APPENDIX G

VAPOR MONITORING EQUIPMENT EXAMPLE OPERATING PROCEDURES

VAPOR MONITORING EQUIPMENT OPERATING PROCEDURES

The following procedures were developed from the instrument manufacturers' operating manuals. Work instructions may be developed to supplement or replace these procedures. Likewise, contractors may have their own procedures.

1.0 THERMO ENVIRONMENTAL INSTRUMENTS MODEL 580B OVM

The Model 580B photoionization detector (PID) detects total concentrations of many organic and some inorganic gases and vapors. It is easy to use and has a rapid response. It has a useful range and sufficient sensitivity.

Ambient air is drawn into the probe that contains an ultraviolet (UV) source. Since every molecule has a characteristic ionization potential, those molecules that are present with an ionization potential less than the probe energy are ionized. The ion pairs formed cause a current to flow between two electrodes. A readout of this current, which is proportional to the concentration of the ion pairs, is displayed on a meter. Probes of 10.2 and 11.7 eV are available. The 11.7 eV probe is used because it can detect compounds that the 10.2 eV cannot detect.

1.2 Limitations

Materials with an ionization potential greater than the probe energy will not be measured. For example, methane (12.98 eV), hydrogen cyanide (13.91 eV), and carbon dioxide (13.79 eV) will not be detected with an 11.7 eV probe.

Instrument readings can be affected by humidity. Condensation may form on the UV light source window, resulting in erroneous results.

1.3 Pre-field Preparation

Make sure the batteries are fully charged; it is not possible to overcharge the batteries. The batteries should be recharged overnight by first plugging the miniphone jack from the charger into the instrument, and then plugging the charger into the 120-volt main. After charging is complete, the charger should be removed from the 120-volt line before the miniphone jack is unplugged from the instrument.

1.4 Calibration/Operating Procedure

The instrument should be calibrated before going into the field and the calibration checked after returning from the field. Turn the unit on, and leave the instrument in the standby position. Allow five minutes for the instrument to warm up. Zero the meter while still in the standby mode.

1. Install shorting plug at rear. Display will show "LAMP OUT".

2. Press the ON/OFF switch on the front panel. The pump will begin running and the display should read "PPM = 0.000".

3. Press MODE/STORE button. "LOG THIS VALUE?" should appear in the display.

4. Press-/CRSR button. "R/COMM, -/PARAM, +/ACCESS, AND S/CLOCK" should appear on the display.

5. Press -/CRSR button. Display should read either "CONC METER, RESET TO CHG" or "CONC. METER, MAX HOLD." Select the appropriate meter to be used.

6. Press -/CRSR button. The amount of free space in the memory will be displayed.

7. Press -/CRSR button. "RESET TO CALIBRATE" is displayed.

8. Press the RESET button. The display should read "RESTORE BACKUP, + = YES, - = NO."

9. Press the -/INC button. "RESET TO CALIBRATE" should be displayed. "ZERO GAS RESET WHEN READY" will be displayed.

10. Fill a Tedlar bag with zero air (0 ppm hydrocarbon-free air) and attach the probe with tygon tubing to the Tedlar bag. Press RESET button. Display will read, "MODEL 580 ZEROING". Then display will read "SPAN PPM = 0250 OR 0100 (depending on span gas that will be used; set appropriate concentration using CRSR -/+) "+" = TO CONTINUE.

11. Display will read "SPAN GAS RESET WHEN READY". Fill another Tedlar bag with span gas (isobutylene) and press RESET button. Display will read, "MODEL 580 CALIBRATING". After it is calibrated, the display will read "RESET TO CALIBRATE".

12. Press the MODE/STORE button to return to the original display for monitor use.

13. Press the ON/OFF switch when finished with the monitor. "LAMP OFF" will be displayed.

14. Remove shorting plug from the rear.

1.5 Field Use

Record the background reading in the field notebook. If a field reading is negative, there is condensation present on the lamp. Move the instrument to a drier area so that the air drawn into the probe will evaporate the condensation. A sharpie pen can be used in the field to quickly verify that the meter is operational.

2.0 DRAGER PUMP/COLORIMETRIC TUBE

The Drager pump pulls a measured volume of air through a colorimetric tube. The tube is chosen for a specific chemical to be measured. The tube changes color according to the concentration of the analyte in the air and the volume of sampled air. Possible interferences are listed with the instructions that accompany the tubes.

2.1 Drager Pump Operating Procedure

1. Inspect pump for any obvious defects.

2. Insert sealed colorimetric tube into the sample inlet.

3. Squeeze pump and observe for five minutes. Pump should remain depressed indicating no leaks.

4. Remove tube and break off sealed ends using the tube breaker on the pump.

5. Insert tube into the sample inlet with the arrow on the barrel of the tube pointing toward the pump.

6. Consult instruction accompanying tubes for number of strokes required, number of tubes to be used, expected results - color change and possible interferences.

EXAMPLE MONITORING EQUIPMENT CALIBRATION FORM

Date	Equipment	Serial #	Pot Setting	Cal. Gas	Gas Conc.	Signature	Comments

Health and Safety Plan (HASP) BBL/BBLES Programs

- Decommissioning, Decontamination, Demolition (D3) Program
- Operation, Maintenance and Monitoring (OMM)
- Environmental Investigation & Remediation Activities
- Silica Hazard & Control

Pratt & Whitney Rocketdyne – United Technologies Corporation
San Jose, California

October 2004
Revised October 2005

BBL
ENVIRONMENTAL SERVICES, INC.
Remedial Management & Construction

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G BBLES Lockout-Tagout Equipment Specific Energy Control Procedure
H Air Monitoring Log

I BBLES Confined Space Entry Checklist
J BBLES Confined Space Entry Permit

1. Introduction

1.1 Objective

The objective of this Health and Safety Plan (HASP) is to support BBLES site activities at the United Technologies Corporation/Pratt & Whitney Rocketdyne (UTC/P&W Rocketdyne) facilities in San Jose, CA. UTC/P&W Rocketdyne has requested that BBL Environmental Services, Inc. (BBLES) conduct assessments at select stations to determine environmental impacts, the presence of energetic materials, and determine decontamination (and in some cases) demolition needs to achieve closure (for hazardous material permitted operations) or, in non-permitted buildings, to mitigate explosive risks associated with fires, intruders as part of the Decontamination, Decommissioning, and Demolition (D3) program. The main components of the D3 program are the three projects referred to as Projects A, B, and C, and encompass 69 stations. Upon completion of assessment activities, BBLES will then carry out the decontamination and/or demolition activities.

This HASP includes activities related to the planning, assessment, station decontamination and select demolition services in support of station closures. The stations included in this effort are as follows:

Project A:
316^{++}, 502, 505, 521, 530, 531, 560, 561, 581, 585^{++}, 1211, 1950, 1971 1972, 1973 (to be demolished)
Project B:
302, 317, 486, 487, 503, 570, 571, 630, 650, 680, 695, 696, 700, 720, 730, 731, 732, 740, 900, 901, 980, 981, 982, 1810/1818, 1811/1840, 1960, 1980, 1986
Project C: (all to be demolished)
1700, 1705, 1706, 1707, 1708, 1710, 1711, 1714, 1715, 1716, 1717, 1718, 1720, 1721, 1730, 1731, 1733, 1734, 1751, 1754, 1760, 1761, 1761, 1762, 1763, 1764, 1790

Project E
485, 485A, 532, 632, 1060, 721, 1210, 1212, 1240, 1311, 1313, 1315, 1830, 1820, 1970, 1985, 15, 20, 22, 23, 23F, 29, 30, 30T, 50, 70, 200, 201, 202, 205, 210, 211, 213, 250, 322/323, 361, 1921, 21, 307, 313, 314, 450, 450FGH, 460, 711, 302, 1213, 1312, 1314, 1319, 1319A, 1319B, 1330, 1371, 1451, 1860, 1920, U1, U7

Additional buildings may be added at the request of UTC/P&W Rocketdyne and are included in this HASP.

++Potential NG-contaminated building

Site activities for this phase of the project will include:

- Mobilization;
- Wipe sampling of equipment/building material surfaces and bulk sampling of residues for one or more of the following explosive analytes [perchlorate, nitrocellulose, explosives (EPA Method 8330), and nitroglycerine (NG)];
- Coring through concrete floors and other porous material and collecting bulk samples for explosive analyses;
- Asbestos and lead-based paint sampling and abatement;
- Decontamination and/or disassembly of process equipment (BBLES and BBLES Subcontractors);
- Decontamination of certain materials;
- Demolition of selected structures (BBLES and BBLES Subcontractors); and
- Demobilization.

This site HASP also covers BBLES activities for Operation, Maintenance and Monitoring (OMM) and environmental investigation and remediation activities.

Site activities for the OMM/Environmental Phase of the project will include:

- Review of current OMM procedures and specifications
- Inspection of existing environmental treatment system equipment and structures
- Operation, maintenance and monitoring of environmental treatment systems
- Environmental assessment and sampling;
    - Surface water sampling and assessment
    - Groundwater sampling
    - Subsurface sampling (geobprobe and drilling)
- Handling regulated materials in preparation for shipment, removal or disposal

Additional site activities covered by this HASP include Emergency Response Services, and hazardous waste characterization and disposal (RCRA and Lab Pack Disposal Support).

The objective of this HASP is to provide a mechanism for establishing safe working conditions at the site. The safety organization, procedures, and protective equipment have been established based on an analysis of potential physical, chemical, and biological hazards. Specific hazard control methodologies have been evaluated and selected to minimize the potential of injury, illness, or other hazardous incidents. California has its own occupational safety and health regulations issued by the Department of Industrial Regulations. If a conflict arises between a Federal Occupational Safety and Health Administration (OSHA) regulation and a California regulation, the regulation offering stricter requirements shall apply.

1.2 Site and Facility Description

The UTC/P&W Rocketdyne Facility is located at 600 Metcalf Road southeast of San Jose, California. UTC/P&W Rocketdyne previously developed, manufactured, and tested solid propellant rocket motors for the defense and space exploration industries. The facility began operating in 1959. The facility occupies 5,113 acres including 200 buildings. A perimeter fence and 24-hour guards at the gates provide facility security. All development, production and testing operations have been discontinued.

Rocket motors are filled with propellants designed to cause a controlled oxidation reaction and release large amounts of energy and gas. Solid rocket propellants are typically synthetic rubber with reactive materials suspended in the rubber matrix. The typical materials used onsite in the production of propellant are polybutadiene polymers, ammonium perchlorate, and aluminum powder. HMX and RDX may be added to propellants to enhance energy levels. Non-chlorinated solvents are used for cleaning motor cases and subassemblies. Historically, chlorinated solvents were also used onsite.

The facility is located in an area of rolling hills, steep terrain, and relatively broad valleys. The two main valleys within the developed portion of the facility are Shingle Valley and Mixer Valley. Each valley has an intermittent stream. The streams and creeks flow into Las Animas Creek, a tributary to Anderson Reservoir located within one-half mile of the southern boundary of the facility. The streams are dry most of the year, but they can carry considerable flow during the wet season, generally October through March.

The front entrance to the UTC/P&W Rocketdyne facility is located on Shingle Valley Road off Metcalf Road. Shingle Valley Road and Mixer Road are the main roads serving the two main valleys. Manufacturing Road connects Shingle Valley and Mixer Roads and ends at Las Animas Road that is the back entrance to the facility. Splinter Valley Road, Solid Road, Liquid Road, and Oxidizer Road serve the side valleys. Most of the station buildings can be reached by these paved roads. In addition, there are several dirt roads that serve out-of-the-way locations. Rest rooms and drinking water are available at several stations including Station 0012 the Administration and Inert Area, Station 0021. (Field Storage). Electricity is available at several stations, and UTC/P&W Rocketdyne has several mobile power generators as well. Telephones are available at most stations.

Due to the unique hazards at the facility all UTC/P&W Rocketdyne, State and Federal safety regulations must be strictly observed by all UTC/P&W Rocketdyne personnel and contractors.

1.3 Policy Statement

The policy of BBL Environmental Services, Inc. (BBLES) is to provide a safe and healthful work environment. No aspect of operations is of greater importance than injury and illness prevention. A fundamental principle of safety management is that all injuries, illnesses, and incidents are preventable. BBLES will take every reasonable step to eliminate or control hazards in order to minimize the possibility of injury, illness, or incident.

This HASP in conjunction with other health and safety guidance, including but not limited to the Process Safety Management (PSM) Compliance Plan, Electrical Safety Plan, Site Contingency Plan, BBLES Injury Illness Prevention Plan (IIPP) and BBLES Standard Operating Procedures (SOPs) prescribes the procedures that must be followed during activities at the site. Operational changes that could affect the health and safety of personnel, the community, or the environment will not be made without the prior approval of the Project Manager (PM) and the Health and Safety Manager (HSM).

This document will be reviewed periodically to confirm that it is current and technically correct. Changes in site conditions and/or the scope of work will require a review and modification to this HASP. Such changes will be completed in the form of an addendum or a revision to the plan. Operation specific Job Safety Analysis (JSAs) must be prepared and approved by PW/S&P prior to starting work.

The provisions of this plan are mandatory for all BBLES personnel. BBLES subcontractors may prepare their own site-specific HASPs that must meet the basic requirements of this HASP. The primary contractors on the site including: Safety Management Services (SMS), Onyx and Sevenson will be working under this HASP. Subcontractors are required to review this HASP, follow all requirements and participate in BBLES health and safety meetings and training. If subcontractors prepare their own HASP, it must be consistent with this plan and must be submitted to BBLES for review and approval. Subcontractors who do not prepare their own site-specific HASPs may work under this HASP, provided that they review it and determine that it adequately addresses the hazards and control measures necessary for their personnel assigned to the project. Subcontractors who work

under this BBLES HASP must also sign the Health and Safety Plan waiver affirming their knowledge of the HASP's contents.

All visitors to BBLES work areas at the site must abide by the requirements of this plan.

1.4 References

This HASP complies with applicable Occupational Safety and Health Administration (OSHA) regulations, CalOSHA, United States Environmental Protection Agency (USEPA) regulations, and BBLES health and safety policies and procedures. This plan follows the guidelines established in the following:

- *Standard Operating Safety Guides*, USEPA (Publication 9285.1-03, June 1992).
- *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, NIOSH, OSHA, USCG, USEPA (86116, October 1985).
- *California Code of Regulations, Title 8*, California Department of Industrial relations Division of Occupational Safety and Health (CalOSHA);
- *Title 29 of the Code of Federal Regulations* (CFR), Part 1910.
- *Title 29 of the Code of Federal Regulations* (CFR), Part 1926.
- *Pocket Guide to Chemical Hazards*, DHHS, PHS, CDC, NIOSH (2003).
- *Threshold Limit Values*, ACGIH (2005).
- *Guide to Occupational Exposure Values*, ACGIH (2005).
- *Quick Selection Guide to Chemical Protective Clothing*, Forsberg, K. and S.Z. Mansdorf, 2nd Ed. (1993).
- *Health and Safety Policies and Procedures Manual*, Blasland, Bouck & Lee, Inc.
- *BBL Environmental Services, Inc., Process Safety Management Compliance Plan (BBLES PSM) for Decontamination and Select Demolition Program Projects A, B, and C Stations, October 2004*
- *BBL Environmental Services, Inc., Contingency Plan for Decontamination and Select Demolition Program Projects A, B, and C Stations, October 2004*

- *BBL Environmental Services, Inc*., Injury Illness Prevention Plan (IIPP), February, 2005
- *Department of Defense DOD Safety Manual for Ammunition and Explosives (September 1997)*
- *Safety Management Services (SMS), Explosives Decontamination Training Manual, October 2004*
- *Pratt & Whitney Work Instructions and Quality Procedures*:
  - *W.I. 23.07.49, Individual Personnel Protection*
  - *W.I.25.04.02, Control of Hazardous Energy (Lockout/Tagout)*
  - *W.I. 23.07.53, Confined Space Entry*
  - *W.I.23.06.13, Deactivation, Decontamination and Closure of Articles, Equipment and Facilities*
  - *QP 23.07, Injury and Illness Prevention Program (additional supporting Work Instructions cited herein)*
  - *Pratt & Whitney Space Propulsion Health and Safety Program*
  - *Pratt & Whitney W1 23.07.6, Classification and Decontamination of Explosive Facilities and Equipment Revision 2, June 20, 2004*
  - *TB 700-4, Decontamination of Facilities and Equipment, October 1978*
  - *IOCP 385-1, Pamphlet 107P 385-1, Classification and Remediation of Explosive Contamination, July 16, 1997*
  - *SP-002 Compliance Guidelines Plan*

1.5 Definitions

The following definitions (listed alphabetically) are applicable to this HASP:

- *Contamination Reduction Zone (CRZ)* - Area between the exclusion zone and support zone that provides a transition between contaminated and clean areas. Decontamination stations are located in this zone.
- *Exclusion Zone (EZ)* - Any portions of the site where hazardous substances are, or are reasonably suspected to be present, and pose an exposure hazard to on-site personnel.

- *Facility* – For the purposes of this HASP, Facility means Pratt & Whiney Space Propulsion San Jose, California.
- *Incident* - All losses, including first aid cases, injuries, illnesses, near misses, spills/leaks, equipment and property damage, motor vehicle accidents, regulatory violations, fires, and business interruptions.
- *Near Miss* - An incident in which no injury, illness, motor vehicle accident, equipment or property damage, etc., occurred, but under slightly different circumstances, could have occurred.
- *Onsite Personnel* - All BBLES and subcontractor personnel involved with the project.
- *Project* – BBLES's scope of work covered in contract documents
- *Site* – BBLES's designated work area.
- *Support Zone (SZ)* - All areas of the site, except the EZ and CRZ. The SZ surrounds the CRZ and EZ. Support equipment and break areas are located in this zone.
- *Subcontractor* - Includes contractor personnel hired by BBLES.
- *Visitor* - All other personnel, except the on-site personnel.
- *Work Area* - The portion of the site where work activities are actively being performed. This area may change daily as work progresses and includes the SZ, CRZ, and EZ. If the work area is located in an area on the site that is not contaminated, or not suspected of being contaminated, the entire work area may be a SZ.

1.6 Acronyms

The following acronyms (listed alphabetically) are applicable to this HASP:

- *ACGIH* - American Conference of Governmental Industrial Hygienists
- *BBLES* – BBL Environmental Services, Inc.
- *CalOSHA* – California Occupational Health and Safety Administration
- *CRZ* - Contamination Reduction Zone
- *EZ* - Exclusion Zone
- *HASP* - Health and Safety Plan

- *HSO* - Health and Safety Officer
- *HSS* - Health and Safety Supervisor
- *II* - Incident Investigation
- *JSA* - Job Safety Analysis
- *MSDS* - Material Safety Data Sheet
- *OMM* – Operation, Maintenance and Monitoring
- *OSHA* - Occupational Safety and Health Administration
- *PM* - Project Manager
- *PFP* – Personal Fall Protection
- *PO* - Project Officer
- *PPE* - Personal Protective Equipment
- *SPM* – Senior Project Manager
- *SS* - Site Supervisor
- *SZ* - Support Zone
- *USEPA* - United States Environmental Protection Agency

2. Roles and Responsibilities

2.1 All Personnel

All BBLES and subcontractor personnel must adhere to the procedures outlined in this HASP during the performance of their work. Each person is responsible for completing tasks safely, and reporting any unsafe acts or conditions to their supervisor. No person may work in a manner that may conflict with these procedures. After due warnings, the PM will dismiss from the site any person or subcontractor who violates safety procedures.

All BBLES and subcontractor personnel will receive training in accordance with applicable regulations, and be familiar with the requirements and procedures contained in this HASP prior to initiating site activities. In addition, all personnel will attend an initial hazard briefing prior to beginning work at the site.

The roles of BBLES personnel and subcontractors are outlined in the following sections. Key project personnel and contacts are summarized in Table 2-1. An organization chart of key personnel is included as Figure 2-1 at the end of this Section.

2.2 BBLES Personnel

2.2.1 Project Officer

The PO is responsible for providing resources to assure project activities are completed in accordance with this HASP, and for meeting regulatory and contractual requirements. Additional BBLES management personnel include the Project Sponsor, Senior Advisor on the project, and the Principal-in-Charge.

2.2.2 Health and Safety Officer and Health and Safety Manager

The HSO has overall responsibility for the technical health and safety aspects of the project, including review and approval of this HASP. Inquiries regarding BBLES health and safety procedures, project procedures, and other technical or regulatory issues should be addressed to this individual.

The HSO (or designee) must approve changes or addenda to this HASP. The HSO is supported by the project Health & Safety Manager (HSM). The HSM interfaces with the H&S staff on an ongoing basis to provide day-to-day direction.

2.2.3 Project Manager

The PM (or his/her designee) is responsible for verifying that project activities are completed in accordance with the requirements of this HASP. The PM is responsible for confirming that the Site Supervisor (SS) has the equipment, materials, and qualified personnel to fully implement the safety requirements of this HASP, and/or subcontractors assigned to this project meet the requirements established by BBLES. It is also the responsibility of the PM to:

- Consult with the HSO & HSM on site health and safety issues;
- Verify that subcontractors meet health and safety requirements prior to commencing work;
- Verify that incidents are thoroughly investigated;
- Approve, in writing, addenda or modifications of this HASP; and
- Suspend work or modify work practices, as necessary, for personnel safety, protection of property, and regulatory compliance.

2.2.4 Health and Safety Supervisor

The HSS is responsible for field health and safety issues, including the execution of this HASP. Questions in the field regarding health and safety procedures, project procedures, and other technical or regulatory issues should be addressed to this individual. The HSS will advise the PM on health and safety issues, and will establish and coordinate the project air monitoring program if one is deemed

necessary (see Section 8.1, Air Monitoring). The HSS is the primary site contact on health and safety matters. It is the responsibility of the HSS to:

- Provide onsite technical assistance, if necessary;
- Participate in all incident investigations (IIs) and ensure that they are reported to the HSO, HSM, and PM within 24 hours;
- Conduct site safety orientation training and safety meetings;
- Verify that BBLES personnel and subcontractors have received the required physical examinations and medical certifications;
- Review site activities with respect to compliance with this HASP;
- Maintain required health and safety documents and records; and
- Assist the SS in instructing field personnel on project hazards and protective procedures.

2.2.5 Site Supervisor

The SS is responsible for implementing this HASP, including communicating requirements to on-site personnel and subcontractors. The SS will be responsible for informing the PM of changes in the work plan, procedures, or site conditions so that those changes may be addressed in this HASP. Other responsibilities are to:

- Consult with the HSS on site health and safety issues;
- Stop work, as necessary, for personal safety, protection of property, and regulatory compliance;
- Obtain a site map to determine and post routes to medical facilities and emergency telephone numbers;
- Notify facility emergency representatives of the schedule of the site operations;
- Observe on-site project personnel for signs of ill health effects;
- Investigate and report any incidents to the HSS;
- Verify that all onsite personnel have had applicable training; and

- Verify that onsite personnel are informed of the physical, chemical, and biological hazards associated with the site activities, and the procedures and protective equipment necessary to control the hazards.

2.2.6 Subcontractors

Subcontractors and their personnel must understand and comply with applicable regulations and site requirements established in this HASP. Subcontractors may prepare their own site-specific HASPs that must be consistent with the requirements of this HASP.

All subcontractor personnel will receive training in accordance with applicable regulations, and must be familiar with the requirements and procedures contained in this HASP prior to initiating site activities. All subcontractor personnel will attend an initial hazard briefing prior to beginning work at the site. Additionally, onsite subcontractor personnel must attend and participate in the daily site safety meetings.

Each subcontractor must designate an individual to function as the PM, HSO, HSS, and SS. In some firms, it is not uncommon for the duties of the HSO to be carried out by the PM. This is acceptable provided the PM has the required knowledge, training, and experience to properly address all hazards associated with the work, and to prepare, approve, and oversee the execution of the site-specific HASP. A subcontractor may designate the same person to perform the duties of both the HSS and the SS. However, depending on the level of complexity of a contractor's scope of work, it may be infeasible for one person to perform both functions satisfactorily.

2.2.7 All Onsite Personnel

All onsite personnel involved with field operations (including subcontractors) must read and acknowledge their understanding of this HASP before commencing work, and abide by the requirements of the plan. Onsite personnel shall attend HASP orientation training and sign the HASP Acknowledgement Form following their review of this HASP. To provide a safe work environment, BBLES will designate at least one of our field staff as the onsite Health and Safety Supervisor (HSS).

The HSS will monitor work practices and confirm they are being performed in accordance with the site-specific HASP. Prior to beginning field work onsite, BBLES' HSS will provide a health and safety orientation to all BBLES employees and subcontractors. Acknowledgement of review and understanding of the HASP will be documented with a sign-in sheet.

BBLES employees and subcontractors will be trained in compliance with OSHA, Cal-OSHA and applicable standards, whereby all field personnel will have at least 40 hours of health and safety training before being assigned to field work. Supervisors have at least 8 hours of additional supervisor training, and most staff receive additional subject training on topics such as excavation safety, confined space entry, lockout/tagout, and loss prevention observation. BBLES and subcontractor employees receive an additional 8 hours of refresher training. Field employees also receive a comprehensive physical examination each year as part of our medical monitoring program. A copy of training records will be maintained by BBLES onsite administrative personnel. At the start of each work day, the HSS will conduct a safety meeting. The meeting will be attended by BBLES employees and subcontractors, and the topics of discussion will be documented. BBLES has determined that these daily health and safety meetings are effective in reinforcing the concepts presented in the HASP, and helping employees focused on keeping themselves and other safe as they perform the work.

UTC/P&W Rocketdyne may exercise its right to remove any employee of BBLES, its subcontractors or suppliers from the work site if, in UTC/P&W Rocketdyne's reasonable judgment, said employee shall fail to adhere to or comply with safety requirements expressed in this Health & Safety Plan or violate any applicable OSHA requirement. Said employee shall not be allowed to return to the work site without UTC/P&W Rocketdyne's prior consent.

2.3 Stop Work Authority

Every BBLES employee and subcontractor at the site has the responsibility and expectation to stop the work of another co-worker if the working conditions or behaviors are considered unsafe.

If work conditions change from the intended scope or activities that were not originally covered in the Work Permit, Sampling and Analysis Plan (SAP) or other work instructions work must stop and be reassessed. A new work permit and supporting documentation (JSA, Sampling Procedures, Decontamination, Standard Operating Procedures (SOPs), etc.) must be completed to cover the new conditions or activities. The following language will be inserted into all SAP and work instruction documents to enforce the requirement to stop work when conditions change.

"Warning: Stop work and depart the work area if known, documented and communicated conditions change, or work activities deviate from the established and approved written procedures"

2.4 Short Service Employees Program

Recognizing that employees who are new to the Firm are at a greater risk for incidents, the following guidelines are established to identify those employees and ease their transition. Short Service Employees (SSEs) will have an assigned field mentor to assist them in adjusting to the project requirements and procedures. SSEs will be identified in the field by wearing an orange hardhat or baseball-type cap.

- BBL employees new to the industry and new to BBLES will be designated SSEs for 6 months; and
- BBL employees experienced in the industry but new to BBLES will be designated SSEs for 3-months.

Additionally, the following apply:

- a crew of 2-3 may have 1 SSE onsite;
- a crew of 5 may have 1 or 2 SSEs onsite; and
- a crew of 10 or more may have no more than 3 SSEs onsite.

TABLE 2-1
BBL ENVIRONMENTAL SERVICES, INC. (BBLES)
KEY PERSONNEL

Name	Role	Telephone	Email	Responsibilities
Rick DiFiore	Project Sponsor	315-446-9120	rpd@bbl-inc.com	Resource Authorization and Commitment to Client
Kathy Lukasiewicz	Principal in Charge	561-792-5980	kl@bbl-inc.com	Contract Matters/Overall Client Responsibility
Fred Kirschenheiter	Decommissioning Project Officer	315-446-9120	fjk@bbl-inc.com	Primary Technical Client Communication
Dave Gerber	Environmental Programs Project Manager	315-446-9120	drg@bbl-inc.com	Primary Technical Client Communication
Patrick Keller, CHMM	Decommissioning Project Manager	408-776-5781 720-480-8223	pck@bbl-inc.com	Primary Onsite PM
Tony Parenteau, REA	OMM Project & Manager Resource Manager	714-814-9191 949-474-9052 x15	atp@bbl-inc.com	BBLES Construction Coordinator/Resource Application Responsibility (Backup Onsite PM)
Jay Keough, C.I.H.	Health and Safety Officer	609-860-0590 x100 908-492-5674	jdk@bbl-inc.com	BBLES Health and Safety Officer
Greg Ertel, C.I.H., C.S.P.	Health and Safety Manager	408-776-5913 585-303-0633 585-385-0090 x25	gne@bbl-inc.com	Project H&S Liaison/H&S Manager
Lisa Kellogg	SCR Project Manager	951-677-0577	lkellogg@bbl-inc.com	SCR Programs Project Manager
Rebecca Lindeman, P.E.	Project Manager	408-834-0368 303-231-9115x123	rdl@bbl-inc.com	Environmental Programs Project Manager
Matt Nicely	OMM Project Manager	408-446-5742	mnicely@bbl-inc.com	OMM Project Manager
Lauri Yusko	Project Manager	720-273-8533 303-231-9115x124	lay@bbl-inc.com	Sampling Plan Preparation; Subcontractor Management
George Cebula	Project Manager	315-446-2570x429	gjc@bbl-inc.com	D&D Documents/Subcontractor Management
Steve Camp	Onsite Health and Safety Manager	408-776-4646	scamp@bbl-inc.com	Project H&S Liaison
Aaron Waters	Health and Safety Supervisor	408-776-5226	awaters@bblinc.com	Project H&S Liaison

BBLES' SUBCONTRACTOR/SUBCONSULTANTS

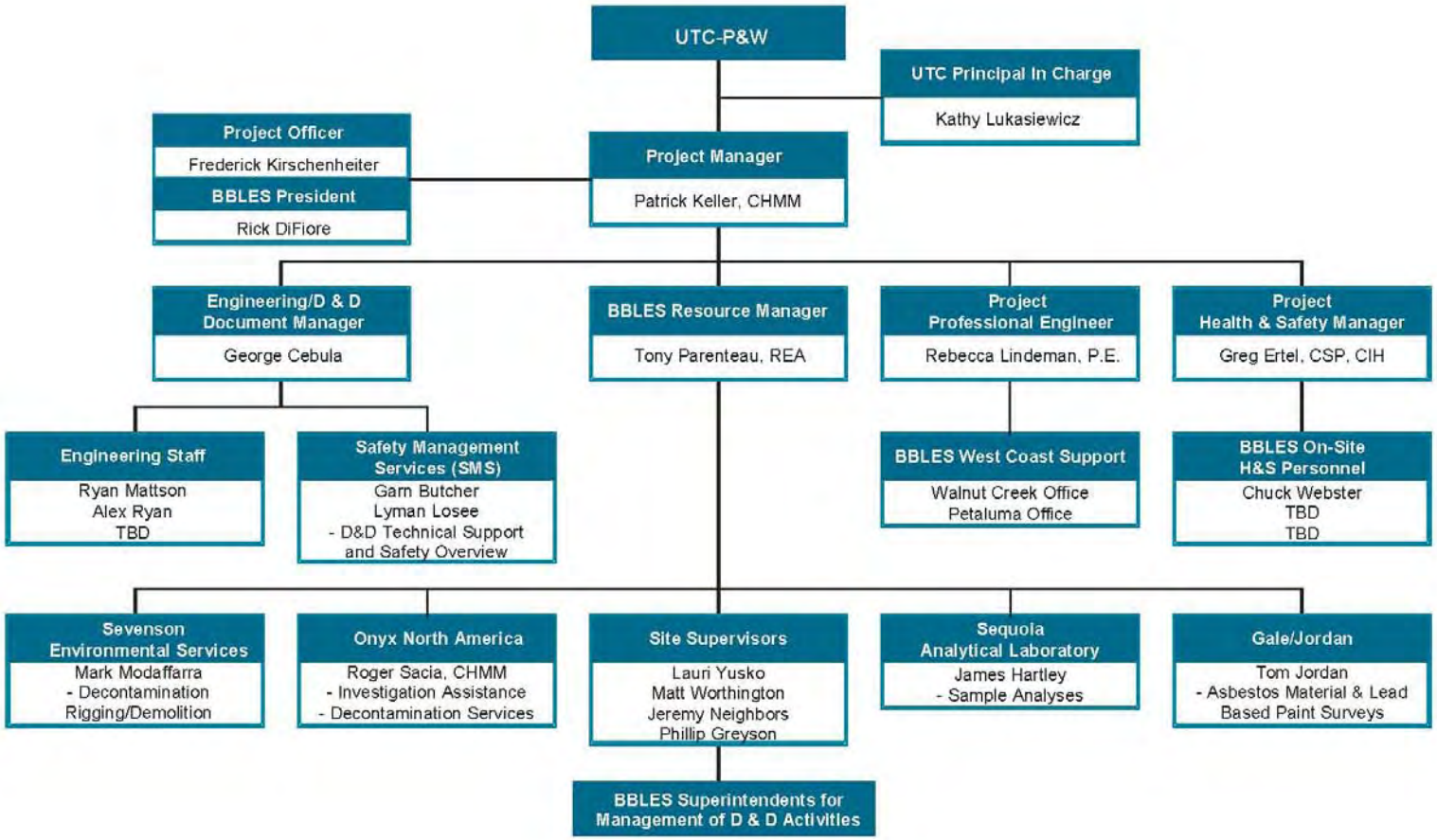
Subcontractor	Description of Services	Contacts		Phone/Fax/E-mail
Safety Management Services, Inc.	Consultants for explosive material assessment safety and decontamination	PM	Garn Butcher	801-567-0456 Phone 801-567-0457 Fax gbutcher@sms-inc.com lalosee@xmission.com
		HSS	Lymon Losee	
		HSO	Brian Wright	
		SS	Gary Dodds	
Onyx Special Services, Inc.	Sampling assistance and explosive decontamination.	PM	Roger Sacia	262-236-8130 (Roger) resacia@onyxsp.com 920-427-6920 (Chris) chohol@onyxsp.com 262-236-8140 (fax)
		HSS	Charles Ossant	
		HSO	Chris Hohol	
		SS	Roger Sacia	
Sevenson	Rigging during decontamination and demolition	PM	John DiMiceli	562-884-3320 (John) john.dimiceli@verizon.net 909-741-2757 (Mark) 716-284-7645 (Alan) ARElia@sevenson.com
		HSO/SS	Mark Modafarra	
		HSS	Paul Hitcho	

Subcontractor	Description of Services	Contacts		Phone/Fax/E-mail
Gale/Jordan	Asbestos and lead-based paint.	PM/HSS/SS	Bob Gearhold	310-316-4377
		HSO	Michael Ridosh, CIH	tjordan@galejordan.com 310-316-4558 (fax)
ALG	Air Permitting Consultant Services	PM/HSS/SS/ HSO	Jayme Anderson	805-370-1472 janderson@algcorp.com

UTC/P&W ROCKETDYNE SPACE PROPULSION KEY PERSONNEL

Contact Name	Role	Telephone	Email	Responsibilities
UTC/P&W Rocketdyne Decommissioning Team				
Mark Mounsey	General Manager	408-776-5402	mounseym@csd.com	Facility General Manager
Marilyn Cassady	Site Manager	408-776-4593	cassady@csd.com	Primary contact for BBLES work product transfer
Al McKenzie	Decommissioning Project Manager	408-776-5539	mckenzie@csd.com	Management of Project activities support to project; review and authority on safety and project scope issues
Joe McKean	Safety Manager	408-776-4262	mckean@csd.com	Safety department liaison
Timothy Marker	Environmental Engineering Supervisor	408-776-6040	marker@csd.com	Project coordinator; document review; waste management director
Frank Thomas	Facilities Telecommunications Manager	408-776-5542	thomasf@csd.com	Facility infrastructure support
Dan Lopez	Emergency Services Manager	408-776-4430	lopezd@csd.com	Emergency services manager
Leonard Orton	Security Lead	408-776-6018	Orton@csd.com	Security
Loren Cantrell	Purchasing Manager	408-776-5816	Cantrell@csd.com	Purchasing

FIGURE 2-1
BBLES DECOMMISIONING PROJECT ORGANIZATION CHART



3. Project Hazards and Control Measures

3.1 Scope of Work

Site activities for Project A, B, C, D, E building assessment will include:

- Mobilization;
- Wipe sampling of equipment/building material surfaces and bulk sampling of residues/material for one or more of the following explosive analytes [perchlorate, nitrocellulose, explosives (EPA Method 8330), nitroglycerine (NG), and other energetic compounds];
- Coring through concrete floors (and other porous material) and collecting other building material and bulk samples for explosive analyses;
- Asbestos and lead-based paint sampling;
- Decontamination and/or disassembly of process equipment;
- Decontamination of facilities and equipment;
- Demolition of selected structures; and
- Demobilization.

Site activities for the OMM and Environmental assessment will include:

- Review of current OMM procedures and specifications
- Inspection of existing environmental treatment system equipment and structures
- Operation, maintenance and monitoring of environmental treatment systems
- Environmental assessment and sampling;
    - Surface water sampling and assessment
    - Groundwater sampling
    - Subsurface sampling (geoprobe and drilling)
    - Surface soil composting
- Site assessment and characterization/data collection in support of environmental permitting compliance
- Handling regulated materials in preparation for shipment, removal or disposal

Site activities for the Emergency Response Services will include:

- Isolation and entry control during hazardous materials (hazmat) response incidents
- Assess the incident, identify materials and formulate appropriate response strategy
- Collect and analyze samples as necessary
- Contain and control spilled materials
- Perform clean-up
- Assess level of contamination
- Perform appropriate decontamination procedures
- Characterize waste materials for disposal
- Document incident and complete required notifications

3.2 Field Activities, Hazards, and Control Procedures

The following activity specific analyses identify potential health, safety, and environmental hazards and controls associated with each type of field activity. Completed JSAs for site activities are referenced as Attachment A and are maintained in the project files. JSAs will be reviewed as necessary in order to verify that work activities, hazards and critical actions are current and reflect the planned scope of work. In addition to the JSAs, work instructions for each activity, such as Sampling and Analysis Plans (SAP), Decontamination Plans and Standard Operating Procedures must be prepared and reviewed by health and safety prior to implementation at the site. Due to the complex and changing nature of field projects, the SS must inspect the site to identify hazards that may affect on-site personnel, the community, or the environment. The SS must be aware of any change in conditions or work activities not covered by this HASP or the Station Specific Work Permit. IF CONDITIONS CHANGE OR UNEXPECTED WORK ACTIVITIES ARE REQUIRED, WORK MUST STOP IMMEDIATELY. The SS must discuss all changes with the PM and HSO to develop procedures and controls for the change in conditions. A new Station Specific Work Permit must be completed and approved. The SS will keep on-site personnel informed of the changing conditions, and the PM will write and/or approve addenda or revisions to this HASP as necessary. Additional or

revised JSA's will address changes in site conditions or any non-standard work activities. JSAs and work instructions will be reviewed with affected employees prior to implementation.

3.2.1 Explosive Hazards

Explosive residues such as AP, NG, HMX, and RDX may be present in some manufacturing buildings and potentially throughout the site. Items that may contain these energetic materials include:

- Vacuum filters;
- Porous building materials;
- Equipment/items with light to dark brown crystals and residue; and
- Items with white crystals and residue.

Hazards – The hazards associated with explosives in residual and bulk quantities include ignition, mass fire and detonation with fragments and over-pressure. Ignition or detonation can occur via an input of threshold energy into explosive materials.

A summary of energetic/explosive materials found at the site and their physical properties and hazard characteristics is presented below:

Summary of Energetic Material Properties

		FORM	COLOR	ODOR	INHALATION HAZARD?	INCOMPATIBLE WITH:	SENSITIVE TO:			EXPECTED EFFECT:		REMOVAL OR DESENSITIZATION: CLEANING SOLVENT
							IMPACT	FRICTION	ESD[1]	CONFINED	UNCONFINED	
Fuel	Al (Aluminum)	Powder	Gray	Odorless	No	Water, Oxidizers	No	No	Yes	No	Explosive hazard as a fine dust	Clean dry or with large amounts of water
Oxidizer	AP	Powder (Crystals or Flour)	White	Odorless	No	Acids	Yes	Yes	Yes	Explodes	Flash	Will dissolve in water
	ADN	Powder	White	Unknown	Unknown, avoid	Acids	Yes	Yes	Yes	Detonates	Explode or detonate if 1/8 inch thick or greater	Soap and water, will dissolve in water
Nitramine	HMX	Powder (Flour)	White	Methanol	if airborne	Acids/Alkalis/ Sunlight (may destabilize)	Yes	Yes	Yes	Detonates	Explode or detonate if 1/8 inch thick or greater	Water (HMX will not dissolve in water)
	RDX	Powder (Sugar)	Off-white	Odorless	if airborne	Acids/Alkalis/ Sensitizers (glass, sand, metal fragments)	Yes	Yes	Yes	Detonates	Explode or detonate if 1/8 inch thick or greater	Water (RDX will not dissolve in water)
	CL20	Powder (sugar or flour)	White		Unknown, avoid	Acids/Alkalis Ethylene glycol	Yes	Yes	Yes	Detonates	Detonate if .1 inch thick or greater	Water (CL20 will not dissolve in water)
Nitrate Ester	NG	Liquid, oily	Clear to yellow	Sweet	Yes	Strong acids Ozone	Yes	Yes	Yes	Detonates	Detonate if .05 inch thick or greater	Soap and Water scrub or Triacitin followed by soap and water scrub. NG killer only on trace amounts
	Nitrocellulose	powder or fibrous	White to off-white	None	Yes	Strong acids Ozone	Yes	Yes	Yes	Detonates	Burns in small quantities	Soap and Water scrub or Triacitin followed by soap and water scrub
	PETN	Powder or solid	Cream	methanol	Unknown, avoid	Copper, zinc, brass, nickel, cadmium, strong acids, alkalis, and oxidizers	Highly	Yes	Yes	Detonates	Detonates	Soap and water, Triacitin
Azide	Lead Azide	Crystalline	Cream	None	If airborne	Acids, copper, zinc, silver, and brass	Highly	Highly	Highly	Detonates	Detonates	Water, but do not store wet with impurities in water. Do not expose to copper, zinc, or alloys containing these materials

		FORM	COLOR	ODOR	INHALATION HAZARD?	INCOMPATIBLE WITH:	SENSITIVE TO:			EXPECTED EFFECT:		REMOVAL OR DESENSITIZATION: CLEANING SOLVENT
							IMPACT	FRICTION	ESD[1]	CONFINED	UNCONFINED	
Various	Composite Propellant	Solid rubbery in cast form, may be in splash or smears	Grey, Brown, Rush, other		If airborne	Strong acids or bases	Yes	Yes	Yes	Explodes	Burns	Desensitize by wetting with water, can use vegetable oil for longer storage
	Energetic Binder Propellant	Solid rubbery in cast form, may be in splash or smears	Green-grey, other		If airborne	Acids, Alkylines	Yes	Yes	Yes	Explodes	Burns	Desensitize by wetting with water, can use vegetable oil for longer storage
	Deposit of unknown composition	Crusty deposits	any color		Unknown, avoid	Acids/Alkalis/ Sensitizers (glass, sand, metal fragments)	Yes	Yes	Yes	May explode	May burn or explode	Desensitize surface by wetting may require treatment by special solvent or chemical compounds

Notes:
[1]ESD – Electrical Static Discharge; release of electrical charge in form of spark may ignite energetic materials.

Control - Items with any of the listed characteristics must be handled with extreme caution. Desensitization and decontamination of residual explosive materials will be conducted as necessary to perform the scope of work and as part of decontamination to support decommissioning and demolition. Water will be used as the primary control for initial sampling and decontamination activities. Water use provides a known method to dissipate heat from friction, reduce flammability and reduce the chance of electrostatic discharge. Application of water may result in displacement of explosive or energetic materials. To reduce significant movement or displacement of energetic materials during application of water an explosive proof vacuum, absorbent towel or approved method that is compatible with the location will be used to collect accumulated water. Water applied with a spray bottle during limited disassembly operations is not expected to result in a significant amount of displacement of energetic material and will not be collected unless required in the station-specific work instructions. Decontamination efforts can include several techniques to safely mitigate the presence of hazardous levels of explosive materials. Prior to implementation of any decontamination techniques a detailed station specific sampling plan will be prepared and reviewed with SMS and BBLES health and safety.

An explosion-proof HEPA (high efficiency particulate air) vacuum or water-wet paper towels will be used to remove AP residue. This vacuum will be equipped with static-dissipating components and anti-static bags in the canister. In general, AP residue will be removed from the vacuum canister in the static bags and packaged for disposal. Residual NG removal techniques are detailed below in section 3.2.1.1. HMX and RDX removal techniques are similar, but involve the use of organic solvents instead of water. Detailed specifications and operating instructions for the “Tiger Vac” explosive-rated HEPA vacuum are on file, have been reviewed and will be followed by affected employees. Detailed instructions on the application and use of organic solvents for HMX and RDX decontamination will be prepared in the station-specific sampling and decontamination plans.

Additional methods for decontamination are outlined in the following sections. These and other methods will be further outlined in decontamination plans to be developed during program implementation.

3.2.1.1 Nitroglycerine Abatement

A mixture of water, ethanol, acetone, and sodium sulfide (also known as NG killer) may be used to abate previously identified areas that are contaminated with nitroglycerine. The mixture will be applied using a spray bottle; it will sit for approximately 4-hours or overnight. The NG killer should evaporate.

Procedurally, the NG Killer is applied with a spray bottle to a suspect location where NG may be present in very minor residual quantities and allowed to penetrate for a 4-hours or overnight. NG Killer must not be applied where it is suspected that any significant quantity of NG is present due to the risk of ignition in a confined area from buildup of excess heat during the decomposition reaction.

One of the bi-products of this process is gaseous hydrogen sulfide. Hydrogen sulfide levels will be measured in accordance with Section 6 Air Monitoring. If air monitoring equipment is unavailable or if levels area above exposure limits, then Level B PPE will be donned. Because hydrogen sulfide is an olfactory inhibitor, air-purifying respirators are inappropriate for respiratory protection. Due to the potential for accumulation of hazardous levels of hydrogen sulfide at various levels in a room or building, adequate ventilation will be provided and employees will conduct air monitoring at breathing zone, waist and knee level to properly characterize potential exposures.

Following the sampling of buildings suspected to contain NG (or similar compounds), the concentration of NG and similar compounds will be known and decisions regarding the need for decontamination to achieve HM Permit Closures or to mitigate explosives risk will be made. At that point, if a thermal treatment approach is needed a separate HASP addendum will be prepared related to thermal treatment.

3.2.1.2 Thermal Treatment

Thermal treatment of contaminated equipment and structures may be used as a decontamination method. Thermal treatment of contaminant residues results in the chemical breakdown and off-gassing of explosive compounds and associated breakdown products. A specific method of thermal treatment

will be designed to meet the objectives of the contaminated areas. Potential methods to be used may include hot gas application, both in situ and ex situ, and open burning with excess, remotely-ignited combustible material.

Task-specific work instructions will be prepared prior to implementation of any decontamination method. All decontamination methods will be reviewed and approved by SMS and BBLES health and safety prior to implementation. All effected employees will be trained on work instructions prior to implementation.

3.2.2 UTC/P&W Rocketdyne Site Access Requirements

The facility consists of an Inert Area and Limited Access Area. The Inert Area contains office and other support facilities. The Live Area contains those facilities involved with the propulsion systems. Leave all matches, lighters, or other flame producing devices at the Match Station when entering the Limited Access Area. UTC/P&W Rocketdyne procedures for accessing buildings should be followed during site activities. All vehicles must pull over when a red flagged vehicle approaches (carrying explosives).

Prior to working at the site all employees will be required to meet all UTC/P&W Rocketdyne and BBLES training requirements. A list of personnel, completed training, and work activity authorization will be maintained by BBLES health and safety.

The following protocol will be utilized to monitor access to buildings for all D3 project activities:

This protocol is to be used when site access cannot be controlled by an individual at the site access point. Upon arrival to a work station and prior to starting work, the following shall be implemented:

Step1. Notify UTC/P&W Rocketdyne Security with work location and number of personnel to be present at the station immediately upon arrival to the site.

Step 2. Stanchions or similar stands, safety cones, caution tape, or other suitable guards shall be placed prior to the station access point to control access to the station. (note: vehicles must not be used as barricades for site access control. Egress and/or access by emergency vehicles and personnel shall not be restricted).

Step 3. Signage shall be attached to the chain, caution tape, or similar product that reads: STOP ACCESS RESTRICTED USE RADIO TO CONTACT BBLES insert radio call ID. (see below)

ACCESS RESTRICTED
USE RADIO TO CONTACT
BBLES Bravo ***

PPE requirements for site access will be addressed at the work site prior to signing in

Step 4. Any personnel accessing the site must have the proper PPE or they will be denied access. The proper PPE requirements for the site will be explained to the visitor(s) prior to signing in on the site sign in log. Vehicles at the site must be parked out of egress paths and pointed in the direction of egress.

Step 5. If outside personnel are accessing the worksite, hazardous operations such as limited disassembly, coring, etc. shall be stopped until the visitor(s) leave the worksite. Other operations taking place will be reviewed on a case by case basis to determine if the work can continue or be stopped until the visitor(s) leave the worksite.

Step 6. Entry by unauthorized visitors will result in a work stoppage.

Step 7. When leaving the worksite (i.e. break, lunch, task completed), a BBLES member shall notify UTC/P&W Rocketdyne Security that operations have been stopped and the number of personnel leaving the site. If work has not been completed, leave the barrier and signage up to maintain site access control.

Step 8. Remove barrier and signage upon completion of work activities.

3.2.3 Wipe Sampling & Field Screening

This task involves sampling numerous surfaces for the presence of Ammonium perchlorate (AP), Cyclotetramethylenetetranitramine (HMX), cyclonite (RDX), nitroglycerin (NG) and nitrocellulose. Wipe sample collection typically involves taking a medium, such as a cotton swab or cloth, moistening it with a solvent, and wiping a surface area. This material is then analyzed using a field screening kit, or packaged and sent to a laboratory for analyses.

Hazards – The primary hazard for this activity is potential ignition, fire or explosion of energetic or explosive materials.

Chemical hazards are related to surfaces potentially impacted with AP, HMX, RDX, and Nitroglycerine. The level of impact is expected to be relatively low, presenting a low level of dermal hazard. Exposure is possible during sampling due to the manipulation of sample media and equipment, manual transfer of media into sample containers, and potential exposure to laboratory preservatives. There exists the potential of ignition by the various energetic materials that may be encountered.

The primary physical hazards associated with this activity are accessing the buildings and ergonomic hazards. The examination and sampling will involve stooping, squatting, and other static body positions. Other physical hazards include strains/sprains and potential eye hazards. Personnel in the buildings may be exposed to physical hazards resulting in fractures, contusions, and lacerations.

If significant quantities of suspect material are encountered, the approach must be reevaluated and additional safety precautions identified. A significant quantity of NG is defined as a quantity sufficient to produce an oily or sticky surface, thin layer, puddle, or greater quantities, and/or any reading detected with an Organic Vapor instrument unless you can confirm it is not NG vapors. A significant quantity of NG is defined by the amount needed to propagate an initiation.

The work areas present slip, trip, and fall hazards from scattered debris and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces, and unstable structure.

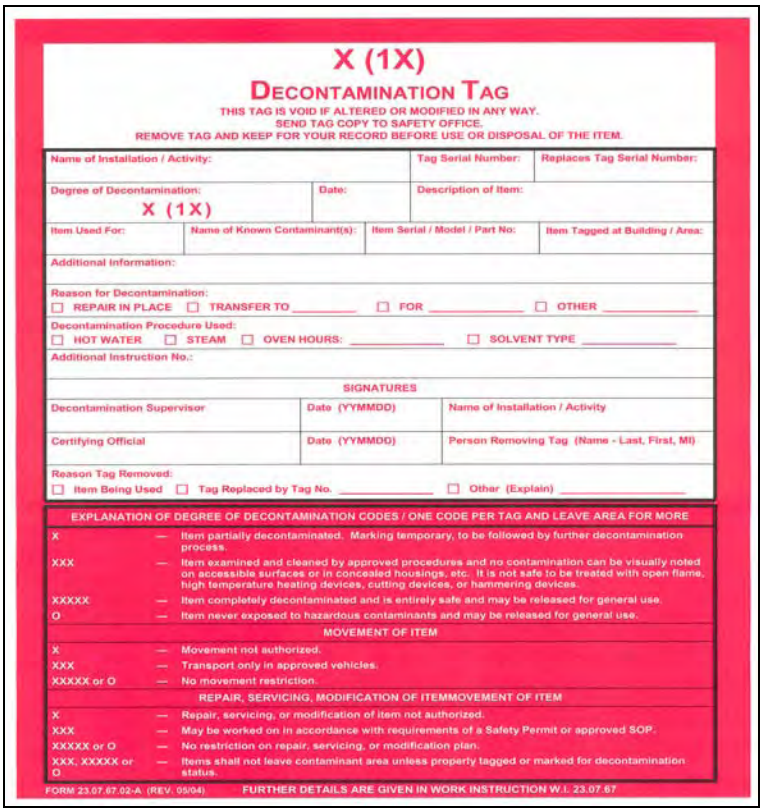
Other hazards include heat-related illnesses and blood-borne pathogens.

Control – Stations will be cleared by station owners and a work permit processed prior to any entry or sampling activities. BBLES will have the minimum number of people required to complete the task in the building during sampling operations. The chemical hazard will be controlled by wearing Nomex® coveralls, protective boot covers, and PVC gloves. If the sampling surface has burred or has rough edges a glove with cut or tear resistance may be necessary. Wipe samples will be conducted on visually clean surfaces, limiting the amount of material encountered. To relieve ergonomic stressors, the samplers will rotate sampling duties and switch sampling hands.

3.2.3.1 Equipment Disposition and Tagging

Based on the results of sampling and assessment activities equipment and building structures will be categorized according to the following Department of Defense (DOD) explosive residue classification system:

1X Decontamination Tag – (Red Tag):



X (1X)

DECONTAMINATION TAG

THIS TAG IS VOID IF ALTERED OR MODIFIED IN ANY WAY.
SEND TAG COPY TO SAFETY OFFICE.
REMOVE TAG AND KEEP FOR YOUR RECORD BEFORE USE OR DISPOSAL OF THE ITEM.

Name of Installation / Activity:		Tag Serial Number:	Replaces Tag Serial Number:
Degree of Decontamination: X (1X)	Date:	Description of Item:	
Item Used For:	Name of Known Contaminant(s):	Item Serial / Model / Part No:	Item Tagged at Building / Area:

Additional Information:

Reason for Decontamination:
☐ REPAIR IN PLACE ☐ TRANSFER TO _____ ☐ FOR _____ ☐ OTHER _____

Decontamination Procedure Used:
☐ HOT WATER ☐ STEAM ☐ OVEN HOURS: _____ ☐ SOLVENT TYPE _____

Additional Instruction No.:

SIGNATURES

Decontamination Supervisor	Date (YYMMDD)	Name of Installation / Activity
Certifying Official	Date (YYMMDD)	Person Removing Tag (Name - Last, First, MI)

Reason Tag Removed:
☐ Item Being Used ☐ Tag Replaced by Tag No. _____ ☐ Other (Explain) _____

EXPLANATION OF DEGREE OF DECONTAMINATION CODES / ONE CODE PER TAG AND LEAVE AREA FOR MORE

X	—	Item partially decontaminated. Marking temporary, to be followed by further decontamination process.
XXX	—	Item examined and cleaned by approved procedures and no contamination can be visually noted on accessible surfaces or in concealed housings, etc. It is not safe to be treated with open flame, high temperature heating devices, cutting devices, or hammering devices.
XXXXX	—	Item completely decontaminated and is entirely safe and may be released for general use.
O	—	Item never exposed to hazardous contaminants and may be released for general use.

MOVEMENT OF ITEM

X	—	Movement not authorized.
XXX	—	Transport only in approved vehicles.
XXXXX or O	—	No movement restriction.

REPAIR, SERVICING, MODIFICATION OF ITEMMOVEMENT OF ITEM

X	—	Repair, servicing, or modification of item not authorized.
XXX	—	May be worked on in accordance with requirements of a Safety Permit or approved SOP.
XXXXX or O	—	No restriction on repair, servicing, or modification plan.
XXX, XXXXX or O	—	Items shall not leave contaminant area unless properly tagged or marked for decontamination status.

FORM 23.07.67.02-A (REV. 05/04) FURTHER DETAILS ARE GIVEN IN WORK INSTRUCTION W.I. 23.07.67

3X Decontamination Tag – (Yellow Tag):

XXX (3X)

DECONTAMINATION TAG

THIS TAG IS VOID IF ALTERED OR MODIFIED IN ANY WAY.
SEND TAG COPY TO SAFETY OFFICE.
REMOVE TAG AND KEEP FOR YOUR RECORD BEFORE USE OR DISPOSAL OF THE ITEM.

Name of Installation / Activity:		Tag Serial Number:	Replaces Tag Serial Number:
Degree of Decontamination: XXX (3X)	Date:	Description of Item:	
Item Used For:	Name of Known Contaminant(s):	Item Serial / Model / Part No:	Item Tagged at Building / Area:

Additional Information:

Reason for Decontamination:
☐ REPAIR IN PLACE ☐ TRANSFER TO _____ ☐ FOR _____ ☐ OTHER _____

Decontamination Procedure Used:
☐ HOT WATER ☐ STEAM ☐ OVEN HOURS: _____ ☐ SOLVENT TYPE _____

Additional Instruction No.:

SIGNATURES

Decontamination Supervisor	Date (YYMMDD)	Name of Installation / Activity
Certifying Official	Date (YYMMDD)	Person Removing Tag (Name - Last, First, MI)

Reason Tag Removed:
☐ Item Being Used ☐ Tag Replaced by Tag No. _____ ☐ Other (Explain) _____

EXPLANATION OF DEGREE OF DECONTAMINATION CODES / ONE CODE PER TAG AND LEAVE AREA FOR MORE

X	—	Item partially decontaminated. Marking temporary, to be followed by further decontamination process.
XXX	—	Item examined and cleaned by approved procedures and no contamination can be visually noted on accessible surfaces or in concealed housings, etc. It is not safe to be treated with open flame, high temperature heating devices, cutting devices, or hammering devices.
XXXXX	—	Item completely decontaminated and is entirely safe and may be released for general use.
O	—	Item never exposed to hazardous contaminants and may be released for general use.

MOVEMENT OF ITEM

X	—	Movement not authorized.
XXX	—	Transport only in approved vehicles.
XXXXX or O	—	No movement restriction.

REPAIR, SERVICING, MODIFICATION OF ITEMMOVEMENT OF ITEM

X	—	Repair, servicing, or modification of item not authorized.
XXX	—	May be worked on in accordance with requirements of a Safety Permit or approved SOP.
XXXXX or O	—	No restriction on repair, servicing, or modification plan.
XXX, XXXXX or O	—	Items shall not leave contaminant area unless properly tagged or marked for decontamination status.

FORM 23.07.67.02-B (REV. 05/04) FURTHER DETAILS ARE GIVEN IN WORK INSTRUCTION W.I. 23.07.67

5X Decontamination Tag – (Green Tag):

XXXXX (5X)

DECONTAMINATION TAG

THIS TAG IS VOID IF ALTERED OR MODIFIED IN ANY WAY.
SEND TAG COPY TO SAFETY OFFICE.
REMOVE TAG AND KEEP FOR YOUR RECORD BEFORE USE OR DISPOSAL OF THE ITEM.

Name of Installation / Activity:		Tag Serial Number:	Replaces Tag Serial Number:
Degree of Decontamination: XXXXX (5X)	Date:	Description of Item:	
Item Used For:	Name of Known Contaminant(s):	Item Serial / Model / Part No:	Item Tagged at Building / Area:

Additional Information:

Reason for Decontamination:
☐ REPAIR IN PLACE ☐ TRANSFER TO _____ ☐ FOR _____ ☐ OTHER _____

Decontamination Procedure Used:
☐ HOT WATER ☐ STEAM ☐ OVEN HOURS: _____ ☐ SOLVENT TYPE _____

Additional Instruction No.:

SIGNATURES

Decontamination Supervisor	Date (YYMMDD)	Name of Installation / Activity
Certifying Official	Date (YYMMDD)	Person Removing Tag (Name - Last, First, MI)

Reason Tag Removed:
☐ Item Being Used ☐ Tag Replaced by Tag No. _____ ☐ Other (Explain) _____

EXPLANATION OF DEGREE OF DECONTAMINATION CODES / ONE CODE PER TAG AND LEAVE AREA FOR MORE

X	—	Item partially decontaminated. Marking temporary, to be followed by further decontamination process.
XXX	—	Item examined and cleaned by approved procedures and no contamination can be visually noted on accessible surfaces or in concealed housings, etc. It is not safe to be treated with open flame, high temperature heating devices, cutting devices, or hammering devices.
XXXXX	—	Item completely decontaminated and is entirely safe and may be released for general use.
O	—	Item never exposed to hazardous contaminants and may be released for general use.

MOVEMENT OF ITEM

X	—	Movement not authorized.
XXX	—	Transport only in approved vehicles.
XXXXX or O	—	No movement restriction.

REPAIR, SERVICING, MODIFICATION OF ITEMMOVEMENT OF ITEM

X	—	Repair, servicing, or modification of item not authorized.
XXX	—	May be worked on in accordance with requirements of a Safety Permit or approved SOP.
XXXXX or O	—	No restriction on repair, servicing, or modification plan.
XXX, XXXXX or O	—	Items shall not leave contaminant area unless properly tagged or marked for decontamination status.

FORM 23.07.67.02-C (REV. 05/04) FURTHER DETAILS ARE GIVEN IN WORK INSTRUCTION W.I. 23.07.67

All employees involved in building assessment and sampling activities will be trained on the rating system and the meaning of these tags. Only trained and authorized personnel (SMS) will apply tags.

3.2.4 Concrete Coring

Concrete coring consists of the collection of a cylindrical piece of concrete flooring or wall material that represents the depth of the material. Cores are typically "cut" using a hollow/round diamond bit drill to remove a concrete core from the building material.

Hazards – The primary hazards for concrete coring including potential reaction with energetic materials, exposure to high noise levels, moving equipment, heavy lifting and potential exposure to

dust and contaminated water. Working with heavy equipment and changing blades will present an ergonomic and laceration hazard.

Control – A Hot Work Permit must be completed and approved prior to initiating concrete coring. Prior to any coring activities the surface should be free of bulk energetic materials; if energetic materials are to expected be present, the area should be decontaminated in accordance with Section 3.2.6 Explosive Hazards. During coring activities, the area should be wetted to reduce the possibility of detonation, fires and dust. Concrete coring may also be performed as an unattended or remote activity if potential hazards warrant it. Dust generation will be kept to a minimum through use of wet methods. BBLES will have the minimum number of people required to complete the task in the building during sampling operations. All equipment must be inspected for defects prior to operation and removed from operation if safety deficiencies are noted. Only trained and qualified employees will operate coring equipment. Modified Level D Personal Protective Equipment (PPE) with hearing protection will be donned in accordance with Section 5 Personal Protective Equipment. Leather work gloves will be used when handling the blade or other objects that present a laceration hazard.

3.2.5 Sampling of Potential Asbestos-Containing Materials

This task involves collecting samples of building materials for subsequent analysis and evaluation of potential Asbestos content.

Hazards - Exposure to Asbestos Containing Material (ACM) can cause asbestosis, lung cancer, mesothelioma, and cancers of the esophagus and digestive system. Asbestos abatement activities may cause blisters, sore muscles, and joint and skeletal injuries; and may present eye, contusion, and laceration hazards. Personnel may be exposed to electrical hazards and physical injury due to the manual lifting and moving of materials. The work area may present slip, trip, and fall hazards from scattered debris, irregular walking surfaces, or elevated work. Asbestos abatement activities may also expose personnel to heat related illnesses.

Control – After explosive residue issues are addressed, including inspection and field characterization of surface residues, asbestos sampling (and subsequent abatement) shall be done in strict accordance with California and associated federal regulations. The asbestos supervisor shall be a Certified Asbestos Consultant (CAC) or Certified Site Surveillance Technician (SST) and remain on-site during all asbestos sampling and abatement activities. In accordance with state regulations, asbestos removal personnel shall be trained and hold a current State Contractor License and Asbestos Abatement Contractor Certification.

3.2.6 Building and Equipment Decommissioning and Disassembly

Equipment disassembly may be required for decontamination or decommissioning purposes. Prior to disassembly, the equipment will be decontaminated as needed. UTC/P&W Rocketdyne personnel or other qualified individuals must be consulted prior to the disassembly of any equipment. BBLES will follow a "clean as you go" procedure during the disassembly of any equipment.

Hazards - The primary hazard for this activity is potential ignition, fire or explosion of energetic or explosive materials.

Hazards may be associated with the equipment to be disassembled, tools and equipment utilized, or the dismantlement and removal activities themselves. BBLES requires subcontractors to address all physical and health hazards presented by the dismantlement, removal, and decommissioning activities (hereafter collectively know as decommissioning activities) in accordance with 29 CFR 1926, DOD Guidance. All equipment disassembly procedures must be reviewed and prepared approved by SMS.

The physical hazards involved with decontamination or decommissioning activities relate to the work conducted with heavy equipment, hand and power tools, and the decontamination or decommissioning environment itself. During decontamination and decommissioning related activities there exists a potential for incidents involving personnel being struck by or against equipment or materials, which may result in fractures, lacerations, punctures, and abrasions. Walking and working surfaces during decommissioning activities may present slip, trip, or fall hazards. Slippery surfaces can increase the

likelihood of slips and falls in addition to back and overexertion injuries. Hot work activities such as cutting and welding may present the risk of a fire or explosion hazard. Overhead hazards such as electrical conduit or process piping may be present due to elevated work.

Decommissioning activities pose the potential for personnel being struck by debris and objects associated with the decommissioning activities and the equipment being used. Improper planning and work practices may place employees in unsafe situations that may result in serious injury or death.

Operations on elevated surfaces (roofs, catwalks, mezzanines, etc.) may expose workers to falls if not utilizing the proper fall protection system. Work from ladders, scaffolding, and aerial lifts also exposes employees to fall hazards and injuries should the equipment be used improperly or employees are not trained in the equipment's safe use.

Electricity may pose a hazard to employees during the use of portable electrical equipment and lead cords. Sources of energy that are not locked out and/or tagged out expose personnel to various forms of energy (electrical, mechanical, high pressure, etc.) that could be hazardous during the performance of decommissioning tasks.

Additionally, employees installing temporary and permanent wiring are exposed to electrical hazards if proper precautions and procedures are not followed, or inexperienced or unqualified personnel conduct the work.

Improper operation of heavy equipment (forklifts, front end loaders, aerial lifts, cranes, etc.) may result in personnel being struck by the equipment or loads being handled, resulting in contusions, fractures, and lacerations. Personnel may be injured and equipment damaged if it is not used for the purpose intended, overloaded, or used improperly by inexperienced or unauthorized individuals. Loads being lifted by cranes may shift causing them to fall and strike personnel causing serious injury or death.

Due to the type of work involved in many decommissioning activities, the primary health hazards involve repetitive motion, lifting, and other ergonomic disorders. Noise may also present a hazard to

employees exposed to high decibel levels. Operation of heavy equipment, power tools, pneumatic tools, and powder actuated tools often result in high noise levels. Exposure to decommissioning materials that may release harmful vapors during their use and curing periods are also possible. Personnel may be exposed to hazardous or toxic vapors created during hot work activities.

Control – The sampling JSA will be reviewed and followed by all personnel and all appropriate Work Permits will be obtained prior to implementing decontamination and disassembly. Site access will be limited to the minimum amount of people and equipment needed to perform the job.

Water will be used as the primary control for initial sampling and decontamination activities. Water use provides a known method to dissipate heat from friction, reduce flammability and reduce the chance of electrostatic discharge. Application of water may result in displacement of explosive or energetic materials. To reduce significant movement or displacement of energetic materials during application of water an explosive proof vacuum, absorbent towel or approved method that is compatible with the location will be used to collect accumulated water. Water applied with a spray bottle during limited disassembly operations is not expected to result in a significant amount of displacement of energetic material and will not be collected unless required in the station-specific work instructions.

Decontamination efforts may include several techniques to safely mitigate the presence of hazardous levels of explosive materials. Prior to implementation of any decontamination techniques a detailed station-specific sampling plan will be prepared and reviewed with SMS and BBLES health and safety.

Employees will receive training in the use and care of equipment that they will be expected to operate. All employees and subcontractors will be trained in compliance with Federal OSHA and Cal-OSHA standards, as well as applicable training for each task such as excavation safety, confined space entry, lockout/tagout, and loss prevention observations. Prior to the beginning field work onsite, BBLES will provide specific health and safety orientation to all BBLES employees and subcontractors involved in this phase of work. This orientation shall include the specific hazards of the field activities, and the known site conditions will be discussed with all BBLES employees and subcontractors. Copies of training records will be maintained onsite by BBLES administrative personnel.

3.2.6.1 Lead-Based Paint Sampling and Abatement

Prior to the torching or cutting of any equipment that is suspected to contain lead-based paint; any necessary abatement of lead paint will be conducted. Paint removal activities will be conducted with wet methods and controls to reduce airborne dust generation to the extent feasible. All employees working on lead removal or sampling will be trained as specified in 29 CFR 1929.62.

Hazards - Exposure to lead can cause weakness, lassitude, insomnia; facial pallor; eye pallor; anorexia, low weight, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremors; wrist and ankle paralysis; brain damage; kidney damage; irritated eyes and hypotension. Lead removal activities may cause blisters, sore muscles, and joint and skeletal injuries; and may present eye, contusion, and laceration hazards. Personnel may be exposed to electrical hazards and physical injury due to the manual lifting and moving of materials. The work area may present slip, trip, and fall hazards from scattered debris, irregular walking surfaces, or elevated work. Lead abatement activities may also expose personnel to heat related illnesses.

Control - Lead abatement shall be done in strict accordance with 29 CFR 1926.62 and associated federal and State of California regulations. A competent person as defined by 1926.62 shall be present during all lead removal activities. An initial exposure assessment will be conducted by the competent person to determine the extent of engineering controls required to maintain exposures below the action level. Real-time air monitoring for total airborne particulate will be conducted during all lead removal activities. Personal sampling will be conducted based on the initial exposure assessment and baseline blood-lead results of the real-time monitoring. Additionally, no hot work will be conducted on any surface covered with a protective coating whose flammability is not known. Employees conducting hot work activities adjacent to toxic preservative coatings shall wear appropriate respiratory protection and the preservative coatings shall be removed a sufficient distance from the area to be heated.

3.2.6.2 Structure and Facility Equipment Decontamination

Some structures and equipment may contain explosive residues such as HMX, RDX, or AP. These residues will be removed using cloth saturated with the solvents appropriate for the materials to be

removed. These solvents include, among others, water, acetonitrile, and methanol. Water will first be sprayed onto the contaminated surfaces to reduce the hazard posed by the residues. After the areas have been sufficiently wetted, a water-wet cloth will be used to gently remove residue.

This will be accomplished using a rod handled such that the operator is not aligned directly in front of the surface being decontaminated. Similar procedures will be implemented using methanol or other appropriate organic solvent, and acetonitrile to remove HMX and RDX.

The activity involving acetonitrile will be conducted in Level B PPE. During this activity air monitoring will be conducted in accordance with Section 6 of this HASP air monitoring. If air monitoring confirms the lack of organic vapors in the work area, then the HSS has the discretion to lower the level of protection. Additionally, a Lower Explosive Level Meter (LEL) will be used to verify that no explosive atmosphere exists. Local exhaust ventilation may be used to control the levels of organic vapors in the area.

Removal of identified NG will be conducted per Section 3.2.6 Explosive Hazards. Additional descriptions of decontamination methods, including mechanical cleaning and high-pressure steam, are detailed in UTC/P&W Rocketdyne W.I. 23.06.13, Appendix B.

BBLES health and safety must review and approve the purchase of any hazardous material prior to its delivery at the site. The inventory of required organic solvents and cleaners will be maintained at the lowest feasible level. All materials will be stored in appropriate containers as specified by site and regulatory requirements. MSDS and other required handling, use and storage instructions will be obtained prior to delivery. Material use will be conducted in accordance with regulatory requirements, manufacturer's recommendations and site requirements. All waste materials will be collected and disposed of according to applicable regulatory and site requirements.

Prior to implementation of any decontamination technique the JSA will be reviewed and work instructions will be prepared. Work instructions and JSAs must be reviewed and approved by SMS and BBLES health and safety prior to use.

3.2.7 Confined Space Entry

Some structures and equipment that require sampling and assessment are classified as Permit Required Confined Spaces. Examples include subsurface vaults and mixing vessels.

Hazards - The primary hazards involved with confined space entry are exposure to toxic or hazardous atmospheres, explosive/fire hazards, working in a small work area and limited means of entry and exit.

Control - The primary control for confined space entry is the implementation of the Permit Required Confined Space Program which includes a thorough assessment and characterization of the space prior to entry, employee training, use of appropriate hazard abatement equipment and controls such as ventilation, retrieval devices, ladders, lighting, fire extinguishers and communication systems. Details of the BBLES Confined Space Entry Program are presented below.

3.2.7.1 Confined Space Entry

BBLES personnel shall follow the BBLES Confined Space Entry Permit Procedure outlined below for all confined space entry activities. Subcontractors conducting confined space entry activities or conducting activities near confined spaces which may create a hazard inside the space must meet the regulatory requirements outlined in 29 CFR 1910.146: Permit-Required Confined Spaces. Each subcontractor shall provide qualified/competent and trained personnel as defined in 29 CFR 1910.146, who are responsible and have authority over confined space entry activities conducted by the subcontractor. The following sections include potential hazards and safety procedures associated with confined space and confined space-related activities. Subcontractors must implement their written confined space entry program, meet the minimum requirements outlined herein, and meet the requirements of in 29 CFR 1910.146.

3.2.7.1.1 Introduction

This section contains the requirements and procedures for working in confined spaces. A confined space is defined as a space large enough and so configured that an employee can bodily enter and perform assigned work, has limited means for entry or exit, and is not designed for continuous

employee occupancy. Potentially contaminated confined spaces may pose additional hazards such as air contamination, flammable or explosive atmosphere, and oxygen deficiency. Confined space entry may pose the possibility of engulfment. Personnel must be properly trained in order to supervise and participate in confined space entry procedures or serve as standby attendants.

All confined spaces shall be initially considered permit-required.

3.2.7.1.2 Confined Space Identification and Designation

Identification: BBLES' HSS or BBLES' subcontractor's HSS is responsible for identifying confined spaces into which their employees or subcontractors will enter. Entry is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space. The Confined Space Entry Checklist (Attachment I) and Confined Space Entry Form (Attachment J) must be filled out prior to the start of confined space activities.

3.2.7.1.3 Duties of Personnel

Each confined space being entered shall have a minimum of one (1) dedicated attendant and one other support person (who may have other duties) within sight or call.

Duties of Entrants:

- Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space.
- Alert the attendant whenever:
  - The entrant recognizes warning signs or symptoms of exposure to a dangerous situation, or
  - The entrant detects a prohibited condition;
- Exit from the permit-required confined space (permit space) as quickly as possible whenever:
  - An order to evacuate is given by the attendant or the entry supervisor,

- The entrant recognizes warning signs or symptoms of exposure to a dangerous situation,
- The entrant detects a prohibited condition, or
- An evacuation alarm is activated.

Duties of Attendants:

- Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- Is aware of possible behavioral effects of hazard exposure in authorized entrants.
- Continuously maintains an accurate count of authorized entrants in the permit space and accurately identifies who is in the permit space by tagging the lifelines with the entrant's name, and recording the names of the entrants.
- Remains outside the permit space during entry operations until relieved by another attendant.
- Communicates with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space.
- Monitors activities inside and outside the space to determine if it is safe for entrants to remain in the space and orders the authorized entrants to evacuate the permit space immediately under any of the following conditions:
  - If the attendant detects a prohibited condition;
  - If the attendant detects the behavioral effects of hazard exposure in an authorized entrant;
  - If the attendant detects a situation outside the space that could endanger the authorized entrants, or
  - If the attendant cannot effectively and safely perform all his duties.
- Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards.
- Takes the following actions when unauthorized persons approach or enter a permit space while entry is underway:
  - Warn the unauthorized persons that they must stay away from the permit space;
  - Advise the unauthorized persons that they must exit immediately if they have entered the permit space; and

- Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space.

- Performs non-entry rescues.
- Performs no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

Duties of Entry Supervisors:

- Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- Verifies, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin.
- Terminates the entry and cancels the permit as required.
- Removes unauthorized individuals who enter or who attempt to enter the permit space during entry operations.
- Determines that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.
- Documents on the entry permit incidents or circumstances requiring review of the confined space entry program. Such incidents include:
  - Unauthorized entry;
  - The detection of a condition/hazard not authorized by the permit;
  - The occurrence of an injury or near-miss during entry;
  - A change in use or configuration of the space; or
  - Employee complaints about the program.
- Prescribes procedures for coordination of entry when personnel from multiple employers will work simultaneously. Subcontractors shall follow all confined space entry procedures.

3.2.7.1.4 Procedures for Permit Space Entry

Acceptable Entry Conditions - The acceptable entry conditions for entry into each space are outlined in Table 3-1 below:

Table 3-1
Acceptable Entry Conditions For Confined Spaces

Airborne Contaminant Entry Conditions and Action Levels		
Parameter	**Reading**	**Action/Level of Protection**
Total Organic Vapors	< 5 parts per million (ppm) ≥ 5 ppm	Acceptable normal operations; Stop work; evacuate confined space and investigate cause of reading
Flammable Vapors (LEL)	< 10% LEL ≥ 10% LEL	Normal operations, acceptable entry condition Stop work; evacuate confined space; ventilate area; investigate source of vapors
Hydrogen Sulfide	< 5 ppm ≥ 5 ppm	Normal operations, acceptable entry condition Stop work; evacuate confined space; ventilate area; investigate source of vapors
Carbon Monoxide	< 25 ppm ≥ 25 ppm	Normal operations, acceptable entry condition Stop work; evacuate confined space; ventilate area; investigate source of vapors
Oxygen	> 19.5%, < 23.5% < 19.5%, > 23.5%	Acceptable entry condition, normal operations Stop work; evacuate confined space; ventilate; re-sample

Isolation Requirements - The confined space must be isolated to prevent the introduction of contaminants during entry. Isolation must include disconnecting or installing slip blanks into lines leading to the space.

To prevent injury from physical hazards within the space, lockout, tagout, tryout and return to service procedures must be implemented for potential sources of hazardous energy.

When isolation is not practical or possible (as in sewer entry) entry conditions must be continuously monitored.

Atmospheric Hazard Control - Atmospheric hazards must be eliminated or controlled to meet the requirements specified in the table below. If necessary, the space shall be purged or inerted, then ventilated to the extent necessary to meet the criteria in the table below. Ventilation equipment may be needed to maintain these conditions.

Inspecting and Testing Procedures - The following equipment shall be available for testing each confined space;

- Multi RAE instrument (our equivalent) with PID, Oxygen, LEL, CO, and Hydrogen sulfide sensors

All equipment shall be maintained in such quantity and condition, per manufacturer recommendations, to adequately monitor and assess all confined space entries.

Testing Procedures - Procedures for inspecting, monitoring and testing the confined space to verify that acceptable conditions exist prior to and throughout the entry operation are as follows:

Permit required confined spaces shall be tested continuously to detect changes in atmospheric conditions. Priority for atmospheric hazard testing shall be oxygen, combustible gases, and then toxic gases.

Communications - Provisions for continuous communication between entrants and attendants shall consist of powered communication equipment (i.e. radio). Powered communication equipment with the appropriate NEC rating shall be provided.

If this is not practical or possible, portable air horns must be provided to all entrants and attendants. The code for air horn blasts is as follows:

- 1 Horn Blast = Are you OK?
- 2 Horn Blasts = Yes, I am OK.
- 3 Horn Blasts = Exit the confined space immediately.

Personal Protective Equipment - (*see Section 5, Personal Protective Equipment, for additional PPE requirements*):

- Protective suits, boots, and gloves;
- Face, head, and foot protection; and
- A chest or parachute harness with approved lifelines at least ½ inch in diameter and 2,000 pounds test. (NOTE: Wristlets may be used only when a harness presents a greater hazard to the employee and wristlets are the safest, most effective alternative). All lifelines shall be secured to a mechanical device or fixed point outside the confined space. Mechanical devices shall be used for all vertical entry permit spaces greater than five feet deep.

Other Required Equipment - Lighting and electrical shall be of the appropriate National Electrical Code (NEC) rating. Rating should be Class I, Division I unless the space specifically meets other rating requirements.

Ingress and Egress Equipment - Protective barriers to be used to protect entrants from external pedestrian, vehicle or equipment hazards. Ladders shall meet the requirements of 29 CFR 1926 Subpart X, Ladders.

Rescue Equipment - All lifelines must be attached to a mechanical device outside the space such that a rescue can begin as soon as the rescuer becomes aware that a rescue is necessary.
A mechanical device must be attached to entrant in order to retrieve personnel from vertical type permit spaces more than 5 feet deep.

Permit System - Before entry is authorized, the contractor's Entry Supervisor shall complete and sign the contractor's entry permit according to their written confined space program and document that all

pre-entry requirements have been met and that acceptable entry conditions exist. The complete permit shall be posted at the primary entrance to the permit space. See Attachment I for a copy of the permit.

All Entry Permits are valid for a maximum of one work shift, and shall be canceled by the Entry Supervisor when the shift ends, confined space operations are complete, or whenever a prohibited condition arises in or near the space. All confined spaces shall be securely closed or barricaded whenever the entry permit is canceled. Each contractor's Entry Permit must be completely executed and include all required information.

Emergency Procedures - The SS/HSS or client shall arrange for outside rescue services. The rescue personnel must be offered an opportunity to inspect the space, and practice a rescue if necessary. The means for summoning rescue services must be clearly communicated and documented on the contractor's entry permit.

3.2.7.1.5 Training

General - Prior to assignment to confined space entry work, all employees shall receive training in the hazards of confined spaces, work practices to control these hazards, and duties to be performed. Employee proficiency shall be established by testing and/or practical demonstration.

Requirements for Entrants, Attendants, and Supervisors - Basic training requirements for entrants and attendants shall include Confined Space Entry Entrant/Attendant training, and 40-hour HAZWOPER training or equivalent if required.

Basic training for entry supervisors and personnel conducting atmospheric testing shall include 8-hour Supervisor Training and Confined Space Entry Training.

Personnel assigned to attendant duties shall be trained in non-entry rescue procedures.

Requirements for Emergency Rescue Personnel - The HSS and UTC/P&W Rocketdyne Emergency Services must coordinate rescue services by identifying a rescue entity, and contacting them to inform

them that a entry will take place. Personnel assigned to provide emergency entry and rescue services shall be trained annually in the proper use of personal protective and rescue equipment. Such training shall include a simulated rescue exercise at least once every 12 months. In addition, rescue personnel shall be trained in the hazards and proper work practices for handling blood or other potentially infectious materials.

3.2.8 General Housekeeping

Site personnel will be responsible for maintaining all work areas in a neat and orderly condition. This will include all general housekeeping activities associated with overall facility maintenance, such as:

- Cleaning of all facility spaces;
- Storage of facility equipment, tools, and supplies; and
- Collection and disposal of refuse.

Hazards - The physical hazards involved with housekeeping activities relate to the work done with the use of hand and power tools, cleaning chemicals, materials handling, and the work environment itself. There exists a potential for incidents involving personnel being struck by or struck against tools, equipment, or materials, resulting in fractures, lacerations, punctures, or abrasions. Manual materials handling may cause blisters, sore muscles, and joint and skeletal injuries; and may present eye, contusion, and laceration hazards. Walking and working surfaces may involve slip, trip, and fall hazards. Working at elevations may create a potential fall hazard. Slippery work surfaces can increase the likelihood of back injuries, overexertion injuries, and slips and falls. During cleaning activities, personnel may handle chemical cleansers. The specific material may present a potential for inhalation, skin contact and eye contact hazard.

Environmental hazards include plants, such as poison ivy and poison oak; aggressive fauna, such as ticks, fleas, mosquitoes, wasps, spiders, and snakes; weather, such as sunburn, lightning, and rain; and pathogens, such as rabies, Lyme disease, and blood-borne pathogens.

Control - Prior to initiating housekeeping activities, scheduled activities will be explained to all employees (including subcontractors). Hazards will be identified and protective measures will be explained. Equipment will be inspected and in proper working condition. Employees shall receive training to address the equipment's operation and care. Mechanical assistance shall be provided for large lifting tasks. Hearing protection is required for use when personnel are exposed to noise levels exceeding 85 dBA, or a level that commonly results in difficult conversation. Control procedures for these hazards are discussed in Section 4, General Safety Practices. Decisions regarding PPE will be based on the potential chemical and physical hazards on the site, and measurements and observations made prior to and during work activities and are discussed in Section 5, Personal Protective Equipment. Safe lifting practices and control procedures for elevated work are discussed in Section 4.

3.3 Live Area Guidelines

These guidelines are adapted from the Department of Defense (DOD) Contractors' Safety Manual for Ammunition and Explosives (September 1997).

3.3.1 Cardinal Rules

The "cardinal rules" to be observed in any location or operation involving explosives are to limit exposure to:

- The minimum amount of personnel needed for an operation;
- A minimum amount of time around material; and
- The minimum amount of the hazardous material.

Non-sparking tools, such as brass, Teflon, bronze, lead, and "K" Monel, will be used for work in locations that contain exposed explosives or hazardous concentrations of flammable dusts, gases or vapors.

3.3.2 Materials in the Work Area

All materials containing AP or any potential explosive material should be placed in Velostat™ bags or wrapped in Velostat™ and should be removed from the work area after each bag is filled, and placed in an appropriate staging area.

3.3.3 Hot Work

Hot work, defined as any activity that creates heat or produces sparks or any other form of energy that may act as an ignition source for explosive or flammable material, will be strictly controlled and permitted in accordance with UTC/P&W Rocketdyne and BBLES requirements. UTC/P&W Rocketdyne's work permit system will be used as a means of establishing permits for hot work (see Attachment I). All hot work permits will be re-evaluated if site conditions change, and become invalid if explosive material or residues are discovered at the work location. JSA's specific to the proposed hot work activity and work area will also be prepared to identify hazards and the appropriate mitigating measures.

3.4 Demolition of Selected Structures

Equipment dismantlement and building demolition activities involve a potential for exposure to many physical and health hazards. In particular, the act of demolition may expose areas of energetic material that had not been previously encountered or decontaminated. Areas of emphasis where field sampling must occur prior to or during demolition include but are not limited to: wall joints, HVAC systems, floor drains, behind interior walls, etc. In addition to equipment dismantlement and removal activities, demolition and installation of temporary facilities and selective demolition of building components may be conducted. Prior to demolition of any structure, various performance standards must be met by BBLES and approved by UTC/P&W Rocketdyne (Table 3-1).

3.4.1 Hazards

The primary hazard for this activity is potential ignition, fire or explosion of energetic or explosive materials.

General physical and construction related hazards associated with the materials used in demolition, equipment utilized, or the dismantlement and removal activities themselves will also be present. BBLES requires subcontractors to address all physical and health hazards presented by dismantlement, removal, and demolition activities, in accordance with CCR, Title 8 and 29 CFR 1926. Subcontractors may utilize their company's standard safe operating procedures for demolition activities provided the minimum requirements of this HASP, CCR Title 8 and 29 CFR 1926 are met.

The physical hazards involved with demolition activities relate to the work conducted with heavy equipment, hand and power tools, and the construction environment itself. During demolition related activities there exists a potential for incidents involving personnel being struck by or against equipment or materials, which may result in fractures, lacerations, punctures, and abrasions. Walking and working surfaces during demolition activities may present slip, trip, or fall hazards. Slippery surfaces can increase the likelihood of slips and falls in addition to back and overexertion injuries. Hot work activities such as cutting and welding may present the risk of a fire or explosion hazard. Overhead hazards such as electrical conduit or process piping may be present due to elevated work.

Demolition activities pose the potential for personnel being struck by debris and objects associated with the demolition activities and the equipment being used. Improper planning and procedures may place employees in unsafe situations that may result in serious injury or death.

Operations on elevated surfaces (roofs, catwalks, mezzanines, etc.) may expose workers to falls if not utilizing the proper fall protection system. Work from ladders, scaffolding, and aerial lifts also exposes employees to fall hazards and injuries should the equipment be used improperly or employees are not trained in the equipment's safe use.

Electricity may pose a hazard to employees during the use of portable electrical equipment and lead cords. Sources of energy that are not locked out and/or tagged out expose personnel to various forms of energy (eg/i.e., electrical, mechanical, high pressure, etc.) that could be hazardous during the performance of demolition tasks. Additionally, employees installing temporary and permanent wiring

are exposed to electrical hazards if proper precautions and procedures are not followed, or inexperienced or unqualified personnel conduct the work.

Improper operation of heavy equipment (eg/i.e., forklifts, front end loaders, aerial lifts, cranes, etc.) may result in personnel being struck by the equipment or loads being handled, resulting in contusions, fractures, and lacerations. Personnel may be injured and equipment damaged if it is not used for the purpose intended, overloaded, or used improperly by inexperienced or unauthorized individuals. Loads being lifted by cranes may shift causing them to fall and strike personnel causing serious injury or death.

Due to the type of work involved in many demolition activities, the primary health hazards involve repetitive motion, lifting, and other ergonomic disorders. Noise may also present a hazard to employees exposed to high decibel levels. Operation of heavy equipment, power tools, pneumatic tools, and powder actuated tools often result in high noise levels. Exposure to demolition materials that may release harmful vapors during their use and curing periods are also possible. Personnel may be exposed to hazardous or toxic vapors created during hot work activities.

3.4.2 Control of Hazards

Prior to starting demolition of any building in the Live Area or a site where there is a possibility of energetic materials a complete characterization according to the SAP will be conducted. Based on the characterization results, required decontamination will be completed. If site conditions change or there is any evidence that hazards from energetic materials exist the demolition will stop and necessary controls developed.

Desensitization and decontamination of residual explosive materials will be conducted as necessary during site work and as part of decontamination to support decommissioning and demolition. Water will be used as the primary control for initial sampling and decontamination activities. Water use provides a known method to dissipate heat from friction, reduce flammability and reduce the chance of electrostatic discharge. Application of water may result in displacement of explosive or energetic

materials. To reduce significant movement or displacement of energetic materials during application of water an explosive proof vacuum, absorbent towel or approved method that is compatible with the location will be used. Decontamination efforts can include several techniques to safely mitigate the presence of hazardous levels of explosive materials. Prior to implementation of any decontamination techniques a detailed station-specific sampling plan will be prepared and reviewed with SMS and BBLES health and safety.

Prior to initiating any field activity, the site conditions will be discussed with all BBLES employees, and including subcontractors. Hazards will be identified and protective measures will be explained. Equipment will be inspected prior to usage and be in proper working condition. Employees will receive training in the use and care of equipment that they will be expected to operate. Tasks should be scheduled in a manner that reduces the likelihood of performing a repetitive task for prolonged periods. Proper lifting techniques should be employed and mechanical means should be used for heavy lifting tasks. Hearing protection is required for use when exposed to noise levels exceeding 85 dBA, or a level that commonly results in difficult conversation.

Control procedures for general electrical hazards are discussed in Section 4.8, Electrical Safety. Control procedures for hot work are discussed in Section 4.6.3, Hot Work Safety Program. Safety during elevated work will conform to the requirements of 29 CFR 1926 Subpart M Fall Protection. Safety procedures governing the use of scaffolding and aerial lifts and the use of ladders shall conform to the requirements of Title 8 CCR, Articles 21 & 22 (Scaffolds General Requirements/ Scaffolds, Various Types) and Article 17 & 25 (Ramps, Runways, Stairwells and Ramps and Ladders, respectively.

Lockout/tagout procedures as specified in 29 CFR 1910.147 and CCR Section 3314 shall be followed by personnel that may be exposed to hazardous energy sources. Line breaking activities shall follow all required procedures and regulations (lockout/tagout), and be performed under the supervision of a competent person. If required by UTC/P&W Rocketdyne, line-breaking activities shall not be conducted until the appropriate facility personnel have been consulted.

Demolition work shall conform to the requirements of 29 CFR 1926 Subpart T, Demolition and CCR Article 31, Demolition. A pre-demolition survey shall be completed by the demolition subcontractor prior to demolition activities. This survey must be documented and reviewed with all affected personnel and contractors. All tasks requiring the use of a crane or rigging will be done in accordance with CCR Title 8, Article 9 Derricks, Cranes and Boom-type excavators and 29 CFR 1926 Subpart N. Removal of hazardous substances and waste materials and cleaning/decontamination of equipment shall be in compliance with CCR Title 8, Section 5192 and 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response (HAZWOPER). Asbestos abatement shall be done in strict accordance with Code Rule 56 and associated federal regulations. Lead work (removal, encapsulation, hot work) will be done in accordance with 29 CFR 1926.62, Lead.

3.4.3 Demolition Safety

Prior to starting demolition of any building in the Live Area or a site where there is a possibility of energetic materials a complete characterization according to the SAP will be conducted. Based on the characterization results, required decontamination will be completed. If site conditions change or there is any evidence that hazards from newly identified energetic materials exist the demolition will stop and necessary controls developed.

Prior to permitting employees to start demolition activities, an “engineering survey” to assess the integrity of the structure shall be made by a competent person to determine the condition of the framing, floors, walls, and the possibility of an unplanned collapse of any portion of the structure. Any adjacent structure where employees may be exposed shall also be similarly checked.

When employees are required to work within a structure, which has been damaged by fire, flood, explosion, or other cause, the walls, and floor shall be braced or shored. All electric, gas, water, steam, sewer, and other service lines shall be shut off, capped or otherwise controlled outside the building before demolition work is started. In each case, any utility company that is involved shall be notified in advance. An underground/overhead utility checklist is included in Attachment B.

If it is necessary to maintain any power, water, or other utilities during demolition, such lines shall be temporarily relocated as necessary and protected. It shall also be determined if any type of hazardous chemicals, gases, flammable materials, or similarly dangerous substances have been used in any pipes, tanks, or other equipment on the site. When the presence of any such substances is apparent or suspected, testing and purging shall be performed and the hazard eliminated before demolition is initiated.

Where the hazard exists from the fragmentation of glass, such hazards shall be removed. Where a hazard exists to employees from falling through wall openings, the opening shall be protected to a height of 42 inches. When debris is dropped through holes in the floor without the use of chutes, the area onto which the material is dropped shall be completely enclosed with barricades which are not less than 42 inches high and not less than 6 feet back from the edge of the opening above. Signs, warning of the hazard of falling materials shall be posted at the lower (and ground) level. Removal shall not be allowed in this lower level until debris handling ceases above.

3.4.3.1 Mechanical Demolition

Personnel shall not be permitted in any area that can be adversely affected by mechanical demolition operations. Only those workers necessary for the performance of the operations shall be permitted in the area. The area shall be barricaded as necessary to prevent unauthorized personnel or anyone not associated with the demolition operation from entering the area.

When removing walls or portions thereof, all steel members affected shall be cut prior to wall removal. All roof cornices or other ornamental stonework shall be removed prior to removing the walls.

During demolition, continuing inspections by a competent person shall be made as the work progresses to detect hazards resulting from the weakened or deteriorated floors, walls, or loosened material. No employee shall be permitted to work where such hazards exist until they are corrected by shoring, bracing, or other effective means.

3.5 Operation, Maintenance and Monitoring

The following presents an overview of activities associated with OMM of soil, surface water and groundwater treatment systems. Systems are currently operational and are in varying states of maintenance.

The following sections identify planned work activities, hazards and controls.

Standard operation procedures for each system are available. System specific hazard analysis is presented, under separate cover, in the work procedures and associated job safety analysis for each system.

3.5.1 Existing System Evaluation

Review of the existing treatment systems and observation of site activities will be conducted.

Hazards - The physical hazards involved with engineering observation activities are related to the activities being performed, operation and proximity to equipment, and the site itself. The presence of overhead utilities such as power lines requires careful positioning of the equipment in order to maintain a safe distance between the lines and the closest part of the equipment.

The presence of underground utilities such as gas lines, power lines, water lines, and sewer pipes must be determined prior to beginning any intrusive activity. Mechanical and electrical hazards may be present in exiting systems.

Personnel in the vicinity of treatment equipment may be exposed to physical hazards resulting in fractures, contusions, and lacerations and may be exposed to high noise levels. Electricity and contact with powered equipment may also present a hazard. The work area presents slip, trip, and fall hazards from scattered debris and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces, and unstable soil. Freezing weather hazards include frozen, slick, and irregular walking surfaces.

Environmental hazards include plants, such as poison ivy and poison oak; aggressive fauna, such as ticks, fleas, mosquitoes, wasps, spiders, and snakes; weather, such as sunburn, lightning, rain, and heat- or cold-related illnesses; and pathogens, such as rabies, Lyme disease, and blood-borne pathogens.

Control - Personnel conducting engineering observation activities will wear Level D protection as a minimum. Personnel performing engineering observation must maintain a safe distance from all activities being conducted by others. Prior to entering an exiting treatment system information will be obtained from UTC/P&W Rocketdyne on the type of equipment, potential hazards and existing controls. BBLES employees will maintain a safe distance from all mechanical and electrical equipment and will not operate any equipment prior to the development of work instructions. Additional controls for general hazards are discussed in Section 4, General Safety Practices.

3.5.2 Operation, Maintenance, and Monitoring

OMM activities involve potential exposures to numerous physical and health hazards. The hazards are primarily associated with the system components, equipment, and specific activities being conducted.

Hazards - The physical hazards involved with OMM activities relate to the work done on equipment, use of hand and power tools, materials handling, and the work environment itself. There exists a potential for incidents involving personnel being struck by or struck against moving equipment parts or materials, resulting in fractures, lacerations, punctures, or abrasions. Walking and working surfaces may involve slip, trip, and fall hazards. Working at elevations may create a potential fall hazard. Slippery work surfaces can increase the likelihood of back injuries, overexertion injuries, and slips and falls.

Environmental hazards include plants, such as poison ivy and poison oak; aggressive fauna, such as ticks, fleas, mosquitoes, wasps, spiders, and snakes; weather, such as sunburn, lightning, and rain; and pathogens, such as rabies, Lyme disease, and blood-borne pathogens. Outside work areas may present hazards of uneven walking surface, slick or slippery work surfaces, soft terrain, and heat or cold stress.

Equipment Operations, Maintenance and Repair - Site personnel are exposed to serious hazards during activities on powered equipment. Workers may be struck by a moving part or by flying material thrown by powered equipment. The potential for exposure to hazardous energy or accidental start-up exists and must be controlled with appropriate lockout/tagout procedures.

Confined space entry and line breaking activities may present physical, chemical, and environmental hazards. Hot work activities may expose personnel to hot surfaces and compressed flammable gases which could result in fires, burns, and potential explosions during compressed gas use.

Materials Handling - Manual materials handling may cause blisters, sore muscles, and joint and skeletal injuries; and may present eye, contusion, and laceration hazards. The most common type of injury that occurs in material handling operations is the "caught between" situation when a load is being handled and a finger or toe gets caught between two objects. Additional hazards may exist when personnel must handle chemicals and hazardous materials.

Health Hazards - Due to the type of work involved in OMM activities, the primary health hazards involve ergonomic disorders such as repetitive motion and lifting. Noise may also present a hazard. Operation of system components and associated equipment may result in high noise levels. Exposure to groundwater and other media containing site COC is possible. During system cleaning activities, personnel may handle chemical cleansers and hazardous waste materials. The specific material may present a potential for inhalation, skin contact and eye contact hazard.

Control - Prior to initiating OMM activities, the equipment operation and scheduled activities will be explained to all employees (including subcontractors). Station specific work instructions will be prepared and reviewed by BBLES health and safety prior to implementation. Hazards will be identified and protective measures will be explained. Equipment will be inspected and in proper working condition. Employees shall receive training to address the equipment's operation and care. Only trained employees will perform OMM activities. Mechanical assistance shall be provided for large lifting tasks. Hearing protection is required for use when personnel are exposed to noise levels exceeding 85 dBA, or a level that commonly results in difficult conversation. Control procedures for

these hazards are discussed in Section 4, General Safety Practices. Decisions regarding PPE will be based on the potential chemical and physical hazards on the site, and measurements and observations made prior to and during work activities and are discussed in Section 5, Personal Protective Equipment.

3.5.2.1 System Sampling and Monitoring

Water samples will be collected from the treatment system to determine system effectiveness. Samples will be placed in containers and analyzed on site or shipped to a laboratory for analysis.

Hazards - Inhalation and absorption (contact) of COC are the primary routes of entry associated with sampling and monitoring due to the manipulation of sample media and equipment, manual transfer of media into sample containers, and proximity of operations to the breathing zone. The primary hazards associated with specific sampling and monitoring procedures are not potentially serious; however, other operations in the area or the conditions under which samples must be collected may present chemical and physical hazards. There exists a potential for incidents involving personnel being struck by or struck against moving equipment parts or materials, resulting in fractures, lacerations, punctures, or abrasions. Walking and working surfaces may involve slip, trip, and fall hazards. Working at elevations may create a potential fall hazard. Slippery work surfaces can increase the likelihood of back injuries, overexertion injuries, and slips and falls.

The flora and fauna of the site may present hazards of poison ivy, poison oak, ticks, fleas, mosquitoes, wasps, spiders, and snakes. The work area presents slip, trip, and fall hazards from scattered debris and irregular walking surfaces. Freezing weather hazards include frozen, slick, and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces and unstable soil.

Control - To control dermal exposure during sampling and monitoring activities, a minimum of Modified Level D protection will be worn. If necessary, based on field observations and site conditions, air monitoring may be conducted during sampling and monitoring activities to assess the potential for exposure to airborne COC. If the results of air monitoring indicate the presence of

organic vapors in a concentration causing concern, personnel will upgrade to Level C protection. Refer to Section 6.1, Air Monitoring, for a description of air monitoring requirements and action levels. A description of each level of personal protection is included in Section 5, Personal Protective Equipment. Control procedures for environmental and general hazards are discussed in Section 4, General Safety Practices.

3.6 Environmental Assessment Activities

3.6.1 Installation of Monitoring Wells

This task includes the installation of monitoring wells at specified locations. The drilling equipment poses a significant physical hazard if it is not properly operated.

3.6.1.1 Drilling Hazards

The primary physical hazards for this activity are associated with the use of the drilling rig. Drilling may also present a potential for dermal and airborne contact with site contaminants in groundwater. Rig accidents can occur as a result of improperly placing the rig on uneven or unstable terrain, or failing to adequately secure the rig prior to the start of operations. Underground and overhead utility lines can create hazardous conditions if contacted by drilling equipment. Tools such and equipment such as elevators, cat lines, and wire rope have the potential for striking, pinning, or cutting personnel.

Wire Rope - Worn or frayed wire rope presents a laceration hazard if loose wires protrude from the main bundle.

Cat Lines - Cat lines are used on drilling rigs to hoist material. Accidents that occur during cat line operations may injure the employee doing the rigging as well as injure the operator. Minimal hoisting control causes sudden and erratic load movements, which may result in hand and foot injuries.

Working Surfaces - Slippery work surfaces can increase the likelihood of back injuries, overexertion injuries, and slips and falls.

Materials Handling - The most common type of accident that occurs in material handling operations is the "caught between" situation when a load is being handled and a finger or toe gets caught between two objects. Rolling stock can shift and/or fall from a pipe rack or truck bed.

3.6.1.2 Drilling Safety Procedures

Drill Crews - All drillers must possess required state or local licenses to perform such work. All members of the drill crew shall receive site specific training prior to beginning work.

The driller is responsible for the safe operation of the drill rig as well as the crew's adherence to the requirements of this HASP. The driller must ensure that all safety equipment is in proper condition and is properly used. The members of the crew must follow all instructions of the driller, wear all personal protective equipment, and be aware of all hazards and control procedures. The drill crews must participate in the Daily Safety Meetings and be aware of emergency procedures.

Rig Inspection - Each day, prior to the start of work, the drill rig and associated equipment must be inspected by the driller and/or drill crew. The following items must be inspected:

- Vehicle condition;
- Proper storage of equipment;
- Condition of all wire rope;
- Fire extinguisher; and
- First aid kit.

Drill Rig Set Up - The drill rig must be properly blocked and leveled prior to raising the derrick. The wheels which remain on the ground must be chocked. The leveling jacks shall not be raised until the derrick is lowered. The rig shall be moved only after the derrick has been lowered.

All well sites will be inspected by the driller prior to the location of the rig to verify a stable surface exists. This is especially important in areas where soft, unstable terrain is common.

All rigs will be properly blocked and leveled prior to raising the derrick. Blocking provides a more stable drilling structure by evenly distributing the weight of the rig. Proper blocking ensures that differential settling of the rig does not occur.

When the ground surface is soft or otherwise unstable, wooden blocks, at least 24" by 24" and 4" to 8" thick shall be placed between the jack swivels and the ground. The emergency brake shall be engaged, and the wheels that are on the ground shall be chocked.

Site Drilling Rules - Before drilling, the existence and location of underground pipe, electrical equipment and gas lines will be determined. Public utility companies will be contacted to mark the location of existing lines. If necessary, an appropriate device, such as a magnetometer will be used to locate the line prior to commencement of intrusive activities. The Underground/Overhead Utility Checklist shall be used to document that nearby utilities have been marked on the ground, and that the drill site has been cleared. The checklist shall be in the possession of the Site Supervisor prior to commencement of the intrusive investigation at that point of the site (See Attachment F). During any subsurface drilling, boring or sampling the first five feet of the entry will be made with minimal force using manual tools such as a post-hole digger or manual direct push method. If any evidence of a product line or underground utility is encountered a new sampling location will be selected.

Combustible gas readings of the general work area will be made regularly in areas where and/or during operations when the presence of flammable vapors or gases is suspected, such as during intrusive activities (see Section 6). Operations must be suspended and corrective action taken if the airborne flammable concentration reaches 10% of the lower explosive level (LEL) in the immediate area (a one-foot radius) of the point of drilling, or near any other ignition sources.

Under no circumstances will personnel be permitted to ride the traveling block or elevators, nor will the catline be used as a personnel carrier.

Overhead Electrical Clearances - If drilling is conducted in the vicinity of overhead power lines, the power to the lines must be shut off or the equipment must be positioned and blocked such that no part, including cables can come within the minimum clearances as follows:

Nominal System Voltage	Minimum Required Clearance
0-50kV	10 feet
51-100kV	12 feet
101-200kV	15 feet
201-300kV	20 feet
301-500kV	25 feet
501-750kV	35 feet
751-1,000kV	45 feet

When the drill rig is in transit, with the boom lowered and no load, the equipment clearance must be at least 4 feet for voltages less than 50kV, 10 feet for voltages of 50 kV to 345 kV, and 16 feet for voltages above 345 kV.

Hoisting Operations - Drillers should never engage the rotary clutch without watching the rotary table, and ensuring it is clear of personnel and equipment.

Unless the drawworks is equipped with an automatic feed control, the brake should not be left unattended without first being tied down.

Drill pipe, auger strings or casing should be picked up slowly. Drill pipe should not be hoisted until the driller is sure that the pipe is latched in the elevator, or the derrickman has signaled that he may safely hoist the pipe.

During instances of unusual loading of the derrick or mast, such as when making an unusually hard pull, only the driller should be on the rig floor; no one else should be on the rig or derrick.

The brakes on the drawworks of the drill rig should be tested by the driller each day. The brakes should be thoroughly inspected by a competent individual each week.

A hoisting line with a load imposed should not be permitted to be in direct contact with any derrick member or stationary equipment, unless it has been specifically designed for line contact.

Workers should never stand near the borehole whenever any wire line device is being run.

Hoisting control stations should be kept clean and controls labeled as to their functions.

Catline Operations - Only experienced workers will be allowed to operate the cathead controls. The kill switch must be clearly labeled and operational prior to operation of the catline. The cathead area must be kept free of obstructions and entanglements.

The operator should not use more wraps than necessary to pick up the load. More than one layer of wrapping is not permitted.

Personnel should not stand near, step over, or go under a cable or catline which is under tension.

Employees rigging loads on catlines shall:

- Keep out from under the load;
- Keep fingers and feet where they will not be crushed;
- Be sure to signal clearly when the load is being picked;
- Use standard visual signals only and not depend on shouting to coworkers; and
- Make sure the load is properly rigged, since a sudden jerk in the catline will shift or drop the load.

Wire Rope - When two wires are broken or rust or corrosion is found adjacent to a socket or end fitting, the wire rope shall be removed from service or resocketed. Special attention shall be given to the inspection of end fittings on boom support, pendants, and guy ropes.

Wire rope removed from service due to defects shall be cut up or plainly marked as being unfit for further use as rigging.

Wire rope clips attached with U-bolts shall have the U-bolts on the dead or short end of the rope; the clip nuts shall be re-tightened immediately after initial load carrying use and at frequent intervals thereafter.

When a wedge socket fastening is used, the dead or short end of the wire rope shall have a clip attached to it or looped back and secured to itself by a clip; the clip shall not be attached directly to the live end.

Protruding ends of strands in splices on slings and bridles shall be covered or blunted.

Except for eye splices in the ends of wires and for endless wire rope slings, wire rope used in hoisting, lowering, or pulling loads, shall consist of one continuous piece without knot or splice.

An eye splice made in any wire rope shall have not less that five full tucks.

Wire rope shall not be secured by knots. Wire rope clips shall not be used to splice rope.

Eyes in wire rope bridles, slings, or bull wires shall not be formed by wire clips or knots.

Pipe/Auger Handling - Pipe and auger sections shall be transported by cart or carried by two persons. Individuals should not carry auger or pipe sections without assistance.

Workers should not be permitted on top of the load during loading, unloading, or transferring of pipe or rolling stock.

Employees should be instructed never to try to stop rolling pipe or casing; they should be instructed to stand clear of rolling pipe.

Slip handles should be used to lift and move slips. Employees are not permitted to kick slips into position.

When pipe is being hoisted, personnel should not stand where the bottom end of the pipe could whip and strike them.

Pipe and augers stored in racks, catwalks or on flatbed trucks should be secured to prevent rolling.

3.6.2 Water Level Measurements and Groundwater Sampling

Water level measurement requires use of an electronic depth gauge within the well. Groundwater sampling consists of the collection of water samples for subsequent laboratory analysis and evaluation of potential impacts. The physical hazards of these operations are primarily associated with the sample collection methods, procedures utilized, and the site environment.

Hazards - Inhalation and absorption (contact) of COCs are the primary routes of entry associated with groundwater sampling due to the manipulation of sample media and equipment, manual transfer of media into sample containers, and proximity of operations to the breathing zone. During the course of this project, several different groundwater sampling methodologies may be utilized based on equipment accessibility and the types of materials to be sampled. These sampling methods may include hand or mechanical bailing. The primary hazards associated with these specific sampling procedures are not potentially serious; however, other operations in the area, or the conditions under which samples must be collected may present chemical and physical hazards. The hazards directly associated with groundwater sampling procedures are generally limited to strains/sprains from hand bailing and potential eye hazards. Exposure to soil and water containing COCs is also possible.

The flora and fauna of the site may present hazards of poison ivy, poison oak, ticks, fleas, mosquitoes, wasps, spiders, and snakes. The work area presents slip, trip, and fall hazards from scattered debris and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces and unstable soil. Freezing weather hazards include frozen, slick, and irregular walking surfaces.

Control - To control dermal exposure during water level measurement and groundwater sampling activities, a minimum of Modified Level D protection will be worn. If necessary, based on field observations and site conditions, air monitoring may be conducted during groundwater sampling activities to assess the potential for exposure to airborne COCs. If the results of air monitoring indicate the presence of organic vapors in a concentration causing concern, personnel will upgrade to Level C protection. Refer to Section 6.1, Air Monitoring, for a description of air monitoring requirements and action levels. A description of each level of personal protection is included in Section 5, Personal Protective Equipment. Control procedures for environmental and general hazards are discussed in Section 4, General Safety Practices.

3.6.3 Surface Water Sampling and Wader Use

Sampling activities may be done using hip waders and the required level of PPE. Waders must be inspected prior to donning for holes, punctures, tears, or any other defect (e.g., missing straps) that would allow water to enter. Personnel must wear a USCG-approved PFD or buoyant work vest during all activities conducted in water. Prior to each use, the PFD or work vest must be inspected for defects that may alter its strength or buoyancy. Defective units must be tagged "Do Not Use" and removed from service. The "buddy system" will be strictly adhered to during any water-related activities. At no time will anyone enter the water without another individual readily available to contact emergency services.

In addition to the drowning hazards associated with working on or near the water, there exists the possibility for slips, trips, or falls caused by slippery, unstable, and irregular walking surfaces. Waders used for sampling activities must be properly sized and provide the wearer with adequate traction.

3.6.4 Surface Soil Composting and Erosion Control

The objective of soil composting and erosion activities is to reduce perchlorate mass in surface soils in Mixer Valley and open burn fields. These activities are considered interim measures and are to be followed by an Interim Remedial Action Plan for soil. Materials for composting will be staged and subsequently moved to specified locations using front end loader or bobcat. Compost will be mixed

into area using an excavator or a walk behind garden tiller depending on soil consistency and overall surface area to be covered. Once treatment, watering, and monitoring are complete, the moisture retention material will be mixed into the soil and the area will be seeded. This activity will support maintenance and erosion control.

Hazards: The primary hazards are associated with working around heavy equipment, ergonomic/strains and working in an outdoor environment; heat/cold stress, exposure to flora and fauna. There is also a potential for contact with energetic materials that are embedded within the soil.

Controls: The primary controls include selection, maintenance of proper use of equipment. Only trained and authorized employees will be allowed to operate the equipment they are assigned. All equipment will be inspected prior to use and removed from service if any safety defects are noted. Employees will follow all site protocols for working outdoors and controlling heat stress. All areas will be inspected for evidence of significant quantities of energetic materials prior to soil manipulation. A detailed description of work activities, hazards and control measures is presented in the JSA.

3.7 Emergency Response

The objective of the emergency response scope of work is to provide an on-call emergency response service at the UTC/P&W Rocketdyne facility. BBLES in conjunction with Onyx will provide four on-call emergency responders during hours that the UTC/P&W ERT is not present.

Emergency response activities will include the following:

- Isolation and entry control during hazardous materials (hazmat) response incidents
- Assess the incident, identify materials and formulate appropriate response strategy
- Collect and analyze samples as necessary
- Contain and control spilled materials
- Perform clean-up
- Assess level of contamination

- Perform appropriate decontamination procedures
- Characterize waste materials for disposal
- Document incident and complete required notifications

Hazards: The primary hazards associated with emergency response include potential for chemical exposure to hazardous substance and the hazards from the explosive and physical properties of the materials. The facility had a variety of materials including energetic/explosive materials, organic compounds and other toxic materials that could be involved in emergency response scenarios. Explosions, fires, deflagrations and other hazardous reactions present a significant hazard when responding to emergency situations. Exposure to hazardous materials in an emergency response situation presents unique challenges since it is difficult to evaluate actual exposures during the response activities.

Controls: The primary controls include a systematic response approach with evaluation of the situation by qualified staff prior to entry into the hazard area. Only trained and authorized employees with hazardous materials response training will be assigned. Prior to entering the area, all available information on type of material, quantity released, hazardous properties and recommended response actions will be reviewed. Information will be obtained from the following sources; MSDS, documentation of building history and use, UTC/P&W Integrated Incident Contingency Plan (IICP) and other available resources. After gathering the available information the Incident Commander will determine the appropriate level of personal protective equipment (PPE) and emergency response steps. Onyx has detailed emergency response procedures based on the type of material that will be referenced.

3.8 Demobilization

Demobilization involves the removal of all tools, equipment, supplies, and vehicles brought to the site. The hazards of this phase of activity are associated with heavy equipment operation and manual materials handling.

Manual materials handling may cause blisters, sore muscles, and joint and skeletal injuries; and may present eye, contusion, and laceration hazards.

The work area presents slip, trip, and fall hazards from scattered debris and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces, and unstable structure.

Environmental hazards include plants, such as poison ivy and poison oak; aggressive fauna, such as ticks, fleas, mosquitoes, wasps, spiders, and snakes; weather, such as sunburn, lightning, rain, and heat-related illnesses; and pathogens, such as rabies, Lyme disease, and blood-borne pathogens.

Control procedures for these hazards are discussed in Section 4, General Safety Practices.

3.9 Chemical Hazards

Chemicals historically used in the proposed work include several of those are listed in Proposition 65, a list of chemicals known to cause cancer or reproductive toxicity in the California Safe Drinking Water and Toxics Enforcement Act of 1986. The primary chemical hazards associated with site operations are related to inhalation, ingestion, and skin exposure to energetic material residue on equipment, buildings, and debris. UTC/P&W Rocketdyne has notified BBLES of the potential presence of these chemicals in work areas of the site.

3.9.1 Energetic Materials

Energetic materials formerly used at this facility included a variety of organic and inorganic compounds. The energetic compound classes most predominantly used for significant production of propellants included:

- inorganic salts (mostly ammonium perchlorate [AP]);
- nitramines (mainly cyclotetramethylenetetranitramine [HMX]); and
- nitrate esters (e.g., nitroglycerin [NG]).

Additionally, nitrocellulose (NC) and cyclotrimethylenetrinitramine (RDX) were used at the site.

A brief summary of the properties of these compounds is included below for reference.

3.9.2 Ammonium Perchlorate/Ammonium Dinitroamide/Cupric Perchlorate

Ammonium Perchlorate (AP) is a white crystalline material as manufactured and has the general appearance of sugar or salt. It is often ground to smaller particle sizes and takes on the appearance of a white powder. Ammonium Perchlorate is stable under normal temperature conditions but decomposes at elevated temperatures greater than 302 °F (>150° Celsius [C]). AP is soluble in water to a concentration of about 20-25% at room temperature. It is impact-sensitive and may explode when light weights are dropped on it. Some metals (e.g., copper) can catalyze AP decomposition to cause fires. Perchlorate esters (i.e., alkyl perchlorates), which can be produced by mixing of perchloric acid and carbonaceous material, and some salts are susceptible to explosive detonation by minimal heat or impact. Grinding AP to very small particle size, less than 20 microns, will significantly increase its ability to explode or detonate when under confinement.

In performing station decontamination and closure activities of potentially perchlorate-contaminated surfaces, it is recommended that the contaminated surfaces be kept as wet as possible and to avoid contacting or using carbonaceous material (e.g., saw dust, oil) near the contaminated surfaces. These safety steps must be taken in addition to the normal precautions required for perchlorate substances, such as eliminating sharp impacts (e.g., hammering), sparks (e.g., static electricity), and heating/flame (e.g., acetylene torch).

AP is an effective oxidizer in the presence of organic materials such as wood, paper, cloth, etc. The fire hazard is significantly increased if AP is impregnated into these materials. Since most are permeable to water, and AP can be dissolved in water, contamination is highly probable particularly in processing areas that handled powdered AP. A concentration of 2% or greater should be considered to have significantly increased fire hazard.

Perchlorates have long been used as chemical oxidizers in the application as for explosives, pyrotechnics, and propellants. One of these is AP, which decomposes at elevated temperatures with a predictable pattern detailed below.

1. AP decomposes at a maintained temperature of 302° F (150° C). Decomposition of AP is negligible at 410 °F (210° C), fairly rapid at 428 °F (220° C), and more rapid at 446°F (230° C).
2. At temperatures below 572°F (300° C), AP reacts auto-catalytically, but the reaction ceases after about 30% decomposition.
3. At temperatures above 662°F (350° C), AP decomposition is complete.
4. Concurrently with these decomposition reactions, AP also undergoes disassociative sublimation (direct "evaporation" from solid to gaseous phase).
5. Explosive decomposition occurs near 752°F (400° C).

Perchloric acid, which may be formed where perchlorate is present under acidic conditions, is able to interact with organic materials to form organic perchlorates such as alkyl, acyl or aroyl perchlorates (Burton and Praill, 1955). The perchlorate group (ClO_4^{-1}) directly attaches to the carbon. Many of these compounds are covalent in their properties while others behave as typical salts. Because of their instability, relatively few of these substances have been isolated.

3.9.3 HMX/RDX /CL-20/Nitramines

HMX is a white, crystalline, organic explosive developed in the 1940s. It is often ground to produce smaller particle sizes. In a finely ground state it has the appearance of talcum powder. It is insoluble in water, but can be desensitized with water if it remains wet. It is commonly used in explosives and in solid rocket propellant. HMX is used in solid rocket propellant to boost performance. It is slightly oxygen rich and thus can be used as a weak oxidizer in solid propellant. It is typically blended with AP to increase the oxygen in propellants, thus making a better performing propellant.

HMX is highly sensitive to impact, friction, and electrostatic discharge (ESD) stimuli. Finely ground dry HMX is particularly sensitive to ESD. It initiates easily and propagates rapidly when initiated. The propagation rate and reaction severity depend both on the quantity of HMX and the means of initiation. HMX unconfined or in small quantities or in layers spread to no more than one inch thick will burn if ignited by flame or other heat source. Any quantity if initiated by impact or shock may

produce a detonation. A layer of 0.10 inches has the potential to propagate a detonation if initiated by shock or impact. Confinement will increase the reaction violence and decrease the quantity necessary to propagate a detonation. Detonation may occur in quantities of less than one gram when impact or shock initiated. HMX in soil or sand at concentrations of greater than 10% make that mixture susceptible to detonation under shock loading. It is accepted at the Pratt and Whitney facility that building materials such as wood, paper, insulation, etc., that have concentrations of HMX in excess of 2% should be handled as potentially explosive.

RDX is very similar to HMX both in appearance and in potential reactivity. Both of these explosives are nitramines and are detected by Expray 2. Like HMX, RDX is sensitive to impact, friction, and ESD. For this reason they are required to be transported wet. RDX has a lower detonation velocity and a lower melting point than HMX. Both are mass detonating high explosives, and among the most powerful of the explosives in common military use. In all practical aspects relating to handling, decontamination and demolition, RDX and HMX are interchangeable.

Hexanitrohexazaisowurzitane (CL-20) is a first generation double caged nitramine explosive material related to the nitrated cyclic family of HMX and RDX. RDX is a trinitramine, HMX is a tetranitramine and CL-20 is a hexanitramine. The chemical and physical properties, in general, may be expected to be similar for each. It is a white crystalline substance similar to HMX. It may also be ground to smaller particles sizes and take on the appearance of a white powder. CL-20 is more energetic than HMX. A hypothetical incident involving CL-20 will result in greater damage than an incident involving the same quantity of HMX.

3.9.4 Nitroglycerin/Nitrate Esters

NG – glyceryl triniatrate (nitrate ester of glycerin) is an oily liquid with a clear to slightly yellowish tint. It is basically insoluble in water, although it will go into solution to about 0.01% at room temperature. NG is denser than water, with a specific gravity of 1.6; thus, it will sink to the bottom of a water container. It is typically stabilized by use of the chemical 2-nitrodiphenyl amine (2NDPA). 2NDPA is an orange dye; stabilized NG will have an orange-yellow color. If a stabilizer is not added

or is depleted, NG can become unstable. If this happens, spontaneous detonation or ignition can occur even at room temperature.

NG is highly sensitive to impact and friction and will propagate in a detonation in very thin layers (i.e., less than 0.1 inch). Initiation by flame, spark, impact or shock may result in detonation propagation. Confinement increases the likelihood of a detonation reaction. NG will permeate into many organic materials (e.g., rubber, wood, and paint). Contamination levels in these materials as low as 0.5% can be hazardous relative to explosion and fire events. NG will burn if ignited by flame or other heat source and can detonate if sufficient quantity is present. NG will cook off to a violent explosion if heated slowly. Slow heating of NG can result in a violent explosion. NG also can vaporize and recondense, forming pockets of the liquid in locations not initially contacted by the primary source.

3.9.5 Nitrocellulose

Nitrocellulose (NC) is produced by reacting cellulose with nitric acid. NC is also known by other names, including “gun cotton” and “cellulose nitrate”. Pure nitrocellulose is normally white or slightly yellow and may have a fibrous or crystalline texture. Normally NC will break into very small fibers or dust size particles when handled. This form is most common at UTC-P&W San Jose site. When used in smokeless powder, graphite (carbon) is often added as a lubricant, producing a black or grey result. NC is not soluble in water, but water can be used to desensitize it if kept wet.

At the facility, the most likely source of nitrocellulose is from use as an ingredient in some propellants and in smokeless powder. NC produced for use in propellants and smokeless powder typically has a nitrogen content of 12.2 to 13.6%. NC is a detonable high explosive when pure and dry.

The decomposition temperature is 320 ^{o}F (160°C). NC is sensitive to impact, friction, ESD, and any source of heat or flame. The most probable consequence of initiation when unconfined is deflagration (very rapid burning) of the material.

Wetting with water or alcohol readily desensitizes this material so long as it is maintained in the wetted state, even though it is not water soluble. Desensitized NC can be handled and stored as a low-level

explosive (Class 1.3) and shipped as a flammable solid (Class 4.1). When cleaning up spills or items contaminated with NC, the use of a wetting agent (e.g. water) is strongly advised.

3.9.6 Solid Propellants

Solid propellants were the principle manufactured commodity at the Pratt and Whitney facility. The propellants made at this facility can be broadly described in two general families. These are Composite and Energetic Binder propellants.

Composite propellants are typically solid rubbery substances with a gritty feel or texture. They are commonly gray, brown, or rust colored depending on the additives that are used. Composition varies, but all contain a significant amount of AP and powdered aluminum. Some contain HMX or RDX. Composite propellants do not contain NG or other nitrate ester binders. Binder materials in composite propellants are inert.

Composite propellants are generally less energetic than energetic binder formulations and will not detonate except under extreme conditions. They can be initiated with heat, flame, impact, friction and ESD. Most are particularly sensitive to friction and ESD. The primary hazard with composite propellants is rapid deflagration.

Composite propellants are not soluble in water but can absorb a small amount. The propellant can be desensitized with water as long at it is kept wet. The primary concern with the use of water on composite propellants is that the water will dissolve surface AP and may in time leach out subsurface AP. The AP can recrystallize on the surface of the propellant as the water evaporates, leaving a sensitive accumulation of AP crystals.

Energetic Binder propellants are typically a solid rubbery substance with a somewhat gritty texture similar to composite propellants. They may have a finer feel and appearance and a more elastic matrix. Energetic binder propellants are typically gray-green in color, but may appear yellow, orange or red. The composition varies, but all contain a liquid energetic ingredient in the binder, typically a nitrate

ester such as NG. These propellants also contain NC, HMX and AP. The HMX content is usually very high.

Because of the composition of energetic binder propellants, they tend to be much more energetic and susceptible to detonation when initiated by impact or shock. In an unconfined condition, large pieces of propellant will burn when initiated by flame or heat. If confined, or if accumulations of fine particles are present, flame initiation can lead to a detonation reaction. Energetic binder propellants are sensitive to impact, shock, friction and ESD.

Energetic Binder propellants are not soluble in water but like composite propellants, can be desensitized as long as they are kept wet. AP can be dissolved out of these propellants as well, although there is typically not as much AP as in composite propellants. Recrystallization is a potential issue. The liquid component of the binder, such as NG, can also migrate out of the propellant and contaminate surrounding materials, such as wood, paper, paint, etc. It can also form as droplets, or an oily film on the surface of the propellant. Precautions must be made to carefully examine locations suspected of having had energetic binder propellants for potential residual contamination.

3.9.7 Unknown Compositions

Typically in the processing of ingredients to make propellants, certain areas of structures and particularly the processing equipment may become contaminated with mixtures of these ingredients. The composition is known to contain all possible energetic components used in the processing, but the percentages of each is unknown. The consistency or form of these unknown materials may be powders, propellants or crusty deposits. Color may vary widely depending on the composition. Because of the unknown characteristics of these deposits, they should be considered to be highly sensitive to impact, friction and ESD.

The solubility in water of these materials is unknown. Wetting with water may be an effective means to desensitize powders. If in the form of cured propellant or crusty deposits, water may be ineffective for any more than surface treatment. If removal is necessary, special provisions will need to be

implemented and some research performed in order to define an acceptable means to desensitize and remove the material.

3.9.8 Aluminum Powder

Aluminum powder is a common ingredient as a fuel in many solid rocket propellants. It is a gray powder substance with a slight metallic appearance. Very fine aluminum powders, on the order of 20 –80 microns is typically used in solid rocket motor propellants. Aluminum powder is generally assumed to be and inert additive. However, special conditions can exist where aluminum powder can be hazardous and very reactive. The critical mixture of water and aluminum powder can cause the generation of hydrogen gas. Concentrations of hydrogen gas can be explosive and are very sensitive to ESD. Dry aluminum powder can provide an explosive dust atmosphere in the proper concentration. The dust can be ignited with a flame or a spark and generate a significant explosion.

Cleaning of aluminum powders from process equipment, or from spills requires application of the correct procedure. The procedure identifies when it is permissible to use water or other liquids, and when to use vacuums or mechanical means for cleaning.

The Material Safety Data Sheet (MSDS) for AP and other energetics are provided as Attachment C. The Master MSDS file is maintained in the Project Administration area in Building 12.

Other chemical hazards that may exist at the site include but are not limited to: acetone, acetonitrile, hydrogen sulfide, ethanol, HMX, lead, ACMs, methanol, nitroglycerine, and RDX. The hazards of these chemicals are listed in the Chemical Hazard Data Table in Attachment D, and the material safety data sheets (MSDS) provided for informational purposes are located in Attachment C. The master inventory of MSDS for BBLES site activities is maintained in the administrative area in a labeled binder. All BBLES site employees and subcontractors have been notified of the location of MSDS and have access to this binder at all times.

4. General Safety Practices

4.1 General Safety Rules

The following items are prohibited at the UTC/P&W ROCKETDYNE facility:

- Cameras or other photographic equipment without a camera pass;
- Electronic sending and receiving equipment (except pipe locators);
- Explosives or incendiaries in any form (except process material);
- Guns, ammunition, or similar weapons;
- Matches, lighters, or other flame producing devices in the limited access areas (factory-installed vehicle lighters may remain in the vehicle);
- Narcotics and alcoholic beverages;
- No horseplay will be tolerated at anytime while onsite;
- Operation of Citizen Band (CB) radios is not allowed; and
- Poisonous or corrosive solids, liquids, or gases (except process material).

General safety rules for facility activities include, but are not limited to, the following:

- At least one copy of this HASP must be in a location at the site that is readily available to personnel, and all project personnel shall review the plan prior to starting work. Copies of the HASP will be maintained in the Project Administration area.
- Consume or use food, beverages, chewing gum, and tobacco products only in the SZ or other designated area outside the EZ and CRZ. Cosmetics shall not be applied in the EZ or CRZ.
- Wash hands before eating, drinking, smoking, or using toilet facilities.
- Wear all PPE as required, and stop work and replace damaged PPE immediately.
- Upon skin contact with materials that may be impacted by Constituents of Concern (COC) remove contaminated clothing and wash the affected area immediately. Contaminated clothing must be changed. Any skin contact with materials potentially impacted by COC must be reported to the SS or HSS immediately. If needed, medical attention should be sought.

- Practice contamination avoidance. Avoid contact with surfaces either suspected or known to be impacted by AP or other contaminants/energetics.
- Remove PPE as required in the CRZ to limit the spread of contaminated materials.
- At the end of each shift or as required, dispose of all single-use coveralls, soiled gloves, and respirator cartridges in designated receptacles designated for this purpose.
- Inspect all non-disposable PPE for contamination in the CRZ. Any PPE found to be contaminated must be decontaminated or disposed of appropriately.
- Recognize emergency signals.
- Report all injuries, illnesses, near misses, and unsafe conditions or work practices to the SS or HSS.

Personnel are to perform only tasks for which they have been properly trained and will advise their supervisor if they have been assigned a task for which they are not trained.

4.1.1 Safe Performance Self-Assessment

All onsite personnel are required to perform a SPSA prior to beginning any activity. This three-step process requires each individual to:

- *Assess* the risk of the task to be performed. Ask the following questions:
  - What could go wrong?
  - What is the worst thing that could happen if something does go wrong?
- *Analyze* the ways the risk can be reduced. Ask the following questions:
  - Do I have all the necessary training and knowledge to do this task safely?
  - Do I have all the proper tools and PPE?
- *Act* to control the risk and perform the task safely.
  - Take the necessary action to perform the job safely.
  - Follow written procedures, and ask for assistance if necessary.

This process must be performed prior to beginning any activity, and must be performed after any near miss or other incident in order to determine if it is safe to proceed. Preparation for emergencies and other things that may go wrong should be planned for.

If work conditions change from the intended scope or activities that were not originally covered in the Work Permit or Sampling and Analysis Plan (SAP) are required, work must stop and be reassessed. A new work permit and supporting documentation (JSA, Sampling Procedures) must be completed to cover the new conditions or activities. The following language will be inserted into all SAP documents to enforce the requirement to work when conditions change.

"Warning: Stop work and depart the work area if known, documented and communicated conditions change, or work activities deviate from the established and approved written procedures"

4.1.2 Loss Prevention Observation

The SS or the HSS will perform the LPO to identify and correct potential hazards, and to positively reinforce behaviors and practices that are correct. The SS or HSS must identify potential deviations from safe work practices that could possibly result in an incident, and take prompt corrective action. The LPO process includes the following steps:

- Identify tasks that have the greatest potential for hazardous incidents.
- Be familiar with the proper procedure for completing the task.
- Discuss with the observed employee the task and the SS/HSS role in observing the task.
- Observe the employee completing the task.
- Document positive conditions and actions and identify areas in need of improvement.

LPO forms are located in Attachment E.

4.1.3 Incident Investigation

An incident is any of the following events: first aid cases, injuries, illnesses, near misses, spills/leaks, equipment and property damage, motor vehicle accidents, regulatory violations, fires, and business interruptions. All incidents shall be investigated within 24 hours and reported to the PM, HSO and UTC/P&W Rocketdyne safety personnel.

The purpose of an II is to prevent the recurrence of a similar hazardous event. II investigates all incidents in the same manner. Using the information gathered during an II, appropriate measures will be taken to protect personnel from the hazard in question. The II form is included in Attachment F.

4.1.4 Job Safety Analysis

JSA is a tool used to identify potential hazards, and to develop corrective or protective systems to eliminate the hazard. A JSA lists all potential hazards associated with an activity. Hazards may include but may not be limited to physical, chemical, biological, explosive ignition, lightning, electrostatic discharge, metal to metal contact, and shock hazards.

After identifying the hazards associated with an activity, control measures are evaluated and protective measures or procedures are then instituted. JSAs are reviewed periodically so that the procedures and protective equipment specified for each activity are current and technically correct. Any changes in site conditions and/or scope of work may require review of and modification to the JSA in question. During this review process, comments on the JSA and its procedures should be obtained from personnel associated with the activity being analyzed.

4.2 Buddy System

On-site personnel must use the buddy system (also referred to by UTC/Pratt & Whitney Rocketdyne, San Jose personnel as the 2-person rule) when performing high hazard operations. High hazard operations are defined as an operation requiring exposure to hazardous substances which has an increased probability of resulting in injury, loss of life, and/or catastrophic loss of equipment if a

mishap were to occur. Several examples of high hazard operations that require the buddy system are but are not limited to: working in an energetic environment, coring, decontamination, demolition, well drilling, high voltage electrical work, etc). Observations for signs of chemical exposure, heat stress, or other adverse health effects must be monitored when using the buddy system. Indications of adverse health effects include, but are not limited to:

- Changes in complexion and skin coloration;
- Changes in coordination;
- Changes in demeanor;
- Excessive salivation and pupillary response; and
- Changes in speech pattern.

Field personnel must inform their partners or fellow crewmembers of non-visible effects of exposure to toxic materials that they may be experiencing. The symptoms of such exposure may include, but are not limited to:

- Headaches;
- Dizziness;
- Nausea;
- Blurred vision;
- Cramps; and
- Irritation of eyes, skin, or respiratory tract.

If protective equipment or noise levels impair communications, prearranged hand signals must be used for communication. Personnel must stay within line of sight or verbal communication of another team member. Radio protocol must be adhered to as outline in section 3.2.2 of this HASP.

4.3 Heat Stress

Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, etc., as well as the physical and conditioning characteristics of the individual. Since heat stress is one of the most common illnesses associated with heavy outdoor work conducted with direct solar load and, in particular, because wearing PPE can increase the risk of developing heat stress, workers must be capable of recognizing the signs and symptoms of heat-related illnesses. Personnel must be aware of the types and causes of heat-related illnesses and be able to recognize the signs and symptoms of these illnesses in both themselves and their co-workers.

Heat rashes are one of the most common problems in hot work environments. Commonly known as prickly heat, a heat rash is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

Heat cramps are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. It is important to understand that cramps can be caused both by too much or too little salt.

Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution (plus or minus 0.3% NaCl), excess salt can build up in the body if the water lost through sweating is not replaced. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments.

Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a loss of sodium may occur. Drinking commercially available carbohydrate electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

Heat exhaustion occurs from increased stress on various body organs due to inadequate blood circulation, cardiovascular insufficiency, or dehydration. Signs and symptoms include pale, cool, moist skin; heavy sweating; dizziness; nausea; headache, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment.

Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, which is a medical emergency.

Workers suffering from heat exhaustion should be removed from the hot environment, be given fluid replacement, and be encouraged to get adequate rest.

Heat stroke is the most serious form of heat stress. Heat stroke occurs when the body's system of temperature regulation fails and the body's temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict.

Heat stroke is a medical emergency. The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature, e.g., a rectal temperature of 41°C (105.8°F). If body temperature is too high, it causes death. The elevated metabolic temperatures caused by a combination of workload and environmental heat load, both of which contribute to heat stroke, are also highly variable and difficult to predict.

If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The worker should be placed in a shady area and the outer clothing should be removed. The worker's skin should be wetted and air movement around the worker should be increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible. The medical outcome of

an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment.

Regardless of the worker's protestations, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.
Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat stroke or exhaustion, that person may be predisposed to additional heat injuries.

Heat Stress Safety Precautions

Heat stress monitoring and work rest cycle implementation should commence when the air temperature exceeds 72°F. A minimum work rest regimen and procedures for calculating ambient adjusted temperature are described in Table 4-1.

TABLE 4-1
SCREENING CRITERIA FOR HEAT STRESS EXPOSURE
FOR 8 HOUR WORK DAY FIVE DAYS PER WEEK WITH CONVENTIONAL BREAKS

	Acclimatized				Unacclimatized			
Work Demands	**Light**	**Moderate**	**Heavy**	**Very Heavy**	**Light**	**Moderate**	**Heavy**	**Very Heavy**
100% Work	85.1ºF (29.5ºC)	81.5ºF (27.5ºC)	78.8ºF (26ºC)		81.5ºF (27.5ºC)	77ºF (25ºC)	72.5F (22.5ºC)	
75% Work; 25% Rest	86.9ºF (30.5ºC)	83.3ºF (28.5ºC)	81.5ºF (27.5ºC)		84.2ºF (29ºC)	79.7ºF (26.5ºC)	76.1ºF (24.5ºC)	
50% Work; 50% Rest	88.7ºF (31.5ºC)	85.1ºF (29.5ºC)	83.3ºF (28.5ºC)	81.5ºF (27.5ºC)	86ºF (30ºC)	82.4ºF (28ºC)	79.7ºF (26.5ºC)	77ºF (25ºC)
25% Work, 75% Rest	90.5ºF (32.5ºC)	87.8ºF (31ºC)	86ºF (30ºC)	85.1ºF (29.5ºC)	87.8ºF (31ºC)	84.2ºF (29ºC)	82.4ºF (28ºC)	79.7ºF (26.5ºC)

Source: 2004 TLVs and BEIs - Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati: American Conference of Governmental Industrial Hygienists (ACGIH), 2004 - page 171.

EXAMPLES OF ACTIVITIES WITHIN METABOLIC RATE CATERGORIES

Categories	Example Activities
Resting	Sitting quietly
	Sitting with moderate arm movements
Light	Sitting with moderate arm and leg movements
	Standing with light work at machine or bench while using mostly arms
	Using a table saw
	Standing with light or moderate work at machine or bench and some walking about
Moderate	Scrubbing in a standing position
	Walking about with moderate lifting or pushing
	Walking on a level at 6 Km/hr while carrying 3 Kg weight load
Heavy	Carpenter sawing by hand
	Shoveling dry sand
	Heavy assembly work on a noncontinuous basis
	Intermittent heavy lifting with pushing or pulling (e.g., pick-and-shovel work)
Very Heavy	Shoveling wet sand

Acclimatization

Acclimatization is a set of physiological adaptations, which allows the body to react to heat stress conditions. Full-heat acclimatization requires up to 3 weeks of continued physical activity under heat-stress conditions similar to those anticipated for the work. Its loss begins when the activity under those heat-stress conditions is discontinued, and a noticeable loss occurs after 4 days. With a recent history of heat stress exposures (e.g., 5 of the last 7 days), a worker can be considered acclimatized for the purpose of using the table Screening Criteria for Heat Stress Exposure.

Additionally, one or more of the following control measures can be used to help control heat stress and are mandatory if any site worker has a heart rate (measure immediately prior to rest period) exceeding 115 beats per minute:

- Site workers will be encouraged to drink plenty of water and electrolyte replacement fluids throughout the day.
- Onsite drinking water will be kept cool (50 to 60°F).

- A work regimen that will provide adequate rest periods for cooling down will be established, as required.
- All personnel will be advised of the dangers and symptoms of heat stroke, heat exhaustion, and heat cramps.
- Cooling devices, such as vortex tubes or cooling vests, should be used when personnel must wear impermeable clothing in conditions of extreme heat.
- Employees should be instructed to monitor themselves and co-workers for signs of heat stress, and to take additional breaks as necessary.
- A shaded rest area must be provided. All breaks should take place in the shaded rest area.
- Employees must not be assigned to other tasks during breaks.
- Employees must remove impermeable garments during rest periods. This includes white Tyvek®-type garments.
- All employees must be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress disorders.

4.4 Biological Hazards

Biological hazards may include poison ivy, snakes, thorny bushes and trees, ticks, mosquitoes, scorpions, and other pests.

4.4.1 Tick Borne Diseases

Lyme disease and erlichiosis are transmitted primarily by the deer tick, which is smaller and redder than the common wood tick. The disease may be transmitted by immature ticks, which are small and hard to see. The tick may be as small as a period on this page.

Symptoms of Lyme disease include a rash or a peculiar red spot, like a bull's eye, which expands outward in a circular manner. The victim may have headache, weakness, fever, a stiff neck, and swelling and pain in the joints, and eventually, arthritis. Symptoms of erlichiosis include muscle and joint aches, flu-like symptoms, but there is typically no skin rash.

Rocky Mountain Spotted Fever (RMSF): This disease is transmitted via the bite of an infected tick. The tick must be attached 4 to 6 hours before the disease-causing organism (Rickettsia rickettsii) becomes reactivated and can infect humans. The primary symptom of RMSF is the sudden appearance of a moderate-to-high fever. The fever may persist for two to three weeks. The victim may also have a headache, deep muscle pain, and chills. A rash appears on the hands and feet on about the third day and eventually spreads to all parts of the body. For this reason, RMSF may be confused with measles or meningitis. The disease may cause death, if untreated, but if identified and treated promptly, death is uncommon.

Control: Tick repellant containing diethyltoluamide (DEET) should be used when working in tick-infested areas, and pant legs should be tucked into boots. In addition, workers should search the entire body every three or four hours for attached ticks. Ticks should be removed promptly and carefully without crushing, since crushing can squeeze the disease-causing organism into the skin. A gentle and steady pulling action should be used to avoid leaving the head or mouth parts in the skin. Hands should be protected with surgical gloves when removing ticks.

4.4.2 Poisonous Plants

Poisonous plants may be present in the work area. Personnel should be alerted to its presence, and instructed on methods to prevent exposure.

Control: The main control is to avoid contact with the plant, cover arms and hands, and frequently wash potentially exposed skin. Particular attention must be given to avoiding skin contact with objects or protective clothing that have touched the plants. Treat every surface that may have touched the plant as contaminated, and practice contamination avoidance. If skin contact is made, the area should be washed immediately with soap and water, and observed for signs of reddening.

4.4.3 Snakes

The possibility of encountering rattlesnakes exists in many areas of the facility, Western Diamondback Rattlesnakes have been observed adjacent to work areas. Snake venoms are complex and include

proteins, some of which have enzymatic activity. The effects produced by venoms include neurotoxic effects with sensory, motor, cardiac, and respiratory difficulties; cytotoxic effects on red blood cells, blood vessels, heart muscle, kidneys, and lungs; defects in coagulation; and effects from local release of substances by enzymatic actions. Other noticeable effects of venomous snakebites include swelling, edema, and pain around the bite, and the development of ecchymosis (the escape of blood into tissues from ruptured blood vessels).

Control: To minimize the threat of snakebites, all personnel walking through vegetated areas must be aware of the potential for encountering snakes, and the need to avoid actions potentiating encounters, such as turning over logs, etc. If a snake bite occurs, an attempt should be made to safely kill the snake for identification. The victim must be transported to the nearest hospital within 30 minutes; first aid consists of applying a constriction band, and washing the area around the wound to remove any unabsorbed venom.

4.4.4 Spiders

Personnel may encounter spiders during work activities. Two spiders of concern are the black widow and the brown recluse. Both prefer dark sheltered areas such as basements, equipment sheds and enclosures, and around woodpiles or other scattered debris. The black widow is shiny black, approximately one inch long, and found throughout the United States. There is a distinctive red hourglass marking on the underside of the black widows body. The bite of a black widow is seldom fatal to healthy adults, but effects include respiratory distress, nausea, vomiting, and muscle spasms. The brown recluse is smaller than the black widow and gets its name from its brown coloring and behavior. The brown recluse is more prevalent in the southern United States. The brown recluse has a distinctive violin shape on the top of its body. The bite of the brown recluse is painful and the bite site ulcerates and takes many weeks to heal completely. Tarantulas are also very prevalent on the facility grounds and contact with them should be avoided.

Control: To minimize the threat of spider bites, all personnel walking through vegetated areas must be aware of the potential for encountering these arachnids. Personnel need to avoid actions that may result

in encounters, such as turning over logs, and placing hands in dark places such as behind equipment or in corners of equipment sheds or enclosures. If a spider bite occurs, the victim must be transported to the nearest hospital as soon as possible; first aid consists of applying ice packs and washing the area around the wound to remove any unabsorbed venom.

4.4.5 Coyotes and Raccoons

Coyotes have been observed adjacent to work areas and elsewhere on the facility. Raccoons are also located throughout the facility. Reportedly there has been a coyote attack on UTC/P&W Rocketdyne property. To minimize the possibility of a coyote or raccoon attack, food or garbage containing food is not be left in work areas after break times. Garbage is to be bagged and either placed in a vehicle or in appropriate trash collection areas at the facility. Animals should not be fed and contact should always be avoided.

If a coyote or raccoon does attack personnel, the possibility exists for contracting rabies. Rabies is an acute, fatal encephalomyelitis caused by neurotropic viruses in the family Rhabdoviridae, genus Lyssavirus. Rabies is almost always transmitted by an animal bite that inoculates the virus into wounds. On rare occasions rabies has been transmitted by nonbite exposures that introduce the virus into open wounds or mucous membranes. The disease progresses from a nonspecific prodromal phase to paresis or paralysis; spasms of swallowing muscles can be stimulated by the sight, sound, or perception of water (hydrophobia); delirium and convulsions can develop, followed by coma and death. All mammals are believed to be susceptible, but reservoirs consist of carnivores and bats. Although dogs are the main reservoir in developing countries, the epidemiology of the disease differs sufficiently from one region or country to another to warrant the medical evaluation of all mammal bites, including rodents. The incubation between the exposure and the onset of symptoms are approximately 10-14 days however it is possible to get infected up to a year after exposure, depending on where the bite occurs.

Treatment for rabies includes the injection of rabies virus (human diploid cell vaccine, rabies vaccine absorbed, and purified chick embryo cell culture). The vaccine must be administered within 24 to 48 hours after the bite. Immediate medical attention must be sought after a bite.

4.4.6 Ground Squirrels

The California Ground Squirrel (*Otospermophilus beecheyi*) is prevalent throughout the site. Other than not stepping in one of the many burrow holes on site, the same precautions should be taken as with raccoons and coyotes. Avoid contact and leaving food where it is accessible to squirrels. One of the diseases carried by ground squirrels is bubonic plague. Plague is of concern if dead squirrels are encountered or if flea bites occur in the field.

Plague is a rare bacterial disease caused by Yersinia pestis (yer-SIN-ee-ah PEST-iss). People usually show symptoms 2 to 6 days after getting plague. Symptoms include fever, chills, weakness, and swollen and painful lymph nodes. A few people get pneumonia (infection of the lungs) as a first symptom of plague. The infection then spreads to other parts of the body. If this disease is not treated right away, many people who get sick will not survive.

To prevent exposure to plague the following precautions will be followed by BBLES employees and subcontractors:

- Do not pick up or touch dead animals
- If plague has recently been found in your area, report any observations of sick or dead animals to UTC/P&W ROCKETDYNE personnel
- Eliminate sources of food
- If you anticipate being exposed to rodent fleas, apply insect repellents to clothing and skin, according to label instructions, to prevent flea bites.

4.4.7 Hantavirus

There is a possibility of coming into contact with field mice on this project. Mice fecal matter may contain hantavirus.

Hantaviruses are a family of viruses of the Bunyaviridae Family. In the United States the species of viruses are Prospect Hill (Microtus pennsylvanicus), Sin Nombre (Peromyscus maniculatus), Black Creek Canal (Sigmodon hispidus), New York-1 (Peromyscus leucopus), El Moro Canyon (Reithrodontomys megalotis), Seoul (Rattus norvegicus) and Bayou (uncharacterized). This disease causes Hemorrhagic Fever with Renal Syndrome (HFRS), survivors have Hantavirus Pulmonary Syndrome (HPS). According to one Centers for Disease Control report, estimated that 10% of the deer mice in the United States are infected with Sin Nombre species of hantavirus.

Hantavirus is spread primarily when the fecal matter and other body fluids are aerosolized and are inhaled or ingested. The primary illness from hantavirus is HFRS which has an incubation period of 5-42 days, however the average incubation time is 12 to 16 days. HFRS is characterized by an abrupt onset of fever lasting 3-8 days, conjunctival infection (mucous membrane that lines the inner surface of the eyelid and the exposed surface of the eyeball), prostration (total exhaustion or weakness leading to collapse), headache, abdominal pain, anorexia, and vomiting. Fatalities occur due to hypotension, and absence of urine formation in approximately 7% of the cases.

Survivors of HFRS are affected by, and some species of hantavirus cause, HPS and is characterized by fever, pain in the muscles, gastrointestinal problems, respiratory distress and hypotension, with a 40-50% mortality rate. The symptoms of HPS include an onset of a fever lasting 3 to 8 days, conjunctival infection, prostration, back pain, headache, abdominal pain, anorexia, and vomiting. Hemorrhaging occurs from the 3rd to 6th days, protein in the urine, hypotension and shock. In some exposures HFRS is not contracted but HPS is contracted.

Treatment of HFRS with intravenously administered Ribavirin needs to be given as soon as symptoms develop. Currently the only treatment for HPS is supportive therapy. In any case seek immediate medical attention if symptoms develop.

4.4.8 Indoor Air Quality/Mold

Projects A, B, and C have many stations that have been vacant from several months to several years. Leaks may have occurred in roofs, walls, and from broken water pipes. Mold may be present and can be detected visually or by smell. Site personnel may have an allergic reaction to mold which may result in sinus congestion or dermatitis, however, these reactions are not life threatening. If excessive mold is encountered, then an evaluation by the HSS may be necessary, and station specific precautions and evaluations by qualified individuals may be necessary before proceeding with work.

4.4.9 Bird and Bat Infestations

Some of the stations have been vacant from several months to several years, and as a result, bats or birds may live in the buildings. Contact with birds and bats should be avoided. Any bites from birds or bats should be reported to the HSS immediately, and a medical evaluation must be sought. The most common hazards when dealing with birds and bats is with their excrement. Bird and bat excrement contains the fungus *Histoplasma capsulatum*. Any dust generated during site activities involving bird excrement should be evaluated by the HSS prior to the start of the activity, remediation of the bird droppings may be necessary.

The primary illness caused by inhaling these spores is histoplasmosis is an infectious disease. Histoplasmosis is not contagious; it cannot be transmitted from an infected person or animal to someone else.

Histoplasmosis primarily affects a person's lungs, and its symptoms vary greatly. The vast majority of infected people are asymptomatic (have no apparent ill effects), or they experience symptoms so mild they do not seek medical attention and may not even realize that their illness was histoplasmosis. If symptoms do occur, they will usually start within 3 to 17 days after exposure, with an average of 10 days. Histoplasmosis can appear as a mild, flu-like respiratory illness and has a combination of symptoms, including malaise (a general ill feeling), fever, chest pain, dry or nonproductive cough, headache, loss of appetite, shortness of breath, joint and muscle pains, chills, and hoarseness. This is a serious illness and requires a medical evaluation.

4.5 Miscellaneous Safety Issues

This site may contain numerous safety issues some of which are described below.

4.5.1 Portable Compressors

These requirements are referenced in the *California Code of Regulations*, Title 8, Section 1696 Portable Compressors. When using portable compressors, the following apply:

- All portable compressors on wheels that are attached to other equipment should be positively locked, blocked, or otherwise adequately prevented from rolling;
- Fans must be guarded with a shroud or side screens.
- Compressed air tanks shall be drained of liquid as recommended by the manufacturer's recommendations;
- Compressor safety valves should be popped at least weekly;
- The compressor should be grounded.

4.5.2 Internal Combustion Engines

These requirements are referenced in the *California Code of Regulations*, Title 8, Section 1553, Internal Combustion Engines. Internal combustion engine-driven equipment shall be operated inside buildings or enclosed structures only when such operation does not result in exposure to dangerous gases or fumes in concentrations above the maximum acceptable published limits.

Some acceptable methods of control may include piping exhaust gases to the outside atmosphere, and providing adequate ventilation.

4.5.3 Lead

The California lead regulations are included in the *California Code of Regulations*, Title 8, Section 1532. Lead coatings may need to be removed prior to work commencing, as such an evaluation by the HSS or other qualified individual may be necessary prior to the commencement of work.

4.5.4 Floor, Roof, and Wall Openings

Upon entering any station site personnel should be aware of their surroundings and avoid working around unguarded floor, roof, and wall openings in accordance with the *California Code of Regulations*, Title 8, Section 1632.

4.5.5 Ladders

- Ladders shall be maintained in good condition at all times, the joint between the steps and side rails shall be tight, all hardware and fittings securely attached, and the movable parts shall operate freely without binding or undue play.
- Safety feet and other auxiliary equipment shall be kept in good condition to insure proper performance.
- Ladders shall be inspected frequently and those which have developed defects shall be withdrawn from service for repair or destruction and tagged or marked as "Dangerous, Do Not Use."
- Rungs should be kept free of grease and oil.
- Portable rung and cleat ladders shall, where possible, be used at such a pitch that the horizontal distance from the top support to the foot of the ladder is one-quarter of the working length of the ladder (the length along the ladder between the foot and the top support). The ladder shall be so placed as to prevent slipping, or it shall be lashed, or held in position. Ladders shall not be used in a horizontal position as platforms, runways, or scaffolds.
- Ladders for which dimensions are specified should not be used by more than one person at a time nor with ladder jacks and scaffold planks where use by more than one person is anticipated. In such cases, specially designed ladders with larger dimensions of the parts should be procured.
- Portable ladders shall be so placed that the side rails have a secure footing. The top rest for portable rung and cleat ladders shall be reasonably rigid and shall have ample strength to support the applied load.
- Ladders shall not be placed in front of doors opening toward the ladder unless the door is blocked upon, locked, or guarded.

- Ladders shall not be placed on boxes, barrels, or other unstable bases to obtain additional height.
- Ladders with broken or missing steps, rungs, or cleats, broken side rails, or other faulty equipment shall not be used; improvised repairs shall not be made.
- Short ladders shall not be spliced together to provide long sections.
- Ladders shall not be used as guys, braces, or skids, or for other than their intended purposes.
- Tops of the ordinary types of stepladders shall not be used as steps.
- No ladder should be used to gain access to a roof or other landing unless the top of the ladder shall extend at least 3 feet above the point of support, at eave, gutter, or roofline.

4.6 Live Area Guidelines

These guidelines are adapted from the Department of Defense (DOD) Contractors' Safety Manual for Ammunition and Explosives (September 1997).

4.6.1 Cardinal Rules

The "cardinal rules" to be observed in any location or operation involving explosives is to limit exposure to:

- The minimum amount of personnel needed for an operation;
- A minimum amount of time around material; and
- The minimum amount of the hazardous material.

Non-sparking tools, such as brass, Teflon, bronze, lead, and "K" Monel, will be used for work in locations that contain exposed explosives or hazardous concentrations of flammable dusts, gases or vapors.

4.6.2 Materials in the Work Area

All materials containing AP or any potential explosive material should be placed in Velostat™ bags or wrapped in Velostat™ and should be removed from the work area after each bag is filled, and placed in an appropriate staging area.

4.6.3 Hotwork

Hot work, defined as any activity that creates heat or produces sparks or any other form of energy that may act as an ignition source for explosive or flammable material, will be strictly controlled and permitted in accordance with UTC/P&W Rocketdyne and BBLES requirements. UTC/P&W Rocketdyne's work permit system will be used as a means of establishing permits for hot work. All hot work permits will be re-evaluated if site conditions change, and become invalid if explosive material or residues are discovered at the work location. JSA's specific to the proposed hot work activity and work area will also be prepared to identify hazards and the appropriate mitigating measures.

4.6.4 Housekeeping

The following housekeeping measure will be followed during daily field work activities:

- The work area should be kept clean and orderly.
- If AP dust is suspected, a grounded HEPA vacuum, water, or other ignition free technique will be used to clean AP; abrasive means will be avoided.

4.6.5 Evacuation before Electrical Storm

UTC/P&W Rocketdyne's procedures include evacuating areas of the facility where AP or other potential explosives may be present if a lightning strike occurs within 10 miles of the facility. This situation is monitored by site security or other UTC/P&W Rocketdyne personnel. In the event that UTC/P&W Rocketdyne personnel notify BBLES that lightning is within the threshold of concern, all

BBLES personnel and subcontractors will report to the BBLES office, located in building 12 or acting field office, and await further instruction from the HSS or designated alternate BBLES personnel.

4.6.6 Prohibited Materials in Hazardous Areas

BBLES personnel shall not carry matches, cigarette lighters, or other flame-producing devices into live areas. Cameras with flashes are prohibited materials in hazardous areas. Personal articles that increase existing hazards are also prohibited.

4.7 Lockout/Tagout Procedures

Only fully qualified and trained personnel will perform work, on, or around energized equipment.. Before work begins on energized equipment, lockout/tagout procedures per CCR Title 8 Sections 2320, 3314, and 4413, BBLES's Lockout/Tagout Procedure (Attachment G) will be followed.

Lockout is the placement of a device that uses a positive means, such as lock, to hold an energy- or material-isolating device such that the equipment cannot be operated until the lockout device is removed. If a device cannot be locked out, a tagout system must be used. Tagout is the placement of a warning tag on an energy- or material-isolating device to indicate that the equipment controls may not be operated until the tag is removed by the person who attached the tag. A Lockout Tagout Checklist should be used to document procedures followed.

4.8 Electrical Safety

Electricity may pose a particular hazard to site workers due to the use of portable electrical equipment. If wiring or other electrical work is needed, a qualified electrician must perform it.

General electrical safety requirements include:

- All electrical wiring and equipment must be a type listed by Underwriters Laboratories (UL), Factory Mutual Engineering Corporation (FM), or other recognized testing or listing agency.

- All portable generators or other portable internal combustion type devices used on site will be grounded. All grounds will be validated twice daily with a multimeter to confirm a resistance of less than ten ohms.
- All installations must comply with the National Electrical Safety Code (NESC), the National Electrical Code (NEC), or United States Coast Guard regulations.
- Portable and semiportable tools and equipment must be grounded by a multiconductor cord having an identified grounding conductor and a multicontact polarized plug-in receptacle.
- Tools protected by an approved system of double insulation, or its equivalent, need not be grounded. Double-insulated tools must be distinctly marked and listed by UL or FM.
- Live parts of wiring or equipment must be guarded to prevent persons or objects from touching them.
- Electric wire or flexible cord passing through work areas must be covered or elevated to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching.
- All circuits must be protected from overload.
- Temporary power lines, switchboxes, receptacle boxes, metal cabinets, and enclosures around equipment must be marked to indicate the maximum operating voltage.
- Plugs and receptacles must be kept out of water unless of an approved submersible construction.
- All extension cord outlets must be equipped with ground-fault-circuit interrupters (GFCIs).
- Attachment plugs or other connectors must be equipped with a cord grip and be constructed to endure rough treatment.
- Extension cords or cables must be inspected prior to each use and replaced if worn or damaged. Cords and cables must not be fastened with staples, hung from nails, or suspended by bare wire.
- Flexible cords must be used only in continuous lengths without splice, with the exception of molded or vulcanized splices made by a qualified electrician.

4.9 Pressure Washing

High pressure washing may be used to decontaminate environmental related equipment (drill rigs, geoprobe or other subsurface sampling equipment) as necessary. High Pressure washing will only be used on equipment that has been previously decontaminated using approved methodology to remove traces of energetic materials.

It is not anticipated that high-pressure washing will be used as a decontamination method for energetic materials. If high-pressure methods are used for energetic materials work instructions and a JSA that include the control of static discharge and line induction fields will be developed and implemented.

Personnel involved in pressure washing may be exposed to skin contact with residuals containing site constituents, volatile emissions from heavily soiled equipment, high pressure water spray, and noise.

The hazards of high pressure water cleaning are related to the high pressure of the water, which may exceed 10,000 pounds per square inch (psi) at the nozzle. Contact with the water spray may cause severe lacerations, which may then be contaminated with hazardous material. Because of the high pressure involved, the opportunity for slicing or injecting the water stream through soft tissues of the body exists. Hydro blasters will also cut through bone at high enough pressures. A second hazard is repetitive motion, or cumulative trauma disorder. These serious disorders are related to repeatedly squeezing the trigger or constantly fighting the pressure of the spray gun with the forearm or wrist.

When pressure washing, steaming, or hydro blasting, the health and safety precautions for hydro blasting outlined below must be observed. Pressure washing presents a splash hazard. Protection against splash to face and skin is mandatory. The pressure washer is not to be pointed at a person at any time. Steam cleaning presents a thermal burn hazard in addition to the hazards presented by pressure washing. Adequate protection from the hot surfaces must be provided.

Only persons trained in use and maintenance of a hydro blaster may use such equipment. Hydro blasting operations will be conducted only by qualified subcontractor personnel.

The following general requirements are provided for high-pressure water cleaning activities:

- The gun, pressure piping, pressure hose ends, and couplings will have a burst pressure of at least four times the operating pressure;
- No equipment or component of such equipment will be operated beyond the manufacturer's specifications or beyond the rated working pressure;
- The maximum operating pressure will be permanently displayed on the pumping unit;
- Wear safety glasses, face-shield, hearing protection, and safety shoes;
- Alternate hands frequently during long periods of use;
- Rotate personnel periodically;
- Use a washer with a gun which supplies water to the wand in a straight line as opposed to supplying water through the grip. This eliminates the gun's twisting motion;
- Keep the equipment in good condition;
- Check to see that releasing the trigger stops the flow of water. Do not wire back the trigger;
- A hose safety shroud will be placed on hoses whenever operating pressure exceeds 2,000 psi;
- The pressure control will be a "deadman" type to safely reduce the nozzle discharge pressure when control is released;
- The pressure discharge gauge indicating pump pressure will be clearly visible for monitoring pump pressure;
- A pressure relief device set to relieve at 110% of the maximum working pressure of the unit or its components, whichever is lower, will be installed on the pump. The relief will be clearly marked and displayed on the device;
- A strainer or filter should be installed on the water supply system to prevent debris from entering the water blasting units and clogging the gun, control, or other device;
- The maximum operating pressure will be permanently displayed on the pumping unit;
- Keep the equipment in good condition; and
- Pay close attention to the water line. It is under pressure, and may whip about if broken. If a water line breaks, relieve the pressure before trying to grab the line.

5. Personal Protective Equipment

5.1 Levels of Protection

PPE is required to safeguard site personnel from various hazards. This section presents the various levels of protection and defines the conditions of use for each level. Table 5-1 provides a matrix of activities and associated PPE requirements.

5.1.1 Level D Protection

The minimum level of protection that will be required of BBLES personnel and subcontractors at the site will be Level D, which will be worn when site activities do not involve potential dermal exposure to hazardous materials and energetics. The following PPE will be used based on the activities being performed and the hazards associated with those task(s). Refer to site specific JSA's and Procedures for required PPE. All personnel must review the JSA and follow the prescribed PPE requirements.

Listed below are examples of frequently required PPE:

- UTC/P&W Rocketdyne flame-retardant lab coats (Nomex);
- Conductive steel-toe work shoes, meeting ANSI Z41;
- Safety glasses with side shields or goggles with side shields, meeting ANSI Z87;
- Leather work gloves
- Hard hat, meeting ANSI Z89 (during activities where overhead hazards are present).

Modified Level D Protection

Modified Level D will be used when site activities present an increased potential for skin contact with items or surfaces potentially contaminated with AP or other hazardous materials and energetics. Modified Level D consists of:

- Tyvek® coveralls over Nomex® coveralls;

- Conductive Footwear when contact with any energetic hazardous materials is anticipated and when working on conductive floors.
- Conductive steel-toe work shoes, meeting ANSI Z41;
- Safety glasses or goggles with side shields, meeting ANSI Z87;
- Leather gloves over PVC surgical gloves; and
- Hard hat, meeting ANSI Z89 (during activities where overhead hazards are present).

5.1.2 Level C Protection

Level C will be used when site activities present an increased potential for skin contact, when air monitoring warrants an upgrade to Level C and engineering or administration controls are ineffective. Level C consists of:

- Tyvek® coveralls over Nomex® coveralls;
- Conductive Footwear when contact with any energetic hazardous materials is anticipated and when working on conductive floors.
- Steel toe work shoes, meeting ANSI Z41;
- Safety glasses or goggles with side shields, meeting ANSI Z87;
- Full Face Respirator with P-100/Organic Vapor Combo Cartridges;
- Leather gloves over PVC surgical gloves; and
- Hard hat, meeting ANSI Z89.

5.1.3 Level B PPE

Level B will be used when site activities present an increased potential for skin contact, when air monitoring warrants an upgrade to Level B, and initially when working with acetonitrile and methanol. Level B consists of:

- Tyvek® coveralls over Nomex® coveralls;
- Conductive Footwear when contact with any energetic hazardous materials is anticipated and when working on conductive floors.

- Steel toe work shoes, meeting ANSI Z41;
- Safety glasses or goggles with side shields, meeting ANSI Z87;
- Full Face Supplied Air Respirator;
- Leather gloves over PVC surgical gloves; and
- Hard hat meeting ANSI Z89.

5.1.4 Donning Procedures

- Remove bulky outerwear. Remove street clothes and store in clean location;
- Put on the required chemical protective coveralls;
- Put on the required chemical protective boots or boot covers;
- Put on the required chemical protective gloves;
- Tape the wrists of the protective coveralls to the gloves; and
- Don remaining PPE, such as safety glasses or goggles and hard hat.

5.1.5 Doffing Procedures

- Upon entering the CRZ, rinse contaminated materials from the boots or remove contaminated boot covers;
- Clean reusable protective equipment;
- Remove protective garments and equipment. All disposable clothing should be placed in plastic bags, which are labeled with contaminated waste labels;
- Wash hands, face, and neck; and
- Proceed to clean area and dress in clean clothing.

All disposable equipment, garments, and PPE must be bagged in plastic bags, labeled for disposal. See Section 7, Decontamination, for detailed information on decontamination stations.

Table 5-1

PERSONAL PROTECTIVE EQUIPMENT SELECTION MATRIX FOR BUILDING ASSESSMENT ACTIVITIES

Activity	Level of Protection
Mobilization/Demobilization	Level D
Visual Assessment of buildings/equipment	Level D
Wipe and bulk sampling for Energetic Materials	Modified Level D
Concrete Coring	Level D
Nitroglycerine Cleanup	Level B
Sampling for lead	Level D/Modified Level D
Sampling for Asbestos Containing Material	Modified Level D or Level C
Building Inspection	Level D
Decontamination/Disassembly	Level D/Modified Level D or Level C (depending upon characterization results)
Demolition	Level D and Modified Level D

PERSONAL PROTECTIVE EQUIPMENT SELECTION MATRIX FOR OMM AND ENVIRONMENTAL ASSESSMENT ACTIVITIES

Activity	Level of Protection
Mobilization/Demobilization	Level D
Visual Assessment of buildings/equipment	Level D
Environmental Sampling	Modified Level D
Drilling / Geoprobe	Modified Level D
OMM	Level D

6. Air Monitoring

6.1 Air Monitoring

Air monitoring will be conducted to evaluate employee exposure to airborne constituents during activities that may cause the evolution of dusts or vapors, such as decontamination activities, decommissioning and demolition activities, ACM or lead-based paint removal, and other intrusive activities. The monitoring results will dictate work procedures and the selection of PPE. The monitoring devices to be used are an MIE Mini RAM particulate monitor (or equivalent) and a Rae Systems MultiRAE detector (PID with a 10.6 eV lamp, oxygen, and LEL). The BBL HSS will be responsible for utilizing the air monitoring results to determine appropriate health and safety precautions for BBL personnel and subcontractors.

Air monitoring will be conducted continuously with the MultiRAE meter during indoor operation of any internal combustion engine and when energetic material decontamination is underway. All work activity must stop where tests indicate carbon monoxide levels in excess of 20 ppm or hydrogen sulfide levels in excess of 5ppm. Such an area must be ventilated to reduce the concentration to an acceptable level. In areas where petroleum hydrocarbons are suspected, benzene detector tube readings must be taken if PID readings exceed 1ppm, and are sustained for 15 minutes in the breathing zone.

Air monitoring will be conducted during operations that involve cleaning with NG Killer to determine employee exposure to airborne constituents. The monitoring results will dictate work procedures and the selection of PPE. Due to the potential for accumulation of hazardous levels of hydrogen sulfide at various levels in a building or room, adequate ventilation will be provided and employees will conduct air monitoring at breathing zone, waist and knee level to properly characterize potential exposures.

Monitoring data will be conducted continuously, but will be logged every half-hour on the Air Monitoring Form (Attachment H) or in the field log book.

6.2 Noise Monitoring

Noise monitoring may be conducted as required during demolition operations. Hearing protection is mandatory for all employees in noise hazardous areas, such as around heavy equipment. As a general rule, sound levels that cause speech interference at normal conversation distance should require the use of hearing protection.

6.3 Monitoring Equipment Maintenance and Calibration

All direct-reading instrumentation calibrations should be conducted under the approximate environmental conditions the instrument will be used. Instruments must be calibrated/calibration checked/zeroed before and after use, noting the reading(s) and any adjustments that are necessary. All air monitoring equipment calibrations, including the standard used for calibration, must be documented on a calibration log or in the field notebook. All completed HS documentation/forms must be reviewed by the HSS and maintained by the SS.

All air monitoring equipment will be maintained and calibrated in accordance with the specific manufacturer's procedures. Preventive maintenance and repairs will be conducted in accordance with the respective manufacturer's procedures. When applicable, only manufacturer-trained and/or authorized personnel will be allowed to perform instrument repairs or preventive maintenance.

If an instrument is found to be inoperative or suspected of giving erroneous readings, the HSS must be responsible for immediately removing the instrument from service and obtaining a replacement unit. If the instrument is essential for safe operation during a specific activity, that activity must cease until an appropriate replacement unit is obtained. The HSS will be responsible for ensuring a replacement unit is obtained and/or repairs are initiated on the defective equipment.

6.4 Action Levels

Table 6-1 presents airborne contaminant action levels that will be used to determine the procedures and protective equipment necessary based on conditions as measured at the site for general sampling and environmental activities.

TABLE 6-1
AIRBORNE CONTAMINANT ACTION LEVELS

Parameter	Reading	Action
Total Hydrocarbons (Stations with no potential for NG) See NG monitoring requirements below.	0 ppm to ≤ 5 ppm > 5 ppm	Normal operations; continue hourly breathing zone monitoring Stop work, leave the area immediately. Notify health and safety investigate source and type of organic material, Review JSA, work instruction and PPE requirements
Airborne Particulates	0 to < 0.5 mg/m^3 ≥ 0.5 mg/m^3 to 1.5 mg/m^3	Normal operations; continue hourly breathing zone monitoring Stop work, leave the area immediately. Notify health and safety investigate source and type of airborne material, Review JSA, work instruction and PPE requirements
Hydrogen Sulfide	0 ppm to 5 ppm > 5 ppm	Normal operations Stop work, leave the area immediately. Notify health and safety.
Flammable Vapors (LEL)	< 10% LEL ≥ 10% LEL	Normal operations Stop work, leave the area immediately. Notify health and safety.

6.4.1 Nitroglycerine Air Monitoring Requirements:

The exact location and extent of potential NG contamination is not precisely known. To provide for a safe and healthy work environment and maintain exposure to the lowest feasible level the following procedures will be implemented when working at stations suspected to contain appreciable amounts of NG:

1. All employees working at the station will be notified of the potential for exposure to NG during the site specific hazard orientation. A review of the primary hazards and symptoms of NG exposure will be discussed (see attached MSDS). Employees will also be advised to notify their occupational physician of the potential for NG exposure at their next scheduled physical.

2. Maximum ventilation with outside air will be maintained within the structure by opening all windows, doors and openings. A minimum of 15 minutes of natural ventilation must be allowed prior to entering the station.

3. Employees will wear two layers of nitrile gloves and Nomex coveralls at all times while inside buildings with suspected NG contamination. All other standard site PPE requirements will also apply. The buddy system will be strictly adhered to while working in any stations suspected to contain NG

4. Systematic air monitoring and upgrades to Personal Protective Equipment (PPE) as described below will be implemented:

Site Entry and Sampling: Prior to entering the station a calibrated MIE PPB Rae will be used to evaluate the level of total organics within the structure. The following action levels will apply while working at the site:

NG AIRBORNE CONTAMINANT ACTION LEVELS

Parameter	Reading	Action
Total Hydrocarbons	0 ppb to ≤ 150 ppb	Normal operations; continue continuous breathing zone monitoring
Above average background	> 150 ppb to 200 ppb	Remove personnel from station, increase ventilation for at least 15 minutes. Reevaluate levels prior to entry.
Measured with a MIE PPB Rae	≥ 200 ppb – 2000 ppb	Upgrade to Level C PPE with organic cartridge respirator, maximum of 4 hours per cartridge in 200-2000 range
	> 2000 ppb	Stop work; investigate cause of reading, notify BBLES Health and Safety Manager

5. If appreciable quantities of NG are discovered or there are any signs or symptoms of NG exposure (sudden headache), all personnel will evacuate the site in a safe and orderly fashion and the activities will be evaluated before proceeding.

6.4.2 Lead/Cadmium Air Monitoring Requirements:

Several buildings are known to contain Lead and Cadmium in the paint. To provide for a safe and healthy work environment and maintain exposure to the lowest feasible level the following procedures will be implemented when working at stations suspected to contain appreciable amounts of Lead or Cadmium in paint or other structures.

TABLE 6-2
AIRBORNE CONTAMINANT ACTION LEVELS FOR LEAD/CAMIUM BASED PAINT REMOVAL

Parameter	Reading	Action
Total Particulate (above background for a 5 minute average)	0 to 0.5 mg/m^3	Normal operations
Cadmium Lead	0 to 25 ug/m^3 0 to 50 ug/ m^3 (lab results)	Stop work; investigate source of particulate, reduce generation rate, Upgrade to Level C protection (PAPR) if levels are not reduced
Total Particulate Cadmium Lead	> 0.5 mg/m^3 > 25 ug/m^3 > 50 ug/ m^3	Stop work; investigate source of particulate; cover work zone, initiate dust suppression
Total Particulate Cadmium Lead **within EZ**	> 1.0 mg/m^3 > 25 ug/m^3 > 50 ug/m^3	
Total Particulate	0 to 0.10 mg/m^3	Normal operations
Total Particulate	> 0.10-0.15 mg/m^3	Stop work; investigate source of particulate, reduce generation rate
Total Particulate **within CRZ or SZ** Lead and Cadmium monitoring will be implemented if action levels in the EZ are exceeded	> 0.15 mg/m^3	Stop work, institute control techniques to maintain levels below action level

6.5 Real Time Air Monitoring in Exclusion Zone

As needed based on the assessment by the HSS, monitoring for particulates for the purpose of estimating worker exposure level will be conducted in the breathing zone with the PDR-1000 during site operations.

At a minimum, all readings will be manually recorded on an hourly basis on air monitoring logs or field notebooks.

6.6 Time Weighted Average Sampling for Lead/Cadmium and Perimeter Air Monitoring

Personal samples will be collected on each job duty in accordance with OSHA Regulations 29CFR1926.62 Lead. Area samples will be collected in a minimum of 3 locations (e.g. one upwind, two downwind) respective to the activities during the day if EZ action levels are exceeded. NIOSH Method 7300 with 37 mm Mixed Cellulose Ester cassettes will be used to collect the samples, with a flow rate of 2-3 liters per minute. When real time instrumentation is used, readings will be logged at 15-minute intervals, if action levels are exceeded (as defined in Table 6-2), then sampling will be done at 5 minute intervals.

Samples will be submitted to an American Industrial Hygiene Association (AIHA) accredited laboratory. These sample results will be submitted to the client within 5 business days after sampling. These sample results will be used to assess the effectiveness of dust suppression methods, evaluate the appropriateness of real-time monitoring action levels, and upgrading or downgrading PPE as necessary. Samples will be collected for lead and analyzed by NIOSH Method 7300 ICP.

6.6.1 General Sampling Protocols

1. Select the employee to be sampled and discuss the purpose of the sampling. Inform the employee when and where the equipment will be removed. Stress the importance of not removing or tampering with the sampling equipment. Turn off or remove sampling pumps before an employee leaves a potentially contaminated area. (such as when the employee goes to lunch or on a break).

2. Instruct the employee to notify the supervisor or the sampler if the sample requires temporary removal.

3. Place the sampling equipment on the employee so that it does not interfere with work-performance. Use duct tape/scotch tape if necessary, also consider using a utility/tool belt.

4. Area samples will be collected on either a tripod, or other appropriate mobile/stationary stand at a height of approximately 5.5 feet.

5. A sample location map will be developed by the HSS and be included with each days paperwork. The work area and sample locations should be clearly denoted on the map.

6. Wind direction data will be collected prior to each set.

7. Attach the collection device (filter cassette) to the shirt collar or as close as practical to the nose and mouth of the employee (i.e. in a hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches.

8. The inlet should always be in a downward vertical position to avoid gross contamination. Position the excess tubing so that it does not interfere with the work of the employee.

9. Turn on the pump and record the starting time.

10. Observe the pump operation for a short time after starting to make sure it is operating correctly.

11. Check the pump approximately once per hour. More frequent checks may be necessary with heavy filter loading. Ensure that the sampler is still assembled properly and that the hose has not become pinched or detached from the cassette or the pump. For filters, observe for symmetrical deposition, fingerprints, or large particles, etc. Record the flow rate.

12. Periodically monitor the employee throughout the workday to ensure that sample integrity is maintained and cyclical activities work practices are identified, and level of protection.

13. Take photos (as appropriate) and detailed notes concerning visible airborne contaminants, work practices, potential interferences, movements, and other conditions to assist in determining appropriate engineering controls.

14. Prepare blank(s) during the sample period for each type of sample collected. One blank will suffice for up to 20 samples for any given analyses.

15. Before removing the pump at the end of the sample period, if there is a pump rotameter, check the flow rate to ensure that the rotameter ball is still at the calibrated mark. If the ball is no longer at the mark, record the pump rotameter reading.

16. Turn off the pump and record the ending time. Remove the sample from the pump and seal it for shipping. Be sure to identify the sample with a minimum of the data and sample number

7. Work Zones and Decontamination

7.1 Work Zones

Work zones established during the course of site activities at the UTC/P&W Rocketdyne facility will be controlled via security and access granted to only authorized and properly trained or escorted individuals. The following sections detail policies and procedures associated with accessing work zones at the facility.

Detailed procedures for the transfer of control of buildings from UTC/P&W Rocketdyne to BBLES will be covered in the Decontamination and Demolition Work Plans. BBLES will be responsible for control of the buildings and preventing unauthorized access.

7.1.1 Authorization to Enter

All BBLES and subcontractor personnel will undergo contractor safety orientation by a UTC/P&W Rocketdyne representative before entry to the site. Live Area training and testing must also be conducted. Entry and exit for personnel without heavy equipment are restricted to the Front Gate entry Check Point. Personnel shall then go only to their designated work areas.

Each person entering the facility for the first time must first report to the Security Office (Station 0101) and receive a Badge.

- Badges must always be visible.
- If your Badge is lost, notify Security immediately.
- Return Badges to the Gate Guard when no longer needed.

Only personnel with the appropriate training and medical certifications will be allowed to work at the site. The SS will maintain a list of authorized persons; only personnel on the authorized persons list will be allowed to enter the site work areas.

Access to specific areas or stations at the facility is controlled and will be authorized by the appropriate UTC/P&W Rocketdyne station owner. Station owners will be notified and kept informed of all site activities at their respective stations.

7.1.2 Site Orientation and Hazard Briefing

No person will be allowed in a work area during site operations without first being given a site/work area orientation and hazard briefing. This orientation will be presented by the SS or HSS, and will consist of a review of this HASP. This review must cover the chemical, physical, and biological hazards, protective equipment, safe work procedures, and emergency procedures for the project. Following this initial meeting, daily safety meetings will be held each day before work begins. Site/work area orientation is distinct from the Facility Orientation that is conducted for personnel upon first entering the facility.

All people entering the site work areas, including visitors, must document their attendance at this briefing, as well as the daily safety meetings on the Site Orientation and Daily Safety Meeting forms, respectively included with this plan. The daily health and safety meeting may include a review of the HASP and other issues that arise from activities within the site/work areas. Daily safety meetings are further discussed in Section 8.1.5.

7.1.3 Certification Documents

A training and medical file will be established for the project and kept in the BBLES office. Specialty training, such as first aid/cardiopulmonary resuscitation (CPR) certificates, as well as current medical clearances for all site personnel required to wear respirators, will be maintained within that file. All BBLES and subcontractor personnel must provide their training and medical documentation to the HSS prior to starting work.

7.1.4 Entry Log

A log-in/log-out sheet will be maintained at the site by the SS. Personnel must sign in and out on a log sheet as they enter and leave the site, i.e., work area. Alternatively, the SS may document entry and exit in the field notebook.

7.1.5 Entry Requirements

In addition to the authorization, hazard briefing, and certification requirements listed above, no person will be allowed in any BBLES work area unless they are wearing the minimum PPE required for the work area as described in Section 5, Personal Protective Equipment.

7.1.6 Emergency Entry and Exit

People who must enter the work area on an emergency basis will be briefed of the hazards by the SS. All activities will cease in the event of an emergency. People exiting the work area because of an emergency will gather in a safe area for a head count. The SS is responsible for ensuring that all people who entered the work area have exited in the event of an emergency.

7.1.7 Contamination Control Zones

Contamination control zones are maintained to prevent the spread of contamination and to prevent unauthorized people from entering hazardous areas.

7.1.7.1 Exclusion Zone

An exclusion zone will be established during applicable activities, such as explosive material handling activities if they arise. Quantity-distance (QD) considerations will be considered if quantifiable amounts of explosives are determined present in a work zone. Appropriate QD considerations will determine the distance established for the EZ where non-essential personnel will be restricted. All personnel entering these EZs must use the required PPE, and must have the appropriate training and medical clearance.

7.1.7.2 Contamination Reduction Zone

The CRZ or transition area will be established to perform decontamination of personnel and equipment. All personnel entering or leaving the EZ will pass through this area to prevent any cross-contamination. Tools, equipment, and machinery will be decontaminated in a specific location. The decontamination of all personnel will be performed on site adjacent to the EZ. Personal protective outer garments and respiratory protection will be removed in the CRZ and prepared for cleaning or disposal. This zone is the only appropriate corridor between the EZ and the SZ.

7.1.7.3 Support Zone

The SZ is a clean area outside the CRZ located to prevent employee exposure to hazardous substances. Eating and drinking will be permitted in the support area only after proper decontamination. Smoking may be permitted in the SZ, subject to site requirements.

7.1.8 Access Restriction

Access to buildings will be restricted by UTC/P&W Rocketdyne security personnel, as dictated by facility procedures. Restricted areas will be reflected on a site diagram as appropriate. Station owners will be notified of access requirements for their respective stations.

7.2 Decontamination

Decontamination of personnel and equipment may be required during the course of project activities.

7.2.1 Personal Decontamination

All personnel wearing protective equipment in the EZ must undergo personal decontamination prior to entering the SZ. The personnel decontamination area will consist of the following stations at a minimum:

- *Station 1*: Personnel leaving the contaminated zone will remove any visible contamination from their outer clothing and boots using a solution of detergent and water.

- *Station 2*: Personnel will remove their outer garment and gloves and dispose of them in properly labeled containers. Personnel will then decontaminate their hard hats, and boots with an aqueous solution of detergent or other appropriate cleaning solution. These items are then hand carried to the next station.
- *Station 3*: Personnel will thoroughly wash their hands and face before leaving the CRZ.

7.2.2 Construction/Sampling Equipment Decontamination

Ammonium perchlorate is water soluble; residue on equipment, vehicles, or PPE will be removed using an aqueous detergent solution.

All vehicles that have entered the EZ will be decontaminated prior to leaving the zone. If the level of vehicle contamination is low, decontamination may be limited to rinsing of tires and wheel wells with water. If the vehicle is significantly contaminated, steam cleaning or pressure washing of vehicles and equipment may be required.

Sampling and other equipment that is used in the EZ will be decontaminated by washing with a detergent solution.

7.2.3 Personal Protective Equipment Decontamination

Where and whenever possible, single-use, external protective clothing must be used for work within the EZ or CRZ. This protective clothing must be disposed of in properly labeled containers. Reusable protective clothing will be rinsed at the site with detergent and water. The rinsate will be collected for disposal.

8. Training and Medical Surveillance

8.1 Training

All on-site personnel who work in areas where they may be exposed to site contaminants must be trained as required by CCR Title 8, Section 5192 and OSHA Regulation 29 CFR 1910.120 (HAZWOPER). Field employees also must receive a minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor. Personnel who completed their initial training more than 12 months prior to the start of site activities must have completed an eight-hour refresher course within the past 12 months. The SS must have completed an additional eight hours of supervisory training, and must have a current first-aid/CPR certificate.

8.1.1 Basic 24 or 40-Hour Course

The following is a list of the topics typically covered in a 24 or 40-hour HAZWOPER training course:

- General safety procedures;
- Physical hazards (fall protection, noise, heat stress, cold stress);
- Names and job descriptions of key personnel responsible for site health and safety;
- Safety, health, and other hazards typically present at hazardous waste sites;
- Use, application, and limitations of PPE;
- Use of respirator protection (40 hour course);
- Work practices by which employees can minimize risks from hazards;
- Safe use of engineering controls and equipment on site;
- Medical surveillance requirements;
- Recognition of symptoms and signs which might indicate overexposure to hazards;
- Worker right-to-know (CCR, Title 8, Section 5194, Hazard Communication);
- Routes of exposure to contaminants;
- Engineering controls and safe work practices;
- Components of a health and safety program and a site-specific HASP;
- Decontamination practices for personnel and equipment;

- Confined-space entry procedures; and
- General emergency response procedures.

8.1.2 Supervisor Course

Management and supervisors must receive an additional eight hours of training, which typically includes:

- General site safety and health procedures;
- PPE programs; and
- Air monitoring techniques.

8.1.3 Demolition Competent Person

The demolition subcontractor's Competent Person must be appropriately trained and have experience in demolition safety. Training for a demolition Competent Person typically includes demolition safety, elevated work safety, heavy equipment operations, and material handling safety.

8.1.4 Site-Specific Training

Site-specific training will be accomplished by on-site personnel reading this HASP, and through a thorough site briefing by the PM, SS, or HSS on the contents of this HASP before work begins. The review must include a discussion of the chemical, physical, and biological hazards; the protective equipment and safety procedures; and emergency procedures. All employees will be required to have the required training based on the activities that they are involved in. An employee training matrix will be maintained at the site to track training requirements and attendance.

8.1.5 Daily Safety Meetings

Daily safety meetings will be held to discuss the work to be accomplished, the anticipated hazards, the PPE and procedures required to minimize site hazards, and emergency procedures. The SS or HSS

should present these meetings prior to beginning the day's fieldwork. The daily safety meeting must be held prior to new tasks and repeated if new hazards are encountered.

8.1.6 First Aid and CPR

At least one employee current in first aid/CPR will be assigned to the work crew and will be onsite during operations. Refresher training in first aid (triennially) and CPR (annually) is required to keep the certificate current. These individuals must also receive training regarding the precautions and protective equipment necessary to protect against exposure to blood-borne pathogens.

8.2 Medical Surveillance

8.2.1 Medical Examination

All personnel who are potentially exposed to site contaminants must participate in a medical surveillance program as defined by CCR Title 8, Section 5192.

8.2.2 Pre-placement Medical Examination

All potentially exposed personnel must have completed a comprehensive medical examination prior to assignment, and periodically thereafter as defined by applicable regulations. The pre-placement and periodic medical examinations typically include the following elements:

- Medical and occupational history questionnaire;
- Physical examination;
- Complete blood count, with differential;
- Liver enzyme profile;
- Chest X-ray, at a frequency determined by the physician;
- Pulmonary function test;
- Audiogram;
- Electrocardiogram for persons older than 45 years of age, or if indicated during the physical examination;

- Drug and alcohol screening, as required by job assignment;
- Visual acuity; and
- Follow-up examinations, at the discretion of the examining physician or the corporate medical director.

The examining physician provides the employee with a letter summarizing his findings and recommendations, confirming the worker's fitness for work and ability to wear a respirator. Documentation of medical clearance will be available for each employee during all project site work.

Subcontractors will certify that all their employees have successfully completed a physical examination by a qualified physician. The physical examinations must meet the requirements of CCR Title 8, Section 5192. Subcontractors will supply copies of the medical examination certificate for each on-site employee.

8.2.3 Other Medical Examinations

In addition to pre-employment, annual, and exit physicals, personnel may be examined:

- At employee request after known or suspected exposure to toxic or hazardous materials; and
- At the discretion of the HSS, HSO, or occupational physician in anticipation of, or after known or suspected exposure to toxic or hazardous materials.

8.2.4 Periodic Exam

Following the placement examination, all employees must undergo a periodic examination, similar in scope to the placement examination. For employees potentially exposed over 30 days per year, the frequency of periodic examinations will be annual. For employees potentially exposed less than 30 days per year, the frequency for periodic examinations will be 18 months.

8.2.5 Medical Restriction

When the examining physician identifies a need to restrict work activity, the employee's supervisor must communicate the restriction to the employee and the HSS. The terms of the restriction will be discussed with the employee and the supervisor.

9. Emergency Procedures

9.1 General

The SS/HSS will review evacuation routes and assembly areas for the facility. All personnel entering the site will be informed of this route and the assembly area. This HASP covers general procedures for emergencies. The procedures outlined in the most current UTC/P&W Rocketdyne Integrated Incident Response and Contingency Plan (IIRC Plan), and the BBLES Contingency Plan will be followed. These plans include detailed contingencies for:

- Fires;
- Earthquakes;
- Floods;
- Bomb Threats;
- Spill or Release of a Regulated Material or Waste;
- Evacuation; and
- Terrorism.

All remote work locations will have a designated emergency evacuation point that is communicated to affected employees prior to starting work. In the event of an emergency evacuation employees will move to the designated area. The task leader must take a head count to verify that all employees are present and accounted for. Communication and coordination with the Fire Department or responding agency will be handled by the task leader or HSS.

9.2 Emergency Response

If an incident occurs, the UTC/P&W Rocketdyne on facility emergency brigade will respond by dialing extension 2222 from any facility telephone. Alternatively, security can be contacted by calling 408-776-2222 from a non-facility phone such as a cell phone. Emergency assistance can also be contacted using a facility radio on Channel 2 (UTC Communication). See Table 9-1 for emergency

contact information. In the case of a fire or explosion, the UTC/P&W Rocketdyne personnel will assess the situation and direct emergency response activities.

9.2.1 Contaminant Release & Fires

In the event of a contaminant release, the following steps will be taken:

- Activate the alarm if operational and call Security control Room (ECC) at extension 2222 unless:
  - It is a very small spill and site personnel have the training and equipment (including air monitoring equipment).
  - Extinguish fires ONLY 1) if is a fire does not involve ammonium perchlorate (AP) propellant or explosives, 2) the fire is in a very small incipient stage that can easily be extinguished with equipment nearby, 3) Personnel are trained to fight fires and 4) is not a waste material
- Evacuate station - Do not allow non-emergency personnel into the area. Go to the designated evacuation area, the senior field person is to conduct a head count, and identify injured and perform first aid if necessary.
- Document, observe, identify the incident details:
  - Where;
  - When;
  - How much is spilled, how did it spill, Spill area conditions, spill direction and if it is moving, and the control actions.
- Attempt to stop a chemical flow, ONLY if it is safe to do so.
- Shut off ignition sources, ONLY if it is safe to do so.
  - Motors;
  - Electric circuits;
  - Open flames.
- Try to contain a spill, ONLY if it is safe to do so:
  - Cover drains and any holes in the direction the spill is flowing.

- Get absorbents and place ahead of spill.
- Contact the HSS, the HSS should contact the station owner and advise the supervisor of the incident.

The SS/HSS has the authority to commit resources as needed to contain and control released material and to prevent its spread to off-site areas.

9.3 Medical Emergency

All employee injuries must be promptly reported to the HSS/SS, who will:

- Ensure that the injured employee receives prompt first aid and medical attention;
- In emergency situations, the worker is to be transported by appropriate means to the onsite medical facility located at station 0024 for initial treatment and assessment for transport to an urgent care facility.
- If the injured person is a BBLES employee, notify BBL Human Resources at 315-446-9120, ext. 336 as soon as possible after an injured worker has left the site.

9.3.1 Emergency Care Steps

Survey the scene. Determine if it is safe to proceed. Try to determine if the conditions that caused the incident are still a threat. Protect yourself from exposure before attempting to rescue the victim.

- Do a primary survey of the victim. Check for airway obstruction, breathing, and pulse. Assess likely routes of chemical exposure by examining the eyes, mouth, nose, and skin of the victim for symptoms.
- Phone Emergency Medical Services (EMS). Give the location, telephone number used, caller's name, what happened, number of victims, victim's condition, and help being given.
- Maintain airway and perform rescue breathing as necessary.
- Perform CPR as necessary.
- Do a secondary survey of the victim. Check vital signs and do a head-to-toe exam.

Treat other conditions as necessary. If the victim can be moved, take him/her to a location away from the work area where EMS can gain access.

9.4 First Aid – General

All persons must report any injury or illness to their immediate supervisor or the SS. Trained personnel will provide first aid. Injuries and illnesses requiring medical treatment must be documented. The SS and HSS must conduct an II as soon as emergency conditions no longer exist and first aid and/or medical treatment has been ensured. IIs must be completed and submitted to the PM within 24 hours after the incident.

If first-aid treatment is required, first aid kits are kept at the CRZ. If treatment beyond first aid is required, the injured person(s) should be transported to the medical facility. If the injured person is not ambulatory, or shows any sign of not being in a comfortable and stable condition for transport, then an ambulance/paramedics should be summoned. If there is any doubt as to the injured worker's condition, it is best to let the local paramedic or ambulance service examine and transport the worker.

9.4.1 First Aid - Inhalation

Any employee complaining of symptoms of chemical overexposure as described in Section 4, General Site Safety Procedures will be removed from the work area and transported to the designated medical facility for examination and treatment.

9.4.2 First Aid - Ingestion

Call EMS and consult a poison control center for advice. If available, refer to the MSDS for treatment information. If the victim is unconscious, keep them on their side and clear the airway if vomiting occurs.

9.4.3 First Aid - Skin Contact

Project personnel, who have had skin contact with contaminants will, unless the contact is severe, proceed through the CRZ, to the wash area. Personnel will remove any contaminated clothing, and then flush the affected area with water for at least 15 minutes. The worker should be transported to the medical facility if he/she shows any sign of skin reddening, irritation, or if he/she requests a medical examination.

9.4.4 First Aid - Eye Contact

Project personnel who have had contaminants splashed in their eyes or who have experienced eye irritation while in the EZ, must immediately proceed to the eyewash station in the CRZ. Do not decontaminate prior to using the eyewash. Remove whatever protective clothing is necessary to use the eyewash. Flush the eye with clean running water for at least 15 minutes. Arrange prompt transport to the designated medical facility.

9.5 Reporting Injuries, Illnesses, and Near Miss Incidents

Injuries and illnesses, however minor, will be reported to the SS immediately. The SS will complete an injury report and submit it to the UTC/P&W Rocketdyne Project Manager, the HSO, and the BBLES PM within 24 hours.

Near miss incidents are situations in which no injury or property damage occurred, but under slightly different circumstances an injury or property damage could have occurred. Near misses are caused by the same factors as injuries; therefore, they must be reported and investigated in the same manner.

9.6 Emergency Information

The means to summon local public response agencies such as police, fire, and ambulance will be reviewed in the daily safety meeting. These agencies are identified in Table 9-1. Directions to the medical facilities are located in Section 9.6.1.

TABLE 9-1
EMERGENCY CONTACTS

CONTACT	TELEPHONE NUMBER	
Fire	2222	
Police	2222	
Project Management	Patrick Keller	Site – 408-776-5781 Cell – 720-480-8223
	Tony Parenteau	Site – 408-776-5781 Cell – 714-814-9191
Health and Safety	Greg Ertel	Site – 408-776-5913 Cell – 585-303-0633
	Steve Camp	Site – 408-776-4646 Cell – 408-802-2456
Site Supervision	Patrick Keller	Site – 408-776-5781 Cell – 720-480-8223
	George Cebula	Cell – 315-857-6212
	Lauri Yusko	Cell – 720-273-8533
Primary Client Contact	Al McKenzie	Site - 408-776-5539

OFF SITE EMERGENCY PROVIDERS	
PROVIDER	**PHONE NUMBER**
California Department of Forestry, Morgan Hill Office	408-779-2121
California Highway Patrol	408-779-5400
Local Fire, Security and Ambulance Services	2222
San Jose Medical Center	408-977-4684
Santa Teresa Community Hospital	408-972-7000
Santa Clara Valley Medical center	408-885-5000
Santa Clara County Sheriffs Department	408-299-3233
San Jose Fire Department	408-277-4444
Santa Clara county DEH Hazardous Compliance Division	408-299-6930
OUTSIDE AGENCIES	
FEDERAL AGENCIES	**PHONE NUMBER**
National Response Center	800-424-8802
United States Coast Guard, San Francisco Office	510-437-3073
Department of Transportation	800-424-8802
US Environmental Protection Agency (Region IX)	415-744-2000
STATE AGENCIES	**PHONE NUMBER**
CA Office of Emergency Services	800-852-7550
CA Department of Forestry (Morgan Hill Headquarters)	408-779-2121
CA Department of Industrial Relations-Occupational Safety and Health	408-452-7288
California Department of Toxic Substances Control	916-255-2002
REGIONAL AND LOCAL AGENCIES	**PHONE NUMBER**
Regional Water Quality Control Board	510-622-2300
Santa Clara County Department of Environmental Health (CUPA)	408-299-6930
Santa Clara Valley Water District	408-265-2600

9.6.1 Directions to Hospital

Evacuation normally will be via helicopter or ambulance service per UTC/P&W Rocketdyne protocols. If driving to the hospital is appropriate the following directions apply. The hospital directions should be verified periodically to verify their appropriateness because the area surrounding San Jose is undergoing a major infrastructure upgrade.

Hospital Name & Address	Blue Cross PPO	24 Hour Facility	Trama Unit	Burn Unit	Chemical Exposure	Snake Bites	Insect Bites	Helipad Capabilty	Helipad Capabilty	Helipad Capabilty	Driving Directions from P&W Site
Santa Clara Valley Medical Center 751 South Bascom Ave San Jose, CA 95128 (408) 885-5000 www.scvmed.org Distance = 18 Miles (25 Minutes)	•	•	•	•	•	•	•	•	•	•	– Lft onto Metcalf Rd – Rt onto Monterey Hwy – Rt onto Bernal Rd – Rt onto Freeway 101 North – Merge Lft onto Freeway 280 North – Exit on Leigh/Bascom Ave – Straight onto Parkmoore Ave – Lft onto Bascom Ave – Hospital is located on the Rt
Regional Medical Center of San Jose 225 North Jackson Ave. San Jose, CA 95116 (408) 259-5000 www.regionalmedicalsanjose.com Distance = 16 Miles (25 Minutes)	•	•	•	•	•	•	•	•	•	•	– Lft onto Metcalf Rd – Rt onto Monterey Hwy – Rt onto Bernal Rd – Rt onto Freeway 101 North – Merge Rt onto Freeway 680 North – Take the Jackson Ave Exit – Turn Lft onto Jackson Ave – Hospital is located on the Lft
Good Samaritan Hospital 2425 Samaritan Drive San Jose, CA 95124 (408) 559-2011 www.goodsamsj.org Distance = 16 Miles (25 Minutes)	•	•	•	•	•	•	•	•	•	•	– Lft onto Metcalf Rd – Rt onto Monterey Hwy – Rt onto Bernal Rd – Rt onto Freeway 85 North – Take the Union Ave Exit – Turn Lft onto Union Ave – Rt onto Samaritan Dr – Hospital is located on the Lft

Santa Teresa Hospital (Kaiser) 250 Hospital Parkway San Jose, CA 95112 (408) 972-3000 www.kpsantateresa.org Distance = 8 Miles (18 Minutes)	•	•	•	•	•	•	•	•	•	•	– Lft onto Metcalf Rd – Rt onto Monterey Hwy – Rt onto Bernal Rd – Rt onto Freeway 85 North – Take the Cottle Rd Exit West – Lft onto Hospital Pkwy – Hospital is located on the Lft

Attachment A

Completed JSAs for Site Activities (Maintained in Project Files)

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Remedial Management & Construction

Attachment B

Underground/Overhead Utility Checklist

BBL
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UNDERGROUND/OVERHEAD UTILITY CHECKLIST

Project Name_____ Date

Location

Prepared By_____ Project Manager

This checklist must be completed for any intrusive subsurface work such as excavation or drilling. It documents that overhead and underground utilities in the work are identified and located. The Project Manager shall request utility markouts before that start of field operations to allow the client and utility companies sufficient time to provide them. If complete information is not available, a magnetometer or other survey shall be performed to locate obstacles prior to intrusive subsurface activities.

Procedure

A diagram of the work area depicting the proposal location of intrusive subsurface work sites (i.e., boring locations, excavation locations) must be attached to this form. The diagram must clearly indicate the areas checked for underground structures/utilities, and overhead power lines. This form and the diagram must be signed by the BBL Project Manager, the BBL Site Supervisor, and the client representative.

Checklist

Type of Structure	Present	Not Present	Method of Markout
Electric Power Line			
Natural Gas Line			
Telephone Line			
Water Line			
Product Line			
Sewer Line			
Steam Line			
Drain Line			
Underground Tank			
Underground Cable			
Overhead Power Line			
Overhead Product Line			
Other (Specify)			

Client Representative_____ Date

BBL Project Manager_____ Date

BBL Site Supervisor_____ Date

Attachment C

Material Safety Data Sheets – Provided for Informational Use only; BBLES Master MSDS Inventory Maintained in the Administrative Area

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Attachment D

Chemical Hazard Data Table

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CHEMICAL HAZARD DATA TABLE

Substance [CAS Number]	IP[1] (eV)	Route[2]	Symptoms of Exposure	Treatment	TWA[3]	STEL[4]	Source[5]	IDLH (NIOSH)[6]
Acetone [67-64-1]	9.69	Inh Con Ing	Irritating. Causes muscle weakness, mental confusion, coma (high concentrations). GI tract irritation, kidney and liver damage, metabolic changes, coma. Dermatitis.	Eye: Irrigate immediately Skin: Water flush immediately Breath: Respiratory support Swallow: Immediate medical attention, fresh air.	1000 ppm 500 ppm 250 ppm	750 ppm	PEL TLV REL	2500 ppm
Acetonitrile [75-05-8]	12.20	Inh Con Abs	Headache, nausea, vomiting, weakness, lethargy, stupor, chest pain, respiratory depression convulsions, death.	Eye: Irrigate immediately Skin: Water flush immediately Breath: Respiratory support Swallow: Immediate medical attention	40 ppm 20 ppm 20 ppm	NE	PEL TLV REL	500 ppm
Aluminum Powder ATA X-86 Spherical Powder (CAS Number 7429-90-5)	NA	Inh Abs Con Ing	Causes skin irritation, abrasive to skin. Mild ingestion effects.	Inh: Remove to fresh air. Skin: Water flush immediately Swallow: Immediate medical attention	5 mg/m^3 10 mg/m^3	NE	PEL TLV REL	NE
Ammonium Perchlorate [7790-98-9]	NA	Inh Abs Con Ing	Severe eyes, skin, and respiratory tract irritant.	Eye: Irrigate immediately Skin: Water flush immediately Breath: Respiratory support Swallow: Immediate medical attention	NE NE NE	NE	PEL TLV REL	NE
Amine Poly Butadiene-Acrylonitrile-acrylic [	NA	Abs Con	Absorption may cause skin irritation Eye contact may cause irritation	Skin: Soap and water Eye: Irrigate immediately	NE NE NE	NE	PEL TLV REL	NE
ADN (Ammonium Dinitramide)	NA	Inh, Abs, Ing	Dust may cause irritation to the mucous membrane, eyes and throat Skin contact may cause numbness of fingers. GI tract irritation. Chronic effects may include blood forming organ damage, epileptic convulsions and unconsciousness.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	NE NE NE	NE	PEL TLV REL	NE
Aerosol Lacquer (V&P Naphtha) [64742-89-9]	NA	Inh Abs Ing	Inhalation causes headache, fatigue, malaise, nausea/vomiting, dizziness, stupor, drowsiness, coughing unconsciousness, and disturbed vision. Skin absorption causes irritation, defatting and dermatitis. Con: severe irritation, redness, tearing, and blurred vision..	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	225 ppm 300 ppm	NE	PEL TLV REL	NE
Asbestos	N/A	Eye Skin Inh Ing	Ingestion causes gastro-intestinal tract irritation, irritant to the eyes and skin. Inhalation may cause nose & throat irritation.	Eye: Lift eyelid & irrigate w/water Skin: Soap wash immediately Breath: Move to fresh air Swallow: Induce vomiting if awake & alert. Call doctor.			PEL TLV REL	

CHEMICAL HAZARD DATA TABLE

Substance [CAS Number]	IP[1] (eV)	Route[2]	Symptoms of Exposure	Treatment	TWA[3]	STEL[4]	Source[5]	IDLH (NIOSH)[6]
Butadiene [106-99-0	NA	Eye Skin Inh	Irritating to skin, eyes, respiratory tractand throat. Vapors may cause eye burns. Skin contact may result in a burn or mild irritation. CNS effects.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	10	NE	PEL TLV REL	NE
CTD Cryocoat 620 T Part A	NA	Eye Skin Inh Ing	Irritating to skin, and eyes. Ingestion of a 0.5 % solution by weight is the LD-50.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	NE	NE	PEL TLV REL	NE
CL – 20 High Explosive	NE	Ing Abs Ing	Sensitization to susceptible individuals causing asthma like symptoms. May aggravate existing medical conditions.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	NE	NE	PEL TLV REL	NE
Detergent 8		Inh Abs Ing	Irritating to eyes, skin, and mucous membranes. May cause nausea or vomiting.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	50 ppm 25 ppm	NE	PEL TLV REL	NE
Ethanol [64-17-5]	10.47	Ing Inh Con	Causes headaches, nervousness, dizziness, tremors, fatigue, nausea, unconsciousness (at high concentrations). Ingestion may cause intoxication, drunkenness, and "hang-overs". Causes severe damage to the eye.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	1000 ppm 1000 ppm 1000 ppm	NE	PEL TLV REL	3300 ppm
Freon 12 (75-71-8)	NA	Inh: Con Abs Ing.	Inhalation causes heart beat irregularities. Irritating to eyes. Causes frostbite.	Breath: Fresh Air Eye Irrigate immediately Skin: Soap wash immediately	NE NE NE	NE	PEL TLV REL	NE
HMX [2691-41-0]	NA	Abs Con	Irritation to the eyes, skin, and respiratory tract. May be harmful by inhalation, ingestion, or skin absorption.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	NE NE NE	NE	PEL TLV REL	NE
Hydrogen Sulfide [7783-06-4]	NA	Inh	Irritating to the eyes/skin/respiratory tract Inhalation causes headache, dizziness, nausea.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support	20 ppm 10 ppm 10 ppm	OSHA: 50 ppm 10-min maximum peak. ACGIH: 15 ppm 10 ppm for 10 min	PEL TLV REL	100 ppm
HTPB – Liquiflex H/P [63231-65-2]	NA	Ing, Eye	Skin contact causes irritation	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention drink water.	NE	NE	PEL TLV REL	1. NE

CHEMICAL HAZARD DATA TABLE

Substance [CAS Number]	IP[1] (eV)	Route[2]	Symptoms of Exposure	Treatment	TWA[3]	STEL[4]	Source[5]	IDLH (NIOSH)[6]
Lead [7439-92-1]	NA	Ing	Pallor, weakness, loss of wt., malnutrition	Swallow: If swallowed and conscious, induce vomiting. Call Physician.	50 ug/m^3 50 ug/m^3 50 ug/m^3	NE	PEL TLV REL	100 mg/m
Liquid Polybutadiene [PROPRIETARY]	NE	Eye Skin[3] Inh ing	Eye: non-irritating Skin: non-irritating Inhalation: not hazardous in normal industrial use Ingestion: not hazardous in normal industrial use	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	NE	NE	PEL TLV REL	NE
Methanol [67-56-1]	10.84	Inh Ing Con Abs	Irritating to the eieys, skin, and respiratory tract. Exposure may result in headache, visual disturbance, blindness, and respiratory failure. Reproductive effects have been reported in animal testing.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	200 ppm 200 ppm 200 ppm	250 ppm (skin)	PEL TLV REL	6000 ppm
Nitrocellulose [Not Determined]	NA	Eye Skin Inh	Eyes may be irritated Skin may cause defatting, dryness, or irritation Inhalation of vapors may cause dizziness, headache and/or narcosis	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	See MSDS	See MSDS	PEL TLV REL	NE
Nitroglycerine		Inh Skin Ing Eye	Small amounts may cause headaches and dizziness. Large amounts may result in vomiting, cyanosis, convulsions and coma. Ingestion of this material may cause gas trio-intestinal tract discomfort. Contact with eyes may cause irritation.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: remove victim, respiratory support Swallow: Immediate medical attention	0.05 ppm 0.05ppm 0.1 mg/m^3	0.05 mg/m^3 (skin)	PEL TLV	75mg/m^3
PBAN (mixture) [25255-19-4]	NE	Abs Eye	Irritating to skin	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	2 ppm 2 ppm	NE	PEL TLV REL	NE
RDX [121-82-4]	NA	Inh Con Ing Abs	Toxic by ingestion, and a convulsant and skin irritant. Exposure can cause nausea, vomiting, epileptiform seizures and unconsciousness lasting a few minutes to 24-hours	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	NE 0.5 mg/m^3 1.5 mg/m^3	NE	PEL TLV REL	NE
TMETN (Trimethylolethane Trinitrate) [3032-55-1]	NA	Inh Abs Eyes Ing	Causes irritation, headache, conjunctivitis, nausea, vomiting, visual disturbances, and mental confusion, narcosis, abdominal cramps, respiratory difficulty.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	NE	NE	PEL TLV REL	NE
Petroleum Oil (Vacuum Pump Oil)	NE	Con Eye Skn Ing	Possible eye and skin irritant. Toxic when ingested.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	NE	NE	PEL TLV REL	NE

[1]IP	=	Ionization potential (electron volts).
[2]Route	=	Inh, Inhalation; Abs, Skin absorption; Ing, Ingestion; and Con, Skin and/or eye contact.
[3]TWA	=	Time-weighted average. The TWA concentration for a normal workday (usually 8 or 10 hours) and a 40-hour work week, to which nearly all workers may be repeatedly exposed, day after day without adverse effect.
[4]STEL	=	Short-term exposure limit. A 15-minute TWA exposure that should not be exceeded at any time during a workday, even if the TWA is not exceeded.
[5]PEL	=	Occupational Safety and Health Administration (OSHA) permissible exposure limit (29 CFR 1910.1000, Table Z).
[5]TLV	=	American Conference of Governmental Industrial Hygiene (ACGIH) threshold limit value – TWA.
[5]REL	=	National Institute for Occupational Safety and Health (NIOSH) recommended exposure limit.
[6]IDLH (NIOSH)	=	Immediately dangerous to life or health (NIOSH). Represents the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects.
NE	=	None established. No evidence could be found for the existence of an IDLH (NIOSH Pocket Guide to Chemical Hazards, Pub. No. 90-117, 1990, 1997).
C	=	Ceiling limit value which should not be exceeded at any time.
Ca	=	Carcinogen.
NA	=	Not applicable.
NE	=	Not Established
ND	=	Not Determined.
LEL	=	Lower explosive limits.
LC_{50}	=	Lethal concentration for 50 percent of population tested.
LD_{50}	=	Lethal dose for 50 percent of population tested.
NIC	=	Notice of intended change (ACGIH).

References:

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National Institute for Occupational Safety and health Pocket Guide to Chemicals, Pub. 1990, No. 97-140, National Institute for Occupational Safety and Health, 2003.

Odor Threshold for Chemicals with Established Occupational Health Standards, American industrial Hygiene Association, 1989.

Respirator Selection Guide, 3M Occupational Health and Safety Division, 1993.

Verschuseren, K., Handbook of Environmental Data on Organic Chemicals, Van Nostrand and Reinhold, 1977.

Warning Properties of Industrial Chemicals – Occupational Health Resource Center, Oregon Lung Association.

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Attachment E

Loss Prevention Observation Form

BBL
ENVIRONMENTAL SERVICES, INC.
Remedial Management & Construction

Loss Prevention Observation

BBL/BBLES

Observer Name/Title	Chevron Facility # Project #	Chevron Project Manager
Date **Time** ☐ **AM** ☐ **PM**	**Project Type / Task Observed**	

Background Information

Site Location:
Equipment on site:
Personnel on site:
Weather conditions:
Unusual circumstances/conditions:

Observer's Positive Comments

Feedback Conducted By		Date		Time	☐ AM ☐ PM

Conclusion: Describe in detail why the questionable item occurred. Reference BBL procedures and Health and Safety Plan requirements. Add employee comments.

Root Cause(s) Analysis (RCA):

1. Lack of skill or knowledge
2. Lack of or inadequate operational procedures or work standards
3. Inadequate communication of expectations regarding procedures or work standards
4. Inadequate tools or equipment
5. Correct way takes more time and/or requires more effort
6. Short-cutting standard procedures is positively reinforced or tolerated
7. Person thinks there is no personal benefit to always doing the job according to standards
8. Uncontrollable.

Questionable Item #	RCA #	Solution(s): How to Prevent Questionable Behavior From Reoccurring	Person Responsible	Due Date	Closure Date

Results of Solution Verification and Validation

Reviewed by	Date	Reviewed by	Date

Environmental Operations

	PRE-TASK PREPARATION	Correct	Questionable	Comments
1.	Health and Safety Plan / MSDSs on site			
2.	Employee familiar / trained on task			
3.	OSHA-required training/medical surveillance			
4.	Utility mark out / check performed			
5.	Traffic hazard addressed / work area marked			
6.	Walking / working surfaces free of hazards			
7.	Tailgate safety meeting performed			
8.	SPSA performed prior to beginning work			
9.	Communicates intentions to other personnel			
10.	Knowledge of emergency procedures			
11.	Distance between equipment and power lines			
12.	Personal protective equipment			
13.	Air monitoring equipment on site, calibrated			
14.	First aid kit / fire extinguisher on site			
15.	One person trained in first aid / CPR			
16.	Work zones established and marked			
	PERFORMING TASK			
17.	SPSA before beginning new task			
18.	Correct body positioning			
19.	Proper lifting / pushing / pulling techniques			
20.	Keep hands / body away from pinch points			
21.	Walking / working surfaces kept clear of debris			
22.	Faces traffic as appropriate			
23.	Vehicles/ barricades to protect against traffic			
24.	Drill rig located properly, blocked / chocked			
25.	Drill rig moved only with derrick lowered			
26.	Excavator located on stable ground			
27.	Eye contact made with equipment operator			
28.	Spoil at least 2 feet back from edge of excavation			
29.	Excavation shored/sloped/benched			
30.	Excavation entry controlled			
31.	Equipment/tools used properly			
32.	Electrical equipment connected through GFCI			
33.	Power tools handled properly			
34.	Electrical cords inspected / in good condition			
35.	Follows lockout / tagout procedures			
36.	Air monitoring conducted/action levels understood			
37.	Equipment decontaminated properly			
38.	Personnel decon prior to eating/drinking/smoking			
39.	Decontamination effective			
	POST – TASK			
40.	Procedures / JSA adequate			
41.	Equipment / tools stored properly			
42.	Proper storage of soil / water / waste material			
43.	Work area secured			
	Total #			**% Safe:** [(Total Correct/(Total Correct + Total Questionable)) * 100]

Attachment F

Incident/Near Miss Investigation Report

BBL
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Remedial Management & Construction

BBLES Incident/Near-Miss Investigation Report

☐ OSHA Recordable	☐ First Aid Injury	☐ Fire	Date of Incident:
☐ Lost Workday Injury	☐ Vehicle Accident	☐ Spill/Leak	
☐ Restricted Duty Injury	☐ Equipment Damage	☐ Near Miss	Incident Number:

Every employee injury, accident, and near miss must be reported within twenty-four hours of the injury. If the incident results in hospitalization, an immediate report must be made by telephone to the Project Manager and the Health and Safety Officer.

Project Information

Project Name: | Project #

Location of Incident:

EMPLOYEE

Name: | Employee Number:

Employment Status: ☐ Regular ☐ Part Time | How long in present job?

INJURY OR ILLNESS INFO

Where did incident / near miss occur? (number, street, city, state, zip):

Employee's specific activity at the time of the incident / near miss:

Equipment, materials, or chemicals the employee was using when the incident / near miss occurred (e.g., the equipment employee struck against or which struck employee; the vapor inhaled or material swallowed; what the employee was lifting, pulling, etc.):

Describe the specific injury or illness (e.g., cut, strain, fracture, etc.):

Body part(s) affected (e.g., back, left wrist, right eye, etc.):

Name and address of treatment provider (e.g., physician or clinic): | Phone No.:

If hospitalized, name and address of hospital: | Phone No.:

Date of injury or onset of illness / / | Time of event or exposure: ☐ AM ☐ PM

Did employee miss at least one full shift's work? ☐ No ☐ Yes, 1st date absent (MM/DD/YYYY) / /

Has employee returned to work? ☐ Regular work ☐ Restricted work ☐ No

☐ Yes, date returned (MM/DD/YYYY) / /

To whom reported: | Other workers injured/made ill in this event? ☐ Yes ☐ No

Description of Incident / Near Miss: (Describe what happened and how it happened.)

Motor Vehicle Accident (MVA)

Company Vehicle? ☐ Yes ☐ No

Accident Location (street, city, state)								
Vehicle Towed?	☐ Yes ☐ No	Other Vehicle?	☐ Yes ☐ No	# Vehicles Towed		# of Injuries		

Spill

Material Spilled	Quantity	Source
Agency Notifications		

Cost of Incident $

Third Party Incidents

Name of Owner		Address	Telephone
Description of Damage:			
Witness Name		Address	Telephone
Witness Name		Address	Telephone

#	Root Cause and Contributing Factors: Conclusion (Describe in Detail Why Incident / Near Miss Occurred)
1	
2	
3	
4	
5	

Root Cause(s) Analysis (RCA):

1. Lack of skill or knowledge
2. Lack of or inadequate operational procedures or work standards
3. Inadequate communication of expectations regarding procedures or work standards
4. Inadequate tools or equipment
5. Correct way takes more time and/or requires more effort
6. Short-cutting standard procedures is positively reinforced or tolerated
7. Person thinks there is no personal benefit to always doing the job according to standards
8. Uncontrollable

#	RCA #	Solution(s): How to Prevent Incident / Near Miss From Reoccurring	Person Responsible	Due Date	Closure Date

Investigation Team Members

Name	Job Title	Date

Results of Solution Verification and Validation

Reviewed By

Name	Job Title	Date
	Project Manager	
	Health and Safety Reviewer	

Attachment G

BBLES Lockout-Tagout Equipment Specific Energy Control Procedure

BBL
ENVIRONMENTAL SERVICES, INC.
Remedial Management & Construction

Standard Operating Procedure: Lockout/Tagout Control of Hazardous Energy/Materials

I. Scope and Application

It is the policy of BBL Environmental Services, Inc. (the Firm) to provide a safe and healthful workplace for its employees. An integral component of the Firm's health and safety program is the Lockout/Tagout Control of Hazardous Energy/Materials. This standard operating procedure (SOP) details the administration and necessary provisions for protecting employees of the Firm from injuries associated with hazardous energy, unexpected start-up of equipment, and hazardous materials. This procedure will be implemented by BBLES personnel in conjunction with other policies and procedures as part of the Firm's comprehensive safety program. This SOP delineates guidelines for employees to follow when performing work in, on, and around energized equipment as defined in the California Code of Regulations, Title 8, Section 3314, Cleaning, Repairing, Servicing and Adjusting Prime Movers, Machinery and Equipment (Lockout/Tagout), and the California Code of Regulations, Title 8, Section 2320.6, Accident Prevention Tags, Section 2320.4, De-Energized Equipment or Systems. Also, the guidelines found in the California Code of Regulations, Title 8, Section 4413, De-Energizing and Lockout. This procedure also assigns responsibility for administration and training with respect to lockout/tagout procedures.

Definitions

1. Affected Employees – A person who operates or uses a machine and/or equipment that receives servicing or maintenance under lockout and/or tagout, or who works in an area where such servicing or maintenance is being performed.

2. Authorized Employees – A person who locks out and/or tags out a machine and/or equipment in order to perform servicing or maintenance on the machine. An affected employee becomes an authorized employee when that employee's duties include performing service and/or maintenance under lockout/tagout.

3. Energy-Isolating Device – A mechanical device that physically prevents the transmission or release of energy including, but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors and, in addition, no pole can be operated independently; a line valve; a block; a chain-restraining device to prevent the movement of equipment; and any similar device used to block or isolate energy. Pushbuttons, selector switches, and other control circuit type devices are not energy-isolating devices.

4. Lockout/Tagout – The placement of a lock or lockout device on an energy-isolating device, in accordance with an established procedure, ensuring that the energy-isolating device and the equipment being controlled cannot be operated until the lockout device is removed. Any energy source- whether electrical, hydraulic, mechanical compressed air, or any other source, must be disengaged or blocked, and electrical sources must be de-energized and locked or positively sealed in the off position.

5. Participant – A person engaged in the repair, adjustment, testing, or setting up operation in addition to the qualified operator or craftsman having control of the machine operating station.

6. Tagout – The placement of a tag on an energy-isolating device, in accordance with an established procedure, to indicate that the energy-isolating device and the equipment being controlled may not be operated until the tag is removed.

7. Restraint – The application of a chain, block, or other similar mechanical means to prevent movement of a part of a system/device.

II. Personnel Responsibilities and Qualifications

Officer

1. Verify that all provisions of this procedure are enforced for divisional employees.

2. Verify that client contract requirements are consistent with the provisions of this procedure with respect to lockout/tagout procedures.

3. Verify that required lockout/tagout equipment is available for divisional employees.

Project Manager

1. Review project work scope to verify that it is consistent with the requirements of this procedure with respect to lockout/tagout procedures.

2. Notify the Health and Safety Group of any site-specific need for development of additional lockout/tagout procedures.

3. Determine if a client currently has lockout/tagout procedures for a site. If the client does currently have lockout/tagout procedures, then Corporate Health and Safety must review the procedures to determine if they are consistent with the Firm's procedures, and the most protective of the procedures will be followed.

Corporate Health and Safety Group

1. Communicate with the corporate Health and Safety group concerning the addition of any new lockout/tagout procedures;

2. Enforce lockout/tagout procedures;

3. Review project health and safety plans (HASPs) to verify that they are consistent with the provisions of this procedure;

4. Communicate changes in current lockout/tagout regulations and changes in this procedure to employees; and

5. Review and update this procedure at least annually to verify compliance with regulatory requirements.

Regional Health & Safety Coordinators

1. Provide Divisional Health and Safety Coordinator (DHSC) support and training required to execute lockout/tagout responsibilities;
2. Provide employee lockout/tagout training in lieu of DHSC as necessary;
3. Review project health and safety plans to assure they are consistent with the provisions of this procedure;
4. Provide required orientation regarding lockout/tagout procedures to DHSCs and HSSs; and
5. Verify that lockout/tagout procedures are being implemented.

Divisional Health and Safety Coordinators (DHSC)

1. Provide initial employee orientation concerning lockout/tagout procedures;
2. Communicate need for additional lockout/tagout procedures to CSA;
3. Enforce all applicable lockout/tagout procedures; and
4. Communicate changes in this procedure to divisional employees.

Health and Safety Supervisors (HSS)

1. Communicate need for additional lockout/tagout procedures to the DHSC;
2. Communicate changes in this procedure to employees; and
3. Enforce applicable lockout/tagout procedures.

Employees

1. Must understand and follow lockout/tagout procedures;
2. Inform HSS or DHSC of any non-compliance with required lockout/tagout procedures; and
3. Inform HSS or DHSC of need for additional lockout/tagout procedures.

III. Equipment List

1. The Firm will provide, as necessary to execute project work, locks, tags, chains, wedges, key blocks, plug lockouts, adapter pins, self locking fasteners, or other hardware for isolating, securing, or blocking of machines or equipment to prevent energy sources.
2. Lockout devices and tags are color coded red, and are the only device(s) used for controlling energy. Locks and tags must not be used for other purposes. All locks and tags provided by the Firm are capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected. Locks and tags are of substantial construction in order to prevent inadvertent or accidental removal. All tags are required to be marked to identify the employee applying the lock(s)/tag(s). All locks placed on equipment will have tags attached.

3. Tags are of standard print and format. Tags are constructed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or the message on the tag to become illegible. Tags will warn against hazardous conditions if the machine or equipment is energized, and will include a legend such as the following: "Do Not Start," "Do Not Open," "Do Not Close," "Do Not Energize," or "Do Not Operate," depending on application.

4. When replacement or major repair, renovation, or modification of a machine or equipment is performed, and when new machines or equipment are installed, energy-isolating devices designed to accept a lockout device for such machines or equipment will be installed.

IV. Health and Safety Considerations

1. All employees of the Firm are covered by this procedure.

2. Employees of the Firm are required to follow all health and safety rules developed for lockout/tagout.

3. Any lockout/tagout situations encountered by employees of the Firm, which are not specifically covered by policies and procedures of the Firm, will be addressed on a case-by-case basis by the Corporate Health and Safety Division.

4. This SOP applies to all field, servicing, and maintenance activities which require:

   - Removal or by-passing of a machine guard or protective enclosure; or

   - Personnel to place any part of their body in a place where the accidental energization of equipment, release of stored energy, or release of stored hazardous materials may cause injury.

5. Hazardous Energy covered by this procedure includes, but is not limited to:

   - electrical;
   - mechanical;
   - hydraulic;
   - pneumatic;
   - chemical;
   - thermal;
   - gravitational (stored);
   - pressure (stored); and
   - hazardous materials.

V. Procedure

Safety Procedures for Lockout/Tagout and Isolation

1. The Firm requires the use of a lockout/tagout device and an attached tag on all isolating devices capable of being locked out or accepting lockout devices. All locks placed on equipment will have tags attached. Each worker must have his or her own lock and the only key to that lock. The lock should be substantial and durable, and may be used only for lockout activities. If any energy-isolating device is not capable of being locked out, the Firm requires the use of an alternate system to provide full employee protection against equipment start-up. The Corporate Health and Safety Group must be involved in the development,

review, and approval of all alternate systems. An alternate system must provide a level of safety equivalent to that obtained by using a lockout device. Additional safety measures may include such steps as the removal of an isolating circuit element, blocking of a controlling switch, opening of an extra disconnecting device, or removal of a valve handle to reduce the likelihood of inadvertent energization.

2. Lockout/tagout isolation procedures will be initiated only by authorized personnel. Personnel not trained in lockout/tagout procedures are not authorized to install, inspect, repair, adjust, remove, maintain, or service equipment where the potential for injury due to accidental start-up, energization, or release of stored energy exists.

3. All affected personnel must be notified prior to equipment deactivation and isolation.

4. All affected personnel must be notified prior to equipment reactivation after isolation measures have been removed.

5. Personnel involved with lockout/tagout isolation of equipment shall receive information concerning the specific type and magnitude of energy or hazardous material involved, the hazards involved, and the method of control to be utilized.

6. Authorized personnel shall de-energize equipment by following a procedure developed specifically for the equipment involved and consistent with the California Code of Regulations, Title 8, Section 2320.4, De-Energized Equipment or System.

7. Prior to performing any work on equipment, all isolation devices shall be in place. Locks and tags shall be affixed to each energy-isolating device by authorized personnel. Devices include hasps, locks, tags, circuit breaker locks, locking covers, and chains. These must secure the isolated equipment in the “off” position. Each person involved with servicing the isolated equipment shall attach a lock to the isolating device. When more then one worker is servicing a piece of equipment that must be locked out, a lockout adaptor can be used which allows all the workers to place their locks on the disconnecting means. After the work is completed, each worker removes his or her lock and the machine is then returned to service. Tags shall be attached with all locks and must identify the authorized individual responsible for each lock.

8. All potentially stored or residual energy must be released, relieved, or disconnected. If there is a potential of accumulation, verification of isolation shall be conducted and documented throughout the project.

9. Prior to work, authorized personnel shall verify and document that the equipment has been disengaged, de-energized, and isolated.

10. Release of lockout/tagout isolation:

    - The work area and equipment shall be inspected to ensure that non-essential items (i.e., tools) are not left in the work are and that the equipment is intact.

    - The work area shall be checked to ensure that all personnel are clear. Before lockout/tagout devices are removed, affected personnel shall be notified.

    - Removal of lockout/tagout devices shall be performed by the authorized personnel who attached the devices.

11. If a machine must be re-energized after initial isolation (i.e., for testing or repositioning), then lockout/tagout procedures must be followed as outlined to re-isolate the equipment.

12. During shift or personnel changes, transfer of control will occur between authorized personnel only. If an authorized person must leave the site, then he/she must remove his/her locks and tags. The new authorized person will then immediately place his/her locks and tags on the equipment and complete the entire lockout/tagout procedure as outlined above.

13. If a situation arises where the equipment cannot be locked out, then a Pratt & Whitney Safety and Maintenance Representative shall be involved prior to attaching lockout tags only and proceeding with any work.

Audit of Lockout/Tagout

1. The Corporate Health and Safety Division reviews the written lockout/tagout SOPs on an annual basis.

2. The Health and Safety Manager will select an authorized person to conduct an audit to review any equipment-specific SOPs and the general SOP. A designated individual will review the lockout/tagout procedure for a specific machine or general application and complete the Periodic Inspection Form (attached).

3. The Health and Safety Manager will review and maintain documentation of each lockout/tagout procedure audit.

General Lockout/Tagout

1. If a client has specific written lockout/tagout procedures for its facility equipment with which employees of the Firm are working, the SOP will be reviewed and the more protective SOP will be utilized.

2. This procedure is applicable to maintenance and servicing activities not covered by a client's SOP or require the use of lockout/tagout procedures for which an equipment-specific written lockout/tagout SOP does not exist or is under development.

   - Only employees who have received training as authorized employees under the Company Lockout/Tagout Program are authorized to implement this lockout/tagout procedure. Only authorized employees may affix locks/tags to energy-isolating devices on the referenced equipment/machines and conduct the above-referenced service and maintenance activities. Authorized employees have received lockout/tagout training concerning the implementation of this SOP. Unauthorized employees shall not conduct the above-referenced service and maintenance activities or affix locks/tags to energy-isolating devices on the referenced equipment/machines. All employees, upon observing a machine and/or equipment that is locked and/or tagged out, shall not attempt to start, energize, or use the machine and/or equipment.

   - All employees affected by implementation of this SOP must be notified by the authorized employee(s) prior to equipment/machine shutdown and isolation.

   - Locate and identify type of energy requiring lockout/tagout:

     - electrical;
     - hydraulic;

- chemical;
- mechanical;
- pneumatic;
- thermal;
- hazardous material; and
- other.

- Lockout/Tagout Sequence

a. The authorized employee(s) shall notify all affected employees prior to the shutdown and isolation of the equipment/machine. Affected employees should be informed of the reason for shutdown and approximate length of time required for servicing or maintenance.

b. The authorized employee(s) shall review the type(s) and magnitude(s) of energy present and the hazards present.

c. If the machine/equipment is operating, the authorized employee(s) shall have the machine/ equipment operator explain the standard shutdown procedure and then shut it down according to the procedure (such as: depress stop button, open toggle switch).

d. The energy isolating devices shall be deactivated so the machine/equipment is disconnected or isolated from the energy source(s).

e. Each isolating device shall be locked out and tagged out. If lockout is not feasible, an alternate procedure will be developed. The alternate procedure will be required to provide employee protection equivalent to the protection provided when lockout procedures are utilized. Each authorized person conducting activities on the equipment/machine shall attach a(n) (individually assigned) safety lock to each isolating device. A standard tag shall also be attached to each individual's lock that identifies, by name, the authorized employee responsible for each lock. For the activities covered by this SOP, safety locks and/or multi-lock hasps must be attached to all energy isolation devices.

f. Stored or residual energy, such as that in capacitors, springs, elevated machine members, rotating fly wheels, hydraulic systems, and air, gas, steam, or water pressure must be released or dissipated from each system to reach a zero energy state. Visual inspection shall be made to confirm that all moving parts have stopped. Any stored or residual energy shall be drained, blocked, repositioned, restrained, or bled. Electrical circuits shall be grounded to discharge electricity stored in capacitors.

g. To verify that the equipment is completely isolated from the energy source(s), it is necessary to test the equipment to make certain that it will not operate. The following methods shall be used to test the equipment:

(1) Check the area and equipment to assure that no personnel are exposed to the start-up of equipment;

(2) Activate all start-up devices and operating controls;

(3) Use tic-tracers or voltage indicators to test electrical circuits; and

(4) Return all operating control(s) to the neutral or off position after verifying the isolation of the equipment.

h. Equipment/machine is locked and tagged out.

- Release of Lockout/Tagout and Return of Equipment to Service

a. When the equipment/machine is ready to be returned to service at the conclusion of work activities, the following steps shall be taken to safely return equipment to service:

(1) Check the machine/equipment and immediate area to ensure that non-essential items and tools have been removed;

(2) Verify that all guards and covers have been replaced;

(3) Verify that all employees are safely positioned or have left the area;

(4) Verify that all operating controls are in the neutral or off position;

(5) All authorized employees shall personally remove their individual locks and tags from the isolation devices; and

(6) All affected employees must be notified that the work activities are completed and the equipment/machine is ready for use.

a. If work activities are not completed prior to a shift ending (or other personnel change), then the procedures in “Transfer of Lockout/Tagout During Shift and Personnel Changes” (below) must be followed.

- Transfer of Lockout/Tagout During Shift and Personnel Changes

a. The supervisor shall designate an authorized employee who shall control the lockout/tagout devices at the end of a shift and shall be responsible for transferring lockout/tagout authority to the next shift.

b. The designated authorized employee shall not remove his/her lock from any of the isolation devices until at least one of the arriving authorized employees has locked out and tagged out all of the isolation devices.

c. If the arriving authorized employees assuming responsibility for lockout/tagout do not attach locks prior to the previous shift employees removing all of their locks, then the employees assuming lockout/tagout authority shall repeat the entire lockout/tagout sequence.

Group Lockout/Tagout

1. When more than two employees are involved in work activities on the machine or equipment covered by this SOP, each authorized employee will attach a lock to a multi-lock hasp on each isolation device.

2. When group lockout/tagout is utilized, the last authorized employee with a lock attached to isolation devices will be responsible for removing the isolation devices and restoring equipment to use conditions according to the equipment-specific or general SOP.

VII. Training

New Employees

1. Receive orientation concerning lockout/tagout policies and procedures;

2. Receive orientation concerning responsibilities outlined in this procedure; and

3. Receive update training concurrent with other safety training programs on an as-needed basis.

Existing Employees

1. Receive initial information concerning lockout/tagout procedures through the distribution and review of this procedure; and

2. Receive updated training concurrent with other safety training programs on an as-needed basis.

Training Documentation

1. Training will be documented on a Lockout/Tagout Training Certification Form (a copy of the form follows this SOP).

2. Training certification will be maintained by the Corporate Health and Safety Division under direction of the CSA.

VIII. References

California Code of Regulations, Title 8, Section 2320.4 – De-Energized Equipment or Systems.
California Code of Regulations, Title 8, Section 2320.6 – Accident Prevention Tags
California Code of Regulations, Title 8, Section 3314 – Cleaning, Repairing, Servicing and Adjusting Prime Movers, Machinery and Equipment (Lockout/Tagout)
California Code of Regulations, Title 8, Section 4413 – De-Energizing and Lockout.

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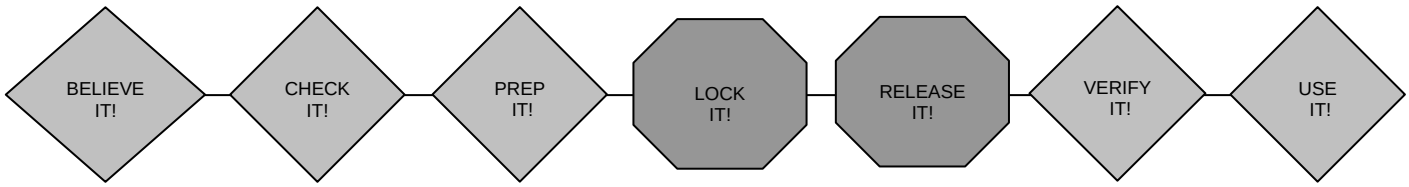
engineers & scientists

Lockout / Tagout Equipment-Specific Energy Control Procedure



Equipment Identification:

_____

_____

Hazardous Energy Source		Isolation Device			Verifying Lockout Means of Verification of Lockout
Type and Magnitude	Function	Type	Location	I.D. No.	
Electrical 120v					
Pneumatic					
Hydraulic					
Mechanical					
Potential					
Gravity					
Other					
Other					
Other					
Area:		**Date of Last Review:**			**Authorized by:**

Approval Signatures

Prepared by: James Poesl Date: 7/27/04

Reviewed by: Jay D. Keough Date: 7/27/04
(Technical Expert)

Reviewed by: Mary Cosco Date: 7/27/04
(Editorial Reviewer)

Reviewed by: Patrick C. Keller Date: 7/27/04
(Quality Assurance Reviewer)

Approved by: Anthony T. Parenteau Date: 7/27/04
(Project Manager)

Attachment H

Air Monitoring Log

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Remedial Management & Construction

DAILY AIR MONITORING LOG

Project:	Date:
Monitoring Instruments:	
Air Monitor:	Activity
Level of Protection:	

Time	Location	Instrument Reading	Comments

Attachment I

BBLES Confined Space Entry Checklist

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Remedial Management & Construction

CONFINED SPACE ENTRY CHECKLIST

ALL COPIES OF PERMIT MUST REMAIN AT JOB SITE UNTIL THE ENTRY IS COMPLETE

Permit # _____ or _____ Non-Permit Entry
Project _____ Date: _____ Time: _____

Location and Description of Confined Space: _____

Checklist	YES	NO	NA	COMMENT
All lines to and from confined space blanked, capped or isolated				
Electrical service locked out (entrant with key)				
Mechanical devices/systems are restrained and locked out				
Explosion-proof electrical equipment in use				
Ladders secured at top				
Ground fault circuit interrupter checked and functioning				
All ignition sources identified and isolated				
Respirators and air supply equipment in proper condition				
Safety harnesses and lifelines in proper condition				
Required PPE being utilized				
Monitoring equipment calibrated and functioning properly				
Atmospheric testing completed				
Trained attendant on standby				
Emergency equipment ready for use				
Rescue provisions in place				
Warning signs posted				
Ventilation equipment functioning properly				
Retrieval system functioning properly				
Communication device for entrance and attendants				
Area secured to eliminate unauthorized entry				
Entry personnel trained for confined space entry				
Confined space entry permit completed and posted				
Permanent ladder rungs in safe condition				

Monitoring Frequency ☐ Continuous ☐ 5 min. ☐ 10 min. ☐ 30 min.

Monitors Name: _____

	Confined Space Air Monitoring Parameters			
	% Oxygen >19.5%	% LEL <10%	CO <20 ppm	Other _____
Time of Reading				
Pre-Entry				

Entry Supervisor _____
PRINT
Signature Date Time

Air Monitor _____
PRINT
Signature Date Time

Attachment J

BBLES Confined Space Entry Permit

BBL
ENVIRONMENTAL SERVICES, INC.
Remedial Management & Construction

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

CONFINED SPACE ENTRY PERMIT

All Copies of Permit Must Remain at Job Site Until the Entry is Completed

Project _____ Date _____ Time _____

Location and Description of Confined Space: _____

_____

Rescue Contact and Phone Number: _____

Entry Objectives: _____

_____

Equipment/Materials required for Entry : _____

_____

Time of Entry: _____ Expiration of Entry:_____

Required Respirator for Entry: _____

Required Protective Clothing for Entry: _____

Monitoring Interval : **Continuous** **5 minutes** **10 minutes** **15 minutes** **30 minutes**

Air Monitoring Requirements			
Monitor For	**Monitoring Equipment**	**Calibrated**	
		Date/Time	**By**
%O_2			
% of LEL			
H_2S			
CO			
Other:			
Other:			

Number of Entrants:		**Number of Attendants:**	
Names of Entrants		**Names of Attendants**	

Entry Supervisor Authorizing Confined Space Entry Permit _____
Print

_____

Signature Date Time

Entry Supervisor Cancelling Confined Space Entry Permit _____
Print

_____

Signature Date Time