

NUREG-1757, Volume 2, Rev. 2, Guidance Revisions

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LaFranzo, Leah Parks, Adam Schwartzman

October 11, 2022, Public Information Meeting

US NRC, Rockville, MD





NUREG-1757
Volume 2
Revision 2

Consolidated Decommissioning Guidance

Characterization, Survey,
and Determination of
Radiological Criteria

Final Report

Office of Nuclear Material Safety and Safeguards

NUREG-1575, Revision 2
EPA-402-P-20-001
DOE/AU-0002

MULTI-AGENCY RADIATION SURVEY AND SITE INVESTIGATION MANUAL (MARSSIM) DRAFT FOR PUBLIC COMMENT



Revision 2

May 2020

Guidance Updates

NUREG-1757, Volume 2, Rev. 2 Working Group

NRC Headquarters Staff:

Cynthia Barr, Senior Risk Analyst

Greg Chapman, Senior Health Physicist

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David Esh, Senior Risk Analyst

Randall Fedors, Senior Hydrogeologist

Leah Parks, Risk Analyst

Adam Schwartzman, Risk Analyst

Regional Staff:

Michael LaFranzo, Region III, Health
Physics Inspector

Retired staff:

Anthony Huffert, Laurie Kaufman
(health physicists)

Other specialists:

Hans Arlt, Mark Fuhrmann (engineered
barriers); Lifeng Guo (hydrology);
Allen Gross (dose modeling)

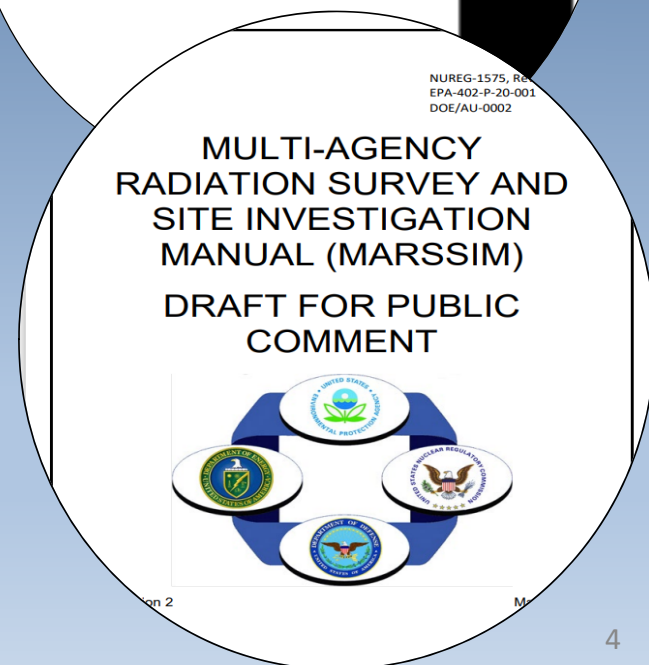
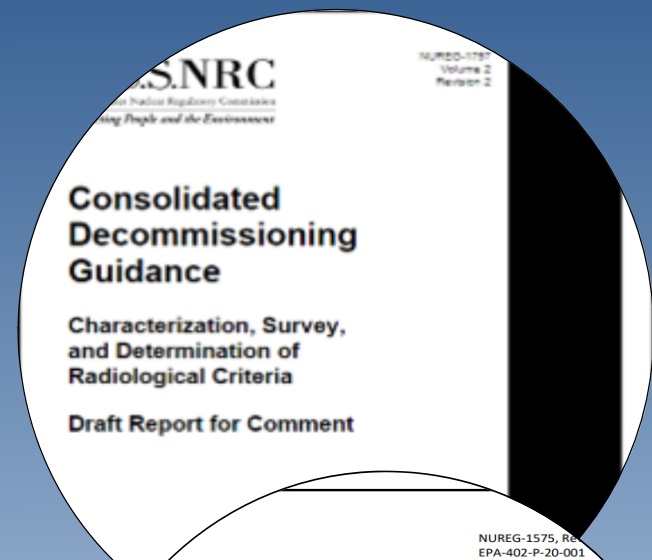
From Draft to Final Guidance

NUREG-1757, Volume 2, Rev. 2, was issued for public comment in December 2020 (ADAMS Accession No. ML20273A010)

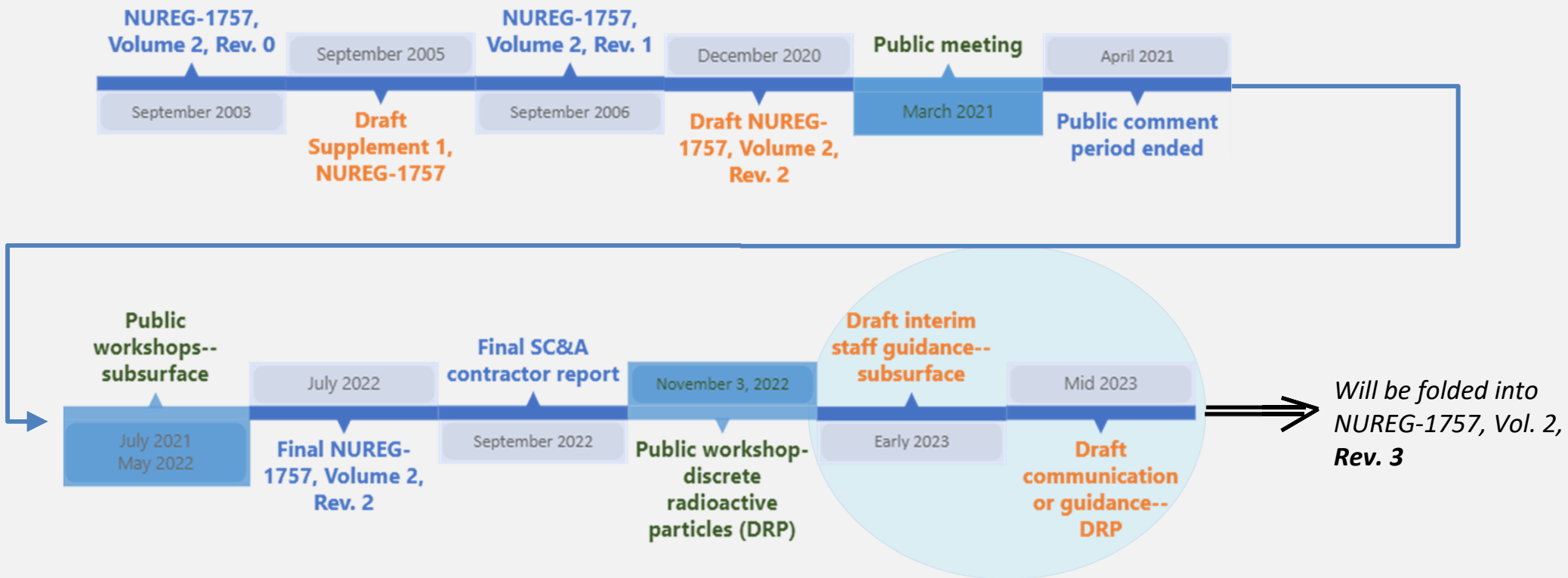
- Over 200 comments in nine comment letters (ML21299A032)
- Final published July 19, 2022 (ML22194A859)
- FRN was published July 22, 2022 (87 FR 43906)

NUREG-1575, Rev. 2, was issued for public comment in July 2021

- Over 60 comments in 17 comment letters
- Science Advisory Board peer reviewed
- MARSSIM Working Group is currently addressing comments

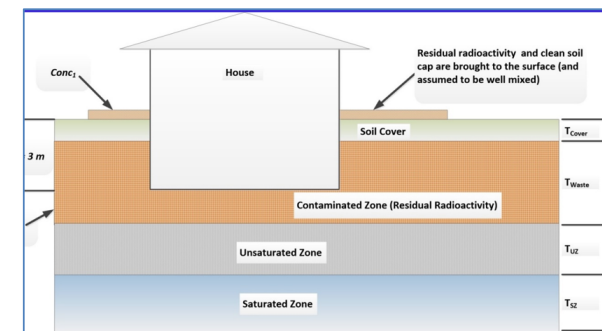
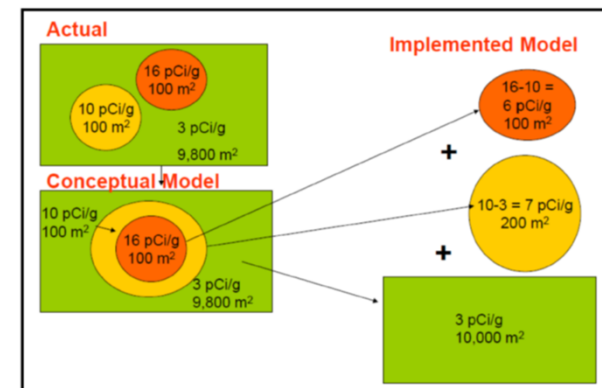


Roadmap—Consolidated Decommissioning Guidance



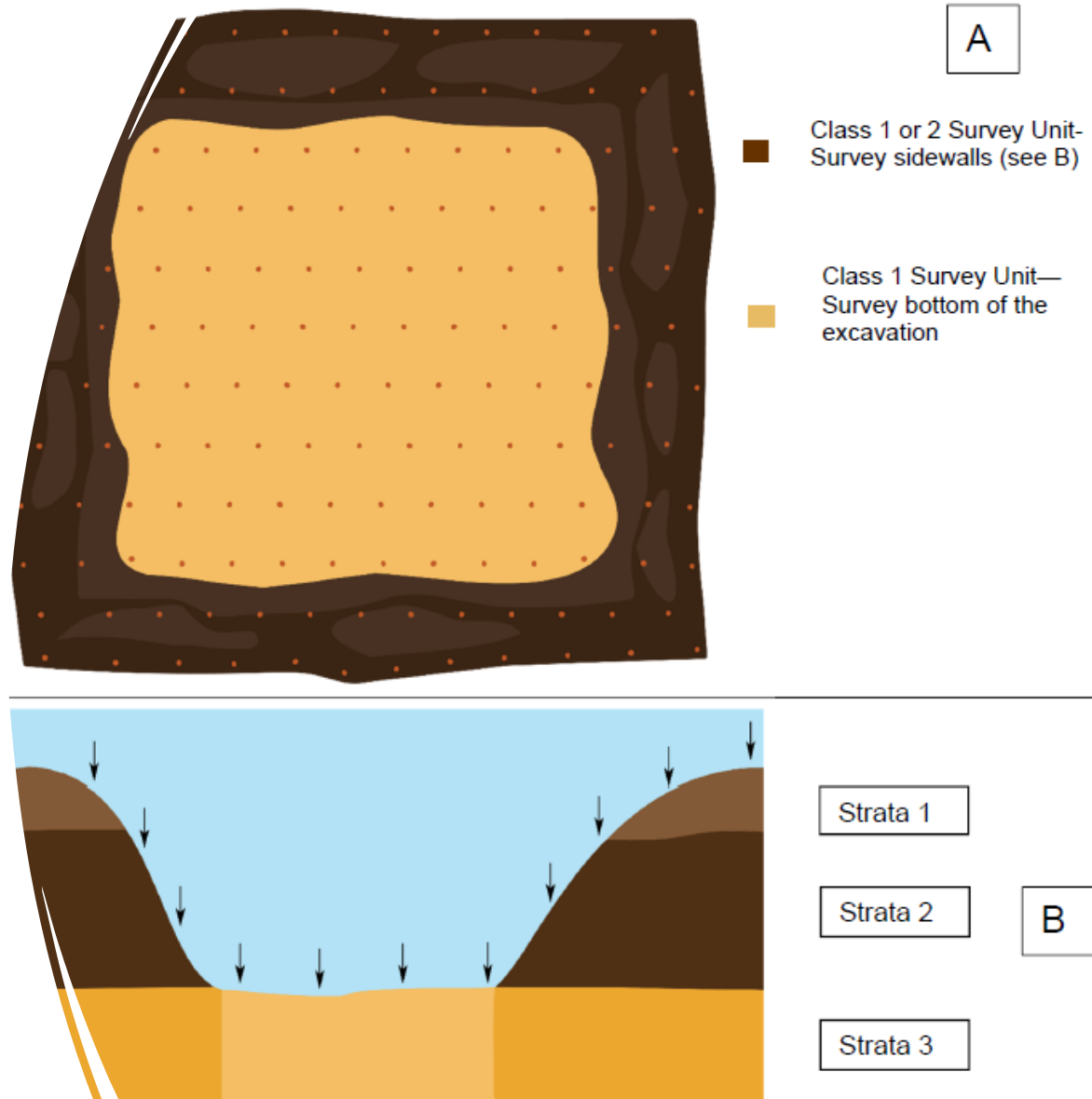
Major Changes to NUREG-1757, Vol. 2, Rev. 2 Dose Modeling (Appendix I, J, and Q)

- Consideration of elevated areas (updated Appendix I)
- Support for distribution coefficients (updated Appendix I)
- Exposure scenarios for buried radioactivity (updated Appendix J)
- Uncertainty analysis considerations (new Appendix Q)



Major Changes to NUREG-1757, Volume 2-- Radiological Surveys (Appendix C, G, and O)

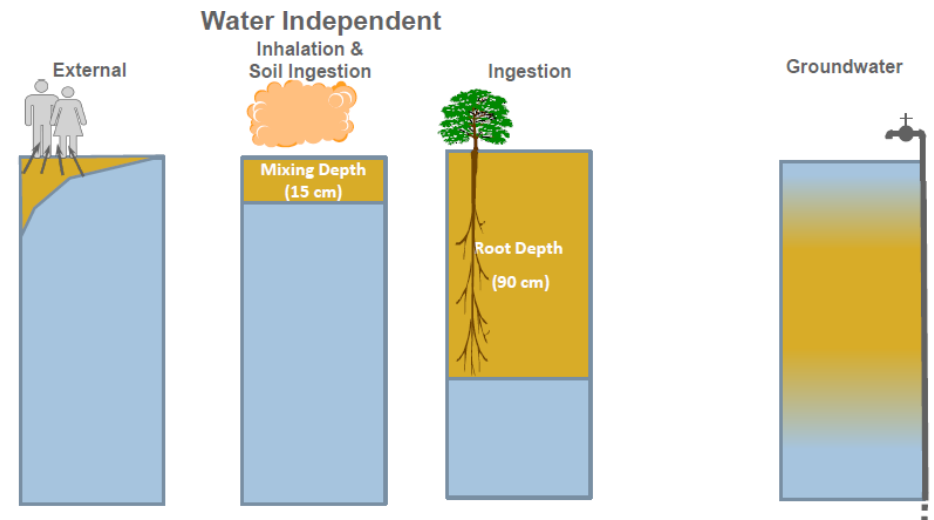
- Surveys of open excavations (new section in Appendix G)
- Surveys of soils/materials for reuse (new section in Appendix G)
- Alternative statistical tests (increased emphasis on Scenario B in Appendix G)
- Composite sampling (new Appendix O)



Significant Comments on NUREG-1757

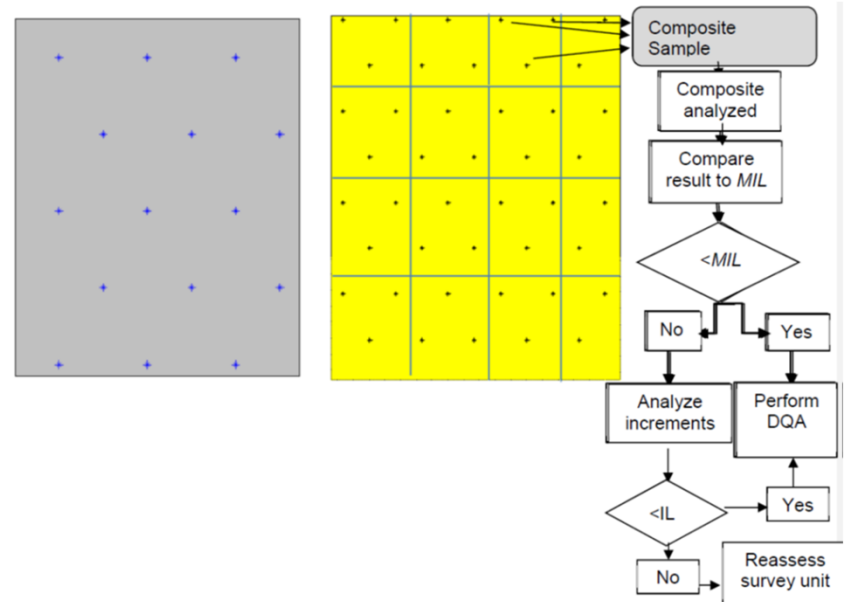
Dose Modeling

- Use of multiple clean-up levels adds complexity (Chapter 3)
- Basis for elimination of groundwater pathway (Chapter 5)
- Potential need for additional support for risk-significant parameters such as distribution coefficient (K_d) (Appendix I)
- Need to consider a large construction project (Appendix J)
- Need for uncertainty analysis technical guidance (Appendix Q)

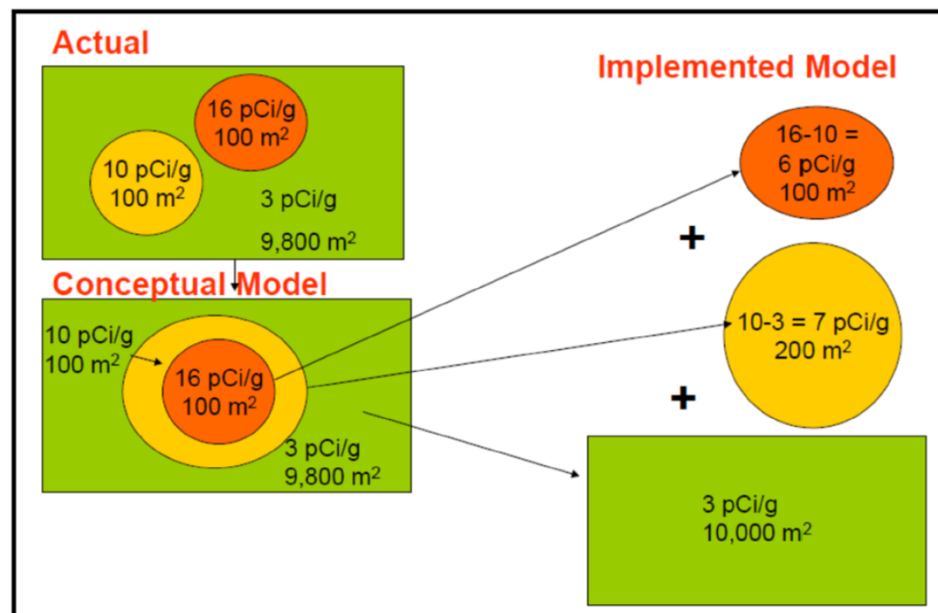


Significant Comments on NUREG-1757 Radiological Surveys

- Data reporting requirements for surveys (level of detail; comments requested both more and less detail)
- Need for guidance on use of ISOCS for radiological surveys
- Survey of reactor basement concrete
- Need for guidance on subsurface surveys and discrete radioactive particles
- Need for simple approaches or screening values for clearing “clean” areas or reuse of material



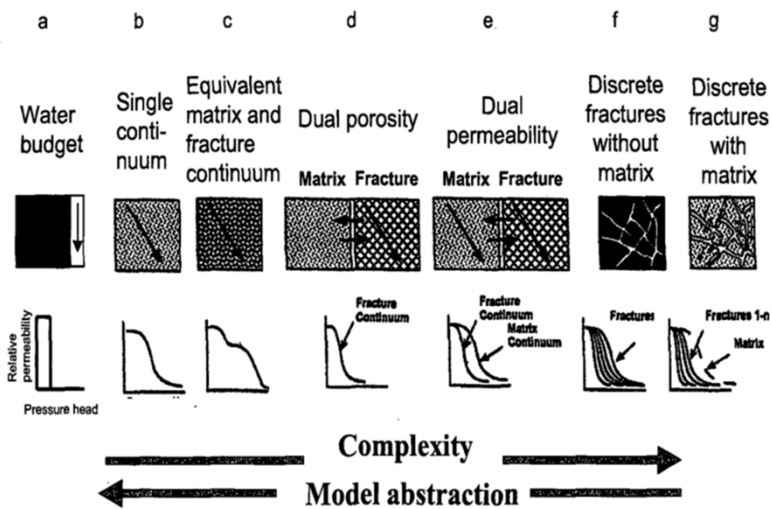
Specific Guidance Update Examples



Surface Water and Groundwater Characterization

Appendix F

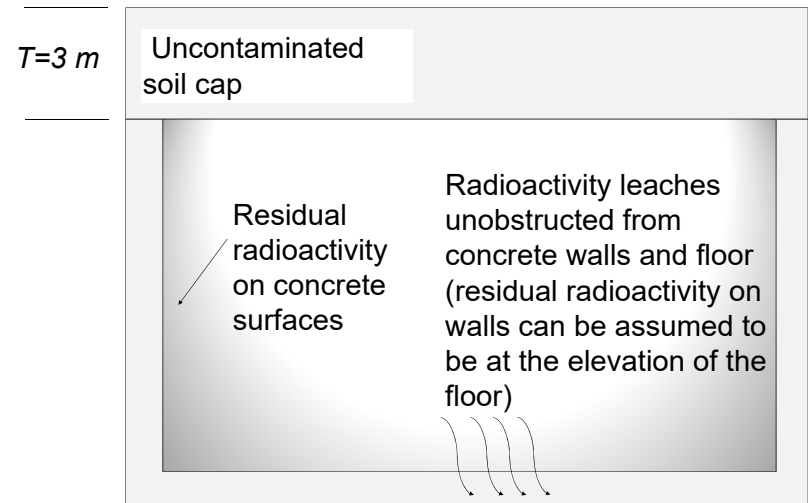
- Updated references throughout appendix
 - Pointers to documents with expanded coverage of topics
- Added section on Development of CSMs and Mathematical Models
 - Emphasize relationship of:
 - Conceptual site model (CSM)
 - Numerical models flow and transport
 - Groundwater component of dose models
- Expanded discussions, but remain generic and dependent on the specific site complexities, for:
 - Monitoring Networks & Sampling Frequencies
 - Detailed groundwater modeling



Exposure Scenarios for Buried Radioactivity

Appendix J

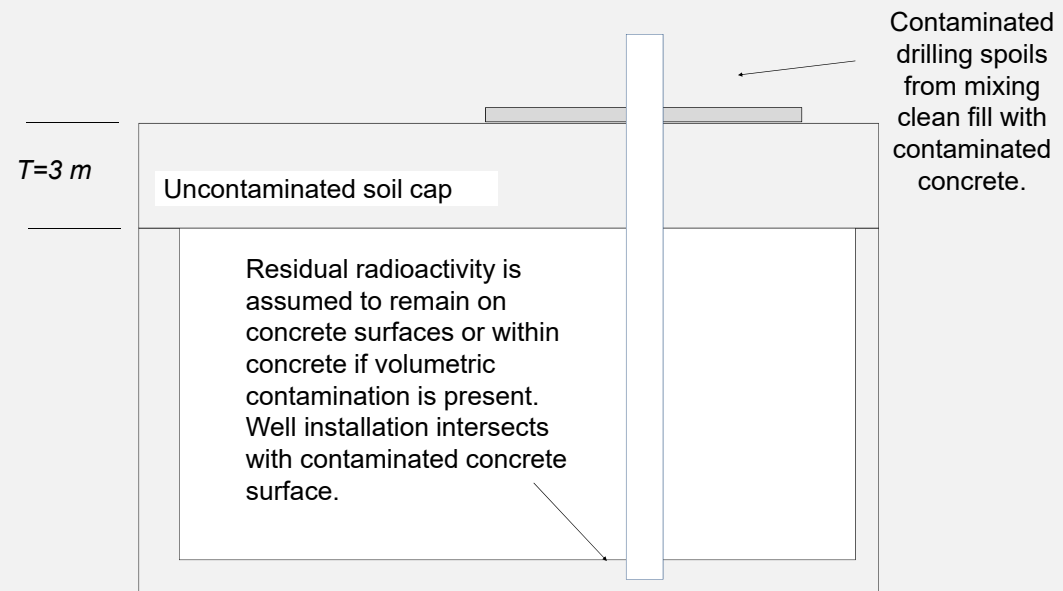
- Exposure scenarios for buried radioactivity (updated Appendix J)
 - Well driller
 - Larger-scale construction



Exposure Scenarios for Buried Radioactivity

Appendix J

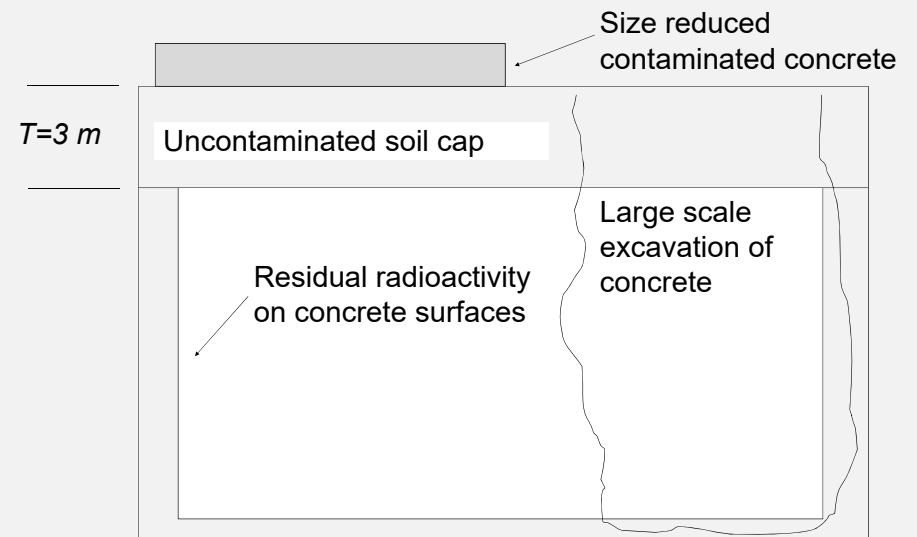
- Well Driller Scenario
 - (i) pathways associated with use of contaminated groundwater from an onsite well and
 - (ii) direct (and indirect) exposure to drilling spoils that are brought to the surface during the installation of the onsite well



Exposure Scenarios for Buried Radioactivity

Appendix J

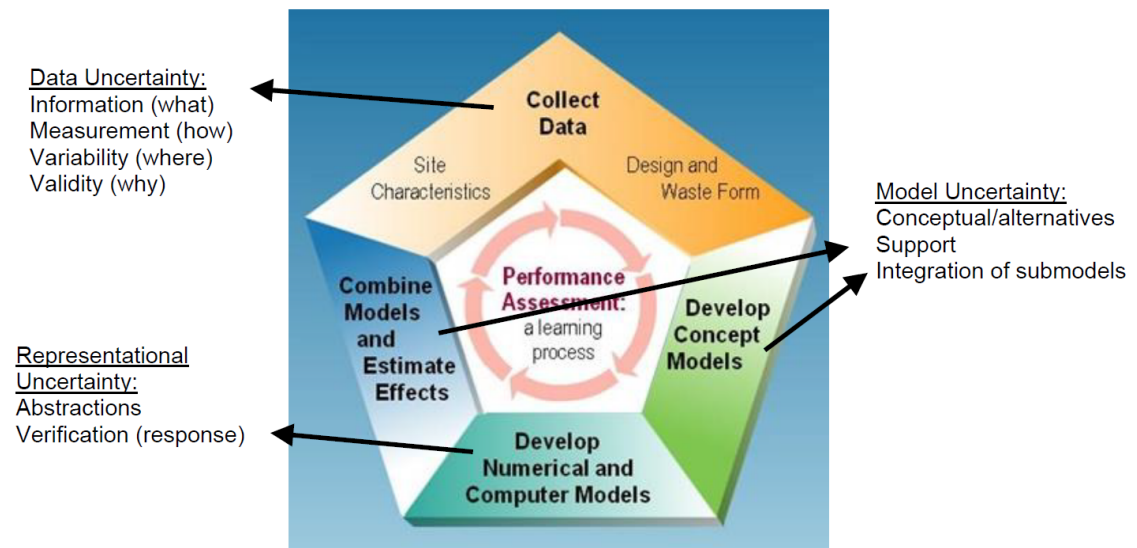
- Large-scale construction scenario
 - dose to the construction worker or other member of the public who may be exposed to the residual radioactivity on the excavated concrete and/or fill material would need to be considered



Uncertainty in Performance and Dose Assessments

Appendix Q

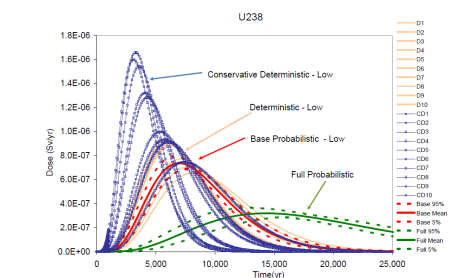
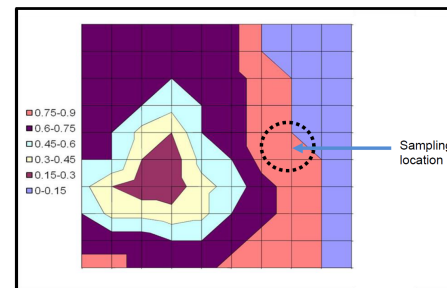
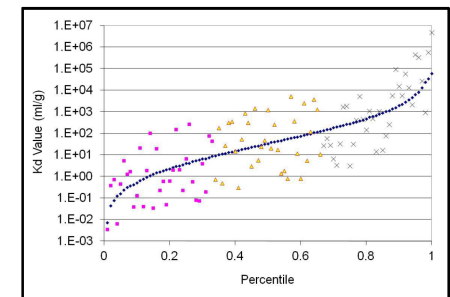
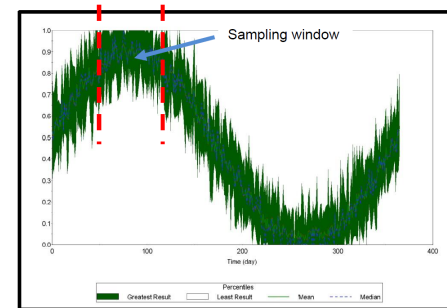
- Provide guidance on the treatment and representation of uncertainty
- Discusses types of uncertainty, approaches to incorporate, and methods to understand uncertainty
- Includes definitions, general considerations, and review procedures



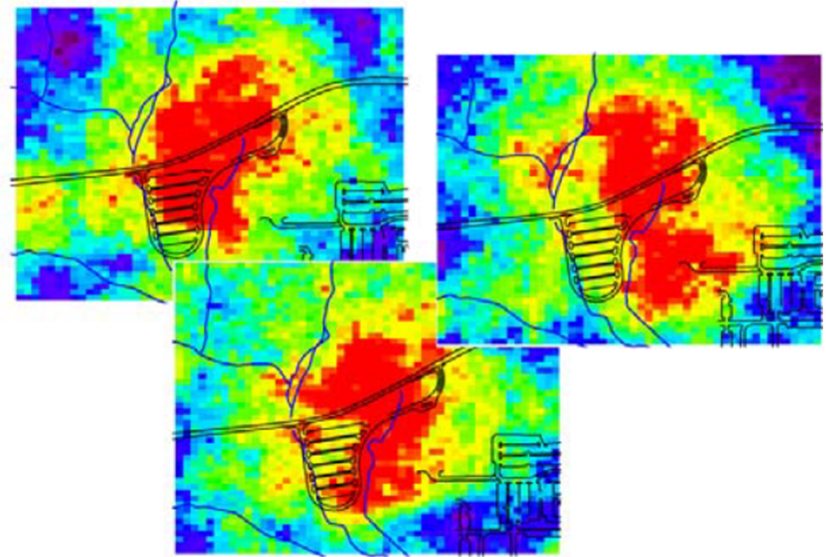
Uncertainty in Performance and Dose Assessments

Appendix Q

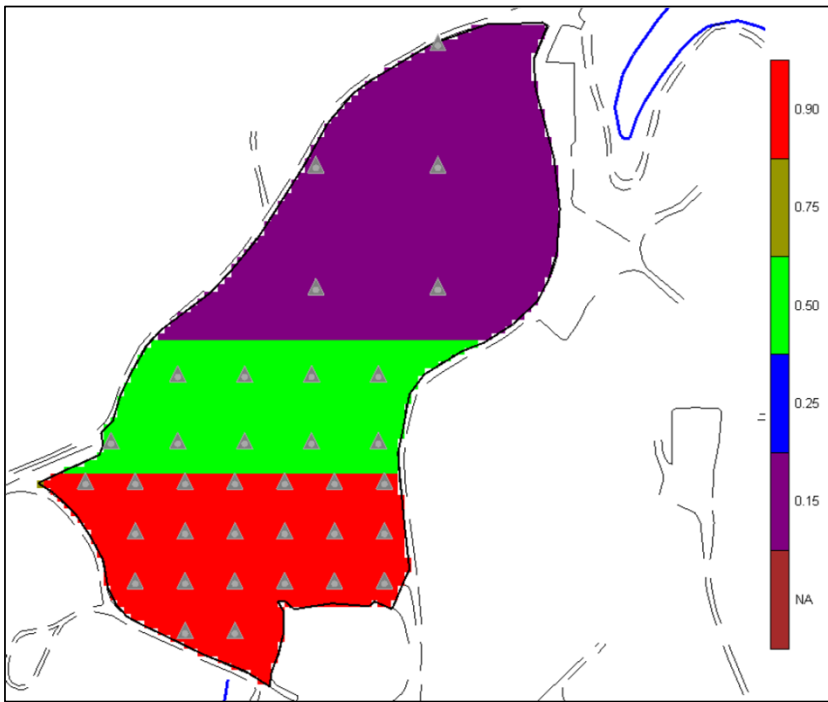
- Examples are intended to convey concepts based on staff experience
- Different practical examples are provided
- Staff are always available to help licensees and agreement state regulators on the assessment of uncertainty in performance and dose assessments for decommissioning



Other Related Activities



Interim Staff Guidance and Code Development Initiatives



Supplemental Interim Staff Guidance (will be folded into NUREG-1757, Vol. 2, Rev. 3)

- Subsurface investigations guidance
- Discrete radioactive particles guidance (guidance or communication)

Supporting Code Development

- Visual Sample Plan (VSP) computer code improvements

Subsurface Investigation Guidance

- First workshop held July 2021 with over 160 participants
- Second workshop held May 2022 with over 120 participants
- Technical topics included:
 - Geospatial tools for radiological survey design
 - Dose modeling for subsurface residual radioactivity
 - Consideration of elevated areas
 - NEI groundwater protection initiative
 - Innovative technologies for subsurface characterization
 - Case studies and lessons learned
- SC&A, Inc. (NRC contractor) white paper provided to support the workshop

<https://www.nrc.gov/waste/decommissioning/whats-new.html>

State Agencies

Industry

Federal Registrants

Subsurface Investigation Guidance

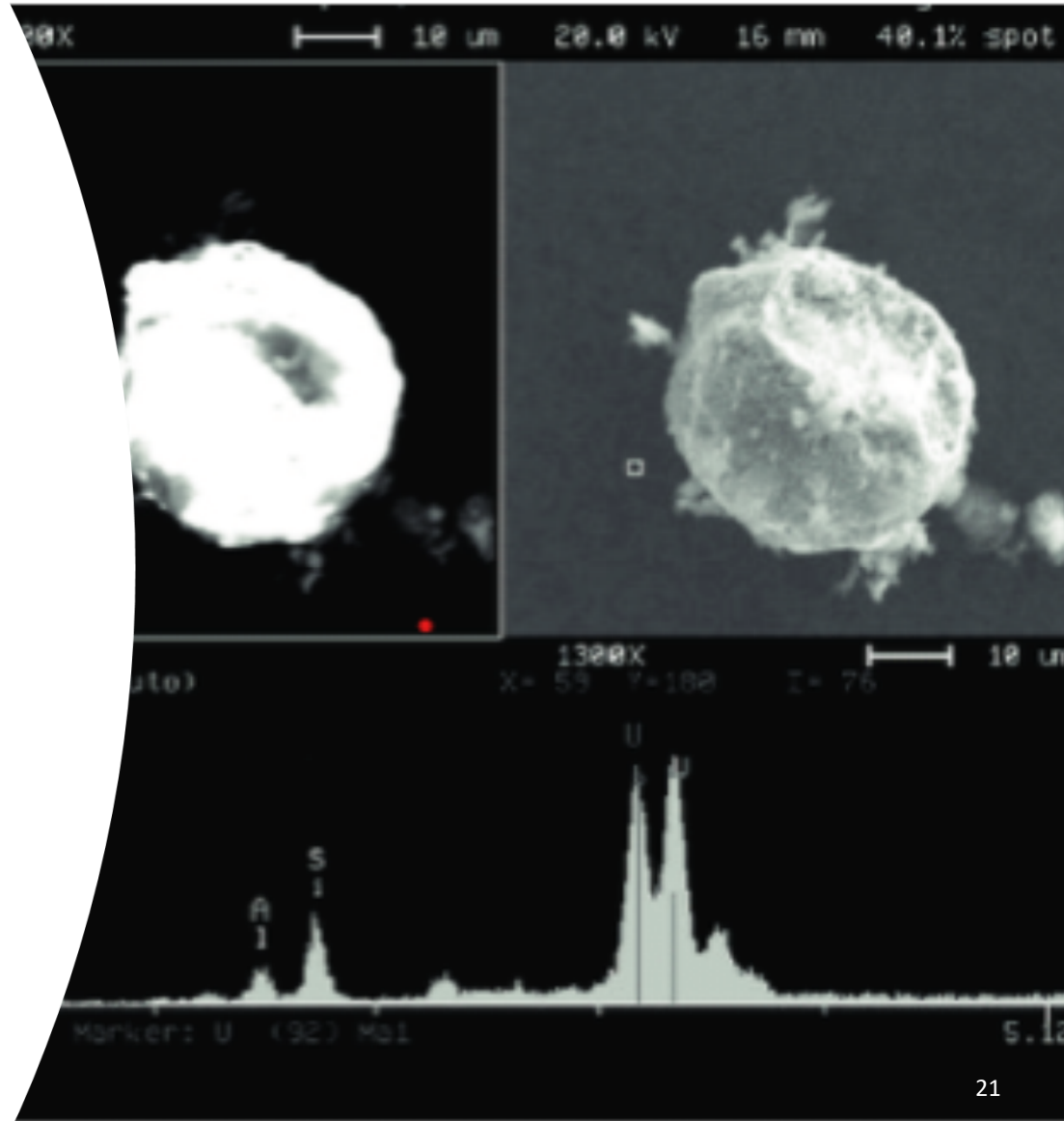
Interim Staff Guidance to be developed in early 2023

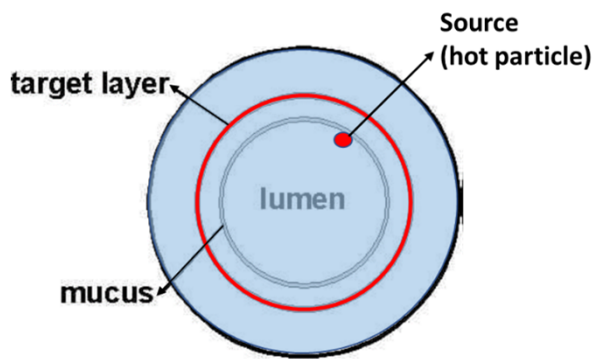
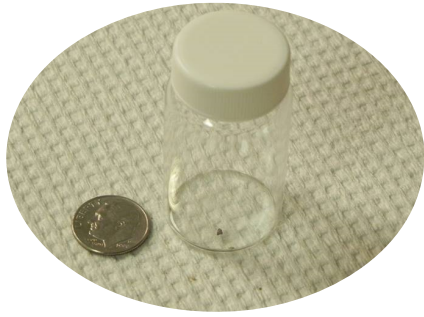
- Will be issued for public comment
- Will include guidance on surveys of open excavations and reactor substructures
- Will include guidance on use of RESRAD-ONSITE for reactor basement substructures
- Case studies will be presented on acceptable use of geospatial tools for subsurface survey design, as well as remedial and final status survey decision-making



Discrete Radioactive Particles (DRP) as residual radioactivity at decommissioning sites

- DRP survey methods (surface and near surface)
- DRP dosimetry
 - Skin dose
 - Inhalation and ingestion dose (including localized exposures)
- Exposure scenarios
- Staff is considering need for interim guidance or some other form of communication
- Hybrid workshop to be held November 3, 2022
<https://www.nrc.gov/pmns/mtg?do=details&Code=20220871>





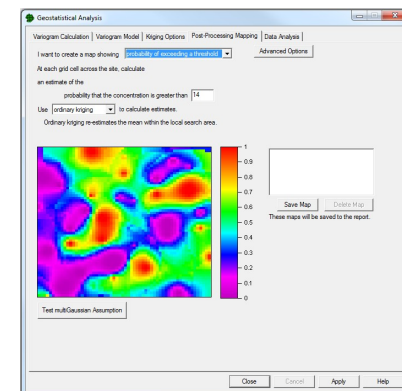
Bottom Image credit: DRAFT
NUREG/International Agreement Report:
*Using VARSKIN for Hot Particles Ingestion
Dosimetry Evaluation*

DRP Proposed Workshop Agenda

- NRC welcome and background presentation
- NEI presentation
- Contractor presentations
 - Oak Ridge Associated Universities/Oak Ridge Institute for Science and Education—DRP radiological surveys
 - Renaissance Code Development—DRP dosimetry
- Technical discussion
 - Technical issue #1: Radiological Survey approach
 - Minimum detectable activities and DQOs
 - Technical issue #2: Consideration of potential exposure scenarios
 - Consideration of likelihood and acceptable risk to the public after license termination
 - Technical issue #3: Dosimetry appropriate for inhalation/ingestion of a particle
 - Avoiding deterministic effects in the lung and GI tract?
- Closing

Visual Sample Plan (VSP)

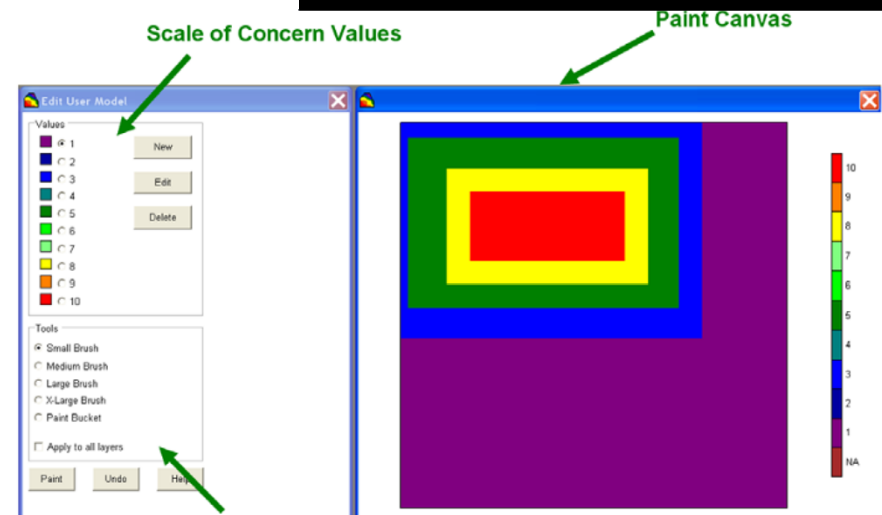
- Scenario B Related Improvements
 - Prospective and retrospective power curves— Scenario B
 - Calculation of reference area variability (Kruskal-Wallis/ANOVA) with user specification of test parameters
 - Quantile test parameters (power, quantile/critical value)
- Add tools for modern data logging systems (without surveyor vigilance or with autonomous vehicles)
- Scoping of tools to facilitate subsurface survey design (to be implemented in FY2023 and beyond)



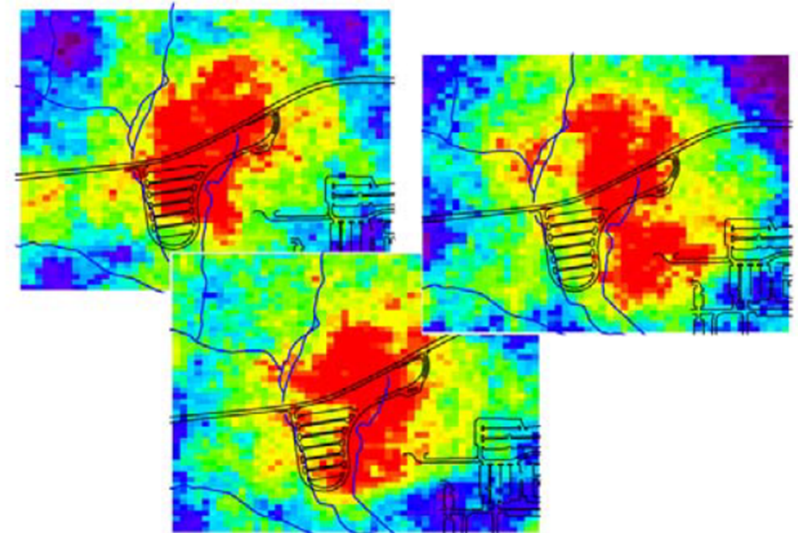
<https://ramp.nrc-gateway.gov/codes/vsp>

Conclusions

- NRC has recently updated key decommissioning guidance documents
- NRC plans to issue interim staff guidance on subsurface surveys and dose modeling in early 2023 for public comment
- Guidance or communications on discrete radioactive particles is expected to be issued in mid 2023
- NRC is sponsoring development of tools to facilitate survey design and data visualization and analysis
- NRC staff looks forward to continuing to work with our stakeholders to develop additional guidance and tools to support the decommissioning program



Paint tools for assigning values





Back-up slides

MARSSIM

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