**Idaho National Laboratory**

| EXPLOSIVE SAFETY | Identifier: RD-2025<br>Revision: 4<br>Effective Date: 12/07/2015 | Page: 1 of **12** |
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| Subcontractors | Program Requirements Document | | eCR Number: 609364 |
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Manual: INL Subcontractor Requirements

## 1. PURPOSE

This document provides requirements to ensure personnel safety during the transportation, storage, and use of explosives. This document highlights requirements referenced in the "Source Documents" section, as well as Contractor requirements. Any applicable regulatory or Contractor requirements must be followed, with the most stringent requirement being met.

## 2. APPLICABILITY

This document applies to all subcontractors who transport, store, or use explosives at the INL, as specified in their contract with Contractor. Stricter requirements may be imposed by subcontractors upon their employees or subtier contractors. The requirements of this document must be followed by subcontractors; however, the means of implementation may vary as determined by the subcontractor.

## 3. REQUIREMENTS

### 3.1 Training

3.1.1 All employees who handle, use, transport, or store explosive materials shall receive the following training:

A. Employees who transport explosives shall be trained and qualified as required by the Department of Transportation (DOT).

B. Employees shall be qualified in accordance with 29 CFR 1910.109, and 29 CFR 1926 Subpart U.

### 3.2 Administrative Activities

3.2.1 Before any explosive operation is conducted, plans and procedures shall be developed and approved, and shall be used for the procurement, handling, storage, inspection, inventory, use, security, and disposal of explosive materials.

3.2.2 Explosives-use plans shall address the following items.

A. a detailed strategy and description for the specific use of the explosives

B. an explosives safety analysis (see Appendix A)

C. methods and equipment for transporting explosives and detonators

D. potential hazards and hazard mitigation procedures

E. alternative use and handling procedures or special operating procedures as needed

F. the type and location of storage facilities

G. the primer assembly procedure and location

H. employee training requirements

I. provisions for protecting people, structures, and property

J. required notifications prior to firing

K. safety signals, post-blast inspection, and misfire procedures

L. provisions for developing and distributing a daily blasting plan covering hole diameter, spacing, loading, and delay patterns

M. provisions for disposal of explosives, blasting agents, and associated materials

N. hazardous materials and explosives procurement records

O. material safety data sheets

P. explosives test data sheets

Q. vendor data

R. explosives storage inventories

S. training records

T. shipping papers.

3.2.3 Applicable environmental regulations shall be incorporated into any disposal procedures for unused, misfired, or out-of date explosive materials.

3.2.4 Qualified explosives-use supervisors shall be assigned for the use of explosive materials.

3.2.5 Explosives-use permits (Form 440.2 Explosive Use Permit) shall be prepared and approved for explosives operations at Contractor-controlled facilities or areas.

3.2.6 Explosives-use permits shall address the following items:

A. an explosives safety analysis (see Appendix A) or job-specific procedure

B. a copy of the explosives-use plan or equivalent document for firing explosives or explosive devices

C. any waivers or exemptions to explosives safety requirements

3.2.7 Explosives-use permits and plans shall be submitted to the Contractor point-of-contact (POC) at least seven calendar days in advance of proposed explosives use.

**NOTE:** *For complex explosives-use permits, additional time may be needed for an adequate review of the explosives-use plan.*

## 3.3 Procurement and Delivery of Explosives

3.3.1 If subcontractor-purchased explosives are to be delivered to the INL, the subcontractor shall provide Contractor with arrival dates and instructions for the disposition of ordered explosives.

3.3.2 Subcontractors shall contact the Contractor point of contact (POC), 24 hours in advance of the expected delivery time of any DOT-classified explosives or blasting agents. The POC will notify the Packaging and Transportation Department, Protective Force, and Warning Communication Center (WCC)

3.3.3 Explosives test data sheets and material safety data sheets (MSDSs) shall be available for each type of explosive brought to Contractor-controlled facilities and areas. (See RD -2101, Hazard Communication)

## 3.4 Explosives Transportation

3.4.1 Before transporting explosives within INL boundaries or on INL site roadways, subcontractors shall contact the Contractor POC and arrange for an escort.

3.4.2 All motor vehicles transporting explosives over public highways within INL boundaries or on INL site roadways shall meet the following regulations:

A. OSHA regulations (29 CFR 1910.109; and 1926 Subpart U)

B. DOT regulations (49 CFR 171-173, 177 & 390-397)

3.4.3 Detonators, electro-explosive devices, and primary explosives must be shipped separately from secondary explosives.

3.4.4 Incompatible explosives must be shipped separately.

3.4.5 Packages must be labeled with the explosive custodian's name, material name, and class/division/group.

3.4.6 Transport vehicles must have the following items:

A. wheel chocks

B. explosive placards meeting DOT requirements on all sides

C. emergency four-way flashers

D. rear-view mirrors on each side of the vehicle

E. two filled fire extinguishers: one 5:ABC inside the cab and one 20:ABC outside the vehicle near the driver’s door

F. positive means of securing the explosives to the bed of the vehicle

G. quick disconnect on the battery if explosives are stored in the vehicle overnight

H. cargo area with no sharp projections

I. tires without excessive wear or damage

J. spark arrestor if vehicle is running while loading or unloading explosives.

3.4.7 Portable explosive magazines must be labeled as to the contents and hazard class.

## 3.5 Explosives Security

3.5.1 Subcontractors shall maintain continuous security and control of explosives.

3.5.2 Explosives custodians shall be assigned for accountability of all explosives.

3.5.3 A custody log shall be maintained when ownership of explosives is transferred.

## 3.6 Explosives Storage

3.6.1 Storage magazines, storage operations, quantity distances, and intraline distances for storage magazines shall meet the applicable requirements of the DOE ESM. (See POC for applicable requirements from the DOE Explosive Manual).

3.6.2 Explosives shall be stored only in magazines and areas approved by the Contractor Explosives Safety Committee through the Contractor POC.

3.6.3 Explosives, time fuses, and detonators shall be stored in accordance with the following requirements:

A. 29 CFR 1910.109 and 29 CFR 1926 Subpart U

B. recommendations of the explosives manufacturers.

3.6.4 Magazines containing detonators shall be separated from magazines containing other explosives or blasting agents by the distances specified in publication number 2 of the Institute of Makers of Explosives (IME).

3.6.5 Explosive materials and accessories shall be removed from the INL within 30 days of the expiration of the associated explosives-use permit, unless approval to keep the materials on the site is obtained from the Contractor POC.

3.6.6 For extended storage, shelf-life criteria for the stored materials shall be reviewed at least annually.

3.6.7 For each type of explosive brought to Contractor-controlled facilities and areas, test data sheets and material safety data sheets shall be available for review.

3.6.8 Explosives magazines shall have fire division and classification signs posted in accordance with DOD 6055-9-STD (DOD Ammunition and Explosives Safety Standards), visible from the normal approaches to magazine areas.

3.6.9 Broken, leaky, or defective packages of explosives shall be disposed of in accordance with approved procedures or methods as soon as possible after detection.

3.6.10 Empty boxes and combustible packing materials that contained explosives shall be removed from the INL and shall be disposed of in accordance with 29 CFR 1926.900(l).

3.6.11 In the event of a fire in an outside explosives magazine, all personnel shall immediately be evacuated and the WCC (526-1515) shall be notified.

3.6.11.1 All affected personnel shall be moved to a safe area at least 2,000 feet from the fire, and the fire area shall be guarded against intrusion.

3.6.11.2 Subcontractor personnel shall not fight any fire in an explosives magazine.

3.6.12 Personnel entry, explosives quantity, and material for operations in and around magazines shall be controlled in accordance with 29 CFR 1910.109; 29 CFR 1926 Subpart U; and the DOE ESM.

3.6.13 Magazines shall be securely locked at all times except for inspection or movement of explosives.

3.6.14 Each magazine door or lid shall be equipped with two hardened padlocks fastened into separate hasps unless located in a secured or patrolled area and approved in writing by the Contractor POC.

3.6.15 Only authorized personnel shall be allowed in or near explosives magazines.

3.6.16 A buddy system shall be used for entrance into any explosives magazine and storage area.

3.6.17 Operational limits for each magazine shall be posted on or near the magazine.

3.6.18 An auditable inventory shall be kept of all explosive materials.

3.6.18.1 The inventory shall use units of measure suitable to the type of explosives being stored.

3.6.18.2 The inventory shall be kept in the explosives storage magazines in accordance with the requirements of the BATF P5400.7.

3.6.18.3 Inventory data shall be provided to the Contractor POC.

3.6.18.4 Any discrepancy in explosive materials inventories shall be immediately investigated to determine if any explosive materials are actually missing.

3.6.18.5 Any actual loss or theft of explosive materials shall be immediately reported to the Contractor POC. The POC shall contact the Protective Force manager, the DOE-ID Safeguards & Security manager, and the WCC.

## 3.7 Handling and Use of Explosives

3.7.1 Explosives operations shall be conducted in accordance with the approved explosives-use plan and permit.

3.7.2 Only authorized and qualified persons shall be permitted to handle or use explosives.

3.7.3 An approved lightning detection device shall be used at explosive blasting sites to give warning of impending electrical storms.

3.7.4 Explosives operations shall be shut down whenever an electrical storm approaches within 5 miles of the explosives area.

3.7.5 When electromagnetic, magnetic, or electrostatic energy threatens an explosives operator, work shall be stopped and the area shall be evacuated (but approval may be obtained from the explosives-use supervisor for a preemptive shot to eliminate the greater hazard).

3.7.6 Explosives operations shall be separated from radio transmitters and electromagnetic power sources by the distances specified in IME pamphlet number 20.

3.7.7 The Explosives Pre-Firing Notification Checklist (form 0440.1) shall be completed before explosives are fired.

## 3.8 Blasting Operations

3.8.1 All blasting operations shall be conducted under the supervision of a qualified explosives-use supervisor, and all loading and firing shall be directed and supervised by the explosives-use supervisor or designated alternate.

3.8.2 Blasting operations shall be coordinated with all Contractor operations or subcontractors in the affected area.

3.8.3 Affected operations personnel and subcontractors shall be notified, when required, 24 hours and 2 hours before blasting is scheduled to begin.

3.8.4 Flagpersons shall be posted at all access points to danger areas to keep all unauthorized persons out.

3.8.5 Blasting signs shall be posted at all access points before each shot.

3.8.6 The explosives-use supervisor shall make sure that all employees are out of the blast area before firing a blast.

3.8.7 The following loud warning signals (blasts on a warning horn) shall be used during blasting operations:

A. blast warning: 1-minute series of long signals 5 minutes before blast signal

B. blast signal: series of short signals one minute before the shot (following the final inspection of the blast area for personnel)

C. all clear: prolonged signal following inspection of the blast area for hazards.

3.8.8 Electrically-fired explosives charges shall be fired with an electric blasting machine or a properly designed and installed power source.

3.8.8.1 Only solid copper wire of sufficient current-carrying capacity shall be used for explosives detonation, unless prior approval for the use of multi-strand blasting wire is obtained from the Contractor POC.

3.8.9 Electrical power shall be disconnected from the electrical blasting leads as follows:

3.8.9.1 The firing lead lines shall be disconnected from the blasting machine and shall be short-circuited (shunted) by twisting the wires together.

3.8.9.2 Locking power switches shall be placed in the open or off position.

3.8.10 Blasting machines shall be secured in a manner that prohibits any use.

3.8.11 After each use of explosives, the detonation area shall be inspected after a minimum 5-minute waiting period.

3.8.11.1 All wires shall be carefully traced to search for unexploded charges and other hazards.

3.8.11.2 The all-clear signal shall be sounded only after a satisfactory inspection of the area.

3.8.12 In the event of a misfire, a second attempt shall be made to detonate the explosives.

3.8.12.1 If the second detonation attempt fails, alternative measures shall be taken to secure the area, and the Contractor POC shall be notified.

3.8.12.2 Misfired explosives shall be disposed of in accordance with a procedure or plan reviewed and approved by Contractor.

3.8.13 Multiple-component explosives (such as kinetics, carbo-ammonium nitrates, and slurries) shall be mixed, used, and stored only by an explosives-use supervisor experienced and qualified for the explosive to be used, and use of such components shall be controlled by a detailed explosives-use permit.

## 4. RECORDS

Records of explosive operations shall be generated and maintained as described below:

| Type of Record | Submitted to Contractor POC | Retained by Subcontractor for duration of the project |
|---|---|---|
| Explosive use permits (form 440.02) | Yes | Yes |
| Explosive use plans (form 440.02) | Yes | Yes |
| Training records and plans | Yes | Yes |
| Explosives custody logs | Yes | Yes |
| DOT explosives shipment inspection records. (form 440.03) | Yes | Yes |

## 5. DEFINITIONS

For definitions of terms used throughout the INL Subcontractor Requirements Manual, refer to LST-359.

## 6. REFERENCES

### 6.1 Source Documents

Bureau of Alcohol, Tobacco, and Firearms (BATF) P5400.7, ATF Explosives - Laws and Regulations

27 CFR 55, BATF, Commerce in Explosives

29 CFR 1910.109, Explosives and Blasting Agents

29 CFR 1926, Subpart U, Blasting and the Use of Explosives

40 CFR 264, 265.382, and 270, Resource Conservation and Recovery Act (RCRA)

requirements applicable to disposal of explosives

49 CFR 171 through 173, U.S. Department of Transportation (DOT) Hazardous

Material Shipping Regulations

49 CFR 390 through 397, Federal Motor Carrier Safety Regulations

DOE STD-1212-2012 DOE Standard Explosives Safety

DOE Order 5480.3, Safety Requirements for the Packaging and Transportation of

Hazardous Materials, Hazardous Substances, and Hazardous Wastes

DOE Order 5480.4, Environmental Protection, Safety, and Health Standards

DOE Order 5483.1A, Occupational Safety and Health Program for DOE Contractor

Employees at Government-Owned Contractor-Operated Facilities

DOE-ID SD 5480.4A, Environmental Protection, Safety, and Health Standards DOE-ID SD 5483.1B, Occupational Safety and Health Program for DOE Contractor

Employees at Government-Owned Contractor-Operated Facilities DOD 6055-9-STD, DOD Ammunition and Explosives Safety Standards Institute of Makers of Explosives (IME) Safety Library publications, pamphlets 1-22 American Table of Distances for Storage of Explosives

Related Requirements

The following documents may also contain requirements that apply to this activity: PRD-2101, Hazard Communication

## 7. APPENDICES

Appendix A, Explosives Safety Analysis

## Appendix A

## Explosives Safety Analysis

This safety analysis details the strategy for the specific use of explosives, describes potential hazards, and outlines hazard mitigation.

The explosives safety analysis should include the following items, as a minimum.

1. a systematic identification of potential hazards
2. analysis of potential consequences
3. measures to eliminate or control the hazards
4. documented management authorization of the operation based on an objective assessment

The completed explosives safety analysis is attached to the associated explosives-use permit and becomes a part of that permit.