

# U-233 Disposition Program

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**Building 3019**




# Inventory Complexities

- Building 3019 U-233 Inventory Properties
  - 1,098 canisters stored in tube vaults in heavily shielded hot cells within Building 3019 at Oak Ridge National Laboratory
  - U-233/U-232 radiological properties
    - Doses of 1-300 R/hr
  - Heterogeneous inventory
    - Consolidated Edison Uranium Solidification Project (CEUSP) Material
    - Molten Salt Reactor Experiment (MSRE) Traps
    - Oxide Powders
    - Metals
    - Zero Power Reactor (ZPR) Plates
    - Miscellaneous



# Mission Drivers

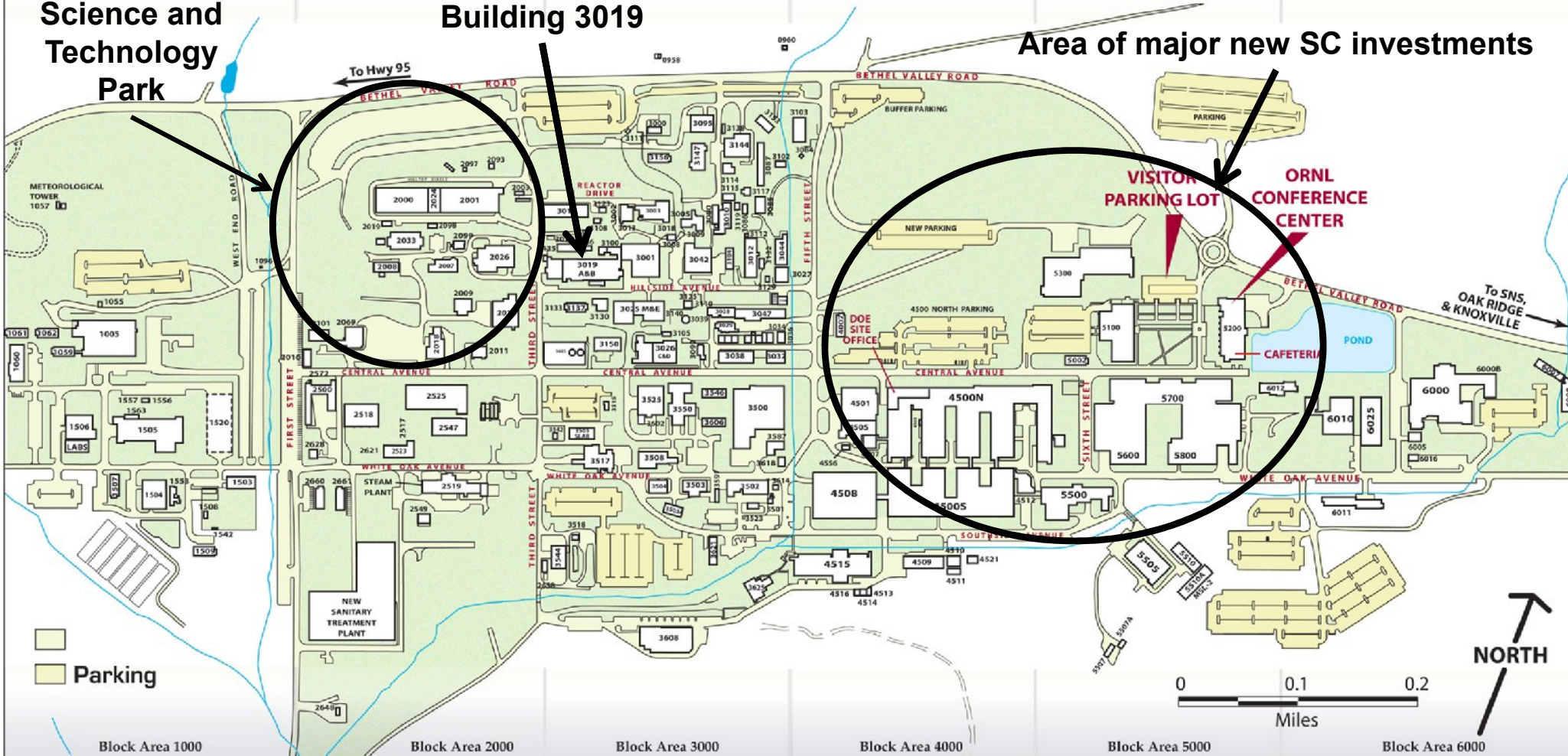
- Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 97-1
    - Concern about safety of long-term storage in old nuclear facilities
  - Security
    - Drives security posture of Oak Ridge National Laboratory (ORNL)
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- Support to the Office of Science (SC) mission at ORNL
    - Threat removal
    - Re-development of the NW quadrant into an open campus

# Oak Ridge National Laboratory Main Campus

Planned  
Science and  
Technology  
Park

Building 3019

Area of major new SC investments



- 1005 Laboratory for Comparative and Functional Genomics
- 1503 Emergency Operations Center
- 1505 Environmental Sciences
- 1520 Joint Institute for Biological Sciences (under construction)
- 2518 Fire Station
- 3001 Graphite Reactor
- 4500N/4500S Chemical and Material Sciences Facility

- 4508 Metals and Ceramics Facility
- 4512 Laboratory Shift Superintendent Office
- 4515 High Temperature Materials Laboratory
- 5100 National Institute for Computational Sciences/Oak Ridge Center for Advanced Studies
- 5200 Research Support Center - Visitor Center/Conference Center/Cafeteria
- 5300 Multipurpose Research Facility (under construction)
- 5600 Computational Sciences

- 5700 Research Office Building
- 5800 Engineering Technology Facility
- 6000 Holifield Radioactive Ion Beam Facility
- 6008 Joint Institute for Heavy Ion Research

ORNL 2007-G00360A/asn



MOVING TO THE FUTURE BY CLEANING UP THE PAST

# The Challenge

- The Problem: FPD forecasted additional cost growth and project risk due to design complications
  - Exacerbated by predictions of constrained funding
- Proposed Solution: Re-examine past alternatives in light of changed conditions over the past 10 years, and determine whether new opportunities exist to disposition the inventory more efficiently
- Implementation Approach: Assemble inter-disciplinary, inter-departmental team of experts from around the country, and involve policy-level decision makers
- Changed conditions included:
  - TRU Waste Processing Center (TWPC ) in Oak Ridge now operational
  - Expressions of programmatic interest in certain inventory elements
  - National Criticality Experiments Research Center (NCERC) at the NNS Device Assembly Facility now operational

# Alternatives Analysis

*“I want to express my full support of another rigorous look at...alternatives, and an evaluation of any new ideas which may emerge...for purposes of determining whether changed circumstances could render a different technical solution more attractive in today’s context.”*

*- DOE Deputy Secretary Poneman*

- Draft Phase I Alternatives Analysis report (Jan, 2011) favored a combination of direct disposition and co-processing
  - Transfer components desired by other DOE programs
  - Direct dispose of the CEUSP material
  - Co-process remaining inventory with other ORNL wastes
- Direct Disposition Campaign will eliminate 52% of canister inventory, 77% of total Uranium and 85% of U-232 isotope

Now called the “Direct Disposition Campaign”

# Phase I Processing Recommendation

- Phase I preferred approach: Dissolution and downblending of remaining inventory in Building 3019 using completed design (as appropriate), followed by co-processing with Melton Valley Storage Tank (MVST) sludges at the ORNL TRU Waste Processing Center (TWPC)
  - Avoids annex construction and a separate waste packaging and transportation campaign, without significantly impacting TWPC operations or their final waste form
  - Eliminates risk of unproven drying and packaging technology
  - Provides acid that TWPC needs for caustic sludge mobilization
- Need a Phase II analysis to make a final determination of the most efficient, lowest risk processing technique



# Phase I Summary: All Parties Win

- Faster and cheaper than the existing baseline
  - >\$100 million savings potential
  - Possible three-year acceleration (benefits Office of Science)
  - Results in earlier initiation of material movement (builds project momentum)
- Still could utilize much of the “sunk” design cost
- Significant risk reduction
- Preserves an opportunity for multiple program uses
- Synergy with TWPC

# Phase II: A New Level of Savings?

- Is additional direct disposal or programmatic transfer possible?
- Can we increase the number of CEUSP canisters per cask?
- Can we avoid a capital project altogether?
  - Recall, Phase I obviated the annex via co-processing
  - Can we eliminate capital upgrades to Building 3019 too?
- Emerging solution: Process in existing ORNL hotcell facility - Building 2026
  - Not yet a consensus recommendation

# The Phase II Alternatives Analysis

- Phase II preliminary conclusions: A whole new level of savings
  - Only 10-20 additional canisters are eligible for direct disposal
  - Additional programmatic demands have emerged for small quantities
    - Preservation of a “strategic reserve” for certified reference material (CRM) may precipitate a follow-on direct transfer campaign
  - Re-activate ORNL Building 2026 for processing on a can-by-can basis instead of using Building 3019 for downblending
    - Completely avoids a major capital acquisition
    - Requires upgrade of Building 2026 from hazard category III to hazard category II
  - Preliminary total “to go” cost: \$250-300M (including Direct Disposition efforts in FY12)
    - Requires \$35-\$45M per year through FY17 (completion in Q1, FY18)

**Represents a potential savings of 10 years and \$600M relative to the original approach, when both are constrained to \$40M/yr!**

# Status

- Fixed price contract option for direct disposition executed on January 1, 2012
- First ZPR plate shipment completed on December 19, 2011
- Draft Phase II Alternatives Analysis will be published in March
  - Still requires joint endorsement of EM and the Office of Science
- Plans are maturing for CEUSP disposal
  - Disposal concept done
  - Subcontract awarded for LWT cask and SARP development
  - Security strategy underway



# Summary of Innovations

- Recognition of changed conditions, and open-minded re-examination of previous alternatives and past decisions
  - Use of policy-level officials to challenge earlier conclusions and pre-conceived notions
  - Focus on the desired outcome, rather than the means to an end
- Adapting the LWT cask for CEUSP shipments
- Partnering for early initiation of the direct disposition campaign
  - Strategic focus on early initiation of material movements
- Potential use of existing facilities owned by other programs to help solve EM problems
  - ‘Capital investment in a non-enduring facility is a last resort’
  - Alignment of programmatic interests
  - Evolution of Building 3019 and 2026 DSAs (start with the easy stuff)