Badger Army Ammunition Plant
Propellant Burning Ground Preferred Remedy For Subsurface Soil

The Army has requested a Permit Modification from the Wisconsin Department of Natural Resources (WDNR) for the remediation of the Propellant Burning Ground (PBG) subsurface soils. This request is based on the results of a recently complete Alternative Feasibility Study to determine the Preferred Remedy for the PBG. The PBG is comprised of three waste pits containing soils impacted primarily with dinitrotoluene (DNT) and solvents.

Remediation History of the Propellant Burning Ground

The original remedy for the PBG soils, approved in 1994 called for:

- **In-Situ Vacuum Extraction:**
- **Soil Excavation and Treatment**:

This process called for excavating the waste pit soils to groundwater, washing the soils to reduce soil volume; composting or incinerating soils to eliminate contaminants, and backfilling the waste pits with the treated soils. This remedy has not been completed because in trials, soil washing and composting of soils was found to be ineffective in removing contaminants.

Three Interim Remedial Actions were conducted while a final remedy was studied.

- **In-Situ Vacuum Extraction**: Conducted between 1997-1999, this successfully removed over 1,600 lbs of solvents from waste pit soils.
- **Partial Excavation of Waste Pits**: Conducted between 1999-2000, this successfully removed the highest contaminated soils from each waste pit and soils and shipped them off site for incineration.
- **Bioremediation System (BEST)**: Operated between 2000-2007, this successfully enhanced the breakdown of DNT compounds by the native bacteria in the soil and greatly reduced remaining DNT concentrations in the deeper soils and groundwater.

Alternative Feasibility Study

An Alternative Feasibility Study has been conducted to determine the preferred Final Remedy for the PBG. Three alternatives were evaluated for:

- Long-term effectiveness
- Implementability
- Economic feasibility
- Short-term effectiveness
- Restoration time frame
- Institutional and engineering controls

Alternative 1	**Alternative 2 (preferred)**	*Alternative 3*
Soil Vapor Extraction	Soil Vapor Extraction	Soil Vapor Extraction
Partial Excavation & Incineration	Partial Excavation & Incineration	Partial Excavation & Incineration
Bioremediation System Operation	Bioremediation System Operation	Bioremediation System Operation
Institutional Controls	RCRA Cap and Cover	Complete Excavation and Incineration
	Groundwater Pump & Treat (2 yrs)	
	Institutional Controls	

Badger Army Ammunition Plant

Propellant Burning Ground Proposed Remedy for Subsurface Soils

The Proposed Remedy (alternative 2 on the previous table) provides overall protection of public health, safety, welfare and the environment. The Wisconsin Department of Natural Resources will make a final determination of the Final Remedy for the PBG following the Public Comment Period.

The proposed remedy is based on a performance standard instead of establishing residual contaminant levels. This performance standard must meet the requirements of NR 722, must be operated in compliance with NR 724, and result in residual soil impacts causing no adverse impacts on groundwater, surface water, sensitive environments, or human health, safety or welfare.

Remedy Process	Status & Purpose
Soil Vapor Extraction	Completed Removed solvents from soils
Partial excavation and incineration of readily accessible soils	Completed Removed highest concentrations of contaminated soils from waste pits
Bioremediation system operation	Completed Greatly reduced DNT concentrations in soils beneath the original waste pits
RCRA cap/cover construction	Proposed Will eliminate precipitation (rain & snow) from seeping into remaining waste pit soils. This will stop leaching of remaining DNT in subsurface soils to groundwater
Continue operation of the groundwater pump and treat system at waste pits area for approximately more two years	Proposed Will continue to reduce remaining DNT concentrations in groundwater beneath waste pits.
Performance Monitoring	Proposed Ensures RCRA cap works as designed. Continued monitoring of groundwater will detect any release of contaminants from site
Engineering Controls	Proposed Ensures RCRA cap is maintained
Institutional Controls	Proposed Deed and access restrictions will ensure RCRA cap and underlying soils remain undisturbed.

Propose Remedy Implementation steps

- Continue partial operation of Bioremediation System for at least 2 years.
  - Continue air injection to soils and groundwater for 6 months.
  - Continue groundwater pump and treat for approximately 2 years.
- Remove unnecessary equipment and wells.
- Design and construct a RCRA cap over the PBG area. This cap will eliminate rainwater infiltration to soils. This RCRA cap will stop the movement of any residual soil contaminants to groundwater.
- Continue groundwater monitoring to:
  - Determine when groundwater pumping and treatment is no longer necessary
  - Monitor performance of the RCRA cap.