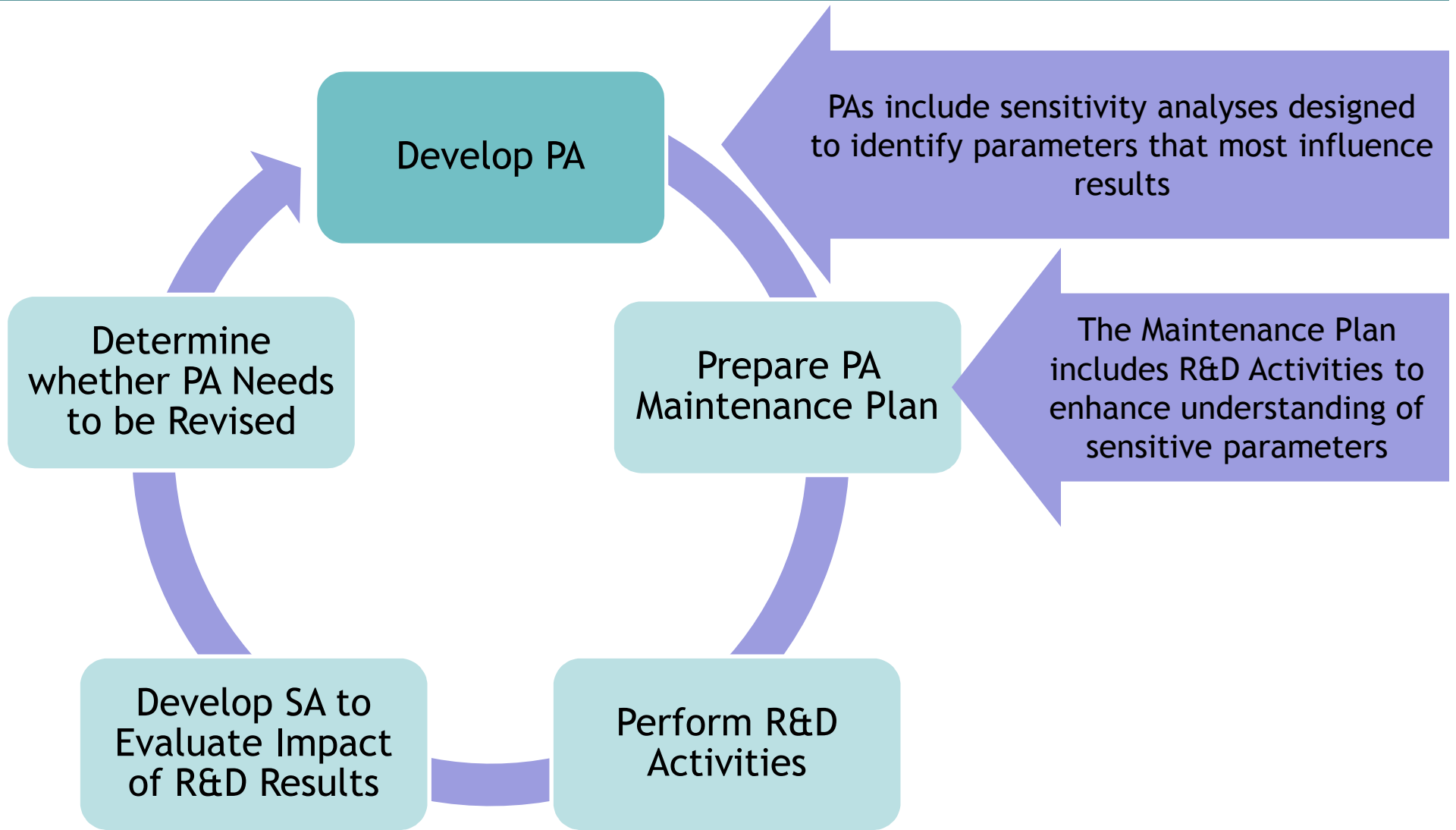
PA's are Living Documents

We do the right thing.

Continuous PA Improvement



We do the right thing.



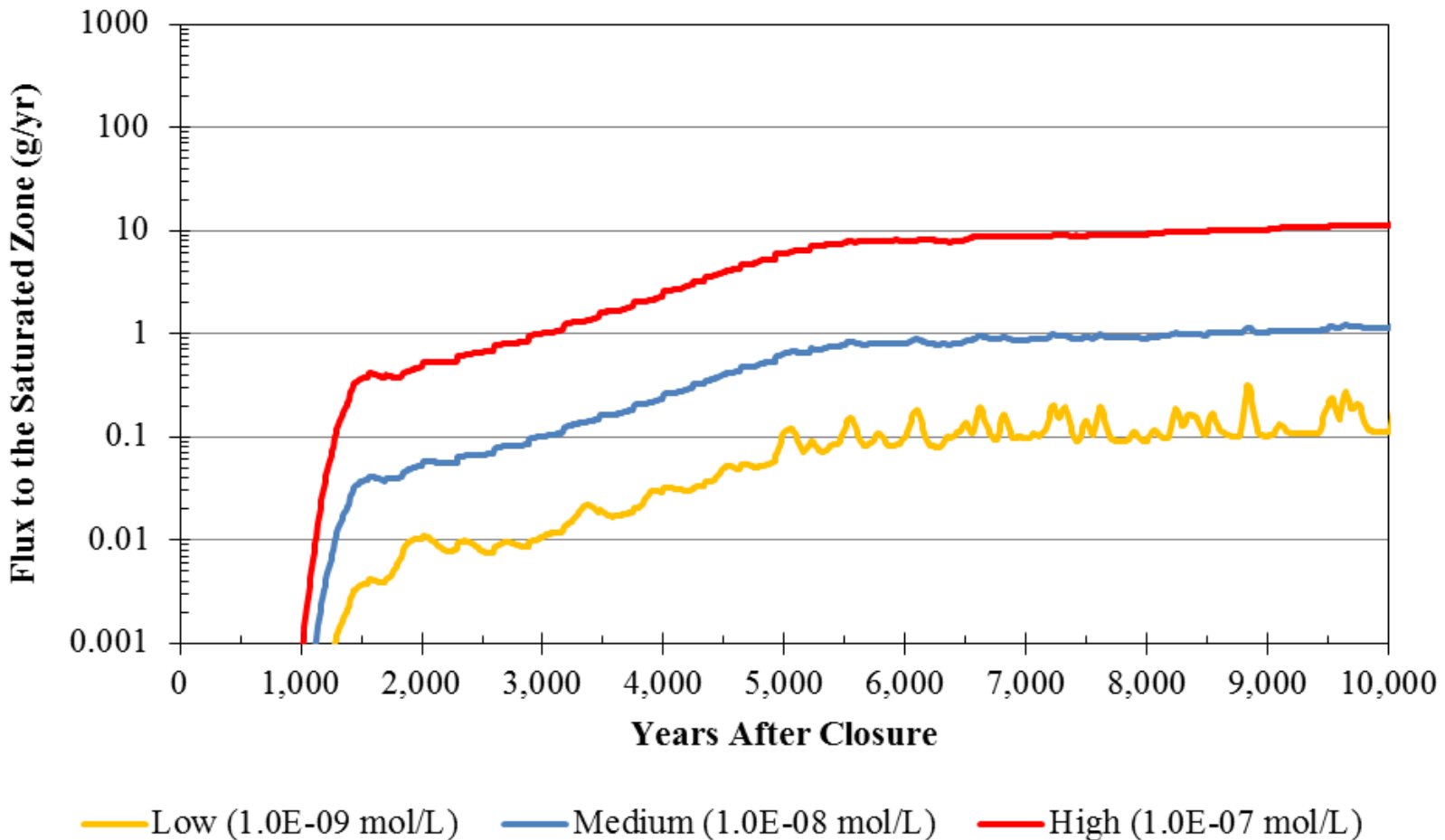
- PAs typically include sensitivity analyses to determine which parameters exhibit the greatest influence on model results

- Types of sensitivity analyses include
 - Single Parameter, Deterministic
 - Multiple Parameter, Deterministic
 - Multiple Parameter, Probabilistic

- **The single parameter deterministic sensitivity analysis (or “One Off” analysis) provides insight to the isolated influence from varying a single parameter**
 - Example: The FY2014 SDF SA included an analysis of technetium solubility where the solubility control was varied by an order of magnitude above and below the value of 1.0E-08 mol/L
 - Section 5.6.6.1 of SRR-CWDA-2014-00006

We do the right thing.

■ Technetium Solubility Analysis



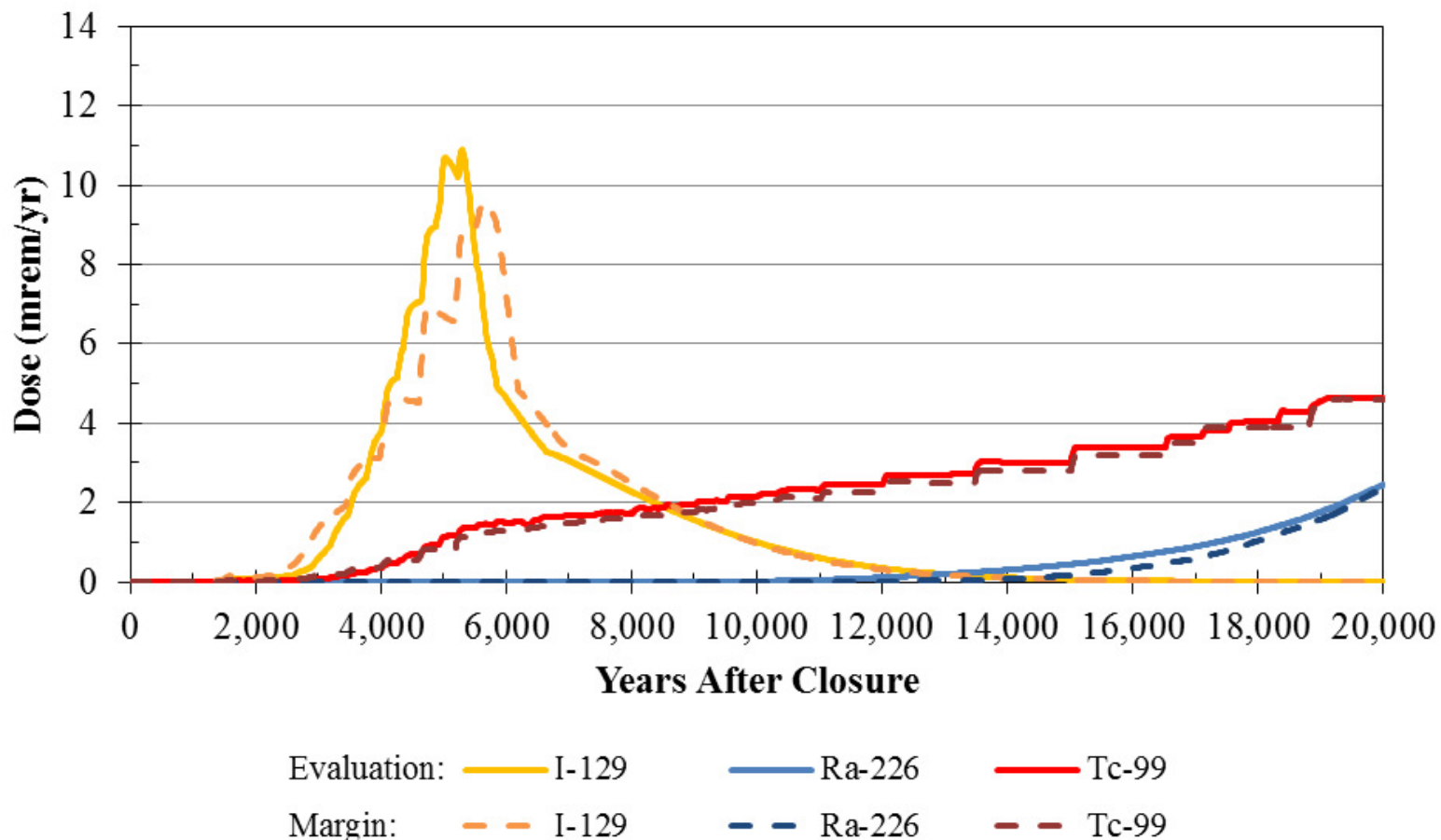
- **The multiple parameter deterministic sensitivity analysis provides insight to the combined influence from varying multiple parameters**
 - The varied parameters are usually related or influence results in similar ways
 - Example: The FY2014 SDF SA included a “Design Margin” analysis which varied the geometry of multiple features of the disposal unit design
 - Section 5.6.7.2 of SRR-CWDA-2014-00006

■ Design Margin Analysis

Parameter	Design	Design with Margin
Roof thickness (inches)	12	9
Roof and floor slope (%)	1.5	1.0
Floor thickness (inches)	12	9
Upper Mud Mat thickness (inches)	6	5
Lower Mud Mat thickness (inches)	4	3
Wall thickness (inches, tapered from bottom to top)	24 - 10	20 - 7
HDPE thickness (mil)	100	60

We do the right thing.

■ Design Margin Analysis



- **The multiple parameter probabilistic sensitivity analysis provides insight to the combined influence from varying multiple parameters**
 - The entire population of variable parameters can be sampled and analyzed
 - Example: The FY2014 SDF SA included a probabilistic sensitivity analysis which evaluated the influence of hundreds of parameters by analyzing the results from many model realizations
 - Section 5.6.5.4 of SRR-CWDA-2014-00006

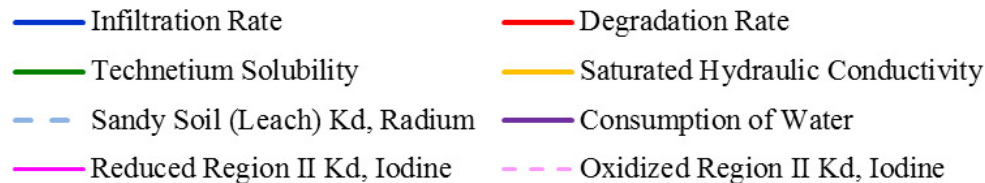
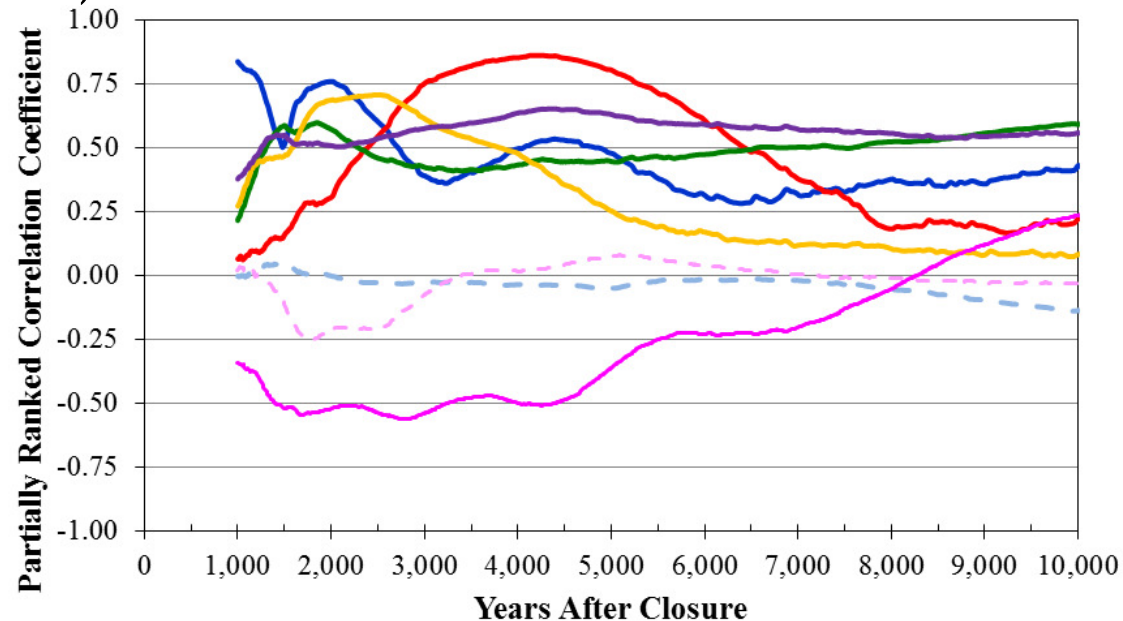
■ Example

- The Probabilistic Sensitivity Analysis in the FY2014 SDF SA examined 380 variables that sampled different values over the realizations
- Statistical methods were used to determine the most sensitive parameters
 - Evolving sensitivity over time
 - Sensitivity at a specific point in time

We do the right thing.

■ Example

- Total Dose from 1,000 years to 10,000 Years (showing top 8 parameters)



■ Example

- Total Peak Dose within 10,000 Years (showing top 6 parameters)

t = 10,000 Years, Final Cumulative R ² = 0.83		
Variable	Cumulative R ²	SRRC
Degradation Rate	0.32	0.57
Infiltration Rate	0.51	0.44
Consumption of Water	0.67	0.41
Reduced Region II K _d , Iodine	0.71	-0.20
Technetium Solubility	0.74	0.19
Initial Saturated Hydraulic Conductivity of Saltstone	0.77	0.17

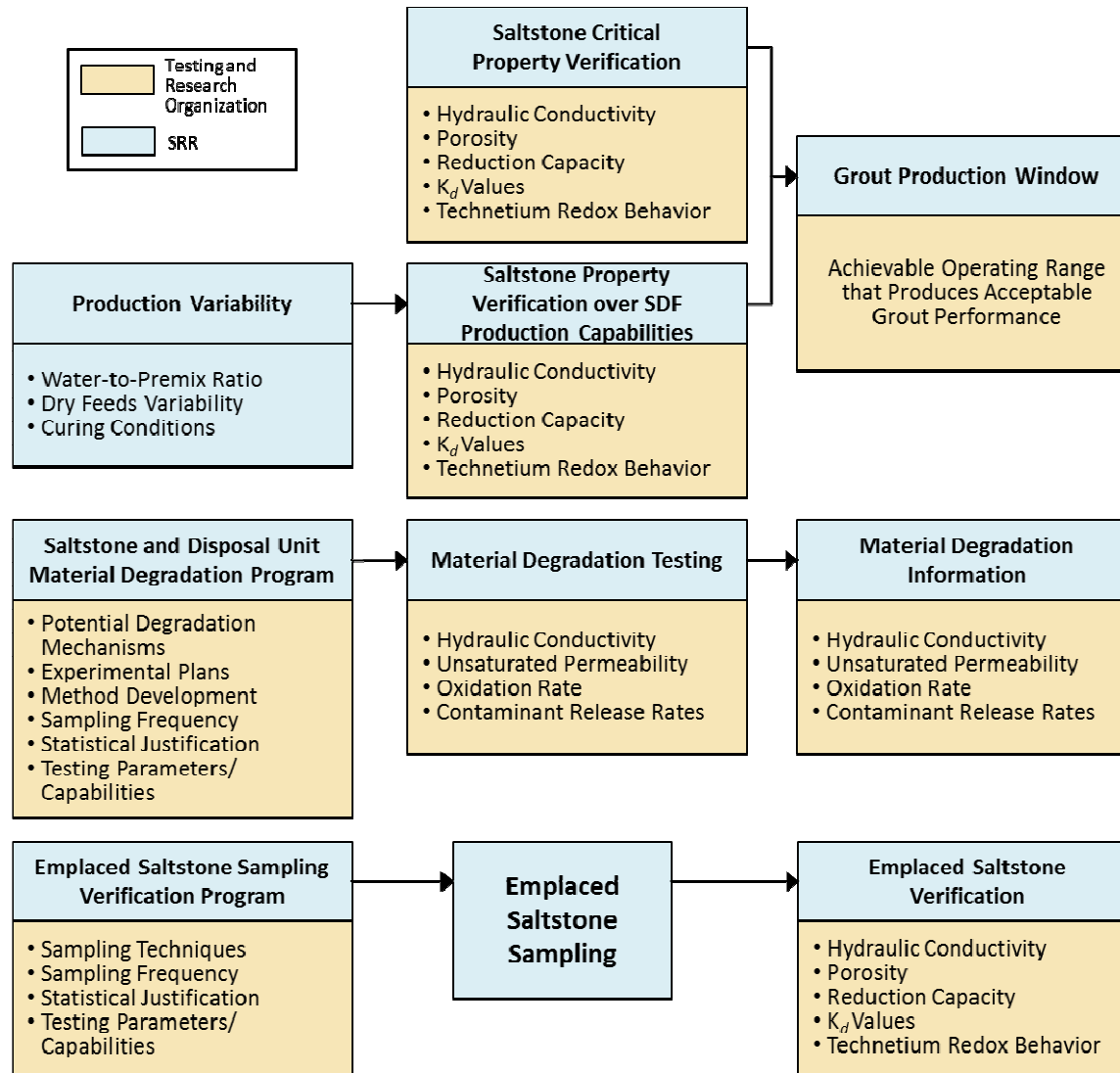
We do the right thing.

- **In addition to sensitivity analyses, R&D programs should also consider concerns raised during external reviews of PAs**
 - For example, stakeholders often provide comments on aspects of disposal that were not explicitly modeled (due to low probability or low consequence) which could become important under specific conditions

We do the right thing.

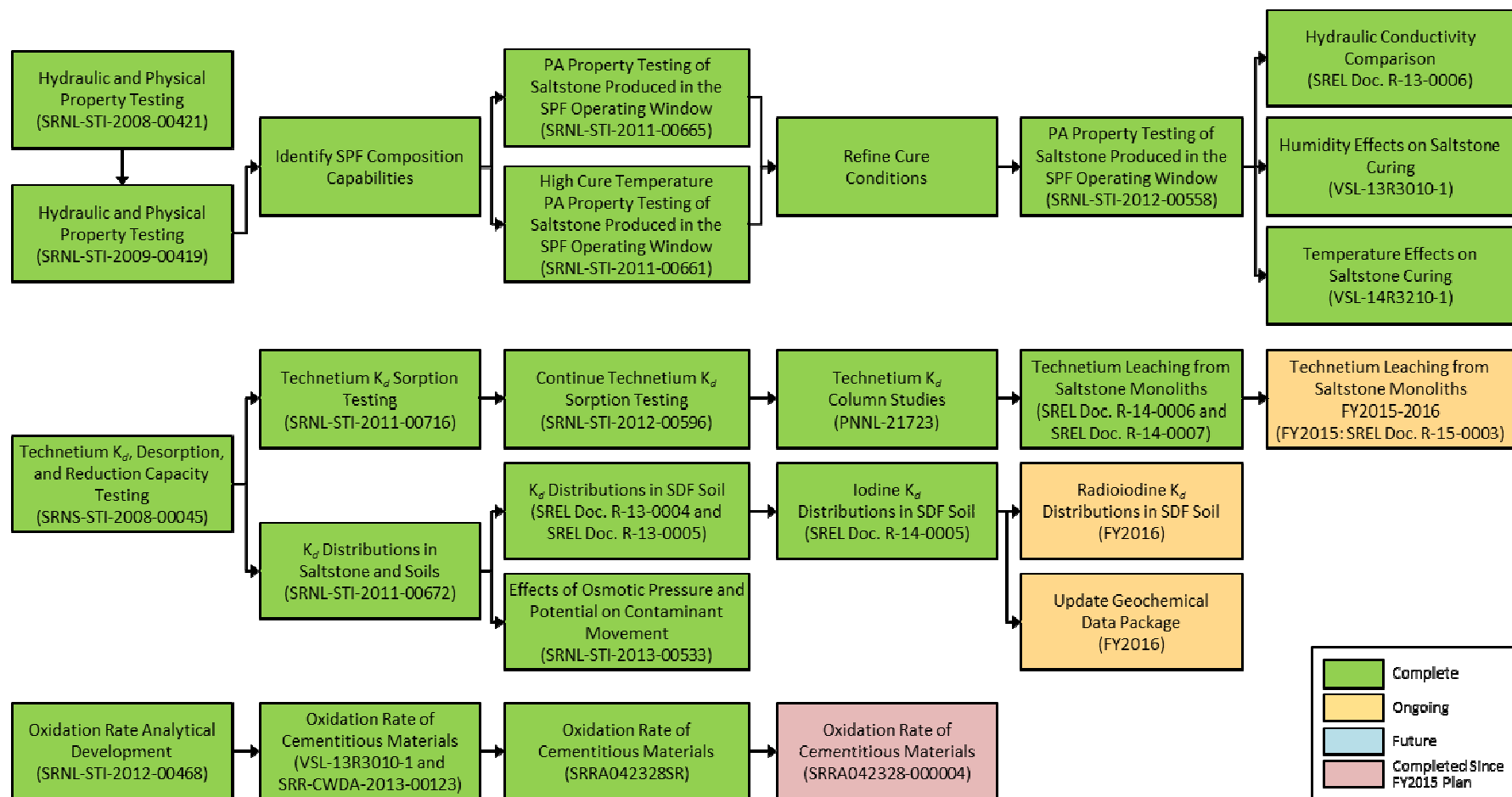
- **Planning of R&D Activities should include knowledgeable personnel**
 - PA Analysts
 - Identify parameters to study based on sensitivity or external concerns
 - Technical Management
 - Identify deliverables and set schedule
 - Subject Matter Experts
 - Determine tests/experiments to enhance understanding of sensitive parameters
 - Cost Account Management
 - Ensure necessary funding is in place
 - Stakeholders
 - Provide feedback and ensure alignment of priorities

We do the right thing.



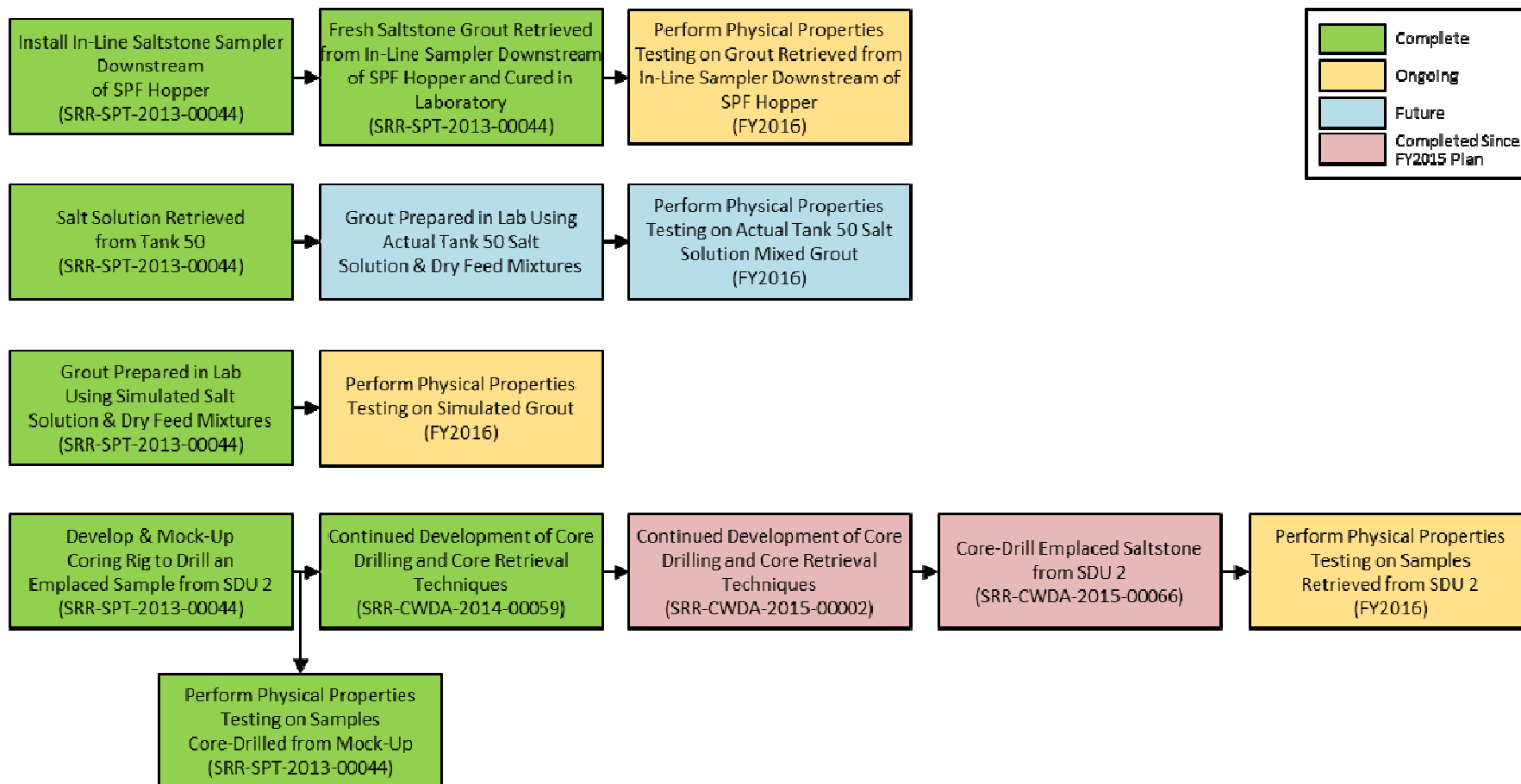
We do the right thing.

■ Saltstone Critical Property Verification



We do the right thing.

■ Emplaced Saltstone Testing



Continuous PA Improvement

We do the right thing.

