FINAL

Plan of Operations

Lime Treatment Pilot Study
Plum Brook Ordnance Works –Pentolite Road Red Water Ponds (PRRWP)
Sandusky, Ohio

Contract No. W91237-06-C-0006

Prepared for:

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APPENDICIES

DEFINITIONS AND ACRONYMS

BTEX	Benzene, Toluene, Ethylbenzene, Xylene
COC	Contaminant of Concern
COCs	Contaminants of Concern
DERP-FUDS	Defense Environmental Restoration Program for Formerly Used Defense Sites
DNT	Dinitrotoluene
DRO	Diesel Range Organics
EPA	Environmental Protection Agency
GSA	General Services Administration
HAZWOPER	Hazardous Waste Operations and Emergency Response
HI	Hazard Index
HTF	Hypersonic Tunnel Facility
HTRW	Hazardous, Toxic, and Radioactive Waste
HSWA	Hazardous and Solid Waste Amendments
IDW	Investigation Derived Waste
ILCR	Incremental Lifetime Cancer Risk
IQCT	Independent Quality Control Team
ISRA	Interim Soil Removal Action
IT	International Technology Corporation
MCL	Maximum Contaminant Level
MSDS	Material Safety Data Sheet
MSL	Mean Sea Level
NASA	National Aeronautics and Space Administration

DEFINITIONS AND ACRONYMS (continued)

NCP	National Contingency Plan or National Oil and Hazardous Substance Pollution Contingency Plan
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
NTCRA	Non-Time Critical Removal Action
ORO	Oil Range Organics
OSHA	Occupational Safety & Health Administration
PAH	Polynuclear Aromatic Hydrocarbons
PBOSB	Plum Brook Operations Support Group
PBOW	Plum Brook Ordnance Works
PBS	Plum Brook Station
PCBs	Polychlorinated Biphenyls
POC	Point of Contact
PQL	Practical Quanitation Limit
PPE	Personal Protective Equipment
PRGs	Preliminary Remediation Goals
QA	Quality Assurance
QC	Quality Control
QAP	Quality Assurance Plan
QCP	Quality Control Plan
RAB	Restoration Advisory Board
RBCs	Risk Based Concentrations
RCRA	Resource Conservation and Recovery Act

DEFINITIONS AND ACRONYMS (continued)

RI/FS	Remedial Investigation/Feasibility Study
RPDs	Relative Percent Differences
SARA	Superfund Ammendments and Reauthorization Act
SMCL	Secondary Maximum Contaminant Level
SOW	Scope of Work
SSHO	Site Safety and Health Officer
SSHP	Site-Specific Safety and Health Plan
SVOCs	Semi-Volatile Organic Compounds
TAL	Target Analyte List
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TNB	Trinitrobenzene
TNT	Trinitrotoluene
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
TSDF	Treatment, Storage, and Disposal Facility
TSS	Total Suspended Solids
UCL	Upper Confidence Limit
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds
WTI	Waste Tron, Inc.

PLAN OF OPERATIONS

Lime Treatment Pilot Study
Plum Brook Ordnance Works –Pentolite Road Red Water Ponds (PRRWP)
Sandusky, Ohio

Contract No. W91237-06-C-0006

1.0 PROJECT DESCRIPTION

1.1 Background and Purpose

The purpose of this contract at Pentolite Road Red Water Ponds (PRRWP) is to study the application of lime for the treatment and reduction of nitroaromatic contamination in soil found in the PRRWP area of the National Aeronautics and Space Administration (NASA) Plum Brook Ordinance Works (PBOW) site, located in Sandusky, Ohio. The United States Corps of Engineers (USACE) is the responsible agency under the Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP-FUDS) at PBOW**.** The results of the completed ISRA provide analysis and evaluation of the PRRWP area. Based on the data contained in this it appears PRRWP is a good candidate for field implementation of the lime treatment technology outlined in the USACE technical report, ERDC/EL TR-03-15, September 2003, *Lime Treatment of 2,4,6-Trinitrotoluene Contaminated Soils: Proof of Concept Study*.

The single Contaminant of Concern (COC), 2,4,6 Trinitrotoluene (TNT) is at concentrations that exceed the preliminary remediation goals (PRGs) as identified in the *Final Action Memorandum for the Pentolite Road Red Water Ponds Interim Removal Action* (USACE 2003). The PRGs are based upon Remedial Goal Objectives (RGOs), which are chemical and receptor specific, risk based remedial criteria that capture all the exposure assumptions and toxicological data used in risk assessment. This reduction in nitroaromatic contamination will be done to minimize the threats to, and provide adequate protection to, human health and the environment from exposure to soil at PRRWP. The study's approach will be to excavate soil from various levels to create eight test plots into which lime will be tilled. The pH of the plots will be measured and recorded. Samples will be collected weekly and analyzed to monitor the effectiveness of the treatment.

1.2 Site Location and History

The former PBOW is located approximately 4 miles south of Sandusky, Ohio and 59 miles west of Cleveland, Ohio. Although the PBOW site is primarily situated in Perkins and Oxford Townships, the eastern edge of the site extends into Huron and Milan Townships. The site is bounded on the north by Bogart Road, on the south by Mason Road, on the west by County Road 43, and on the east by U.S. Highway 250. The surrounding area is mostly agricultural and residential.

The 9,009 acre PBOW site was built by the United States Army in early 1941 as a manufacturing plant for 2,4,6-TNT, DNT, and Pentolite. Production of explosives at PBOW began in December 1941 and continued until 1945.

PBOW PRRWP consists of an area of approximately 9 acres located at the north-central portion of the former PBOW. PRRWP is located just south of Pentolite Road, southeast of the former Pentolite Area and approximately one mile north of TNT B. During the operation of the site by the Department of Defense (DOD), the wastewater produced by the purification of TNT within the TNT A and TNT B areas was discharged by means of wooden flumes and/or ceramic pipes into various settling ponds (West Area Red Water Ponds and PRRWP). This wastewater was then transported to a wastewater treatment and incineration area. PRRWP also received discharge from Wastewater Treatment Plant #1 that previously existed on site located approximately 700' east of the PRRWP area. Original PRRWP construction plans indicate pond dimensions of 200' wide (east-west) by 400' long (north-south) by 3' deep with a 1' high levee, which created a storage capacity of 182,000 cubic yards of wastewater. NASA had PRRWP filled in 1977 following a breach of the ponds.

NASA acquired the property on March 15, 1963 and currently utilizes the site. The General Services Administration (GSA) performed further decontamination efforts during the 1963 transfer. The decontamination process included removing contaminated surface soils above the drain tiles, flumes, etc., destruction of all buildings by fire, and the removal of all soil, debris, sumps, and concrete foundations. All materials, including the soil in those areas, were flashed. The area was then rough graded. The decontamination process also included the burning of excavated nitroaromatic filled flumes.

NASA currently operates the PBS of the John Glenn Research Center at Lewis Field. Most of the aerospace testing facilities built at the site in the 1960's are on standby or inactive status. On April 18, 1978, NASA declared approximately 2,152 acres of PBOW as excess. The Perkins Township Board of Education acquired 46 acres of the excess acreage and uses this area as a bus transportation area. The remaining excess acreage in the Southwest area was sold to various private concerns. NASA currently controls approximately 6,400 acres of land which includes approximately 5,400 acres within the fence line. Of the acreage inside the fence line, NASA has a use agreement with the Ohio National Guard for 604 acres and the remainder is utilized for aerospace research as a satellite operation of the Glenn Research Center. The acreage outside the fence remains part of the test facility exclusion zone and is leased to various farmers and the Erie County Conservation League. The details of land transactions are listed in the site management plan (ICI, 1995) and can be found at the NASA PBS.

1.3 Overview of Remedy and Proposed Action

To date, an ISRA has been conducted at the PRRWP area and a report prepared that addresses soil contamination limits that still remain in the area. The COC was identified as nitroaromatics, specifically, 2,4,6 TNT. TNT existed in surface soil, subsurface soil, and groundwater, however surface water and sediment were not found to be contaminated.

The objective of ISRA for PRRWP completed in 2003 and the current Lime Treatment Pilot Study at PRRWP is to minimize threats to, and provide adequate protection to, human health and

the environment from exposure to contaminants in soil. The remedial objectives identified for soils at PRRWP are to:

1.) Minimize the potential for human exposure via incidental ingestion, dermal contact, and inhalation of soil contaminated with nitroaromatics.

2.) Minimize the potential for nitroaromatics to migrate from soil at the site to the groundwater.

Due to funding limitations, only the 20' x 20' x 10' area identified in the *Final Action Memorandum for the Pentolite Road Red Water Ponds Interim Removal Action* (USACE 2003), has been excavated and backfilled with clean soil. The area was only excavated to a depth of 8' rather than the 10' specified because groundwater was encountered. Exploratory test pits were used in place of continued excavation to determine the horizontal limits of the contamination. Following the test pit activities, confirmation sampling and the calculation of the hazard index (HI) determined that the original extent of contamination was grossly underestimated. Further excavation or treatment is necessary to minimize threats to, and provide adequate protection to, human health and the environment from exposure to the nitroaromatic contamination in the soil. In addition to the original excavation of 118 cubic yards, approximately 7,600 cubic yards of additional excavation or treatment would be required to remediate PRRWP.

The Lime Treatment Pilot Study project has become available due to newly distributed funding and will investigate the possibility of reducing the TNT found in the area below the PRG level so that the soil can remain on site rather than being disposed of off site.

Project actions consist of (at minimum): excavation, tilling (in lifts between 12" and 18") of the soil with hydrated/slaked lime (potential for several treatments based on reduction levels achieved during 1st treatment), obtaining a pH that is conducive for treatment to occur, sampling periodically (field and lab confirmation analysis) to determine the decrease in the nitroaromatics, comparing the reduced levels to the identified preliminary remediation goal (PRG) of 13.8 mg/kg for TNT. Surveying will also be performed to determine the volumes of soils treated prior to placing the soil back into the ground, seeding area with common grasses occurring naturally in the PRRWP area, and preparing a report documenting the processes performed in this pilot study along with its findings. The results of this pilot study will also be presented to a Restoration Advisory Board (RAB) meeting.

In discussion with the Ohio EPA, it was agreed upon that the soil could be placed back in the ground at the PRRWP should the treatment not reduce the TNT levels below the RGO levels. This agreement was based on the facts that future funding will be available for a continuation of the Interim Soil Removal Action on the additional contaminated soil and because this soil was identified as non-hazardous

1.4 Overview of Tasks

McTech will provide all equipment, labor, materials, and supervision necessary for the Pilot Study as described in the Statement of Work (SOW). Activities generally consist of excavation, tilling, sampling, replacing soil back into the ground, and site restoration.

The following tasks are required to be performed under this SOW:

Task 1 Preparation and submission of a Site Specific Safety and Health Plan.

Task 2 Preparation and submission of a Quality Control Plan.

Task 3 Preparation and submission of a Plan of Operations

Task 4 Notification/ scheduling of field activities and coordination of utility marking with NASA officials prior to site mobilization.

Task 5 Site surveying as necessary for identifying limits of excavation.

Task 6 Excavation of contaminated material/ Tilling of hydrated or slaked lime.

Task 7 Field Screening/ Confirmation Analysis by Laboratory

Task 8 Site Restoration

Task 9 Preparation/ Submission of the Draft and Final Lime Treatment Pilot Study Report for PRRWP.

Task 10 Public meeting support to the USACE for the work defined by this contract.

The tasks outlined in Section 2.0 of the SOW are described in detail in the following sections of this Plan of Operations. This work will be conducted by McTech in an environmentally acceptable manner conforming to existing federal, state, and local regulations under USACE Huntington District (CELRH) supervision.

1.4.1 (Task 1) Preparation and Submission of a Site-Specific Safety and Health Plan (SSHP)

McTech Corp will prepare a SSHP that covers the planned field activities. As always, the plan will comply with the requirements of the U.S. Army Corps of Engineers, Safety and Health Requirements Manual, EM 385-1-1, latest version, and the Department of Labor, Occupational Safety and Health Administration (OSHA) as presented in Title 29 of the Code of Federal Regulations, Part 1910.120. At a minimum, McTech SSHP will address the following items:

- Cover sheet. Identify company name, contract number, project location, signed and dated by plan developer.
- Responsibilities and lines of authority.
- Employee qualifications. Physical fitness, job competence, special skills, equipment operation.
- Employee training. First aid, CPR, back injury prevention.
- Safety meetings. "Tool box" meetings.

- Job Hazard Analysis. Preparation and revision, discussion with employees.
- Emergency response plan. Emergency number, means of communication, route to nearest medical facility.
- Accident reporting and Project Manager responsibility. Report all accidents immediately to the Contracting Officer and submit ENG Form 3394 within two (2) working days.
- First aid kits.
- Personal protection equipment. As a minimum, employees must wear long-legged trousers, sleeved-shirt, and steel-toes shoes. Safety glasses with side shields and hard hats may also be appropriate, depending on activity.
- Hearing protection.
- Vehicles and equipment.
- Public safety.
- Fire safety.
- Environmental hazards.
- Housekeeping.
- Standard operating procedures.

McTech will read and conform to the SSHP when conducting this work. Documentation to this effect will be furnished to the Government Point of Contact (POC) prior to initiation of any work. The plan will also include the names, and qualifications of the Site Safety and Health Officer (SSHO), including education, training and work experience.

1.4.2 (Task 2) Preparation and Submission of a QCP

McTech Corp will prepare a QCP that covers all products and activities including planned field activities, contained in the SOW. The QCP will be prepared according to the applicable ISO 9000 processes as identified at www.lrh.usace.army.mil/ct/quality developed for this type of work.

The QCP will define the responsibilities and roles of each member on the Independent Quality Control Team (IQCT), along with those preparing or performing the tasks/activities in this SOW. The QCP will also detail the methods and procedures for inspection of work, identifying and correcting deficiencies, maintenance of records, list of authorized Quality Control Inspectors, list of authorized McTech Corp representatives, and security measures.

The draft and final versions of the various plans will include a separate QC appendix that includes an activity review checklist (appropriate checks on those activities that were performed/reviewed) for the specific product, along with a signed sheet which designates the name, date and official work title of those persons performing/conducting the QC activities. All comments and responses, from both McTech's QC review and USACE's QC review, as well as contract compliance review comments of the plans will be included in the QC appendix of the final plans.

1.4.3 (Task 3) Preparation and Submission of a Plan of Operations

McTech Corp will prepare a Plan of Operations that covers the planned office and field activities. McTech will also include in the Plan of Operations a Sampling and Analysis Plan that will outline the sampling and analysis required. This has been included in Section 5.0 of this Plan of Operations.

McTech Corp will also include in the Plan of Operations an Investigative Derived Waste Plan (IDWP) for this project. Requirements for this plan can be found in under Task 7, Section 3.7. Please reference this section for all IDW requirements.

1.4.4 (Task 4) Field Activities/Utilities

Field Activities The site is currently owned by NASA Plum Brook Station (PBS), however, rights of entry are not required for this pilot study. Coordination with PBS personnel will be conducted by USACE to ensure that McTech is allowed access to/from the site to perform all activities during this removal action. McTech will be required to enter/exit through the PBS security gate, therefore, McTech personnel will follow all rules set forth by PBS security. McTech will coordinate their field activities with all appropriate authorities and agencies as required. No field work will be started until the QCP and SSHP have been approved by USACE and the Notice to Proceed has been given by the USACE Contracting Officer. McTech will also be responsible for providing (with the notification) an up-to-date, detailed time schedule for the field work to be performed.

Utilities An excavation permit has already been acquired / coordinated with the Plum Brook Operations and Support Group for the PRRWP area. McTech will coordinate with PBOW NASA and PBOSG (NASA's contractor) to determine if the previously acquired excavation permit is still valid. Work will stop immediately if any underground utilities are detected and the NASA POC will be notified immediately.

1.4.5 (Task 5) Site Survey

The Final ISRA Report for TNT B, dated May 2006 identifies the surveyed limits for the proposed excavation. McTech will utilize this report in obtaining information to survey/stake the limits prior to tilling. These areas will also be surveyed once the excavation/tilling is completed.

1.4.6 (Task 6) Excavation of Contaminated Material/ Tilling of Hydrated or Slaked Lime.

McTech will excavate an area approximately 60 feet by 40 feet within the area of concern to a depth of approximately 8 feet. This material will be excavated in a safe manner and activities will adhere to all environmental and safety laws, regulations and ordinances. During excavation efforts, McTech will stop excavation when encountering bedrock or groundwater. Any water generated during the excavation will be considered existing groundwater or surface water and will be left in place.

McTech will carefully excavate the soils in 12 to 18 inch lifts staging each lift in a separate pile. Each pile will then be spread out to a depth of no greater than 18 inches. This will result in a total of 8 treatment piles. Piles 1 and 2 will be used as the control for this pilot study. Hydrated Lime will be tilled with the soils from the remaining piles. Refer to Section 4.0 of this Plan of Operations for more detail. Tilling will continue on a daily basis. Piles 3 and 4 will have lime added to the tilling operation every 7 days. Piles 5, 6, 7, and 8 will have lime added to the tilling as needed, based on pH measurements of the piles, in order to obtain a fairly constant, elevated pH that has been shown in laboratory studies to be more conducive for the alkaline hydrolysis to occur. This process of tilling with lime addition, and periodic sampling will continue for a 6 week period.

This pilot study will be able to compare the results achieved via alkaline hydrolysis on a periodic basis (once per week addition), a continuing basis (sustained elevated pH), and the control plot. Weather conditions such as temperature and precipitation may affect the rates of TNT reduction. However, by utilizing the "control plots" weather related variables should be effectively controlled. Weather conditions are recorded on the daily QCR.

McTech will decontaminate all equipment that comes in contact with the soil. Before excavation will begin McTech will submit a plan (within the Plan of Operations) showing the proposed limits of excavation and the locations of each treatment pile.

1.4.7 (Task 7) Field Screening/ Confirmation Analysis by Laboratory

Field pH measurements will be made daily on each pile. Composite samples will be collected every seven days from each of the 8 piles. These samples will be analyzed for the single Contaminant of Concern (COC), 2,4,6 Trinitrotoluene (TNT) and compared to the identified RGO of 13.8 mg/kg.

1.4.8 (Task 8) Site Restoration

At the completion of this pilot study and with the approval of the Ohio EPA all excavated soils will be returned to the original excavation. All disturbed areas will be seeded with common grasses found within the PRRWP area.

Due to the minimal IDW expected to be generated, an IDW Plan is not a separate Plan but rather is included as a distinct section, Section 6.0 within the Plan of Operations. For IDW, McTech will collect the waste, any used PPE, decontamination liquids, and all waste generated from the construction activities. This media will be containerized and placed in a secured area on the site until the results of the analyses are known. All containers will be labeled as to project name, contents, and date of collection, and secured to prevent tampering. If drums are used, they will be secured with tarps, ropes and pallets. Waste from different sites will not be mixed.

1.4.9 (Task 9) Preparation and Submission of Draft and Final Lime Treatment Pilot Study Report

McTech will prepare a draft and final Lime Treatment Pilot Study Report, which details the complete efforts during all activities in the SOW. Once the draft report has been generated, McTech will submit it to USACE for review. Any comments arising from this review will be incorporated by McTech into the final report. Refer to the QCP for all required reporting to be incorporated into the final report.

1.4.10 (Task 10) Meeting Support

McTech will support USACE project manager or Technical Coordinator during meetings necessary to discuss the work defined by this contract. It is assumed a maximum of 1 meeting outside of field activities time will be held to discuss the proposed work. This meeting will be held at a location in the Sandusky Ohio area. McTech will be responsible for preparing slides, handouts, and coordinating this meeting. McTech will place a notice in the local newspaper

announcing the meeting and inviting the public to attend. McTech will document the meeting minutes and supply these to the USACE project manager or technical coordinator. If necessary, McTech will plan to give a presentation highlighting the requirements of this work.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The collection of quality data and the completion of any given project are strongly affected by the project organization. A project that is properly organized with personnel responsibilities well-delineated results in a successful project conclusion. A listing of functional areas and qualified personnel are given for this project.

A. Government Technical POC — The technical POC representing the USACE who will serve as a liaison between the USACE and the contractor.

USACE POC		Phone Number
Lisa Humphreys		(304) 399-5953
	Cellular	(304) 617-1461

B. NASA Technical POC— These are the technical POC representing NASA.

NASA POC	Phone Number
Robert Lallier	(419) 621-3234

NASA PBOSG	Phone Number
Gary Ponikvar	(419) 621-3342

C. Contractor's Project Manager – McTech Corp's Project Manager provides technical insight and provides supervision for the project. The Project Manager has overall responsibility to see that the project is completed in accordance with the Scope of Work.

McTech Corp Project Manager		Phone Number
Kimberlie Chambers	Cellular	(304) 215-0099
	Alternate	(218) 330-6436

D. On-site Project Manager—The On-site Project Manager will be in charge of field activities in coordination with the Contractor's Project Manager.

C&K Industrial Service, Inc On-site Project Manager		Phone Number
Gary Cooper		(216) 642-0055
	Cellular	(216) 956-9253

E. Site Safety and Health Officer (SSHO) – The SSHO is responsible for safety on site. This person has the authority to stop work if unsafe conditions warrant.

C&K Industrial Services, Inc. SSHO		Phone Number
Gary Cooper		(216) 642-0055
	Cellular	(216) 956-9253

F. **Quality Control Officer (QCO)**—This person is responsible for QC at the site. This person has the authority to stop the work if QC is not being met. The QCO is an employee of McTech Corp and is trained in QC.

McTech Corp QCO		Phone Number
Michael Malloy	Cellular	(216) 857-4517

G. **Field Personnel** – These personnel are responsible for assisting the Project Managers in completing the tasks required under this contract.

McTech Corp Field Personnel	Phone Number
Dan Cashbaugh	(216) 391-7700
James B. Russell	

H. **McTech Corp Independent Quality Control Team–** An internal quality control team will independently review the work plans and reports to ensure that they meet requirements of the Scope of Work.

McTech Corp Independent Quality Control Team	Phone Number
Mark Perkins	(216) 391-7700
Rodney Bumgardner	(304) 201-2205

I. **REIC Laboratory**–Samples will be sent to the following USACE certified laboratory. REIC Laboratory is located in Beaver, West Virginia.

REIC Laboratory Contact	Phone Number
Grant Wilton	(800) 999-0105

J. **Erie County Landfill—** Non-hazardous materials removed from the site will be disposed of at the Erie County Landfill.

Erie County Landfill Contact	Phone Number
Fred Dobbert	(419) 433-3624

K. **Molnar Construction, Inc.—**This company will be used for the transportation of any non-hazardous materials removed from the site.

Molnar Construction Contact		Phone Number
Matt Molnar		(419) 732-2763
	Cellular	(419) 656-3423

L. **Mountain State**—Personnel from Mountain State will perform a survey of the treatment area and the area to be excavated.

Mountain State Contact	Phone Number
Jim Young	(304) 949-4762

M. C&K Industrial Services, Inc.—Non-hazardous IDW containing liquids will be managed by C&K Industrial Services, Inc. located in Cleveland, Ohio.

C&K Industrial Services Inc.		Phone Number
Scott Dean		(216) 642-0055
	Cellular	(216) 952-1375

N. Environmental Quality Company - Wayne County Landfill— Hazardous soil removed from the site will be disposed of at the Wayne County Landfill.

Wayne County Landfill Contact	Phone Number
Melissa Rickabaugh	(800) 592-5489

O. EnviroServe, Inc.—This company will be used for the transportation of hazardous materials removed from the site.

EnviroServe Contact	Phone Number
George Karas	(216) 642

3.0 APPLICABLE or RELEVANT AND APPROPRIATE REQUIREMENTS

Characterization activities at the PBOW site, specifically PRRWP, have indicated soil contamination resulting from past processes at the site. The *Final Action Memorandum for the Pentolite Road Red Water Ponds Interim Removal Action* (USACE 2003). identified the soil remediation goal for TNT, the nitroaromatic COC identified at this site.

The *Final Action Memorandum for the Pentolite Road Red Water Ponds Interim Removal Action* (USACE 2003) addressed soil contamination only. The elements of the selected remedy(s) were presented in *Final Action Memorandum for the Pentolite Road Red Water Ponds Interim Removal Action* (USACE 2003). The overall objective of the Soil Removal Action for the PBOW site was to minimize threats to, and provide adequate protection to, human health and the environment from exposure to contaminants in soil. The remedial objectives identified for soils at the PBOW site were:

1) Minimize the potential for human exposure via incidental ingestion, dermal contact, and inhalation of soil contaminated with nitroaromatics. PRG values are used to insure that the potential for human exposure is minimized. The PRG values are calculated based on risk assessments conduced during the RI/FS.

2) Minimize the potential for nitroaromatics to migrate from soil at the site to the groundwater. This migration potential is measured using the toxicity characteristic leaching procedure (TCLP) developed under the RCRA guidelines, which simulates the contaminants leaching from soil to groundwater.

The soil objectives were designed to sufficiently address the principal threats at this site, which were nitroaromatics.

3.1 Preliminary Remedial Goals

Based upon the RI/FS Investigation the only COC for the site was TNT, therefore only one PRG was established for PRRWP. The PRG was based on residential usage of the site in the future. Refer to Table 1 for the COC PRG for this site.

Table 1 - Contaminant of Concern

Contaminant of Concern	PRG (mg/kg)[1]
Nitroaromatics	
TNT	13.8

[1] mg/kg=milligram per kilogram

3.2 Resource Conservation and Recovery Act

The PRG for PRRWP was established to minimize the potential for human exposure to the COC. However, the PRG does not correlate with the toxicity of the COC within excavated soil, and cannot be used to determine whether excavated soil is hazardous. Therefore the toxicity of the excavated soil must be determined in addition to the comparison with the established PRG for the site.

Subtitle C of the Federal Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments (HSWA) of 1984, authorizes the EPA to regulate the management of hazardous wastes. The designation of a waste as hazardous subjects all those charged with managing that waste to the stringent "cradle-to-grave" requirements of RCRA Subtitle C. It is crucial, therefore, for all those managing wastes to properly identify them and determine whether or not those wastes are in fact "hazardous". There are four kinds of hazardous wastes as defined by Subtitle C of RCRA:

- Solid wastes, which exhibit hazardous characteristics (i.e., ignitability, corrosivity, reactivity, or toxicity).
- Solid wastes specifically listed by the Agency as being hazardous.
- A waste that is considered a declared waste.
- A waste mixed with a known hazardous waste.

The toxicity characteristic identifies wastes that are most likely to leach hazardous concentrations of certain toxic contaminants into groundwater under improper storage conditions. The toxicity of a waste can be determined by applying the Toxicity Characteristic Leaching Procedure (TCLP), a test designed to simulate the leaching of toxic contaminants. Full TCLP analysis (volatiles, semi-volatiles, metals, herbicides, and pesticides) will be performed on all soil and investigation derived waste (IDW) that was removed from the project site. Analytical data from the TCLP analysis will be compared to the RCRA regulatory levels for TCLP contaminants. During the pilot study no contaminated soil is expected to leave the site.

4.0 FIELD ACTIVITIES

McTech will notify the USACE POC and receive approval of the planned project schedule prior to mobilizing to the site. McTech will set up an office trailer on site to be used by McTech and USACE project personnel throughout the duration of the project.

McTech will begin clearing/grubbing activities for the excavation and tilling areas. Material grubbed from theses areas will be placed in windrows for wildlife habitat if approved by NASA and USACE.

McTech applied for the digging and excavation permit on November 27, 2006. This permit was subsequently approved and issued on November 30, 2006. McTech will use an excavator to remove contaminated soils from the approximately 60 feet by 40 feet excavation area. As the contaminated soil is removed in approximately 12 to 18 inch lifts, it will be staged in 8 separate piles in the tilling area. Once completed, the excavation will be barricaded and marked. The soil piles will then be spread out to approximately 12 inch depth, but in no case will it exceed 18 inch depth, using a dozer. Each of the piles should consist of approximately 2400 cubic feet (0.055 ac-ft). The piles will be placed such that sufficient area exists to maneuver in and around each pile. One five point composite sample will be obtained from each of the piles and submitted for laboratory analysis as indicated in Section 5.0 of this Plan of Operation. Field pH measurement will be made from across each of the piles. All field pH measurements and composite samples will be obtained from as near as feasible to the mid depth and at various locations of each pile.

Based upon the available literature review and the SOW hydrated lime should be added and mixed with the impacted soils at a rate of 3 to 5 tons per acre-foot. It is anticipated that this will increase the pH to a level that is more conducive for the treatment through alkaline hydrolysis to occur.

In order to evaluate the lime application rate, applicable pH levels, and overall treatment effectiveness, the soil piles will be treated as follows:

Piles 1 and 2 will be used as the control on this pilot study. These piles will be tilled and managed in the same manner as each of the other piles. The only exception will be that no lime will be added and mixed during the study. It is expected that the pH level will remain constant throughout the study.

Piles 3 and 4 will receive lime addition at the rates noted above on a weekly basis, with the application being the same as the remaining piles. With the anticipated soil volume, the application rate will be 500 pounds per pile per application. These piles will be tilled and managed in the same manner as each of the other piles. The only exception will be the lime addition once per week. It is expected that the pH level will peak at each treatment and then taper off until subsequent application.

The four remaining piles 5, 6, 7, and 8 will have an initial application of lime at the rates identified above. With the anticipated soil volume, the application rate will be 500 pounds per pile. Each pile will be tilled daily with the use of an All Terrain Vehicle with a tiller attachment. Based upon the daily pH levels measured, each of these piles will receive a lime application sufficient to maintain an elevated pH through the course of this pilot study. The application rate

will be strictly dependant upon the measured pH value. It is expected that the pH level will remain fairly constant and significantly elevated over Piles 1 and 2, the control.

The stock piles will only be placed on the already contaminated soil, well within the limits of the contaminated area, thereby preventing the contamination of surrounding areas. At the conclusion of this pilot study the excavated and treated soils will be placed back into the original excavation using a dozer and excavator as appropriate.

5.0 ANALYTICAL REQUIREMENTS

McTech will use Research Environmental and Industrial Consultants Laboratory of Beaver, West Virginia to perform the analytical testing for the confirmation and waste characterization samples associated with this project. REIC is a USACE certified laboratory. REIC's detection and quanitation limits are based upon their minimum detection limit (MDL) studies and are specific for each media and the instrumentation that is being used. The laboratory will follow the most currently promulgated EPA methods.

McTech will collect representative samples from each of the 8 treatment piles. The first sample will be collected prior to the addition of the lime. Subsequent samples will be collected on a weekly basis for a six week period. These samples will be analyzed for the single Contaminant of Concern (COC), 2,4,6 Trinitrotoluene (TNT) using approved EPA Methods.

6.0 EQUIPMENT DECONTAMINATION/INVESTIGATION DERIVED WASTE

Stainless steel sampling spoons/trowels, a stainless steel mixing bowl, and a backhoe bucket will be used for sampling. Laboratory equipment (pipets, cuvettes, beakers, and so forth), as appropriate, associated with the field screening will be decontaminated. Also, the stainless steel sampling spoons/trowels, mixing bowl, and backhoe bucket will require decontamination.

All non-disposable sampling equipment will be thoroughly cleaned. Decontamination of all of the sampling equipment will be accomplished prior to and between sampling.

Refer to Table 5 for general decontamination procedures for sampling equipment that will be reused at the site.

Table 6--Decontamination Procedures

Parameter[1]	**Detergent Wash**	**Tap Water Rinse**	**Inorganic Desorbing Agents**	**Tap Water Rinse**	**Organic Desorbing Agents**	**Deionized Water Rinse**	**Air Dry**
Nitroaromatics	yes	yes	no	no	Hexane	yes	yes

1 No inorganic desorbing agents (hydrochloric acid or nitric acid) will be used for the Total/TCLP metals since we are not looking for trace levels and we will use stainless steel or disposable sampling equipment.

In cases of gross contamination on sampling equipment, a tap water wash may first be performed to remove clumps of dirt in order to make the detergent wash more effective. The detergent wash will be a non-phosphate detergent solution, which will be used with brushing or circulating techniques to remove gross contamination. Potable tap water will be used as a rinse for the equipment. A solvent rinse using hexane will be used as an organic desorbing agent. The analytical laboratory performing the analysis will be consulted prior to sampling to ensure that decontamination procedures do not affect the subsequent analysis. It is recommended that all solvent rinses be made from an appropriate grade of chemical, such as pesticide or purge-and-trap grade quality. A triple rinse with deionized organic-free water will follow all other decontamination reagents.

All rinsates will be collected and properly disposed. Collection will occur in the designated decontamination areas. A decontamination area will be transportable (kiddie swimming pool or equivelant) between office trailer site and the excavation/treatment area as necessary. Drums, buckets, water, detergent, and brushes will be located in the work area. Drums will be available for containerizing the decontamination waste. A pump will be available to transfer decontamination liquids to the drums.

Investigation Derived Waste (IDW) (PPE, decontamination liquids, waste from field test kits, and all waste/media generated from the investigation activities) from the site will be disposed in accordance with this Plan of Operations and in compliance with EPA's off-site disposal policy, RCRA regulations including the RCRA land disposal restrictions for on-site and off-site waste disposal, and the Department of Transportation's (DOT) regulations. McTech will arrange for all services necessary for transport and disposal of the waste at an appropriate disposal facility. Personnel will adhere to the safety procedures as outlined in the Site-Specific Safety and Health Plan. Personnel will wear, at a minimum, Level D PPE when performing waste sampling activities.

Flammable or other known hazardous waste will be segregated and stored separately. Waste will not be stored on site longer than 90 consecutive days. Waste from this site will not be combined with waste from another site. All waste will be transported in containers meeting DOT specifications. All drums/containers will be labeled with the project name, contents, and collection start date.

Non-hazardous liquid waste will be managed by C&K Industrial Services, Inc. and non-hazardous solid waste may be disposed at Erie County Landfill. All hazardous IDW will be transported to an appropriate disposal facility (EQ Environmental in Michigan) by Enviroserve, a licensed hazardous waste transporter.

McTech will provide the USACE with the following documentation concerning the disposal of all IDW from the site:

- Laboratory analysis
- Copies of waste profiles which include land disposal restriction notifications
- Signed manifests (hazardous and non-hazardous)
- Weigh slips for bulk transport

7. 0 FIELD DOCUMENTATION PROCEDURES

The following sections outline the standard practices and procedures for proper documentation of activities for this project. Standard documentation required on all USACE projects, including daily reports and field logs will be completed by the Project Manager.

7.1 Field Logbook/Field Activity Forms

A bound notebook will be maintained by the field crew to provide daily records of significant events, observations, and measurements during field investigations. In addition, field records will be maintained regarding the various aspects of the sampling. All pertinent information regarding the site and sampling procedures must be documented in indelible ink. Notations should be made in logbook fashion, noting the time and date of all entries. The field records should include the following information:

- Site Location
- Project Number or Work Order Authorization
- Name and title of author
- Names and responsibilities of field personnel on site
- Names and titles of site visitors
- Sampling location and number of samples taken
- Sample description (color, odor etc.)
- Sample collection method and sample preservation methods
- Sample ID numbers
- Dates and times
- Matrix of sample
- Photograph logs
- Sampling changes, modifications or change orders
- Weather conditions
- Other applicable comments

7.2 Photographs

Photographs will be taken of all site activities. A digital camera will be used and, if possible, the camera will be programmed to include the date and time on each photo. For each photograph taken, the following items should be noted in the field logbook:

- Date and time
- Photographer (signature)
- Name of site/Project number
- General direction faced and description of the subject taken

7.3 Sample Identification Labeling

All sampling will be done in accordance with USEPA protocol. Sample labels are required to properly identify the samples. All samples will be labeled in the field and care will be taken to

assure that each sample container is properly labeled. The samples will be placed in sealed plastic bags to prevent the labels from soaking off or becoming illegible from exposure to water during transport to the laboratory. Labels will contain the following information:

- Site location and project number
- Sample Identification number assigned sequentially as described below
- Description of the sample
- Time and date sample was taken
- Notation of whether preservatives were added to the sample and type of preservative
- Type of sample (such as a grab or composite)
- Type of analysis requested

All field documentation should be done in indelible ink. Errors in field sampling documents will be corrected by drawing a single line through the error, writing in the correction, and initialing and dating. Sample numbers should be assigned sequentially and include the project number and pile number from which the soil was sampled. For example: 200614M-P1-001, 200614M-P1-002, 200614M-P2-001, and so on.

7.4 Chain-of-Custody

Chain-of-custody procedures provide documentation of the handling of each sample from the time it is collected until analysis is completed. Chain-of-custody procedures are implemented so that a record of sample collection, transfer of samples between personnel, sample shipping, and receipt by laboratory that will analyze the sample is maintained. The chain-of-custody record serves as a legal record of possession of the sample. To simplify records and eliminate potential litigation problems, as few people as possible should handle the samples during the investigation. A sample is considered to be under custody if one or more of the following criteria are met:

- The sample is in the sampler's possession.
- The sample is in the sampler's view after being in possession.
- The sample was in the sampler's possession and then was locked up to prevent tampering.
- The sample is in a designated secure area.

A chain-of-custody should be filled out on-site and will include the following information:

- Project number
- Project manager
- Site location
- Client contact
- Description of the sample
- Time and date sample was taken
- Notation of whether preservatives were added to the sample
- Type of preservative
- Type of sample such as a grab or composite
- Matrix of sample
- Amount of sample being transported to the laboratory

- Sample number or ID assigned in the field
- The appropriate analytical parameters to be tested
- Seals will be placed on each sample container (except VOCs)
- Any other information that the sampler feels is pertinent to the analysis of the sample(s).

The sampler must sign the chain-of-custody and all sample containers will be transported with a chain-of-custody form. Shipping containers will be sealed for shipment to the laboratory. The original chain-of-custody form will accompany the shipment and McTech will retain copies. A sample chain-of-custody form is located in Appendix C.

7.5 Corrections to Documentation

All original data recorded in field logbooks, on sample labels, and chain-of-custody records are to be written in indelible ink. If an error is made on any document related to this project, corrections should be made by drawing a single line through the error and entering the correct information. The erroneous information will not be obliterated. Any error discovered on a document should be corrected by the person who made the entry. All corrections will be initialed and dated.

8.0 SAMPLE PACKING AND TRANSPORTATION

The following are procedures for packaging and shipping of samples for this project:

- All containers, except the VOC vials, will be taped shut.
- All samples will be chilled immediately after collection.
- Each sample container will be placed in a separate plastic bag and sealed. As much air, as possible will be squeezed from the bag prior to sealing. Sample containers and bags will be sealed with evidence tape or custody seals.
- A picnic cooler will be used as the shipping container. In preparation for shipping samples, the drain plug on the cooler will be taped shut from the inside and outside, and a large plastic bag will be used as a liner for the cooler. Inert packing material will be placed in the bottom of the liner.
- The sample containers will be placed upright in the lined picnic cooler in such a way that they do not touch and will not touch during shipping.
- All samples will be shipped to the laboratory on ice and chilled to 4 ºC.
- Plastic ice packs or ice placed in double plastic bags will be placed around, among, and on top of the sample containers.
- The paperwork going to the laboratory will be placed inside a sealed plastic bag, which will be taped to the inside lid of the cooler.
- The cooler will be taped shut with strapping tape.
- At least two signed custody seals will be placed on the cooler lid (one in front, the other on the side).

9.0 MCTECH CORP CHEMICAL QUALITY CONTROL

9.1 Data Quality Objectives

The process of generating useful chemical data of acceptable quality begins with determining what the objectives of collecting the data are, and what decisions will be made based on the data that is generated. Next, the actual type of data that is required to meet these objectives is determined, along with the appropriate data collection methodologies and quality control procedures. The methodologies for collecting quality data must be consistent with accepted practices and standard operating procedures that have been developed for the specific type of data collection to insure quality chemical data. Generally, these steps have been predetermined by the USACE for this project and are delineated in the SOW.

Quality controls are incorporated into both the sample collection and analytical procedures. Quality controls utilized in sample collection include, but are not limited to, following the approved plans and procedures for sample collection, proper documentation of sample collection activities and site conditions, reporting and resolving any problems during sampling activities, and proper handling, preserving, packaging, and shipment of samples. In addition, quality control samples (duplicates and trip blanks) are collected to check the accuracy, completeness, precision, and comparability of the actual field samples. The contract analytical laboratory will follow its internal quality control procedures to insure analytical data quality. The laboratory will use the precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS) defined below to insure that their internal quality control objectives have been successfully met.

After the samples have been analyzed and the data reports have been generated, the resulting data will be reviewed, and compared. To assess the quality of the field activities, quality control samples (i.e. duplicates, trip blanks, matrix spikes) will be evaluated for completeness and duplicate relative percent differences (RPDs). The calculation of RPDs from field sample and field duplicate sample data indicates the precision of the sampling efforts as well as the sample media. RPDs are calculated by the following equation:

$$RPD = (C_f - C_d)/\{(C_f + C_d)/2\} X\ 100$$

Where C_f is the concentration of the compound found in the field sample and C_d is the concentration of the compound found in the field duplicate (QC) sample. The RPDs should equal 35% or lower for soils to indicate homogeneity of the sample and the reproducibility of the analytical data (a measure of precision). If the data does not meet the desired RPDs it may be necessary to re-analyze the samples in question, or re-sample if problems cannot be resolved. Decisions to re-analyze or to re-sample will be made with the joint input of the USACE, McTech, and the contract laboratory. In this process the PARCCS of the data will be evaluated and a joint determination of the data quality will be made accordingly.

Once all data has been received and analyzed in accordance with the above requirements, the results and recommendations will be forwarded onto USACE. The USACE will then use this information to make decisions regarding specific properties as they relate to project implementation.

The laboratory will use the following PARCCS to insure that their internal quality control objectives have been successfully met.

- Accuracy: This is the degree to which a measurement agrees with the actual value. The accuracy of an analytical procedure is determined by addition of a known amount of spike standard to a field sample matrix or a laboratory control matrix.

- Precision: This is a measure of the degree of reproducibility of an analytical value and it is used as a check of the quality of the sampling and analytical procedures. Precision is determined by analyzing replicate samples. Duplicate samples will be collected in the field for this project.

- Completeness: Completeness is a measure of the amount of the data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. The minimum level of completeness expected is 95% for each analytical method requested. This level is met in the laboratory by ensuring proper sample extraction procedures. This level is met in the field by collecting enough sample that the laboratory has an ample amount in case they need to reanalyze the sample.

- Representativeness: Representativeness expresses the degree to which sample data accurately and precisely represents actual conditions. Representativeness is a qualitative determination. The representativeness objective of the quality assurance program is to eliminate conditions that may result in non-representative data. Maintaining sample integrity is of the utmost importance.

- Comparability: Comparability is the confidence with which one data set can be compared with another. When traceable standards and standard methodology are used, the analytical results can be compared to other laboratories with similar operating procedures. Quality Assurance samples will not be collected for this project.

All field activities will be performed in accordance with the protocols outlined in this Plan of Operations. Samples will be kept in ice filled coolers until they are shipped via overnight express or hand delivered to the laboratory.

9.2 Lab Quality Assurance for Chemical Data Measurement

The overall Quality Assurance (QA) objective is to ensure that data of known and acceptable quality is generated from both field and laboratory activities. REIC will be responsible for ensuring that their personnel adhere to their laboratory Quality Assurance Plan (QAP). The number and types of internal QC checks for each analytical method are defined in the laboratory's QAP, which is contained in Appendix D. The laboratory must follow the quality

objectives for precision, accuracy, representativeness, comparability, completeness, and method detection limits as set forth in their laboratory QAP.

All data generated from the chemical analysis will be reported in accordance with the Scope of Work. Any sample failing the method or laboratory quality control limit may be re-analyzed. The analytical laboratory, McTech, and the USACE will jointly make the decision regarding re-analysis. Internal QC results should include information about agreement between replicate analyses, spike and surrogate recoveries.

The Remedial Action Summary Report will include analytical results and a Level 2 Quality Control data report from the laboratory. The Level 2 data package will include the following:

- Case Narrative-Information should include number and type of samples received, analysis of those samples, any problems that occurred, whether quality control was within acceptable limits, etc.
- Analytical Report-Summary of all sample analysis information including surrogates for organic methods. Detection limits/reporting limits will be included
- Chain-of-custody
- Summary of Quality Control-A summary will be included of all quality control specific to the project. This may include method reagent blanks, midlevel calibration checks, spike and spike duplicates. All QC will include acceptance criteria and relative percent data where applicable.

9.3 Field Quality Control for Chemical Data Measurement

Field quality control is as vital to a project as is quality control within the laboratory. Proper execution of each project task is needed in order to yield consistent reliable information that is representative of the media and conditions being measured. The overall quality assurance objective is to ensure that data of known quality is generated so that it will be useful in meeting the intended project objectives. The On-site Project Manager will be responsible for seeing that field personnel (McTech and subcontractors) adhere to McTech's QCP.

QC field oversight checklists to be used for field activities are provided in Appendix C as well as in the QCP. The field oversight checklists should be completed for each project site. The On-site Project Manager will provide an explanation on the QC field oversight sheets for any items that he marks were not completed. The On-site Project Manager will review the following items with the field crew prior to beginning on-site operations.

- Scope of Work
- Contents of this Plan of Operations
- Contents of Site-Specific Safety and Health Plan
- Contents of Quality Control Plan
- Field equipment to be used at project sites
- Sample collection equipment
- Labeling for sample containers
- Chain-of-custody forms
- Laboratory information

- Proper preservation methods for samples
- Proper packaging and shipping procedures for samples
- Proper equipment decontamination procedures
- Proper use of field screening and/or field monitoring equipment

10.0 DAILY QUALITY CONTROL REPORTS

During the field excavation and tilling activities, daily Quality Control Reports (QCR) will be prepared daily, dated, and signed by the On-site Project Manager or the QC Officer. McTech will utilize the USACE QCR Report Form (see Appendix C). The following information will be recorded on the QCR:

- Weather information
- Field instrument measurements
- Departures from the approved plans (any deviation that may affect data quality objectives must be conveyed to the USACE immediately)
- Personnel on-site and their job activities
- Any problems encountered
- Instructions from government personnel
- Field photo descriptions

11.0 CORRECTIVE ACTION

Corrective action measures may be required to be taken in the event a discrepancy is discovered in the field, during an audit, and/or the laboratory discovers a discrepancy or problem. Laboratory discrepancies, unrelated to field procedures, will be addressed by the laboratory's personnel and will be corrected in accordance with their QAP.

Any deviations from the approved plans will be fully documented. The USACE Contracting Officer's Representative (COR) will be notified if deviations from the approved plans are necessary. The USACE COR must approve the deviation prior to proceeding with the deviation. Deviations from the plans that compromise data quality or personnel safety will not be allowed.

12.0 SPILL PREVENTION, CONTROL, AND COUNTERMEASURE

Although a formal Spill Prevention, Control and Countermeasure (SPCC) Plan is not required for the work McTech is performing on this site, it is important to ensure that the area is secured and that the situation is assessed quickly. Ventilation, vapor suppression, and dust suppression may be required prior to cleaning up a site. Trained personnel will clean up spills quickly unless safety reasons prevent it. All of McTech's personnel on-site have been trained in emergency response and clean-up operations. The Project Manager will immediately inform the USACE and NASA POCs of any spills, regardless of the spill location. Additionally, it may be appropriate to contact the Ohio EPA, Northeast District Office (330-963-1200) and the National Response Center after contacting the USACE and NASA POCs.

12.1 Potential Spills

Potential sources for spills on this project are:

- Spills or leaks of decontamination liquids from equipment decontamination activities.
- Spills or leaks of decontamination liquids from personnel decontamination activities.
- Petroleum leaks from trucks or heavy equipment used at the site.
- Spills of chemicals (acetone, nitric acid, Tornado-50 cleaner, hexane) used on site. It should be noted that only small amounts (1-2 gallons each) of acetone, nitric acid, Tornado-50 cleaner, and hexane will be used on-site.

Material Data Safety Sheets (MSDS) for the products that may be brought onsite will be posted at the site. Chemicals/petroleum products will not be stored onsite without a current MSDS being provided and kept onsite. At this time, McTech does not intend to store diesel, motor oil, antifreeze, or any other petroleum product on-site. The following is a list of the materials anticipated to be stored on-site.

- Acetone
- Tornado-50 cleaner
- Hexane
- Hydrated LIme
- Dilute nitric acid
- PPE and small amounts of lab waste (less than 5 gallons of lab waste)

12.2 Spill Prevention

This plan represents a written commitment by McTech to supply the manpower, equipment, and materials required to expeditiously control and remove any potential harmful spills that may occur at the NASA PBS site due to project activities. The following are spill prevention procedures that will be implemented at the site:

- All drums used to store liquids that would be harmful to the environment if spilled will be checked on a weekly basis. The drums should be stored on a pallet for ease of transportation. The On-site Project Manager will perform the weekly inspections.
- Heavy equipment (trucks, excavators, etc.) will be inspected weekly prior to use to ensure that they are not leaking. A copy of the inspection form can be found in Appendix C of the SSHP.
- The hydrated lime required for this project will be place in a secured storage building until its application to the contaminated soil in the PRRWP.
- A secure area will be used for the storage of decontamination fluids.
- Personnel will be instructed as to their particular requirements as described in this Spill Control Plan

12.3 Spill Response

In the event of a spill or a leak, site personnel will:

- Inform the Project Manager, Kimberlie Chambers immediately. Ms. Chambers will then immediately inform the USACE of any spills, regardless of the spill location and/or amount. In the event that the Project Manager is not on-site the On-site Project Manager will be informed of any spills.
- All nonessential personnel will be cleared from the area. Personnel trained in emergency response and spill control measures will be utilized to contain any spillage of materials.
- Personnel will isolate the area.
- If spill occurs outside of the exclusion (hot) zone, then personnel must designate the spill area as an exclusion zone to limit potential exposure to onsite personnel.
- Trained personnel will attempt to locate the source of the spillage and stop the flow if it can be done safely.
- Trained personnel will begin containment and recovery of the spilled materials.
- PPE required during spill response for this project will at a minimum be Level D PPE. Level C or higher PPE may be used if spill conditions so warrant.
- Spill clean up will be performed only by personnel who are trained with spill response procedures.
- Material safety data sheets (MSDS) will be posted for any potential hazardous materials that are expected to be encountered or used.
- Spills will be reported to the USACE and NASA POCs. If the spilled material reaches any navigable body of water, the Ohio EPA, Northeast District Office (330) 963-1200 and the National Response Center (800) 424-8802 may be notified.
- Fire extinguishers will be available on-site and ready for use.
- Eye wash will be available on-site and ready for use.
- This Spill Control Plan will be posted at the site

12.4 Spill Containment

Spill containment equipment will be located on-site. Materials used for cleanup will be placed in drums for proper disposal according to appropriate state and federal regulations. Spill containment material that will be on-site is:

- Lime spilled in outside of the Pilot Study area shall be cleaned up with brooms, shovels and buckets and taken to the Pilot study area for future use..
- Absorbent pads, booms, or rolls (sufficient number to absorb a minimum of 200 gallons of spilled liquids).
- Drums containing IDW waste or other materials will be stored within in a lined dike area capable of containing any spills or leaks.
- Fluorescent marking tape and/or orange construction fence.

The following are requirements for handling drummed materials on-site:

- All drums and containers used will meet DOT, OSHA, and EPA regulations for the waste that they contain.
- Drums and containers will be inspected and their integrity assured prior to being moved. Drums or containers that cannot be inspected before being moved because of storage conditions, will be positioned in an accessible location and inspected prior to further handling.

- Operations for the site will be organized so as to minimize the amount of drum or container movement.
- Employees involved in the drum container operations will be warned of the hazards associated with the containers.
- Where spills, leaks or ruptures may occur, adequate quantities of spill containment equipment (absorbent, pillows, etc.) will be stationed in the immediate area.
- Drums or containers that cannot be moved without failure will be emptied into a structurally sound container.

12.5 Spill Reporting

McTech personnel are to immediately report any imminent or actual spills to the McTech Project Manager and/or On-site Project Manager. The Project Manager/On-site Project Manager will then report immediately to the USACE POC and NASA POC. The USACE POC will report the information to any regulatory agencies or authorize the Project Manager to do so if the spill amount is reportable. If appropriate, the Ohio EPA, Northeast District Office (330) 963-1200 and the National Response Center (800) 424-8802 may be notified. Reportable Quantities of spilled material will be posted in the office trailer. It is of great importance for personnel to gather the following information if they encounter an imminent or actual spill.

- The location of the release or imminent release.
- The name and quantity of the material involved, to the extent known.
- The possible source or cause of the release.
- The date and time of the release.
- A description of any emergency response actions taken or currently being taken by others.

After the cleanup of a spill, the Project Manager will investigate to determine the possible cause of the spill. The Project Manager will implement corrective actions to prevent a reoccurrence of the spill.

12.6 Contingency

In the event that on-site field personnel cannot handle the spill, NASA and McTech will dispatch their Emergency Response Teams. The Emergency Response Teams have been trained and have sufficient equipment to perform spill clean up for this project.

13.0 PROTECTION OF RIVERS, STREAMS, AND IMPOUNDMENTS

McTech will exercise every reasonable precaution throughout the life of the project to prevent silting of ditches and streams at the site. Erosion and silt control measures will include, but are not limited to, the following:

- Prior to suspension of excavation operations for any appreciable length of time, McTech will shape the top of earthwork in such a manner as to permit the runoff of rainwater and construct earth berms along the top edges of embankments to intercept runoff water. The berm

construction will not be permitted to decrease the stability of the embankment section. In addition, silt fence and straw bales may also be used to prevent erosion from runoff water.

- Preventive measures taken to adequately control any run-off or run-on of water to excavation areas or to the storage/staging areas. Should such preventive measures fail and an appreciable amount of material begins to erode into a waterway, McTech will act immediately to bring the silt under control.
- All excavated soil will be deposited in stockpile areas to prevent any contamination from migrating to waterways or washing away by high water or runoff.
- Diversion ditches will be constructed around areas where running or standing water is present.

14.0 AIR EMISSION CONTROLS

If necessary, water will be used for dust control in areas of excavation and on haul roads. A water truck will remain on site for the duration of the project. The Project Manager/On-site Project Manager and the QC Officer will make visual observations of dust levels to determine if water suppression is necessary and/or working.

15.0 PROJECT SCHEDULE

McTech will furnish originals and copies of the work plans and response to comments in the quantities below. A written response to all comments will also be prepared by McTech and included in the final submittal document. Submittals are as follows:

- Draft and Final QCP, SSHP and Plan of Operations – 7 draft and 7 final copies of each plan to USACE
- Draft and Final Lime Treatment Pilot Study Report – 7 draft and 7 final copies to USACE

15.1 Address for Submittals

U.S. Army Corps of Engineers
Huntington District
502 Eighth Street
Huntington, WV 25701-2070
ATTN: CELRH-EC-CE (Lisa A. Humphreys)

15.2 Due Dates, McTech Corp Submittals and Action Items

McTech Corp Submittals / Action Items	No. Days
Notice to Proceed	0
Submission of Draft QCP, SSHP and Plan of Operations	20 Days after NTP
Submission of Final QCP, SSHP and Plan of Operations	30 Days after NTP
Submission of Draft Lime Treatment Pilot Study Report	120 days after NTP
Submission of Final Lime Treatment Pilot Study Report	30 days following receipt of comments to Draft LTPS

16.0 REFERENCES

The following reference materials were used in compiling the information contained in this plan and/or were be used in other documents associated with this project.

40 CFR Part 261, *Identification and Listing of Hazardous Waste,* United States Environmental Protection Agency

CELRHR 5-2-7, *Quality Management Plan*, U.S. Army Corps of Engineers, May, 1999

EM 200-1-2, *Technical Project Planning Process*, U.S. Army Corps of Engineers, August 1998

EM 200-1-3, *Requirements for the Preparation of Sampling and Analysis Plans* , U.S. Army Corps of Engineers, February 2001

EM-200-1-6, *Chemical Quality Assurance for Hazardous, Toxic and Radioactive Waste Projects (HTRW)*, U.S. Army Corps of Engineers, October 1997

ER-1110-1-263, *Chemical Data Quality Management for Hazardous Waste Remedial Activities,* U.S. Army Corps of Engineers, April 1998

ER 1165-2-132, *HTRW Guidance for Civil Works Projects*, U.S. Army Corps of Engineers, June 1992

ERDC/EL TR-03-15, September 2003, *Lime Treatment of 2,4,6-Trinitrotoluene Contaminated Soils: Proof of Concept Study* U.S. Army Corps of Engineers, September 2003

ESTCP website:
http://www.estcp.org/projects/compliance/200216o.cfm

"Final Action Memorandum for Interim Removal Action for Pentolite Road Red Water Ponds", USACE , June 2003

Final Interim Soil Removal Action Report, WTI, 2006

"Final Plan of Operations for Stabilization, Excavation, and Disposal of Contaminated Soil for Pentolite Road Red Water Ponds", WTI, December 2002

"Final Quality Control Plan", WTI, December 2002

"Final Site-Specific Safety and Health Plan for Pentolite Road Red Water Ponds", WTI, December 2002

"General Quality Control Plan", WTI, August 2004

"General Safety and Health Plan", WTI, August 2004

Kinetics of the Alkaline Hydrolysis of Important Nitroaromatic Co-Contaminants of 2,4,6 Trinitrotoluene in Highly Contaminated Soils, Monika Emmrich, Environmental Science and Technology/Bol 35, No 5, pgs 874-877, 2001

United States Environmental Protection Agency, web site at http://www.epa.gov

Appendix A Scope of Work

Appendix B Site Map

Appendix C Field Activity Forms

Appendix D Laboratory QA Plan

REIC’s QA Plan

APPENDIX E QC Documentation

Quality Control Certification

Plan of Operations

Lime Treatment Pilot Study
Plum Brook Ordnance Works –Pentolite Road Red Water Ponds (PRRWP)
Sandusky, Ohio

Contract No. W91237-06-C-0006

This document is provided to certify that the Independent Quality Control Team (IQCT) has reviewed the Plan of Operations in accordance with the Quality Control Plan. All comments resulting from the various reviews have been resolved and/or incorporated.

Assignment	Name	Signature	Date
Senior Review			
	Mark Perkins	_____	_____
Peer Review			
	Rodney Bumgardner	_____	_____