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CAMP EDWARDS, MASSACHUSETTS MILITARY RESERVATION IMPACT AREA GROUNDWATER STUDY PROGRAM

INNOVATIVE TECHNOLOGY EVALUATION PROGRAM

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Innovative Technologies at MMR

- **Who:**
 - Initiated by the National Guard Bureau
- **What:**
 - Review of innovative remediation technologies
 - Testing of technologies that may be effective at MMR
- **Why:**
 - Remediation of explosives in soils and groundwater at MMR
- **How:**
 - Select technologies that are innovative and have had some experience with explosives
 - Conduct treatability studies
 - Select successful technologies for field demonstration

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Today's Presentation

- **Soil Remediation Technologies**
 - Technologies currently under study
 - Technologies slated for treatability studies
- **Groundwater Remediation Technologies**
 - Technologies under evaluation for treatability studies

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Soil Remediation Technologies - Under Study

- **Soil Washing: ex-situ process**
 - Actually a volume reducing technology
 - Isolates and segregates fractions of soil containing most of the contaminants
 - Segregation techniques similar to mining processes
- **Bioslurry: ex-situ process**
 - Creates a wet environment (70 to 80% water) and adds a nutrient, such as molasses, to the soil
 - Molasses helps naturally occurring micro-organisms grow
 - Flourishing micro-organisms eat contaminants as well as nutrients

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Soil Remediation Technologies (continued)

Soil Washing at MMR



Photo courtesy of Brice Environmental Services Corp.

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Soil Remediation Technologies - Slated for Study

- **Composting: in-situ or ex-situ**
 - Similar to composting in your back yard
 - Adds locally available nutrients, such as cranberry mash
 - Adds bulking agents, such as wood chips
- **Solid phase bioremediation: in-situ or ex-situ**
 - Adds a proprietary additive made from plant fibers

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Soil Remediation Technologies (continued)

- **Chemical oxidation: ex-situ**
 - Uses chemicals such as hydrogen peroxide
 - Oxidation destroys contaminants
- **Chemical reduction: ex-situ**
 - Uses materials such as iron filings
 - Reduction destroys contaminants
- **Thermal desorption/destruction: in-situ**
 - Slowly heats soil, like in an electric oven at home
 - Contaminants thermally degrade or volatilize (evaporate); removed from sealed cover

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Soil Remediation Technologies (continued)

Thermal Desorption/Destruction



Photo courtesy of TerraTherm, Inc.

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Groundwater Remediation Technologies Slated for Study

- **Chemical oxidation: in-situ**
 - Uses oxidants such as hydrogen peroxide or permanganate
 - Injected directly into the groundwater
 - Quickly degrades contaminants via chemical oxidation
- **Redox manipulation: in-situ**
 - Uses easily degraded nutrient such as molasses, or a form of lactic (as found in milk) acid
 - Injected directly into the groundwater
 - Enhances growth of naturally occurring micro-organisms, which then eat the contaminants as well as the nutrients

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Innovative Technology Evaluation Schedule

- **Soil Treatability Studies**
 - Soil Washing complete; analyses of results pending
 - Bioslurry still in process
 - Composting, solid phase bioremediation, thermal desorption/destruction, chemical oxidation, chemical reduction to start circa January 2001
- **Groundwater Treatability Studies**
 - Chemical oxidation and redox manipulation to start circa February 2001

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Innovative Technology Evaluation Summary

- **Currently researching several technologies**
 - Remediation of soils
 - Remediation of groundwater
- **Will choose most appropriate technology**
 - Most efficient and effective
 - Environmentally friendly
- **Will keep media and public informed of progress**