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EPRI Groundwater Protection Guidelines for Nuclear Power Plants

NRC Public Meeting

February 5, 2008

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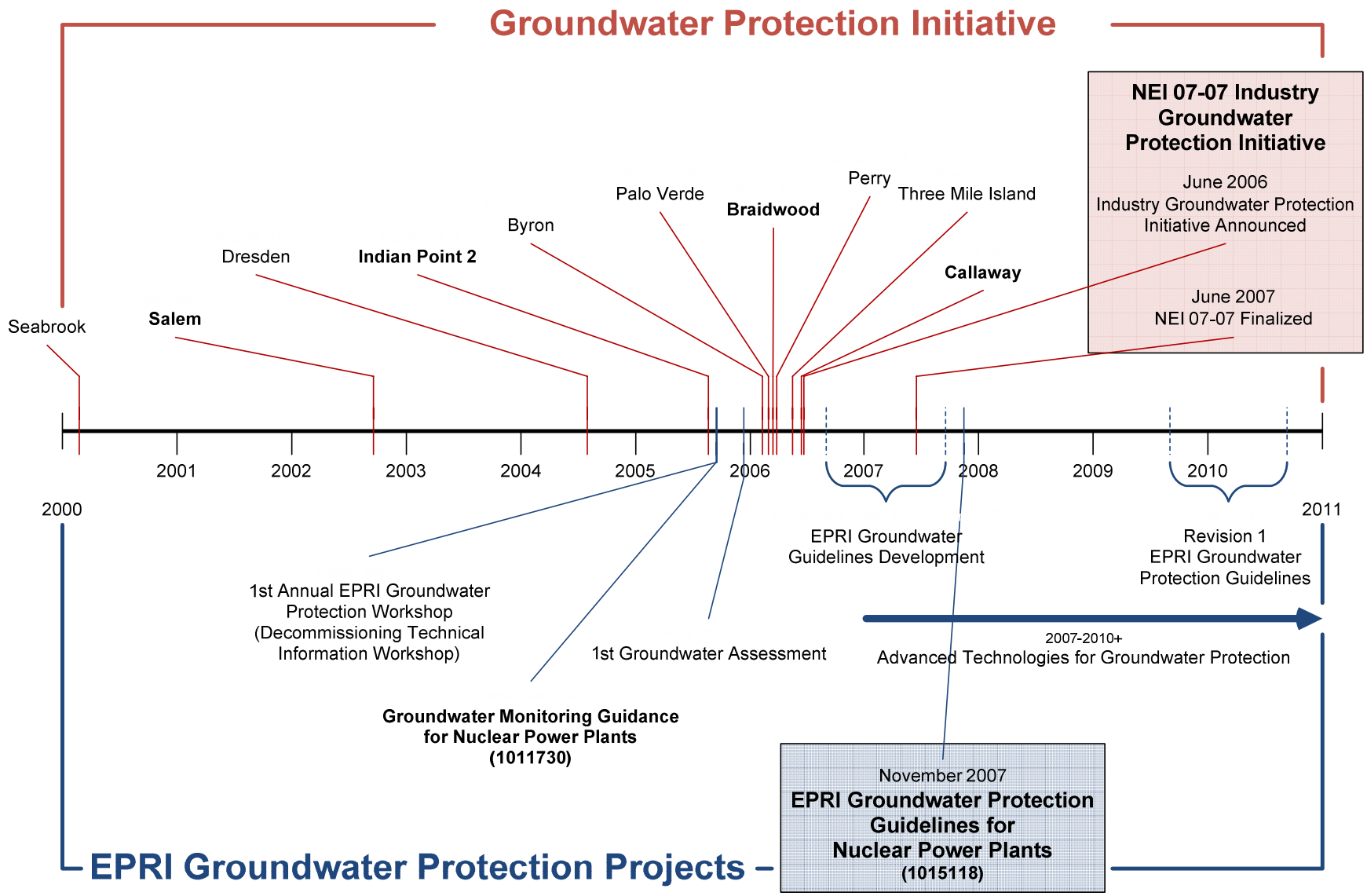
EPRI

Nuclear Industry Groundwater Protection Initiative & EPRI Technical Projects



EPRI Groundwater Protection Guidelines Committee: Key 2006-2007 Participants

AEP
Ameren UE
Cooper
Dominion
Duke Energy
Energy Northwest
Entergy
Exelon
FENOC
FPL
NMC
NPPD
OPG
OPPD
PG&E
PPL Susquehanna
Progress Energy
SCE
Southern
TVA
Yankee Atomic
ANI
EPRI LLW-RM TAC
NEI Task Force

<u>NSSS Suppliers</u>:
Areva
GE
Westinghouse

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EPRI Groundwater Protection Guidelines Structure

- Graded Approach:
  - [BASELINE] program for all Nuclear Power Plants (NPPs)
  - [ELEVATED] program “tools” for NPPs with higher potential for groundwater contamination

- Guidance Statements:
  - Evaluation of Potential Subsurface Releases
  - Establishing a Site Conceptual Model
  - Locating, Installing, and Testing Monitoring Wells
  - Establishing a Groundwater Sampling and Analysis Process
  - Evaluating Sampling and Monitoring Data
  - Program Validation and Review

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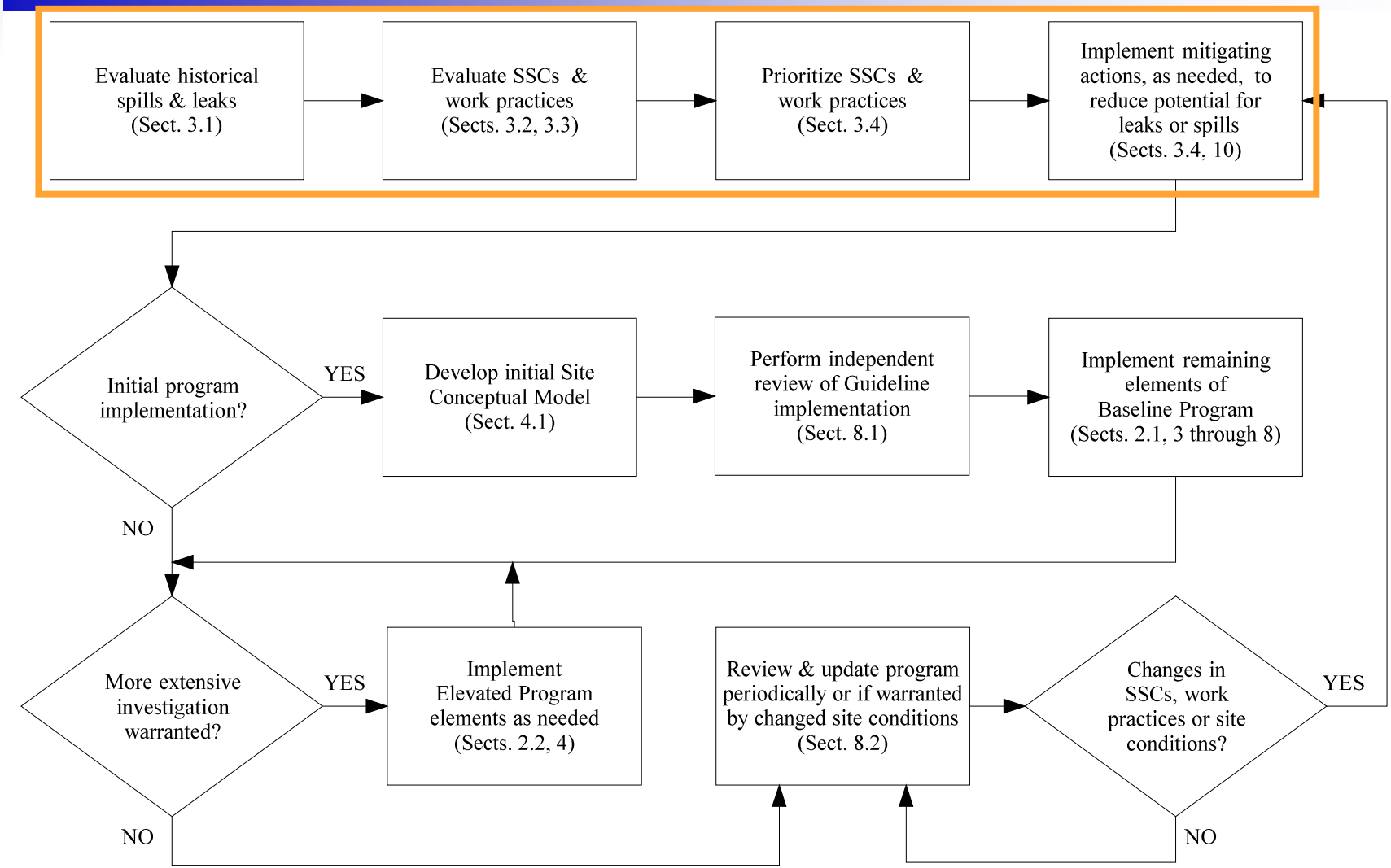
EPRI Groundwater Protection Guidelines Implementation Steps



Note: SSC = System, Structures, Components

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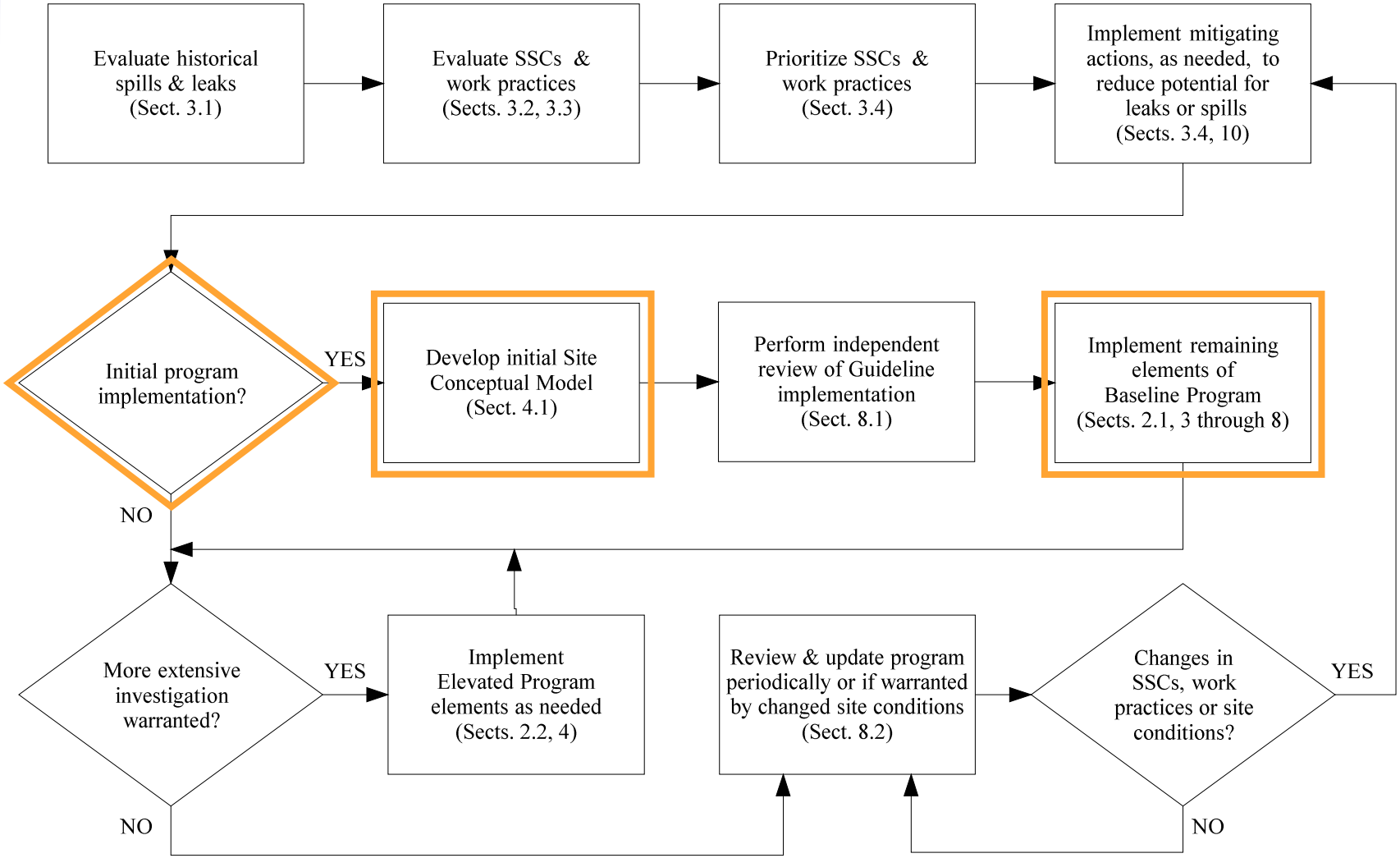
EPRI Groundwater Protection Guidelines Implementation



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EPRI Groundwater Protection Guidelines
Site Conceptual Model

- Develop the initial site conceptual model
  - Site operating history, potential contamination sources, plant layout, site hydrogeology
  - Examine photos, drawings, and previous hydrogeologic reports
  - Evaluate potential receptors of groundwater contamination
  - Makes preliminary estimate of groundwater flow characteristics
    - Records of groundwater elevation
    - Pre-operational groundwater and geologic data
    - U.S.G.S. and State Geological Survey reports and maps

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EPRI Groundwater Protection Guidelines
Location, Installation, & Testing of Groundwater Monitoring Wells

- Evaluate configuration management, permitting requirements, accessibility, location of wells
  - Locate wells based on Conceptual Site Model and assessment of SSCs and Work Practices
- Install monitoring wells
  - Under supervision of qualified geoscientist/engineer
  - In accordance to recognized standards (i.e. ASTM, EPA)
- Develop and implement a maintenance program for monitoring wells
  - Appropriately decommission wells that are no longer in use.

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EPRI Groundwater Protection Guidelines
Groundwater Sampling & Analysis Process

- Establish MDC requirements and criteria for positive detection
- Establish sample volume, container, and preservation requirements
- Validate and Analyze analytical results
  - Develop database for groundwater monitoring data
- Review and revise conceptual site model
  - Based on analytical results of monitoring program
  - Substantial site construction or disturbance of site or near-site property
  - Substantial change in on-site or adjacent off-site water use

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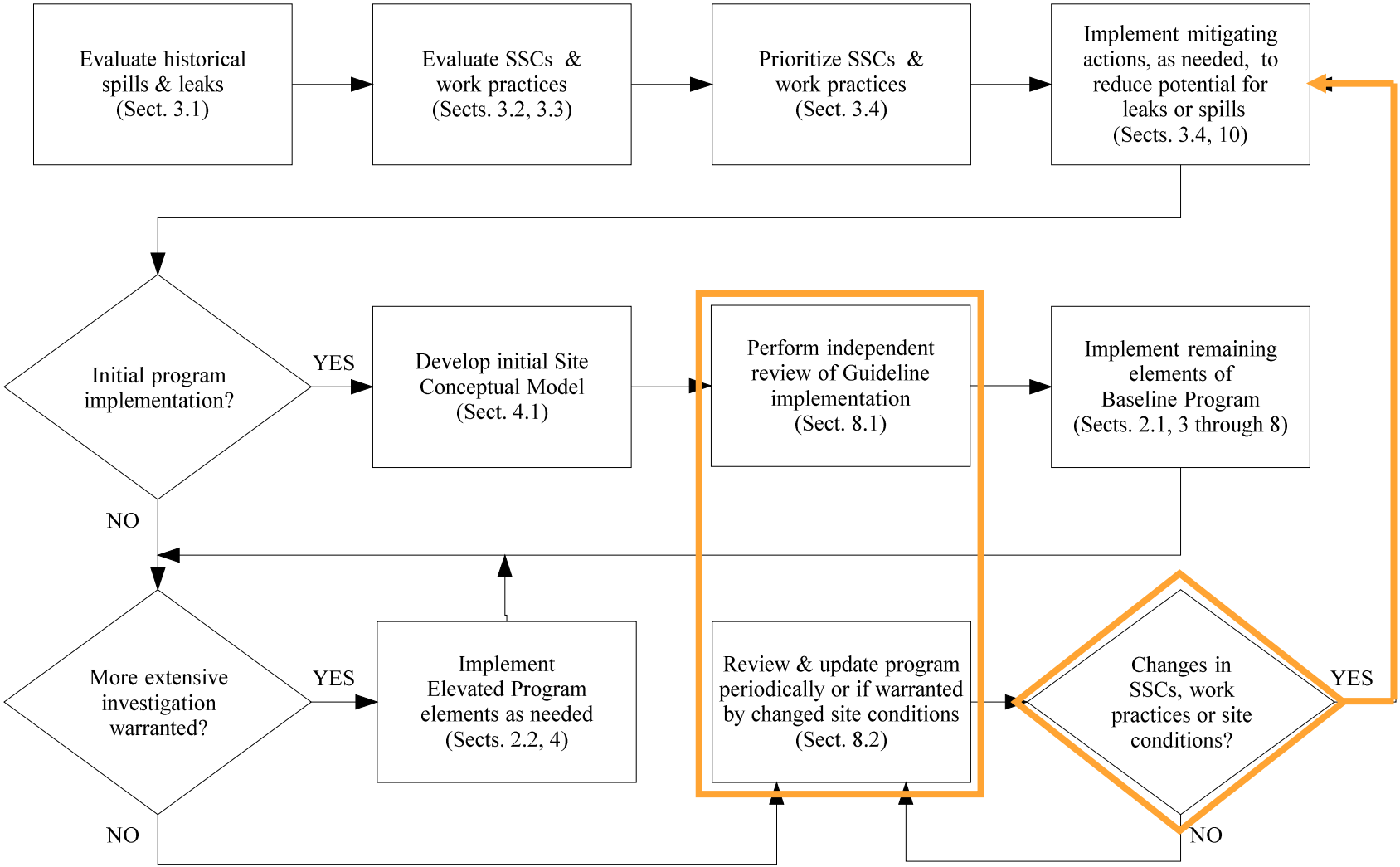
EPRI Groundwater Protection Guidelines Implementation



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EPRI Groundwater Protection Guidelines
Program Validation & Review

- Perform independent reviews
  - After historical leaks & spills, SSCs & Work Practices have been assessed
  - After groundwater monitoring program has been developed

- Revalidate potential sources of subsurface contamination
  - Establish and document a review cycle for potential sources of contamination
  - Review cycle should not exceed 5 years

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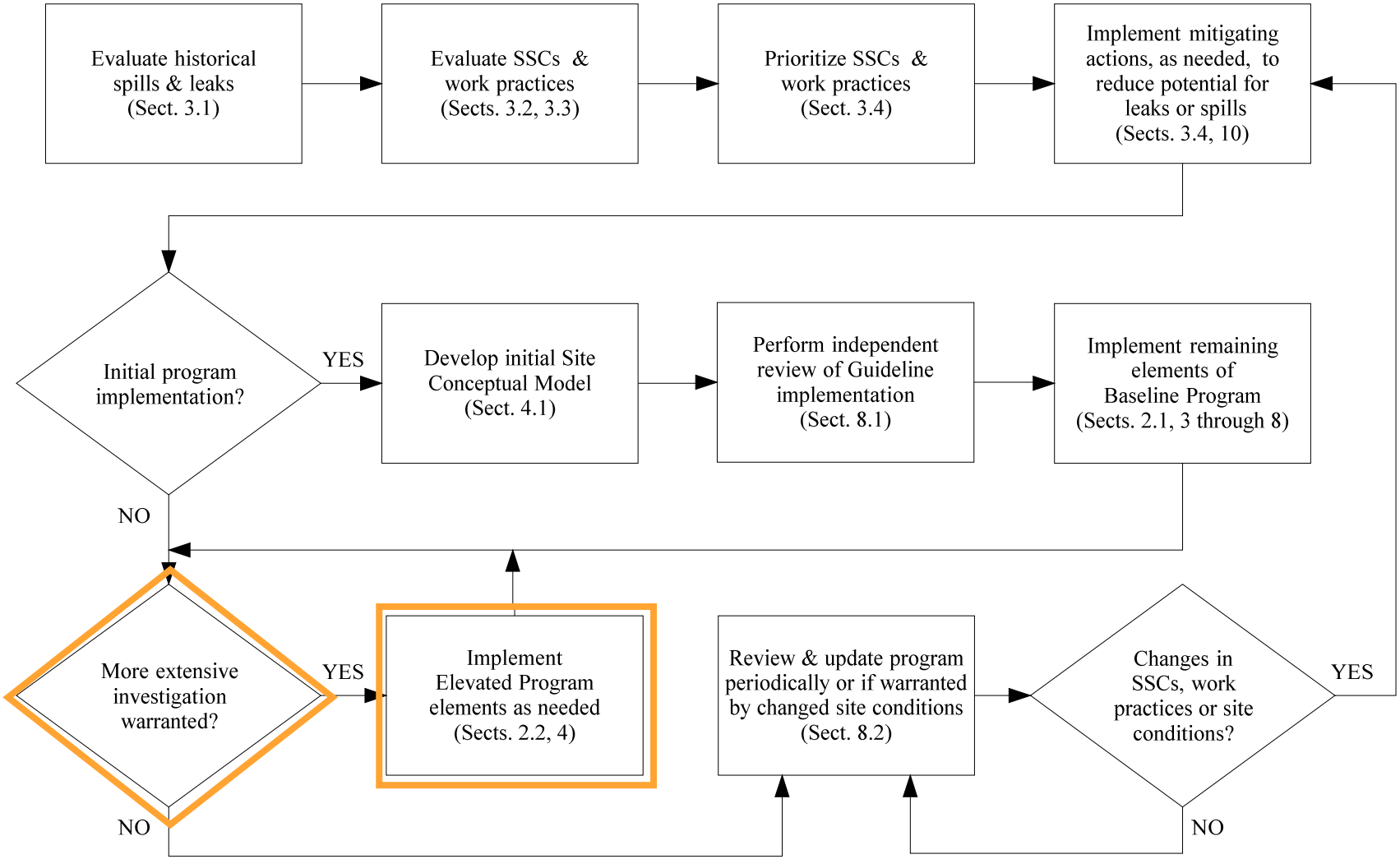
EPRI Groundwater Protection Guidelines Implementation



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EPRI Groundwater Protection Guidelines
ELEVATED Program

For sites or plants with higher potential for groundwater contamination (e.g. complex hydrogeology, closer proximity of leak/spill to site boundary, greater amount of contamination):

- Determine vertical distribution and movement of contaminant plume
- Conduct aquifer tests
- Consider use of water-level transducers
- Conduct geophysical testing
- Consider use of hydraulic conductivity testing
- Consider use of hydrophysical testing
- Evaluate need for fate and transport numerical modeling

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EPRI Program- NEXT STEPS

- Guidelines will be on a 2- year review and update schedule
- EPRI developing technologies to assist in Groundwater Protection Program implementation
  - Software and remediation tools
  - NDE and materials tools
- EPRI Groundwater Protection Conference will be held on an annual basis- next Augusta, GA –Sept, 2008

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