Performance Assessment Training

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Citizens Advisory Board Meeting

SRMC SAVANNAH RIVER MISSION COMPLETION

BWXT
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SRMC Performance Assessment Program

- **Purpose of, and Need for, a Performance Assessment**
- **Aspects of Performance Assessment**
  - Model development
- **Uses of Performance Assessment Results**
  - Reasonable expectation of meeting performance objectives
- **Reviews and Stakeholder Involvement**
- **Performance Assessment Program**
  - Evaluation of continued compliance
  - Reduction of uncertainties
- **Conclusions**

Purpose of a Performance Assessment

- **Per DOE Manual 435.1-1, a Performance Assessment (PA) is defined as:**

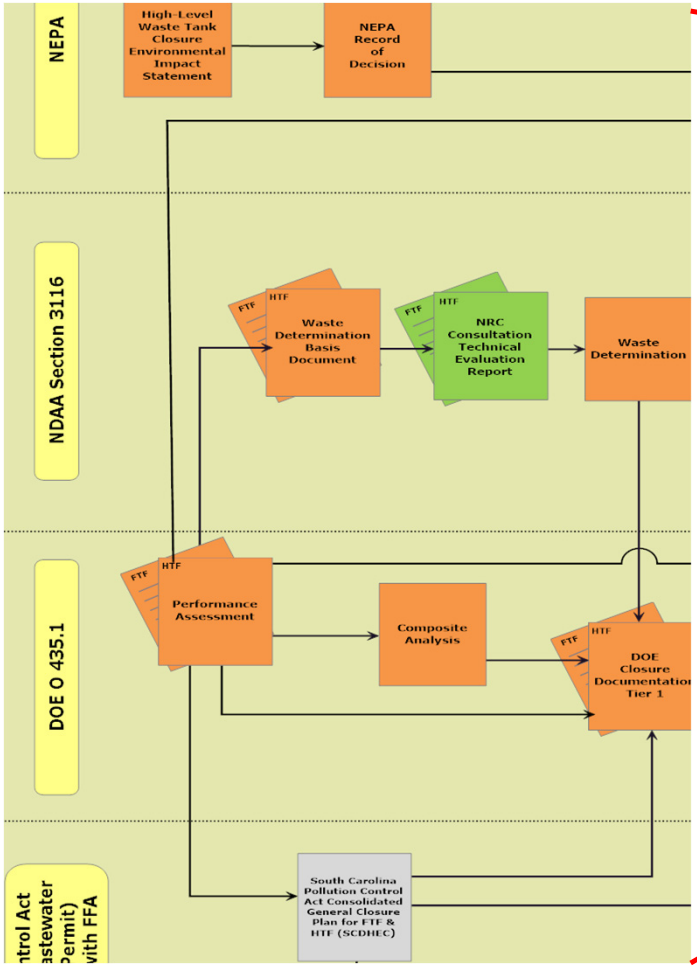
  An analysis of a radioactive waste disposal facility conducted to demonstrate there is a reasonable expectation that performance objectives established for the long-term protection of the public and the environment will not be exceeded following closure of the facility.

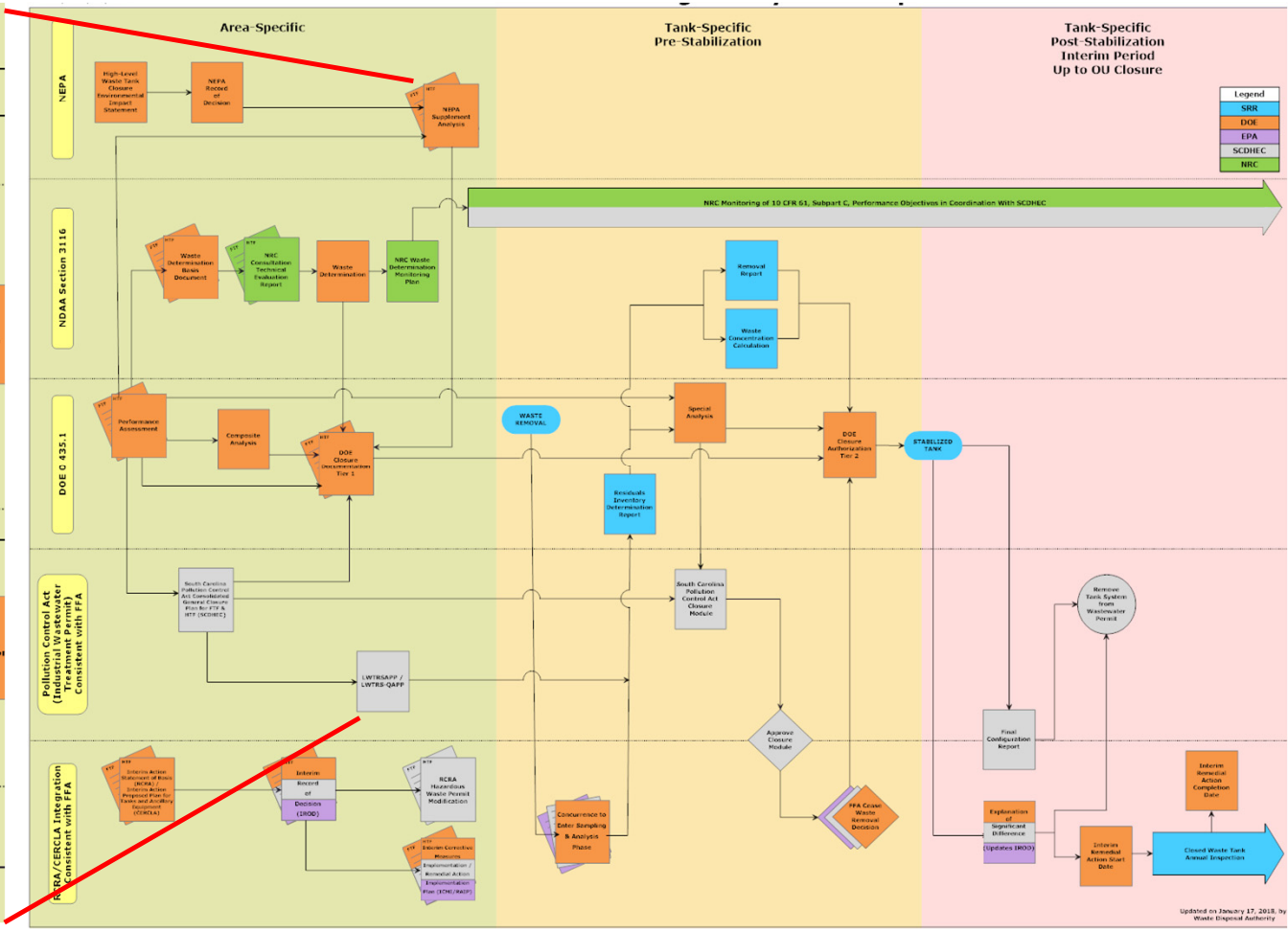
- **A PA is the tool used to make design and operational decisions for a disposal or closure facility to ensure future human health and the environment will not be adversely impacted.**
- **Evaluates post-closure state now so there is opportunity to take actions in the future vs. risk to current worker safety and need for immediate actions.**
- **Evaluates impacts 100s, 1000s or 10000s of years in future.**

Need for Performance Assessment

- **Why do we generate Performance Assessments?**
  - Required by DOE Order 435.1 / Manual 435.1-1
  - Manual establishes a set of performance objectives / measures
  - Necessary for Disposal Authorization Statement to operate a low-level waste disposal facility (Saltstone Disposal Facility)
  - Necessary for Tier 1 Closure Authorization (F and H Tank Farms)
  - Compare to 10 CFR 61 Subpart C performance objectives as required by the National Defense Authorization Act for FY2005 Section 3116 (NDAA §3116)

Need for Performance Assessment

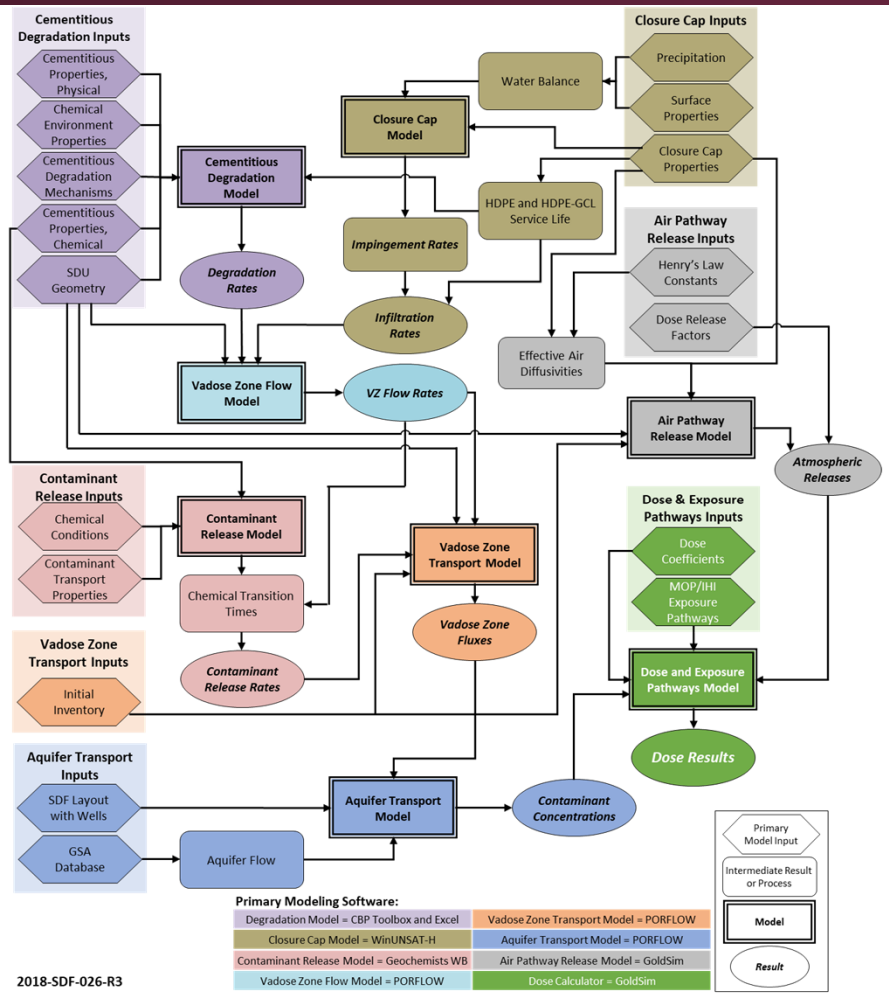




Model Development

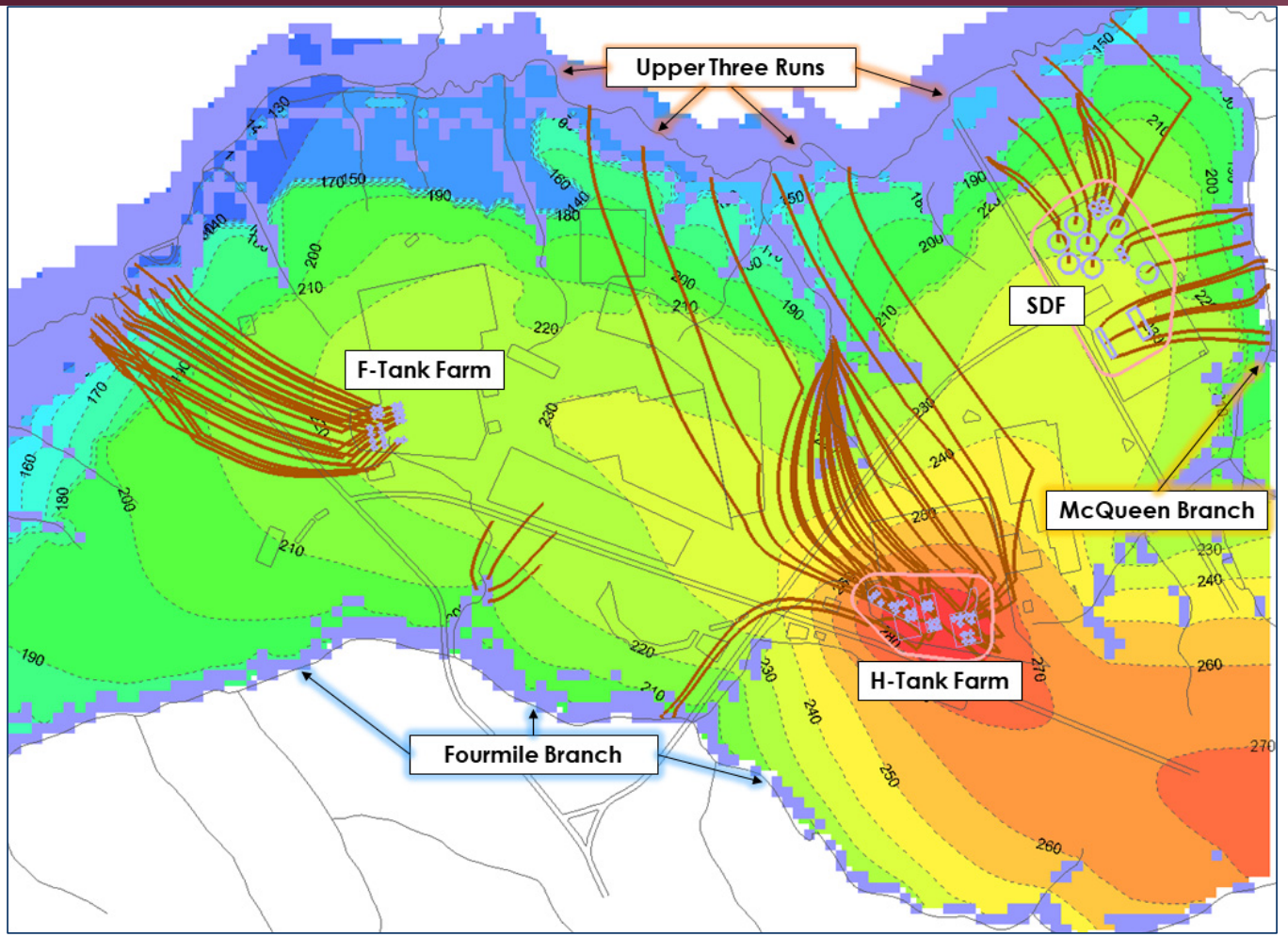
- **Given the long time periods considered in modeling, there can be significant variability in possible future conditions**
  - It is not reasonable to model everything
- **A Compliance Case (or Base Case) provides a single conceptual model as a foundation for communicating results**
  - Captures best knowledge available but has inherent uncertainty
- **No ONE model provides a complete understanding of the system**
  - Use of both deterministic and probabilistic transport models – PORFLOW and GoldSim modeling codes
  - Alternative conceptual models can be used to improve understanding and build confidence

Development of Modeling Inputs



- **Model input development includes a multi-disciplinary team including:**
  - Geologists/hydrogeologists
  - Chemical Engineers
  - Nuclear Engineers
  - Mechanical Engineers
  - Civil Engineers
  - Materials Scientists
  - Health Physicists
  - Environmental Engineers
  - Business/Project Management

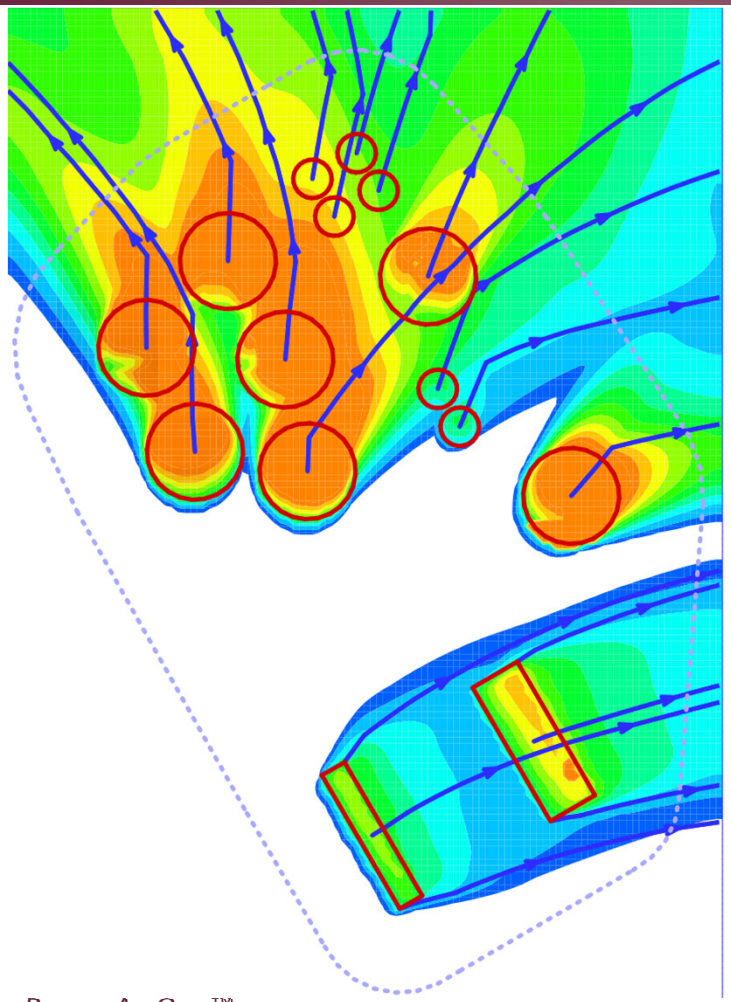
Integrated System Modeling



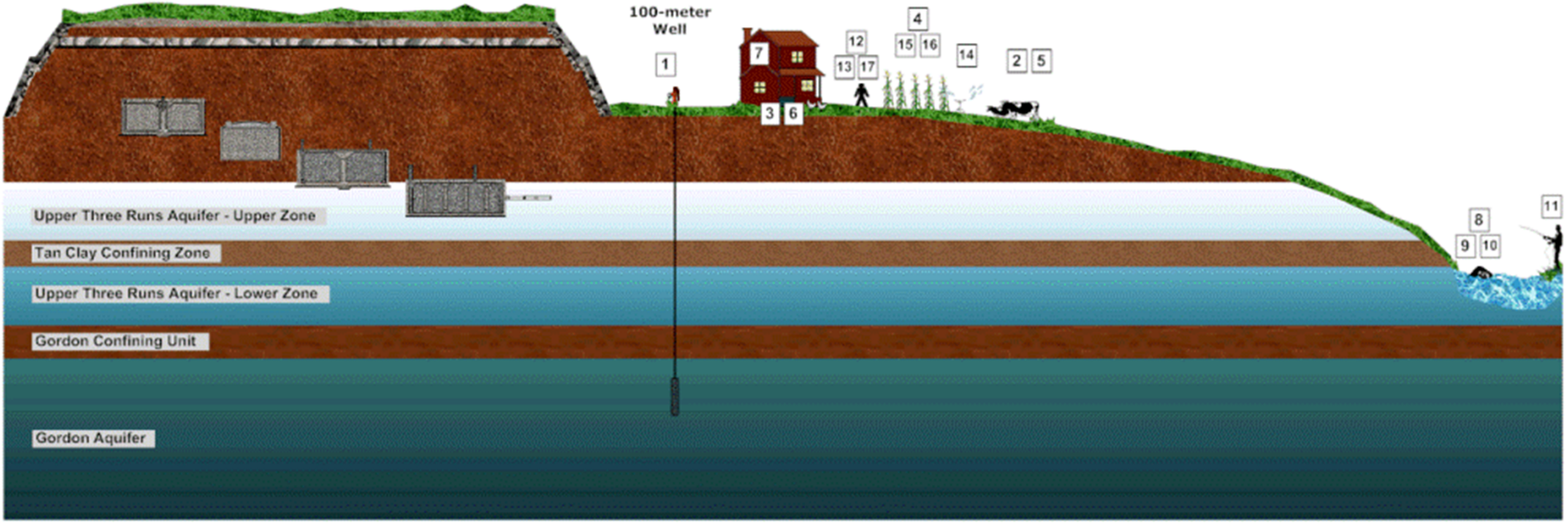
Note: colors represent changes in grade elevation and lines the general direction of ground water flow

Uses of Performance Assessment Results

- **Calculate concentrations over time at specific locations**
  - 100 Meter boundary for member of public
  - 1 Meter boundary / on top of facility for inadvertent human intruder
  - At streams
- **Peak doses are calculated using the concentrations and an all-pathways approach**
  - Exposure pathways
  - Dose conversion factors
  - Consumption rates
  - Usage factors



Dose Calculation Pathways



SCENARIO WITH WELL WATER AS PRIMARY WATER SOURCE

1. Direct ingestion of well water
2. Ingestion of milk and meat from livestock (e.g., dairy and beef cattle) that drink well water
3. Ingestion of meat and eggs from poultry that drink well water
4. Ingestion of vegetables grown in garden soil irrigated with well water
5. Ingestion of milk and meat from livestock (e.g., dairy and beef cattle) that eat fodder from a pasture irrigated with well water
6. Ingestion of meat and eggs from poultry that eat fodder from a pasture irrigated with well water
7. Ingestion and inhalation of well water while showing
8. Direct irradiation during recreational activities (e.g., swimming, fishing, boating) from stream water
9. Dermal contact with stream water during recreational activities (e.g., swimming, fishing)
10. Incidental ingestion and inhalation of stream water during recreational activities
11. Ingestion of fish from the stream water
12. Direct plume shine
13. Inhalation
14. Inhalation of well water used for irrigation
15. Inhalation of dust from the soil that was irrigated with well water
16. Ingestion of or dermal contact with soil that was irrigated with well water
17. Direct radiation exposure from radionuclides deposited on the soil that was irrigated with well water

Performance Objectives/Measures

Requirement	All-Pathways Dose	Intruder Dose	Air Pathway Dose	Radon Flux	Groundwater Protection
DOE M 435.1-1	25 mrem/yr	500 mrem – acute 100 mrem/yr – chronic	10 mrem/yr	20 pCi/m^2/s at ground surface	< MCLs and < 4 mrem/yr beta-gamma dose
NDAA §3116: 10 CFR 61.41 and 61.42	25 mrem/yr	500 mrem/yr	N/A	N/A	N/A
SCDHEC Primary Drinking Water Regulations (SCDHEC R.61-58)	N/A	N/A	N/A	N/A	< MCLs and < 4 mrem/yr beta-gamma dose

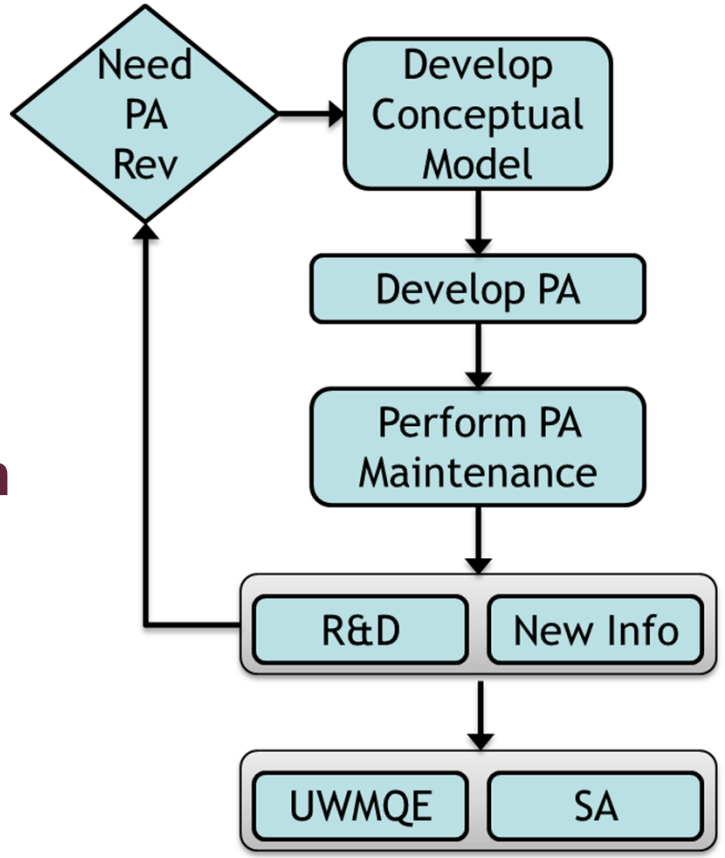
- **Department of Energy, South Carolina Department of Health and Environmental Control, Environmental Protection Agency and Nuclear Regulatory Commission criteria**

Reviews and Stakeholder Involvement

- **SRMC currently maintains three Performance Assessments (F and H Tank Farms, Saltstone Disposal Facility)**
- **Reviewers typically have included:**
  - Department of Energy (DOE) oversight personnel (SR & HQ)
  - South Carolina Department of Health and Environmental Control
  - Environmental Protection Agency
  - Nuclear Regulatory Commission
  - Other DOE contractors
  - Members of academia
  - SRS Citizens Advisory Board
  - Members of the public
- **DOE-HQ Low Level Waste Disposal Facility Federal Review Group (LFRG) is responsible for overall DOE Performance Assessment program**

Performance Assessment Program

- **Analyses rely heavily on complex, forward looking analyses**
- **SRMC initiatives in place to:**
  - Reduce uncertainty in the model inputs
  - Provide confidence in results
  - Address potential changes
- **Unreviewed Waste Management Question**
  - For evaluating facility changes and new data – applicable to SDF and tanks in "closure" mode
  - Screenings by facility personnel as part of technical evaluations
- **Research and Development important**



Conclusions

- **SRMC has a rigorous Performance Assessment Program in place for the Liquid Waste Facilities**
- **Proposed activities and new information is reviewed to ensure that we stay in compliance with the Performance Assessment conclusions**
- **Performance Assessment Maintenance activities will continue to reduce uncertainties and evaluate future opportunities**
- **The Performance Assessments are living documents that will continually be reviewed and revised as necessary**