Nuclear Metals, Inc. Site

Public Meeting on Proposed Remedial Action Plan

November 2014

SDMS Doc ID 568484

Presenters

- **Melissa Taylor - US EPA**
  - EPA Project Manager

- **Bruce Thompson - *de maximis, inc.***
  - Project Coordinator for Respondents to RI/FS and NTCRA Administrative Orders on Consent

Presentation Outline

- Site Background
- Update on Non-Time-Critical Removal Action (NTCRA) Removal of Buildings and Contents
- Remedial Investigation (RI) / Risk Assessment
- Feasibility Study (FS)
  - Development and Analysis of Remedial Alternatives
  - Site Wide Soil / Sediment and Groundwater Remedial Alternatives
- **EPA's Proposed Remedial Action Plan (PRAP)**
- **Question and Answer Session on RI/FS and PRAP**

Project Team

- **EPA** is the lead agency for all site work. EPA used internal experts and an outside consultant to assist in reviewing project documents.
- **MassDEP** is the support agency, and provided separate review of project documents.
- ***de maximis, inc.*** is the General Contractor that conducted the RI/FS and is performing the NTCRA
- The project team has met with representatives from community group **CREW** and Concord's **2229 Main Street Committee** about every other month since 2004 to present data and update site progress. These groups also reviewed and commented on project documents.

Site in 2004

Areas of Investigation (AOIs)

History of Nuclear Metals, Inc.

- Nuclear Metals, Inc. (NMI) purchased undeveloped property in 1957 and built original facility buildings in 1958.
- Owners/Operators:
  - **1958 – 1972**: Textron Inc. and Whittaker Corp. sequentially own NMI, which performed specialty metals research and development, primarily for US Army and the Atomic Energy Commission.
  - **1972**: Employees purchase company and incorporate as NMI – expand work to include production of depleted uranium (DU) penetrators under contract with US Army

History of Nuclear Metals, Inc. (continued)

1997: NMI changes name to Starmet Corporation, stops DU penetrator production and focusses on other manufacturing (metal powders, beryllium-aluminum alloys).

1998: Starmet (with Army funding) conducts a partial cleanup of the Holding Basin with oversight by the Commonwealth of Massachusetts .

2001: EPA conducts a time-critical removal action to line the Holding Basin and cap the "old landfill" on site.

2003: Administrative Order on Consent to conduct RI/FS is executed between EPA and US Army, US DOE and Private Respondents (Whittaker Corp, and Textron, Inc.).

2004: Remedial Investigation field work begins.

History of Nuclear Metals, Inc. (continued)

2005-2006: Commonwealth of Massachusetts conducts a removal action (with Army funding) to remove depleted uranium drums and uranium metals from the facility.

2007-2008: After a fire occurred at the facility in June 2007, EPA conducts a second time-critical removal action to remove some hazardous and flammable materials from the facility.

November 2011: Starmet and affiliated businesses abandon Site and Massachusetts Department of Public Health-Radiation Control Program terminates Starmet's Radioactive Materials License.

November 2011: NTCRA for demolition of facility buildings is initiated.

(See page 8 of PRAP for NMI Site Timeline)

Current Site Work

Remedial Investigation / Feasibility Study (RI/FS)

- Initiated in 2004- Completed 2014
- Evaluation of nature and extent of contamination, risks to human health and the environment, and options and costs to address unacceptable risks
- "Everything outside the buildings"

Non-Time-Critical Removal Action (NTCRA)

- Initiated in 2011
- Progressive removal of buildings contents and demolition of buildings, with capping of foundations
- Scheduled completion Fall 2015

NTCRA Scope

- Install access controls and provide site security
- Remove hazardous, flammable and combustible materials
- Remove asbestos, universal waste, and building contents
- Demolish ~180,000 feet^2 of buildings down to slabs
- Dispose of all removed materials and debris off-site at appropriately licensed facilities
- Fill voids and place a temporary cap over foundation
- Perform “post-removal site control” (security, monitoring)

Starmet Facility Buildings

NTCRA Timeline

- Trust funded September 2011, last Starmet-related tenant left Site November 2, 2011
- As of November 10, 2014, 4,468,520 pounds of waste (250 truckloads) shipped off-site. Essentially all building contents now removed (except for oversized equipment to be removed during demolition)
- Interior asbestos and PCBs to be abated this Fall / Winter, along with removal of rooftop equipment. Remaining tasks will then be demolishing the buildings and installing a temporary cap over the slabs
- NTCRA work on track to be completed by Fall 2015

Building C “before”

Building C “after”

Building D Waste Loading

Building C "Pickling Area" – Before Work

Pickling Area - Ductwork Removal

Pickling Area -Trench Clean-out

Pickling Area - Post Removal

Remedial Investigation Summary

Purpose of the RI is to collect data necessary to adequately characterize the site for the purpose of developing and evaluating remedial alternatives

Work included:

- Removing buried drums and other wastes;
- Sampling soil, sediment, surface water, groundwater, soil vapor and biota;
- Developing a groundwater flow model, and a second model to assess the transport and migration of depleted uranium in groundwater;
- Preparing the Human Health and Ecological Risk Assessments;
- Preparing the Remedial Investigation Report.

Drum Excavation & Off-Site Transportation and Disposal

- Work performed December 2004.
- Excavated materials placed in roll-off containers, sampled and disposed off-site.

Phase 1, 1B, and 1C RI Work Summary

- >1,000 person-days of fieldwork
- Installed 44 new groundwater monitoring wells (60 monitoring wells present prior to the RI)
- Phase 1 - 141 groundwater samples, 78 surface water samples, 257 sediment samples, 485 soil samples collected. Drum excavation and removal.
- Phase 1B - 84 groundwater samples, 135 soil / sediment samples collected. Also prepared EE/CA to support NTCRA for buildings
- Phase 1C - 81 soil / sediment samples, 3 additional surface water samples, vapor intrusion study
- Interim Monitoring and Sampling – continued groundwater monitoring program during RI/FS process

RI Sampling Locations

RI Off-Property Sediment Sampling Locations

Monitoring and Supply Well Locations

Risk Assessments

- Risk Assessments performed in accordance with EPA guidance, with review and comment by EPA, MassDEP and citizen groups.
- Human Health Risk Assessment evaluated scenarios ("uses of the site") including current and future residential, site workers, trespassers, and recreation.
- Ecological Risk Assessment also used data from sediment toxicity tests, benthic macro-invertebrate community surveys, and tissue analysis.

- Process described on pages 10 and 11 of PRAP

Contaminants of Concern (COCs) and Proposed Clean Up Levels (PCLs)

The risk assessment process identified COCs for soil, sediment, and groundwater. COCs are discussed on pages 9 and 10 of the PRAP.

EPA has chosen PCLs that will be protective for future residential use at the site.

PCLs for soil, sediment, and groundwater are presented in Tables 1, 2 and 3 of the PRAP.

Feasibility Study (FS) Report

The objective of the FS is to develop and evaluate remedial alternatives so that an appropriate remedy can be selected

The FS process includes the following steps:

1. Identifying "applicable or relevant and appropriate requirements (ARARs)" – the enforceable federal and state laws or public health requirements that will guide the clean up work;
2. Developing Remedial Action Objectives and target clean up levels;
3. Identifying areas and volumes of media affected and developing "general response actions" for each affected medium.
4. Screening applicable technologies and assembling remedial alternatives from the retained technologies.
5. Preparing detailed and comparative analysis of individual alternatives (using criteria specified in the NCP- page 17 of PRAP).

Feasibility Study (FS) Report (continued)

Additional work conducted during the FS process included:

- **Site-specific pilot study**: Consisted of testing the use of a material called "Apatite" to treat DU in groundwater. Apatite is a phosphate mineral derived from fish bones (a waste product of the fishing industry).

- **DU metal investigation:** Integrating results of further field investigation activities conducted under the NTCRA to identify and remove DU metal from soil.

- **Updated 1,4-dioxane and VOC plume delineation:** Integrating more recent groundwater monitoring results using newer analytical methods to provide lower detection limits for 1,4-dioxane.

Soil / Sediment Remedial Alternatives

Five remedial alternatives (SS-1 through SS-5).

- SS-2 through SS-5 each include excavation of ~82,500 yards^3 of materials, which includes building slabs and sub-slab soil. About 5,500 yards^3 of soil was added during the FS to incorporate DU found in soil during the NTCRA.
- Major differences between alternatives are:
  - whether excavated materials are consolidated on-site (SS-2) or disposed off-site (SS-3, SS-4, and SS-5)
  - how the Holding Basin (HB), the source of DU to groundwater, will be managed.

DU Survey Areas and Locations With Detections/Removal

Pavement Areas Scanned and DU Removal Areas

Soil Areas Scanned

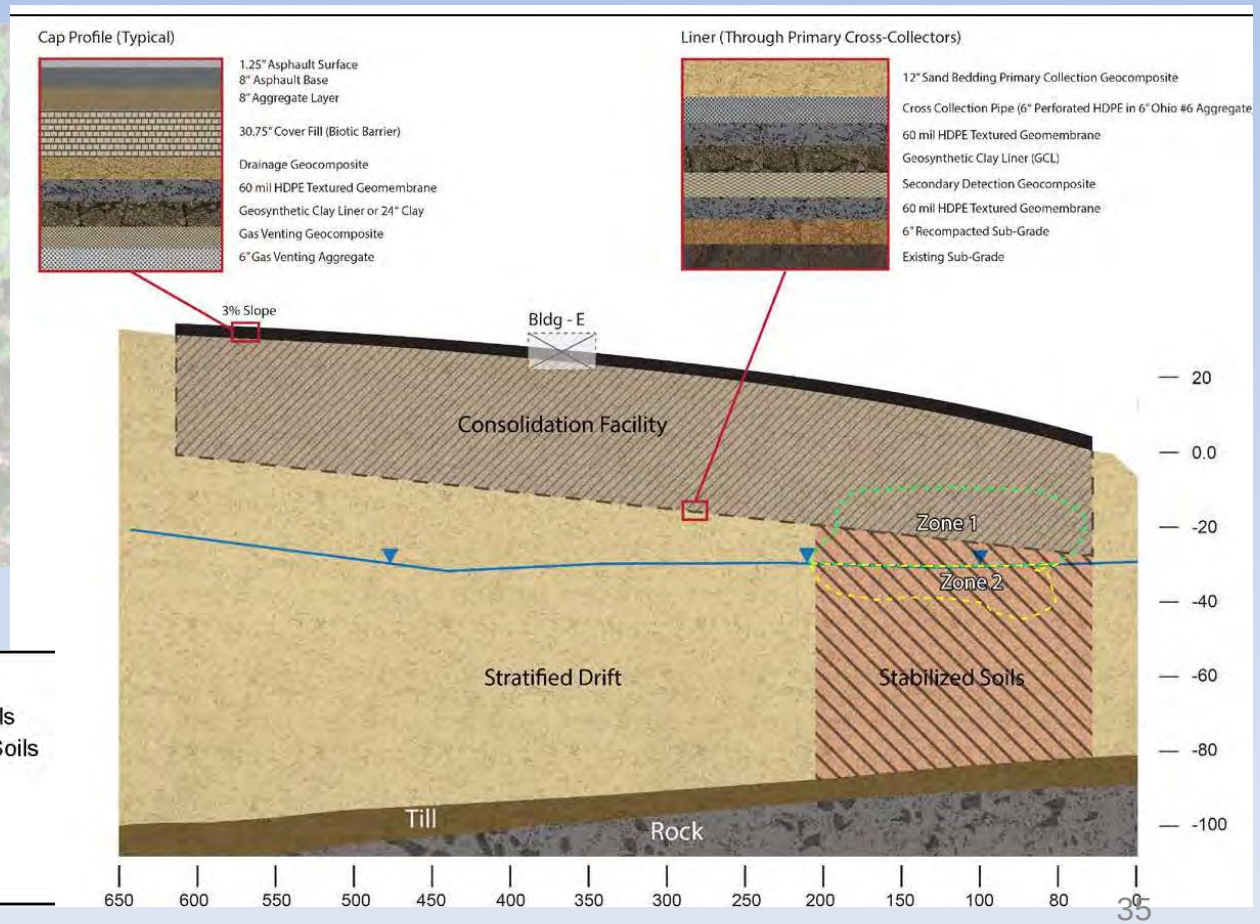
Fence added (Summer 2014)

Soil / Sediment Areas to be Remediated

Soil / Sediment Remedial Alternatives

- Described in detail on pages 14 – 17 of PRAP
- Summarized in Table 4 of PRAP.
- DU and PCBs are main drivers for soil/sediment remediation

SS-2 - Excavation and On-Site Consolidation of Soils (including Unsaturated HB Soils) and Sediments with Cap and Liner System, In-Situ Stabilization of HB Saturated Soils Using Apatite Injection

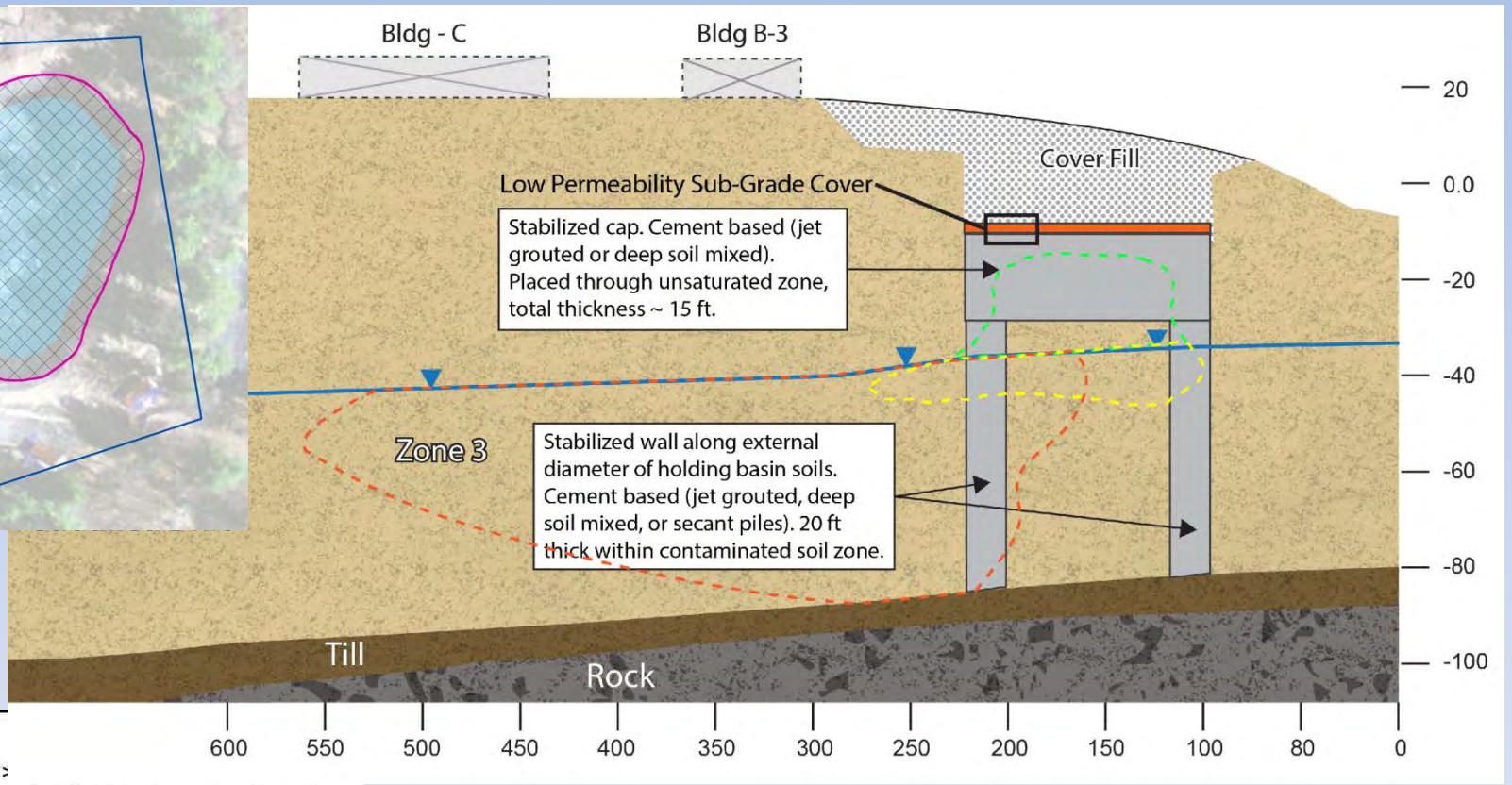


LEGEND

- Zone 1 - Uranium > 30 mg/kg in Vadose Zone Soils
- Zone 2 - Uranium > 30 mg/kg in Saturated Zone Soils
- Zone 3 - Uranium > 30 ug/l in Groundwater
- Building to be demolished
- Groundwater

Units depicted are feet (ft)

SS-3 - Excavation and Off-Site Disposal of Sediments and Non-HB Soils, Containment with Partial In-Situ Solidification/Stabilization of HB Soils Using Cement Grouting and a Low-Permeability Sub-Grade Cover

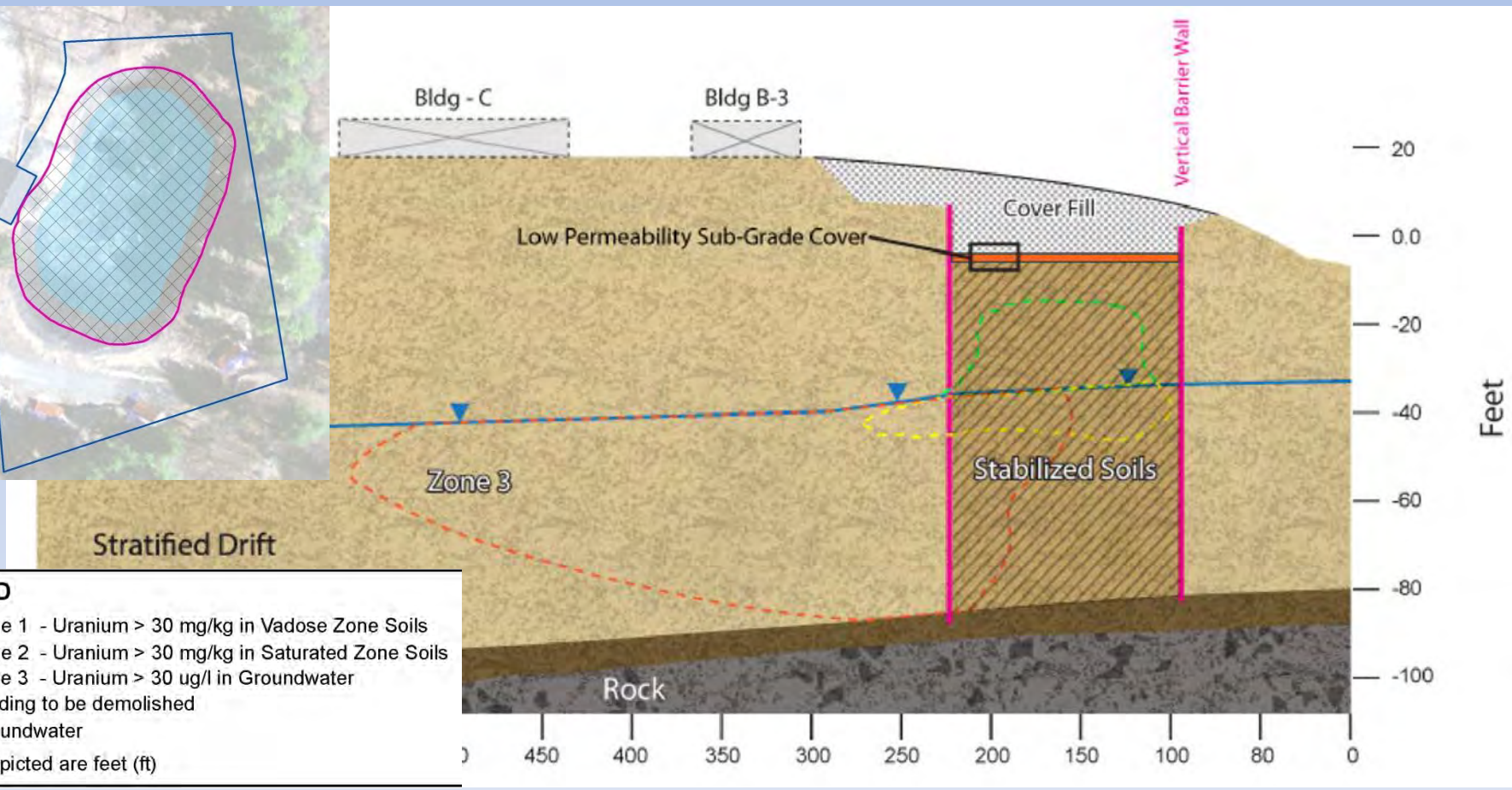


LEGEND

- Zone 1 - Uranium >
- Zone 2 - Uranium > 30 mg/kg in Saturated Zone Soils
- Zone 3 - Uranium > 30 ug/l in Groundwater
- Building to be demolished
- Groundwater

Units depicted are feet (ft)

SS-4 - Excavation of Non-HB Soils and Sediments and Off-Site Disposal, Stabilization of HB using Apatite Injection, and Containment with Low-Permeability Wall and Sub-Grade Cover

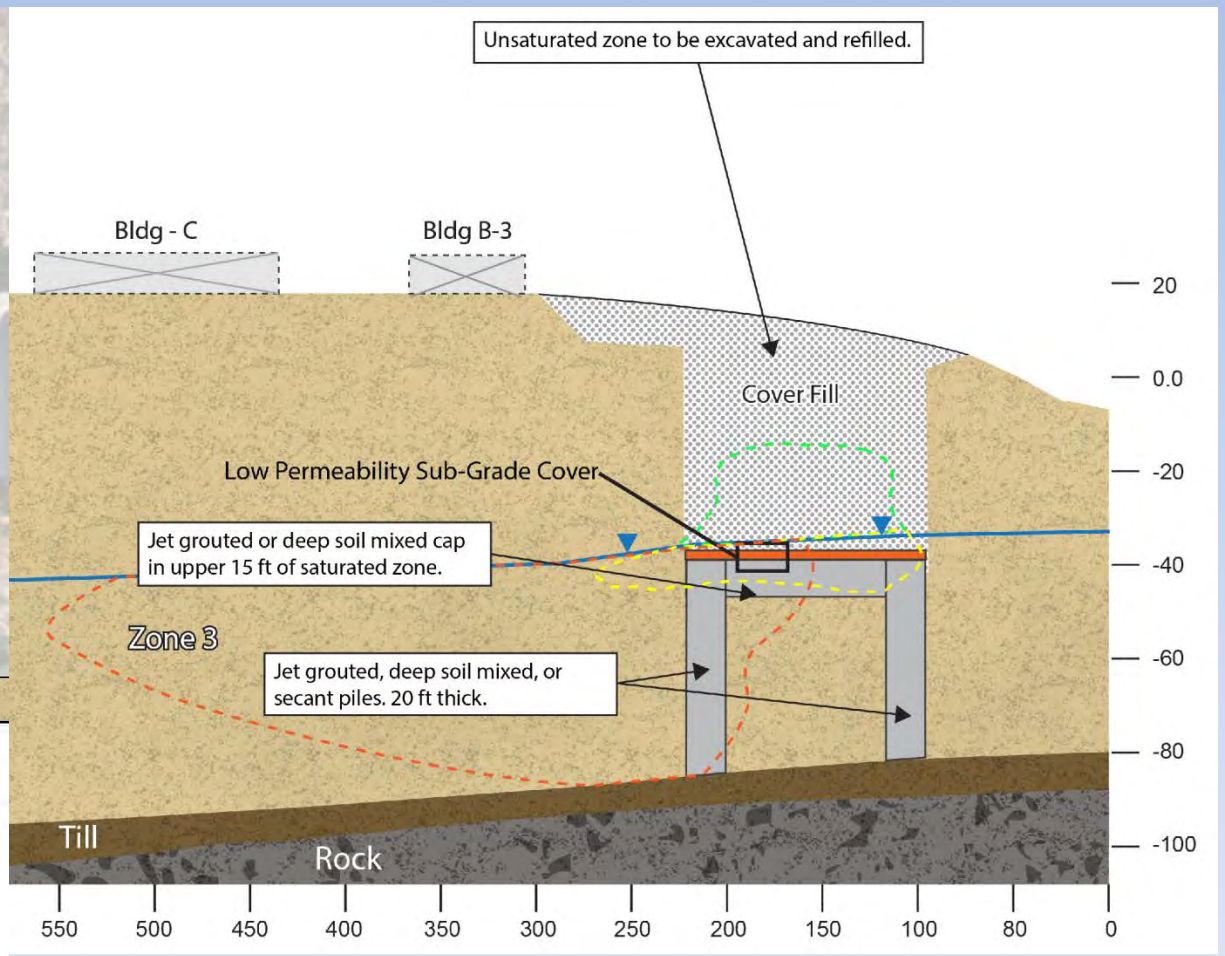


SS-5 - Excavation and Off-Site Disposal of Sediments and Soils (including Unsaturated HB Soils), and Containment with Full In-Situ Solidification/Stabilization of HB Saturated Soils Using Cement, and Low-Permeability Sub-Grade Cover

LEGEND

- Zone 1 - Uranium > 30 mg/kg in Vadose Zone Soils
- Zone 2 - Uranium > 30 mg/kg in Saturated Zone Soils
- Zone 3 - Uranium > 30 ug/l in Groundwater
- Building to be demolished
- Groundwater

Units depicted are feet (ft)



Summary of Soil / Sediment Alternatives Costs (200 year NPV, 7% discount rate)

	SS-1	SS-2	SS-3	SS-4	SS-5
Alternative	No Action	Excavation and On-Site Consolidation of Soils and Sediments. Cap and Liner System, In-Situ Stabilization of Holding Basin Saturated Soils Using Apatite Injection	Excavation and Off-Site Disposal Of Sediments And Non-Holding Basin Soils, Containment with Partial In-Situ S/S of Holding Basin Soils Using Cement Grouting, and Low-Permeability Sub-Grade Cover	Excavation and Off-Site Disposal Of Sediments and Non-Holding Basin Soils, Containment with Vertical Wall Low-Permeability Sub-Grade Cover In-Situ Stabilization of Holding Basin Soils Using Apatite Injection	Excavation and Off-Site Disposal of Sediments and Soils (including Unsaturated Holding Basin Soils), and Containment with Full In-Situ S/S of Holding Basin Saturated Soils Using Deep Soil Mixing Low-Permeability Sub-Grade Cover
Capital Costs	**0**	**$ 37,953,000**	**$ 127,682,000**	**$ 103,188,000**	**$ 146,358,000**
Annual OM&M	**0**	**$ 3,915,000**	**$ 1,566,000**	**$ 1,566,000**	**$ 1,566,000**
TOTAL	**0**	**$41,868,000**	**$129,248,000**	**$104,754,000**	**$147,924,000**

Groundwater Remedial Alternatives

- Described in detail on pages 17 and 18 of PRAP.
- Four alternatives developed to address groundwater COCs, which include:
  - DU in overburden groundwater
  - Natural U in bedrock groundwater
  - VOCs in overburden and 1,4-dioxane in overburden and bedrock groundwater
    - Nitrate and nitrite in overburden and bedrock groundwater are only present in a few wells above the MCL, and can be easily treated along with VOCs (they are not “remedial drivers”).
- Summarized on Table 5 of PRAP.

Groundwater with VOCs and 1,4-Dioxane > Proposed Cleanup Levels

Locations Where VOCs and/or 1,4-Dioxane > Proposed Cleanup Levels – October 2012

Locations Where VOCs and/or 1,4-Dioxane > Proposed Cleanup Levels – August 2013

Depleted Uranium in Overburden Groundwater > PRG

Uranium in Bedrock Groundwater > PRG

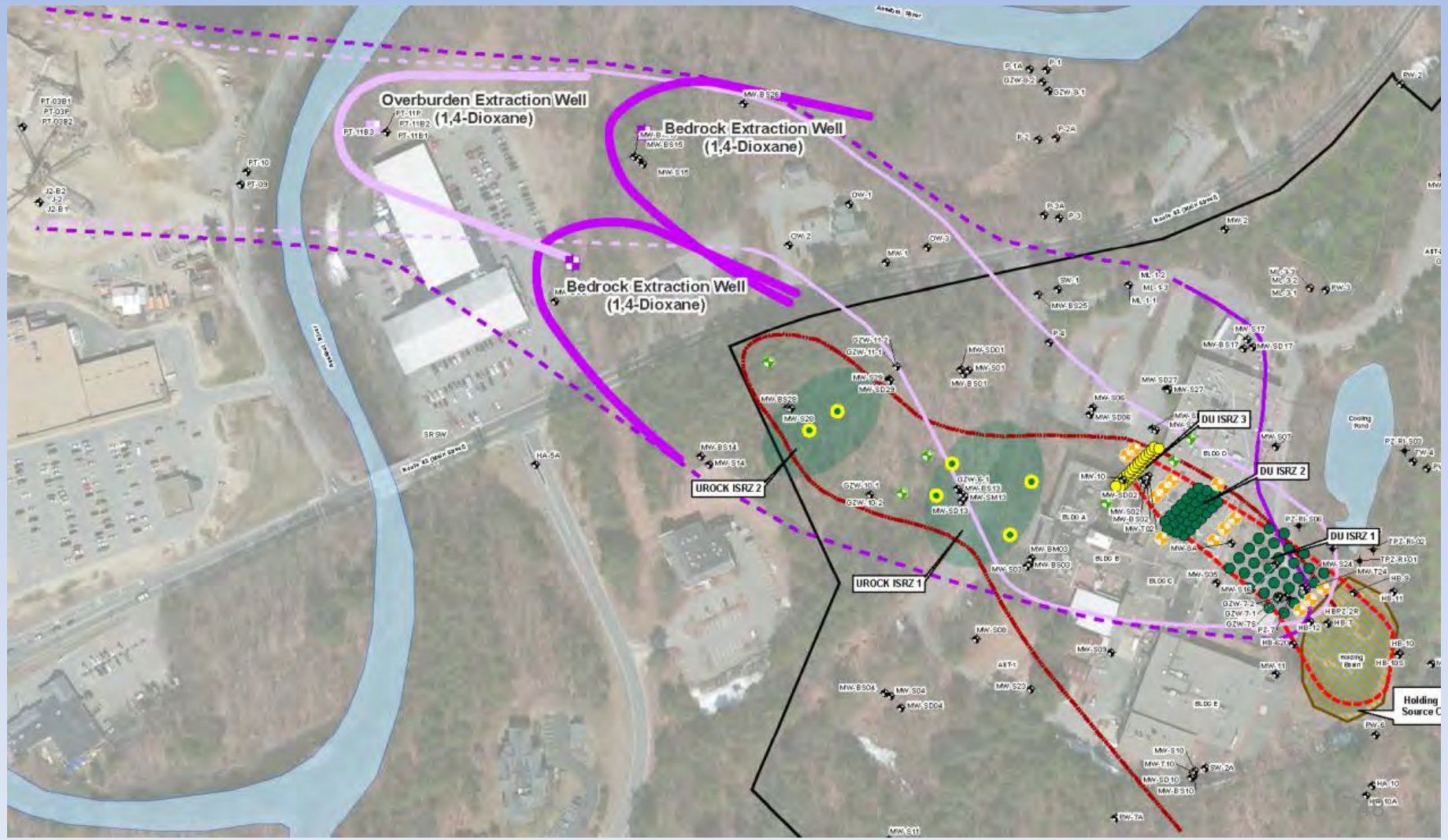
GW-2
Institutional Controls and Long-Term Monitoring

- Implement institutional controls to:
  - prohibit use of on-and off-property groundwater as a drinking water source until cleanup goals are met, and
  - evaluate potential vapor intrusion risks should structures be built before VOC cleanup goals are met, and if necessary, install vapor mitigation systems

- Periodic monitoring of COC concentrations in groundwater to assess natural attenuation over time

GW-3 - Ex-Situ Treatment, Institutional Controls, and Long-Term Monitoring

GW-4 - Ex-Situ Treatment of VOCs and 1,4-Dioxane, In-Situ Treatment of DU and Natural Uranium, Institutional Controls, and Long-Term Monitoring



Summary of Groundwater Alternatives Costs (30 and 200 year NPV, 7% discount rate)

	GW-1	GW-2	GW-3	GW-4
Alternative	No Action	Limited Action /Institutional Controls and Long-Term Monitoring	Ex-Situ Treatment (DU, UROCK, and 1,4-Dioxane), Institutional Controls, and Long-Term Monitoring	Ex-Situ Treatment (VOCs and 1,4-Dioxane), In-Situ Treatment (DU and Natural Uranium), Institutional Controls, and Long-Term Monitoring
Capital Costs	**0**	**$1,185,000**	**$ 6,510,000**	**$ 9,669,000**
OM&M	**0**	**$1,724,000**	**$22,755,000**	**$10,573,000**
TOTAL	**0**	**$ 2,909,000**	**$29,265,000**	**$20,242,000**

Remedy Selection

Based on analysis of the NCP criteria, EPA has chosen Alternatives **SS-4** and **GW-4** as the preferred options for the Remedial Action at the NMI Site.

These options are the best approach to protect human health and the environment, maintain protection over time, and minimize untreated waste.

EPA's Preferred Remedial Alternatives

Recap of SS-4

- Excavate approximately 82,500 yards^3 of site soils and sediments. Dispose off-site.
- Holding Basin
  - In-situ stabilize unsaturated and saturated HB soils using Apatite injection.
  - Install vertical containment wall around HB
  - Install low-permeability below grade cover
  - Backfill remaining HB basin to bring it to grade.

Estimated Costs: $104,754,000

SS-4 - Excavation of Non-HB Soils and Sediments and Off-Site Disposal, Stabilization of HB using Apatite Injection, and Containment with Low-Permeability Wall and Sub-Grade Cover

Recap of GW-4

- In-situ treatment of overburden DU and bedrock U plumes using Apatite and/or ZVI.
- Extraction of groundwater and ex-situ treatment of 1,4-dioxane and VOCs in overburden and bedrock
- Long-term monitoring
- Institutional controls:
  - prohibit use of on-and off-property groundwater as a drinking water source until cleanup goals are met, and
  - evaluate potential vapor intrusion risks should structures be built before VOC cleanup goals are met, and if necessary, install vapor mitigation systems

Total Estimated Costs: $20,242,000

GW-4 - Ex-Situ Treatment of VOCs and 1,4-Dioxane, In-Situ Treatment of DU and Natural Uranium, Institutional Controls, and Long-Term Monitoring

Expected Outcomes of Remedy

- **Soils and sediments will no longer present unacceptable risks** to human health or ecological receptors.
- **Groundwater will no longer present an unacceptable risk** to human health.
- **Unrestricted access to almost all of the NMI property.** Some restrictions will be needed regarding:
  - building over the former Holding Basin,
  - using groundwater (until it meets clean up goals), and
  - to evaluate (and mitigate, if appropriate) for vapor intrusion prior to new on-site construction.

Proposal to Accelerate Implementation of 1,4-Dioxane Portion of GW-4

- Ongoing groundwater monitoring during the RI/FS process has identified 1,4-dioxane migration towards the Acton Assabet Wellfield.
- While there are other known and potential sources of 1,4-dioxane in the area, EPA believes it appropriate to address the NMI-related 1,4-dioxane in an expedited fashion.
- EPA is asking for public comment on whether to expedite this portion of the remedy by addressing it under EPA's Non-Time-Critical Removal Action (NTCRA) authority.

Locations Where VOCs and/or 1,4-Dioxane > Proposed Cleanup Levels – August 2013

Next Steps

- **December 2014**
  - Formal Public Hearing on December 10, 6:30 pm
- **Spring 2015**
  - Record of Decision integrating Action Memorandum for 1,4-dioxane (if selected)
  - Negotiate and implement 1,4-dioxane treatment (if selected)
- **Fall 2015**
  - Begin Negotiating Remedial Design (RD)/Remedial Action (RA) Consent Decree
- **2016-Forward**
  - Sign and fund RD/RA Consent Decree, prepare RD Work Plans and design documents

How to comment on Proposed Plan

- **Public Comment Period begins November 13, 2014 and ends December 15, 2014**
  - Submit comments in writing by letter, fax, or email
- **Public Hearing December 10, 2014, 6:30 pm**
  - Oral comments will be transcribed
- EPA will respond in writing to all comments

Where to comment

- Proposed Plan and FS are available on line at:
  - www.epa.gov/region1/superfund/sites/NMI
  - www.nmisite.org
- ***Oral*** comments can be made at the **Public Hearing on 12/10/14 at 6:30 pm**
- ***Written*** comments must be submitted by **midnight 12/15/14** to:

Melissa Taylor
EPA New England
5 Post Office Square, Suite 100
Mail Code OSRR07-04
Boston, MA 02109-3912

Or at Taylor.MelissaG@EPA.gov

Question and Answer Session

Moderated by Kelsey O'Neil - US EPA Community Involvement Coordinator