

LARGE FILING SEPARATOR SHEET

CASE NUMBER *11-5542-EL-BGA*
11-5543-EL-BGA

FILE DATE *1/31/2012*

SECTION: *2 of 4*

NUMBER OF PAGES: *201*

DESCRIPTION OF DOCUMENT: *Confidential Release*

This is to certify that the images appearing are an accurate and complete reproduction of a case file document delivered in the regular course of business.
Technician *je* Date Processed JAN 31 2012



Section III Forms & Information

Valid from: November 2008

	Section III RPSHSE 7.1.6	Valid from: November 2008
---	---	---------------------------

Revision Profile

Rev.	Date	Name	Approval Signature	Remarks
0	11/08	Owens O'Quinn QHSSE Consultant	On File	ORIGINAL
0	11/08	Tammy Conekin	On File	ORIGINAL
1				
2				
3				
4				
5				

Original Review Progress

Date	Reviewer	Signature
11/08	J.K. Barrilleaux – Grammar/Technical Format <i>Evergreen QHSSE Solutions LLC</i>	On File
11/08	Owens O'Quinn – QHSSE Consultant <i>Evergreen QHSSE Solutions LLC</i>	On File
11/08	Tammy Conekin – Head of Service	On File



	Section III RPSHSE 7.1.6	Valid from: November 2008
---	---	---------------------------

Section III: 7.1.6 RPSHSE - 6
Hearing Conservation Program Occupational Noise
Exposure

Contents

Section	Topic	Page No.
1.0	Introduction	3
2.0	General	3
3.0	Monitoring and Testing	5
4.0	Engineering and Administrative Controls	7
5.0	Recordkeeping	7
6.0	Training	8
7.0	Definitions	8

1.0 Introduction

It is the policy of **REPOWER USA** to protect all employees against the effects of noise exposure when sound levels exceed the allowable exposure levels determined by OSHA, CFR 29, Part 1910.95. When the daily exposure is composed of two or more periods of noise exposure of different levels, their combined effect shall be considered, rather than the individual effect of each.

2.0 General

2.1 Program Compliance

In order to comply with the required regulations the hearing conservation program includes the following phases:

- Issuance of Personal Protective Devices
- Engineering and Administrative Controls
- Noise Monitoring
- Employee education and training
- Audiometric Testing
- Recordkeeping

2.2 Responsibility

When employees are subjected to sound levels above those listed in the table, feasible engineering or administrative controls shall be utilized.

If such controls fail to reduce the sound levels to within the acceptable perimeters, all employees working the 8-hour and 12-hour shifts shall use personal protective equipment to do so.

When it is not possible to reduce the noise levels or the duration of an employee's exposure ear protective devices will be provided and used. **Plain cotton is not an acceptable protective device.** Ear protective devices inserted into the ear shall be fitted and determined individually by competent personnel.

Each employee is ultimately responsible for protecting his/her hearing. It is important that each employee take the time and effort to know the hazards and how to protect themselves. Because hearing loss is a gradual process, it is easy to overlook or ignore the value of hearing protection.

The On-Site Field Superintendent/Supervisor and the Department/Operations Manager of each work group are responsible for the implementation of this program wherever employees are subject to the exposure of excessive noise. The **REPOWER USA** HSE Manager is designated as the program administrator.

2.3 Types of Hearing Protection Devices (HPD)

There are four categories of Hearing Protection Devices (HPD's):

- **Enclosure** - This type of device surrounds the head like a helmet. This type is unpopular due to the cost and discomfort factors.
- **Earplugs (also known as Aurals)** - Earplugs fit in the ear canal and come in 3 forms:
 - Formable (disposable after 1 use)
 - Custom-molded (molded for a specific individual)
 - Molded-inserts (Pre-molded and reusable)

Earplugs can reduce the noise reaches the ear by 25 to 30 dbA in the higher sound frequencies.

- **Canal Caps (Superaural)** - This type seals the external edge of the ear canal. These caps are made of soft rubber and are held in place by a headband. This type is good for workers who enter and leave high noise areas frequently during the workday.
- **Earmuffs (Circumaural)** - This type fits over the whole ear and usually provides the most protection.

2.4 Hearing Protection

Hearing protection devices are to be worn by all employees and casual visitors who are exposed to noise levels greater than 85 decibels over an 8-hour period. In all cases where the sound levels exceed 85 dbA over an 8-hour duration an effective site-specific hearing conservation program shall be administered. During each Job Site Safety Analysis (JSA), Hearing Protectors are evaluated for the noise environment in which they will be used.

Approved hearing protectors are provided to the employees and provided to casual visitors. Either the plug or muff type will be available. On-Site Field Superintendent/Supervisors are responsible for ensuring that hearing protection is worn in the required areas.

The **REPOWER USA** HSE Manager approves of earmuffs and disposable or reusable ear plugs (inserts). However, soiled disposable plugs are not to be reused.

2.5 Exceptions

Earmuffs or plugs are **required** in designated areas where high noise levels exist. Noise level **CAUTION** signs must be posted on the entrance doors or near these areas. The sign should state:

Caution: Ear protection is required while equipment is operating.

MUFFS or **PLUGS** are **REQUIRED** when equipment is operating in the areas listed below:

- Engine rooms.
- Turbine and pump rooms.
- Additive or mud rooms (using air pumps).
- Other locations where high noise levels may be identified or may occur, signs should be posted and hearing protection should be required and made easily accessible.

To allow for the proper usage of personal hearing protection, the placement of earmuffs or plugs should be placed outside of the designated areas such as pump rooms, turbine rooms, and engine rooms, etc.

When using other loud machinery or power tools, employees are required to wear **MUFFS** or **PLUGS**.

3.0 Monitoring and Testing

3.1 Employee Testing:

At facilities where the noise exposure equals or exceeds the average of 85 dbA or more over an 8-hour period, **REPOWER USA** is required to provide audiometric testing to all exposed employees by a certified audiologist or a trained technician. A baseline audiogram test should be established with follow-up testing at least once a year. Employees hired and/or transferred to work in exposed noise areas should be initially tested prior to starting the assignment but after no more than 60 days in the position. Audiometric testing facilities and equipment must meet OSHA standards. For accurate test results, employees to be tested must wear their ear protection muffs or plugs from the beginning of their work shift that day until tested.

The designated **RPSHSE** Medical Consultant may also evaluate the audiograms.

No employees to be tested shall be exposed to workplace noise levels unless the adequate and proper Personal Protective Equipment (PPE) is used for a period of 14 hours prior to the scheduled test. Also, the employees are to avoid high levels of noise.

Should it be determined during an employee's audiometric testing process that a Standard Threshold Shifts (STS) has occurred the following will be done:

- The **REPOWER USA** Medical Consultant will send letters of notification of any Standard Threshold Shifts (STS) directly to the affected employee within 21 days of the date the Standard Threshold Shifts (STS) are determined.

- The **REPOWER USA** Medical Consultant will forward a copy of the Standard Threshold Shifts (STS) to the **REPOWER USA** HSE Manager and the Human Resources Manager to be included in the **REPOWER USA** employee's Personnel/Medical File.
- Employees with suspected Standard Threshold Shifts (STS) will be retested within 30 days of the determination of the shift.
- It is the responsibility of the Department/Operations Manager, the **REPOWER USA** Human Resources Department and the **REPOWER USA** HSE Manager to ensure that the employees are appropriately retested.
- Any associated costs with repeat tests are the responsibility of the Company.
- Employees with a confirmed Standard Threshold Shifts (STS) shall be refitted and retrained for the hearing protector used and referred, with a completed **REPOWER USA** Medical Consultant Referral Letter, to a hearing specialist for a consultation and an opinion of the following:
 - Probable cause of the hearing loss.
 - Factors other than the potential occupational noise exposure that could contribute to the loss.
 - Is there a medical pathology in the employee(s) ears that may be aggravated by wearing hearing protectors?
 - Recommendations to improve, stabilize, or prevent further hearing loss.
 - **NOTE:** The referral should include the results of the available noise monitoring of the employee's work area and a summary of the audiometric tests including the employee's baseline(s). This should be included in the Hearing Case Study report that is attached to the **REPOWER USA** Medical Consultant's letter and mailed to the employee.

3.2 Sound Level Monitoring

Sound level surveys will be performed by the HSE Department using sound level meters meeting ANSI S1.4-1971 specifications with the meter set on the A-scale, slow response.

Facilities with recorded excessive sound levels and where engineering has not successfully reduced the noise level to the permissible levels will be tested annually. Facilities will also be surveyed with the installation of new equipment, equipment modification, or any change in the process altering the existing noise levels.

Sound level survey records must show the following:

- Make, model and serial number of the instrument used.
- Date and time of the survey.
- Location within the facility or plant (a drawing of the specific areas and the noise level readings is recommended).

	Section III RPSHSE 7.1.6	Valid from: November 2008
---	---	---------------------------

- Machinery or equipment that generates noise.
- Location of the meter with respect to the machinery or equipment where the reading was taken.
- Name of the person taking the test.

4.0 Engineering and Administrative Controls

REPOWER USA recognizes the desirability of controlling the existing noise levels by engineering and/or administrative controls. Engineering controls are defined as those which reduce the sound intensity at the source of the noise or in the hearing zone of the worker.

These controls are obtained by the application of engineering principles to advance the process: dampen vibrations and reduce sound transmissions, specify the noise levels when ordering equipment, and/or isolate the noise source or the operator from the noise source. Administrative controls are defined as those which reduce the length of time employees are exposed to noise, rather than reducing the noise itself. Examples are rearranging work schedules, spreading workloads between more than one employee, or arranging to run a machine only as required, etc.

It is realistic to assume that part of the burden for reducing the noise will be the responsibility of the equipment supplier due to the complexity of some of the machinery. The supplier should always be asked to redesign his equipment, when possible, to meet the defined guidelines or at least in the noise abatement program.

5.0 Recordkeeping

REPOWER USA recognizes the need for keeping comprehensive documentation on the employee's exposure to noise levels, the audiometric test results, audiometric equipment calibrations, and the employee training programs and noise levels in audiometric test environments.

REPOWER USA shall retain all records for the period indicated in the OSHA Hearing Conservation Program.

6.0 Training

Annual training shall be given to each employee in Hearing Conservation which will include the following:

- The effects of noise on hearing.
- The purpose of hearing protectors: advantages, disadvantages. The attenuation of various types and the fitting instructions and care.
- The purpose of audiometric testing and the procedures.
- The employee's right to access the monitoring and testing results.

7.0 Definitions

- **Hearing Loss** - A temporary hearing loss can occur from short exposure to loud sounds but the hearing soon recovers when the noise stops. However, if the noise level is high enough and long enough, health problems can occur - including permanent hearing loss.
- **Sound** - Frequency and intensity measure sound. Frequency is the pitch (high or low) of a sound. High-frequency sound can be more damaging to your hearing than low-frequency sound. Intensity is the loudness of a sound. Loudness is measured in decibels (dB(A)), named by Alexander Graham Bell.
- **Noise Reduction Rating (NRR)** - All hearing protectors carry a label indicating the NRR; a higher number on the label means more effectiveness.



Section III Forms & Information

Valid from: November 2008

Section III:

7.1.6 RPSHSE - 6

Hearing Conservation Program Occupational Noise Exposure

Form1 – Recordkeeping Chart

Recordkeeping Chart**RECORDKEEPING**

Document Retention	
Noise Exposure Measurement	2 years
Audiometric Test Results	The duration of the affected employee's employment + 30 years
Audiometric Equipment Calibration	2 years
Employee Training	2 years
Noise levels in the Audiometric Test Environment	Most recent assessment



Section III Forms & Information

Valid from: November 2008

Section III:

7.1.6 RPSHSE - 6

Hearing Conservation Program Occupational Noise Exposure

Form 2 - OSHA Permissible Exposure Levels Chart

OSHA Permissible Exposure Levels Chart

Duration Per Day, (#Hours)	Sound Level (dbA)
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25 or less	115

	Section III RPSHSE 7.1.7	Valid from: November 2008
---	-------------------------------------	---------------------------

Revision Profile

Rev.	Date	Name	Approval Signature	Remarks
0	11/08	Owens O'Quinn QHSSE Consultant	On File	ORIGINAL
0	11/08	Tammy Conekin	On File	ORIGINAL
1				
2				
3				
4				
5				

Original Review Progress

Date	Reviewer	Signature
11/08	J.K. Barrilleaux – Grammar/Technical Format <i>Evergreen QHSSE Solutions LLC</i>	On File
11/08	Owens O'Quinn – QHSSE Consultant <i>Evergreen QHSSE Solutions LLC</i>	On File
11/08	Tammy Conekin – Head of Service	On File



Section III
7.1.7 RPSHSE – 7
Permit-to-Work**Contents**

Section	Topic	Page No.
1.0	Introduction	3
2.0	Procedures	3
3.0	Responsibilities	5
4.0	Welder Qualifications	7
5.0	Permit Limitations	8
6.0	Permit Disposition	8
7.0	Definitions	8

1.0 Introduction

This procedure has been developed to standardize and document the methods and responsibilities during any hot work operation. Its purpose is fire protection and prevention for any situations in plant or field operations where there are or have been hydrocarbons or other flammable liquids present.

A Permit-to-Work is **required in any classified area** before performing any function that requires the use of an open flame or where sufficient heat or sparks might be generated to serve as a source of ignition where hydrocarbons or other flammables are or have been.

A Permit-to-Work is required in all **REPOWER USA** operations for any work in a **classified area** that require the following:

- Welding
- Cutting
- Hot tapping
- Burning
- Grinding
- Blasting
- Opening energized electrical junction boxes
- Drilling (electric or air)
- Buffing (electric or air)
- Operating conventional gasoline or diesel engine-driven equipment
- Operating unapproved battery operated equipment with switches or electric motors.
- Painting and other operations around spark-producing equipment
- Portable spark producing devices including heaters, spark-ignited engines, vehicles, and electrical hand tools. (Lighting process heaters do not require a Permit-to-Work but does require compliance with safe lighting procedures, including a gas check).

NOTE: When conventional gasoline or diesel engine-driven equipment is utilized in an area that requires a Hot Work Permit, the equipment must be continuously monitored while it is in operation.

- **NOTE:** Additional Permits-to-Work may be required, such as for a Confined Space Entry. A permit for a **Confined Space Entry** is required for work in a confined space that may be hazardous due to the presence of flammable/toxic gas, lack of breathable atmosphere, etc.

2.0 Procedures

2.1 General

In normal operations, there is always a potential danger of fire or explosion due to flammable nature of many of the products handled.

The object of this procedure is to define a system of control that will allow work involving a possible source of ignition to be carried out in a safe manner. No one associated with the job shall have smoking materials (lighters, matches, cigarettes, etc.) on their person at the job site.

It is obvious that not all situations and circumstances can be covered by procedures and regulations.

Therefore, On- Site Field Superintendent/Supervisors must:

- Develop full knowledge of the situation regarding any work to be performed
- Determine what precautions are required above and beyond the minimums specified herein
- Exercise sound judgment and make conservative decisions regarding the manner in which the work will be performed.

All plant and field units must operate and control within the **Permit-to-Work Program**. This responsibility includes stocking permits, maintaining records, maintaining oxygen and gas detection devices, and acting as the final authority during the permitting process.

Employees themselves must also exercise good judgment and evaluate and question, if necessary, the precautions and conditions concerning their personal safety and that of other the personnel and the facility itself. It is the responsibility of every individual to:

- Work in a safe manner.
- Question any work tasks or procedures that he/she may not understand.
- Report any unsafe work practices or circumstances witnessed to his/her immediate supervisor.

Access to the work areas covered by the permit(s) will be limited to the members of the work party who are familiar with the hazards of the job, the work tasks required, and the precautions needed to do the work in a safe manner.

All other unauthorized personnel must vacate the work area. All members of the work team shall establish and maintain the proper communications.

A Permit-to-Work is automatically and immediately cancelled if, for any reason, the conditions upon which the permit was issued change or other factors arise that could create an unsafe environment.

2.2 Specific Precautions

It is essential, as a minimum, that the fire prevention and protection requirements detailed in OSHA CFR 1910.119(a) have been implemented prior to beginning any hot work operations. Individuals involved in the preparation of the permits and the execution of the work should familiarize themselves with the precautions detailed in this regulation.

2.3 Areas where Permits-to-Work are required

Permits are **required** in all process areas, warehouses, flammable storage buildings, storage buildings, pipe alleys, storage tank areas, laboratories, waste disposal facilities, tank truck loading and unloading racks, sewer systems, and any other areas or confined spaces where the possibility of a fire or explosion hazard may exist.

2.4 Areas where Permits-to-Work are not required

Under normal conditions, Work Permits are not required for work in maintenance shops, offices, change house, and designated burning areas. A Permit-to-Work is not required for approved fabrication areas such as established plant and field fabricating shops. The On-Site Field Superintendent/Supervisor and/or the Operations/Department Manager may designate a work area "safe" for the duration of specific jobs or projects without requiring that a Permit-to-Work be used. Such designated areas must be clearly marked or roped off.

In new area projects where no hydrocarbons are present and where all new equipment is used, a permit stating "New Construction - No Hydrocarbons Present" may be used.

3.0 Responsibilities**3.1 General**

Requesting and initiating the Permit-to-Work should include a description of the work (the specific tasks to be done), the location of the work, the work procedures, and the required time period.

The description should be clear so that all the personnel involved and the On-Site Field Supervisor will know exactly what must be done. If there are any questions about the job, **REPOWER USA** personnel should resolve them prior to completing the permit.

The permit shall indicate the following:

Note: If the space on the form is not sufficient, write the description on a separate sheet of paper and attach it to the permit.

- The atmosphere testing, if required, of the covered area.
- The preparation of the equipment.

- The performance all required safety checks, including the inspection and placement of fire extinguishers, fresh air equipment, and other required safety equipment. The completion of the Permit, including the date and time the work is approved to start.
- The re-inspection and gas checking of the work area, as necessary.

The permit shall accomplish the following:

- Warn the other operating personnel in the vicinity not to perform any operation that is likely to change the work conditions and thus void the permit.
- Prevent other operations that may conflict with the permitted work.
- Instruct all personnel concerned to stop work if a change that could create an unsafe condition occurs.

3.2 The On-Site Field Supervisor (or designee) shall:

- Review the Permit and satisfy himself/herself that it is safe to perform the detailed work.
- Approve the Permit, including the date and time the work is approved to start.
- Ensure that all elements of the permit procedure are completed.

3.3 Operations and Maintenance will then:


- Review the completed form and verify that the permit requirements are complete before starting any work.
- Review the job and safety requirements in the presence of the work crew and ensure that all parties are knowledgeable in the work tasks to be performed and the safety precautions to be taken. Lead representatives will then sign the Permit-to-Work acknowledging the review and understanding of the job and the HSE requirements.

NOTE: Depending on the type of operation, a **REPOWER USA** function may or may not be a separate function due to job size, location, type, etc. In a combined function, the On-Site Field Superintendent/Supervisor and/or the Operations/Department Manager will be responsible for both functions.

3.4 Fire Watch

The Fire Watch is responsible for the following duties only:

- Use of fire equipment, as necessary.
- Continuously monitoring the area during hot work (open flame, grinding, cutting, or welding) and thirty (30) minutes after its completion.
- Stopping the hot work if sparks, flames, or heat is projected outside the permitted area.
- Alerting personnel entering the permitted area of hazards (arc-flashes, grinding, cutting, overhead hazards).

	Section III RPSHSE 7.1.7	Valid from: November 2008
---	---	---------------------------

3.5 Contractors

Contractors must maintain a permanent record of all the welders used, showing each welder's name, social security number, identifying mark, qualification record, the date of their last certification, and the testing authority.

Ensure that the welders are fully aware of all safety regulations and the contents of this standard.

3.6 Completion of Work

Immediately after the work is completed, the work area and adjacent areas will be inspected to ensure there has been no spread of sparks or heat. The fire watch will remain at the work site for a period of thirty (30) minutes after hot work has ceased, to ensure that the area is secure.

The person(s) doing the work will return their copy of the permit to the supervisor after the job is complete and the area is secure.

6.0 Welder Qualifications

Prior to the commencement of the operation to be performed, the **REPOWER USA** On-Site Field Superintendent/Supervisor must verify that the personnel are qualified to perform the type of work to be done according to applicable regulations.

6.1 Process Piping and Vessel Welding

Vessels - Qualifications and certifications of welders welding on ASME Section I or Section IV boilers or ASME Section VIII hydrocarbon vessels must meet the ASME Boiler and Pressure Vessel Code, Section IX specifications.

Gas Plants - Qualifications and certifications of welders welding on all Gas Plant or offshore platform process piping (ANSI B31.3 piping) must meet the ASME Boiler and Pressure Vessel Code, Section IX, specifications.

Flow lines - Certifications of welders welding on field liquid transmission piping or flow lines (ANSI B 31.4 piping) or field gas transmission piping flow lines (ANSI B 31.8 piping) must meet ASME Boiler and Pressure Vessel Code, Section IX, or API 1104 specifications.

Wellheads, Casing, and Tubing - Qualifications and certifications of welders welding on wellheads, casings, and tubing must meet ANSI B 31.3 for pressure containing components. For welding on surface casing, welders must AWS D1.1 specifications.

6.2 Main Structural Welding

Certification of welders welding major structural members must meet AWS D1.1 specifications. (Examples include, deck beams, deck extensions, boat landings, and structural supports such as vent boom supports, etc.)

6.3 All Other Welding

Any burning or welding on anything other than main structural or process equipment as defined in 6.1 and 6.2 above shall be performed only by the personnel approved by the **REPOWER USA** HSE Manager.

Welders must be fully aware of all safety regulations. "Other Welding" should be limited to minor structural welding (Examples include, handrails, grating, pipe supports, fire tubes, etc.).

7.0 Permit-to-Work Limitations

The Permit-to-Work will be dated and issued for one shift only, normally 8 to 12 hours, with a maximum time limit of 12 hours. The Permit-to-Work will be terminated when changing conditions, such as gas leaks or oil spills, create a hazard. Program review will be conducted should an unauthorized entry be identified, identification of hazard not addressed in original permit, should there be any employee complaints and should any accident/incident/near miss occur during the process of the Permit.

The On-Site Field Supervisor may reinstate the Permit after the hazardous condition(s) has been corrected.

8.0 Permit Disposal

The original copy of the permit will be inserted in a clear plastic envelope and displayed at the work site. One copy **must** be forwarded to the **REPOWER USA** HSE Department. After the work has been completed, or the permit has expired, the original will be returned to the On-Site Field Supervisor.

Unless any problems occur, the original permit will be turned over to the Manager/Supervisor in Charge for disposal. Otherwise, the original will be retained temporarily and may be destroyed after one year following the annual review of the Confined Space Protocol and Permitting System. It is the On-Site Field Supervisor's responsibility to forward a copy to the **REPOWER USA** HSE Department for OSHA documentation.

9.0 Definitions

9.1 Classified Area

For purposes of this standard, classified areas are defined as the following:

- Areas within plant boundaries except in the designated areas.
- Areas within 100 feet of production facilities, pipeline connections and valves if an open flame is involved.
- Areas within 20 feet of hydrocarbon facilities when the use of portable spark producing devices (including non-DOT approved vehicles), or the opening of energized electrical junction boxes is required.
- Areas within 20 feet of tanks or vehicles that transport hydrocarbons, such as vacuum trucks or fuel tanks, or any other area deemed necessary by supervision.

9.2 Fire Watch - The person(s) and associated fire protection equipment assigned to stand by during welding, cutting, or open flame conditions. This will be the **ONLY** function of this assignment.

- 9.3 Access Barrier** - The means of restricting access to a Confined Space Area.
- 9.4 Atmospheric Testing** - The process of examining a space for potential atmospheric hazards. Test the space remotely at various levels and intervals from top to bottom. Test first for oxygen, then secondly for a flammable atmosphere, then for toxins, if necessary.
- 9.5 Authorized Attendant** - A trained individual stationed outside a permitted Confined Space who monitors the authorized entrants and who performs all the attendants' duties as assigned in this procedure.
- 9.6 Authorized Entrant** - A trained individual who is authorized by the Authorized Entry Supervisor to enter a permitted Confined Space and performs all the assigned work as outlined in the Confined Space Entry Permit.
- 9.7 Authorized Entry Supervisor** - A properly trained individual designated by the **REPOWER USA HSE** Department and is responsible for determining if acceptable entry conditions are present at a Confined Space where entry is planned. The Authorized Entry Supervisor will be responsible for authorizing entry and overseeing all entry operations, and for terminating entry as required under existing situations.
- 9.8 Confined Space** - A space large enough and so configured that an employee can bodily enter and perform assigned work but has limited or restricted means for entry or egress. Examples are: tanks, vessels, silos, storage bins, hoppers, vaults, and pits or spaces that may have limited means of entry and is not designed for continuous employee occupancy. The definition could also apply to a trench, bell hole, cellar, or excavation (reference 29 CFR 1926.21 (6) (ii)).
- 9.9 Enclosed Space** - A working space, such as a manhole, vault, tunnel, or shaft that has a limited means of egress or entry and is designed for periodic employee entry under normal operating conditions. The Enclosed Space, under normal operating conditions, does not contain a hazardous atmosphere, but may contain a hazardous atmosphere under abnormal conditions. (Reference 29 CFR 1910.269 (e)).
- 9.10 Entry** - The action by which a person(s) passes through an opening into a permit-required Confined Space. Entry includes work activities in that space and is considered to have occurred as soon as any part of the Authorized Entrant's body breaks the plane of the space.
- 9.11 Entry Permit** - The completed written or printed document that allows and controls entry into a permitted Confined Space area.
- 9.12 Hazardous Atmosphere**
An atmosphere that may expose employees to the risk of death, incapacitation the impairment of ability to self-rescue, injury, or acute illness from one or more of the following causes:
- Atmospheric oxygen concentration below 19.5% or above 23.5% present in the Confined Space area.

- Flammable gas, vapor or mist in excess of 10% of its Lower Explosive Limit (LEL).
- Airborne combustible dust at a concentration that meets or exceeds its (LEL).
- NOTE: Withdraw from the area if vision obscured less than five feet.
- Atmospheric concentration of any substance, which could result in an employee's exposure in excess of its dose of the Permissible Exposure Limit.
- Any other atmospheric condition that is Immediately Dangerous to Life or Health (IDLH) or that would interfere with an individual's ability to escape unaided from a permitted Confined Space area.

Note: For air contaminants for which Occupational Safety & Health Administration (OSHA) has not determined a dose or permissible exposure limit, other published sources of information **SHALL** be used for guidance.

- 9.13 **Hazard Elimination** - Complete removal of the hazard potential by double block and bleed, blind flange, and/or the removal of a spool piece.
- 9.14 **Hazard Control** - Complete removal of all energy sources by Lockout/Tagout procedures. Use of ventilation to maintain a safe atmosphere.
- 9.15 **Hazardous Hot Work** - Any work that is conducted where a flammable atmosphere or a potential flammable condition exists.
- 9.16 **Hot Work** - Work, which may result in sparks; work which may generate an electric arc, gas flame, or any source of ignition.
- 9.17 **Lower Explosive Limit (LEL)** - The minimum percentage of a vapor in air that will explode once it is ignited.
- 9.18 **Permissible Exposure Limit (PEL)** - Maximum safe exposure a person can be subjected to for an 8-hour period.
- 9.19 **Permit Required Confined Space**
A Confined Space that has one or more of the following characteristics:
- Contains or has a potential to contain a hazardous atmosphere.
 - Contains a material that has the potential of engulfing an Authorized Entrant (example: liquids, flammable solids, etc.).
 - Has an internal configuration such that an Authorized Entrant could be trapped, and/or possibly be asphyxiated?
 - Contains any other recognized, uncontrollable, serious safety or health hazard, such as:
 - Rotating Equipment
 - Electrical shock hazards
 - Fall potential
- 9.20 **Prohibited Condition** - Any condition in a permitted Confined Space that is not allowed by the permit during the period when entry is authorized.
- 9.21 **Toxic Exposure** - The exposure to a substance that has the ability to induce injury.



Section III RPSHSE 7.1.7A

Valid from: November 2008

Section III 7.1.7 A RPSHSE – 7 A

Confined Space

Contents

Section	Topic	Page No.
1.0	Introduction	2
2.0	Purpose	2
3.0	Procedures	2
4.0	Responsibilities	4
5.0	Training	7
6.0	Testing and Monitoring	7
7.0	Labeling and Posting	9
8.0	General Requirements	9
8.0	Emergency Rescue Conditions	14
9.0	Recordkeeping	15

1.0 Introduction

More than 1.6 million workers enter confined spaces each year and approximately 63 of them die from asphyxiation, burns, electrocution, drowning, and other tragedies related to their hazardous jobs. More alarming is the fact that 60% of those who die are untrained rescuers who not only fail to save a co-worker but also are killed during the rescue attempt. The Occupational Safety & Health Administration (OSHA) requires that a trained, equipped rescue team be available whenever employees work in confined spaces.

2.0 Purpose

The purpose of this procedure is to establish, standardize, disseminate, and document the methods, responsibilities and other considerations related to the implementation of suitable HSE measures prior to any personnel entering into a confined space. The employee who enters a confined space may be exposed to hazards which require controls to prevent injury or death due to fire and explosion, engulfment, exposure to toxic materials, oxygen deficient atmospheres, entrapment due to internal configuration, and any other recognized serious safety or health hazard.

3.0 Procedures

3.3.1 General Precautions

The On-Site Supervisor and/or the On-Site HSE Coordinator will ascertain that:

- The confined space is prepared and the necessary precautions are taken to determine that the air has the proper oxygen content, is non-flammable, and is non-toxic.
- The confined space, including sections of the lines that could hold harmful materials between blinds and vessels, is thoroughly empty.
- The confined space is washed and/or purged, as necessary, to remove hazardous or toxic materials.
- The confined space is equipped with forced-air ventilation using either of the following to supply ambient air into the vessel:
 - An air-horn or educator, motivated by plant air, to pull ambient air into the confined space.
 - An approved, electrically powered blower.
- A blind list is prepared and given to the personnel responsible for the Maintenance Function for execution. The blind list should also include the following, where applicable:
 - A listing of instruments where purging is not possible.
- If circumstances make it impossible to blind a line at the confined space, a spool piece may be removed and the process side of the line blinded to prevent possible spill.

- When blinding is impossible (such as with welded valves), valves may be chained and locked closed and a bleed valve upstream locked open.
- The following electrical disconnections are made:
- Electrical circuits are disconnected and locked out as specified in the
- Lockout/Tagout - Control of Hazardous Energy Procedure.
- A check (by a qualified person) that voltage is not present on the load side of the disconnected device.
- At least one audible alarm-type oxygen and combustible gas analyzer is inside the confined space while work is being performed. If the work prevents the analyzer from being kept inside the confined space, it shall be kept at the entrance and the atmosphere inside shall be checked periodically. (Reference "Testing and Monitoring")
- Ladders or scaffolds are provided, where they are needed, to permit safe access to the confined space openings. There are safeguards against falling and protection from falling objects and heat and harmful material contacts inside the space. Access openings are to be kept free of all obstructions.
- As applicable provisions and precautions will be in place to address necessary procedures for pedestrians, vehicles and/or barriers as necessary to ensure protection for "ALL" individuals involved in the Confined Space Permit protocol with these items identified on the Permit-to-Work permit.
- The Confined Space Entry permit is completed and signed after personally verifying that all the conditions have been met.

3.3.2 Confined Space Entry SHALL be by the "Permit-to-Work System" only:

- The permit is the written authorization and approval that specifies the locations and type of work to be done.
- It certifies that a Competent Person (CP) and the necessary protective measures have evaluated and existing hazards eliminated and precautions have been taken to insure the safety of each worker.
- This permit shall be dated and carry an expiration time that will be valid for one shift only, normally 8 to 12 hours, with maximum time of 12 hours.
- The new permit shall be issued for each shift. The permit shall be posted next to the entrance(s), with a copy on file at the facility.
- Permits are terminated when changing conditions, such as gas leaks or oil spills, create a hazard. The Field Superintendent/Supervisor is responsible for determining when a new Confined Space Entry Permit must be issued.

4.0 Responsibilities

4.1 The On-Site Supervisor:

Is responsible for the following:

- Requesting and initiating the **Confined Space Entry Permit**.
 - This includes a description of the work, the specific tasks to be done, the location(s), the work procedures, and the required time period.

Note: If the space on the form is not sufficient, write the description on a separate sheet of paper and attach it to the permit. The description shall be clearly written so all involved personnel and the On-Site Supervisor will know exactly what must be done. If there are any questions about the job, the **REPOWER USA** Operations and Maintenance personnel should resolve them prior to completing the permit.

- Ensuring the completion of the Permit-to-Work.
- Preparing the confined space area.
- Performing all required safety checks.
- Testing the atmosphere prior to entry:
 - Oxygen level.
 - Flammability and/or explosive levels.
 - Toxic substance levels.
- Testing the atmosphere while work is in progress.
- Completing the hot work permit.

NOTE: Supervision may contact **REPOWER USA** HSE Department if additional resources are needed to complete the entry permit.

4.2 The On-Site Supervisor, or his designee, must:

- Review the permit with all involved personnel and satisfy himself/herself that it is safe to perform the detailed work.
- Approve the Permit.

4.3 The On-Site Supervisor will then:

- Review the completed form and verify that the permit requirements are complete before starting the required work.
- Review the job and safety requirements in the presence of the work crew and ensure that all parties are knowledgeable in the work tasks to be performed and the safety precautions to be taken. Lead representatives are to review the permit acknowledging understanding of the job and the HSE requirements.
- Complete the isolation checklist:
 - Blinding and/or disconnecting
 - Electrical lockout
 - Mechanical lockout
 - Any other energy isolation required
 - Review the required special clothing and equipment

- Review the Personal Protective Equipment and clothing, including respiratory protection
- Safety harnesses and life lines
- Tools approved for use in accordance with the Hazardous Location Classification (NEC 1978)
- Identify Standby person(s) named on the permit and review the emergency procedures and location of first aid equipment.

NOTE: Depending on the type of operation, the Operations and Maintenance function may be separate functions or a combined function due to job location, size, type, etc. In this situation, the On-Site Supervision shall be responsible for both functions.

4.4 HSE Department

The **REPOWER USA** HSE Department shall provide technical support for risk evaluation, monitoring, training, and Personal Protective Equipment (PPE) review and selection.

- **REPOWER USA** will provide appropriate training to address the various aspects of Confined Space Work.
- Training will be completed and documented for assigned Entry Supervisors, Attendants & Entrants.
- This training will be completed prior initial assignment, prior to change in assigned duties and should any new hazard be identified or should special deviations occur.
- Standard protocol for "ALL" training conducted by **REPOWER USA** HSE Department is identified on the written test with students name, date of training, instructors name, appropriate signatures.
- All training records are available for audit/inspection by external & internal auditors, Clients and authorized representatives for the employees and the employees.

4.5 Authorized Attendant(s)

REPOWER USA SHALL ensure that each Authorized Attendant(s):

- Is responsible for only **one** permitted Confined Space Entry and has no other duties that may distract him/her from their assigned position. Knows the hazards that may be faced during entry including the information on the mode, signs, symptoms, and consequences of potential exposure. Is aware of the possible behavioral effects of potential hazard exposure to
 - **Authorized Entrants.**
 - Continuously maintains an accurate count of the Authorized Entrant(s) in the permitted Confined Space.
 - Remains outside the permitted Confined Space until relieved by another
 - **Authorized Attendant.**
 - Communicates with the Authorized Entrant(s), as necessary, to monitor the Authorized Entrant(s)' status and to alert them of need to evacuate the permitted Confined Space.

- Monitor activities inside and outside the permitted Confined Space to determine if it is safe to remain in the permitted Confined Space and directs the Authorized Entrant(s) to evacuate the permitted Confined Space immediately under any of the following conditions:
 - If the Authorized Attendant detects a prohibited condition.
 - If the Authorized Attendant detects any behavioral effects of a hazardous exposure in the Authorized Entrant(s).
 - If the Authorized Attendant detects a situation outside the permitted Confined Space that could endanger the Authorized Entrant(s).
 - If the Authorized Attendant becomes unable to effectively and safely perform all the duties required of him/her.
 - Summons rescue and other emergency services as soon as the Authorized Attendant determines that the Authorized Entrant(s) may require assistance to escape from a permitted Confined Space hazard.
 - Takes the following actions when unauthorized personnel approach and/or enter a permitted Confined Space while entry/work is underway:
 - Warn all unauthorized personnel that they must stay away from the permitted Confined Space.
 - Advise unauthorized personnel that they must exit immediately if they have entered the permitted Confined Space.
 - Inform the Authorized Entrant(s) and the Authorized Entry Supervisor if unauthorized personnel have entered the permitted Confined Space.
 - Performs non-entry rescues as specified by the employer's rescue procedure.
 - Performs no other duties that might interfere with the Authorized Attendant's primary responsibilities to monitor and protect the Authorized Entrant(s).
- **REPOWER USA** Authorized Attendants will be responsible for "ONLY" one Confined Space Entry procedure.
- Participates in the Permit-to-Work Confined Space Permit review, signing, equipment calibration, and air monitoring results.

4.6 Authorized Entrant(s)

REPOWER USA SHALL ensure that all Authorized Entrant(s):

Know the hazards that may be faced during a permitted Confined Space including information on the mode, signs and symptoms of exposure, and their consequences.

- Are properly trained.
- Use equipment properly.
- Communicate with the assigned Authorized Attendant as necessary to monitor the status of the permitted Confined Space and alert them of the need to evacuate the permitted Confined Space.

- Alert the assigned Authorized Attendant whenever an Authorized Entrant(s) recognizes any of the warning signs and symptoms of exposure to a dangerous situation or detects a prohibited condition.
- Exit from the permitted Confined Space as quickly as possible whenever:
 - Directions are given to evacuate by the assigned Authorized Attendant or the Authorized Entry Supervisor.
 - The Authorized Entrant(s) recognizes any of the warning signs or symptoms of exposure to dangerous situations.
- The Authorized Entrant(s) detects a prohibited condition.
 - An evacuation alarm is activated.
 - Participate in the Confined Space Permit review, signing, equipment calibration and air monitoring results.

4.7 Authorized Entry Supervisor

REPOWER USA SHALL ensure that each Authorized Entry Supervisor:

- Knows the hazards that may be faced during a permitted Confined Space Entry, including the information on the mode, signs or symptoms, and the consequences of potential exposure.
- Verifies that all tests specified by the Confined Space Permit have been conducted and that all procedures and equipment specified by the Confined Space Permit are in place before endorsing the permit and allowing entry to begin.
- Verifies that all personnel involved in Confined Space Entry Permit are properly trained and competent in their assigned responsibilities.
- Verifies that Rescues Services are available and that the means for summoning them are operable.
- Removes all unauthorized personnel who enter or who attempts to enter the permitted Confined Space during entry operations.
- Determines that entry conditions are maintained whenever the responsibility for a permitted Confined Space entry operation is transferred and at the intervals dictated by the hazards and operations performed within the Confined Space.
- Terminates the entry and cancels the Confined Space Entry Permit when the entry operations specified by the Confined Space Permit have been completed or when a condition not allowed under the Confined Space Permit arises in or near the permit area.

5.0 Training

5.1 Training

- No **REPOWER USA** employee **SHALL** be assigned work-requiring entry into a confined space or any activities necessary to support confined space entry unless the employee has successfully completed the required training course and a Quantitative Fit Test.
- No person will be permitted to supervise a Confined Space Entry unless the employee has successfully completed the required training course.

- Training shall be considered satisfactory when the employee has attained an acceptable degree of proficiency for entering and working in confined spaces and satisfies the respective course requirements.
- All personnel who work near confined spaces shall be made aware of the hazards associated with confined spaces during pre-entry orientation.

6.0 Testing and Monitoring

- Entry into a confined space is **prohibited** until an initial testing of the atmosphere has been done from the outside.
- The tests performed shall include those for oxygen content, flammability, and toxic materials. Additional tests will be selected and performed to the satisfaction of the qualified person. The qualified person, taking into account the hazards present and the operations being performed, shall determine the frequency of the monitoring (if unable to monitor on a continual basis).
- Air Monitoring tests will be done continuously with and without ventilation while work is in progress.
- Atmospheric monitoring shall be performed in accordance with the permit. The equipment for the continuous monitoring of gases and vapors shall be explosion proof with direct reading capability and an audible alarm danger-signaling device that will alert employees when a hazardous condition develops. Instruments used for testing the atmosphere in confined spaces shall be selected for their functional ability to measure hazardous conditions.
- Instruments shall be calibrated in accordance with the manufacturer's guidelines. Each calibration shall be recorded and maintained in accordance with existing state and federal regulations.
- The percentage of oxygen for entry in a confined space shall be no less than 19.5% or greater than 23% at the standard temperature and pressure. If tests indicate the oxygen level to be greater than 23%, entry is prohibited until ventilating techniques have reduced the oxygen level to no greater than 21%. If the percentage of oxygen falls below 19.5%, entry into a confined space shall be prohibited until ventilating techniques have increased the oxygen level to a minimum of 19.5%. Exceptions to these criteria are noted in Section E of this procedure.
- Supplied-air respiratory protection is not to be used for routine work in confined spaces unless the conditions and equipment or the task is of such complexity that the use of air-purifying respirators are not appropriate. The **REPOWER USA** HSE Department will assist the Component Person (CP) in resolving any questions that arise in this area.
- Entry into a confined space for any type of work (including hot work which requires additional permit conditions to be met) shall be prohibited when tests indicate the concentration of flammable gases in the atmosphere is greater than 10% of the lower explosive limit (LEL). It is necessary to determine the oxygen level (by the appropriate testing) prior to testing the atmosphere for flammability to make necessary corrections in the flammability measurements.

- The concentration of toxic gases, vapors, or particulates must be determined using equipment that will provide sufficient detection ability and meaningful data to the user. For example, the measurement of the total hydrocarbon concentration may not be sufficiently sensitive or specific enough.
- Ventilation **SHALL** be used and testing **SHALL** be conducted before entry and during Confined Space Entry work.
- All Authorized Personnel **SHALL** participate in the review of calibrated air monitoring data and the signing of Confined Space Permits prior to entry.

7.0 Labeling and Posting

- All warning signs shall be printed in English. Where established symbols exist, they shall be used. Workers unable to read the labels and posted signs shall be informed of the instructions printed on the signs.
- All entrances to any confined spaces shall be individually posted and the warning signs protected from heat, moisture, or other physical dangers.

Signs shall include, at a minimum, the following information:

**DANGER
CONFINED SPACE
ENTRY BY PERMIT
ONLY**

- Emergency procedures, including the phone numbers of the fire department and emergency medical services, shall be posted conspicuously within the immediate area of the confined space or at the telephone from which help would be summoned.

8.0 HSE Equipment and Clothing

- The entry permit shall specify the personal protective equipment to be used in the confined space as determined by the trained Qualified Person.
- Personal items such as hearing aids, prescription eyeglasses, dentures, etc. may affect the individual's ability to perform work in a confined space. It is the Qualified Person's responsibility to approve the use of such items pending the job assignment.
- Items normally used to protect against traumatic injury include safety glasses, hard hats, protective footwear, and protective clothing.
- The additional safety equipment that is necessary to protect the worker in the environment of a confined space includes:
 - A full body harness with "D" rings and an attached lifeline. It shall be worn at all times.
 - If the exit opening is less than 18" (45cm) in diameter, a wrist type harness shall be used.

- Other protective measures shall include:
 - Safety nets shall be used to protect employees working 6 feet above ground or grade level when other fall protection devices are impractical.
 - Life jackets shall be worn if the workers are exposed to falls into a liquid over 4-ft. (1.2 m) in depth.
 - Insulated floor mats shall be used when hot work requires the use of electrical energy.
 - When employees enter a confined space, a barricade shall be erected if inadvertent entry poses a problem. The barricade shall be a mechanism that prevents the closure of an egress and shall have signs posted warning of the dangers present or it shall be a physical barrier (fence) to keep the area clear and it shall have an adequate platform (3 feet X 3 feet, minimally) for entry and/or exit.
 - Tripods with block and tackle for safety lines and communication equipment should also be considered for added safety features when the entry plan is formulated.

8.1 Work Practices

Before entering a confined space all employees involved in the job or task shall participate in a job safety briefing and review the specific requirements for safe entry and emergency exit. These requirements shall be compiled by the Competent Person and be definitive on all the possible hazards. Employees and/or their authorized representatives may at any time request additional monitoring of the Confined Space protocol.

NOTE: The following conditions shall prohibit confined space entry. These conditions may exist when standard techniques such as isolation, purging, positive or negative pressure ventilation, etc. will not provide entry conditions satisfactory to the requirements of this procedure.

- These two conditions are:
 - Entry into a space with an atmosphere greater than 10% of the Lower Explosive Limit (LEL).
 - Entry into a space with an atmosphere that contains greater than 23.0% oxygen content by volume.

NOTE: The following conditions shall require additional evaluation prior to Confined Space entry. These conditions may exist when standard techniques such as isolation, purging, positive or negative pressure ventilation, etc. will not provide entry conditions satisfactory to the requirements of this procedure.

- These three conditions are:
 - Entry into an atmosphere Immediately Dangerous to Life or Health (IDLH).
 - Entry into an atmosphere that contains less than 19.5% oxygen by volume of air.
 - Entry into an atmosphere which contains exposure to a known carcinogen in excess of the accepted health and safety standards.

- The following procedures must be met prior to confined space entry under the above guidelines:
 - Notification is provided to the Department/Operations Manager, the On-Site HSE Coordinator, the Client Representative, and the **REPOWER USA** HSE Department.
 - The scope of the job or task and the need to enter is reviewed with the Department/Operations Manager, the **REPOWER USA** HSE Department, and the On-Site HSE Coordinator for the area of operations involved.
- Approval is given by the On-Site Supervisor, the On-Site HSE Coordinator Department/Operations Manager, the On-site Competent Person, the and Client Representative for the area of operations involved and concurs with the agreement of the **REPOWER USA** HSE Department to follow the procedures mutually specified and required for safe entry and the subsequent work.
- Ventilation and atmospheric containment must be reviewed during the job safety briefing and incorporate the following items:
- Purging and ventilating may be required prior to entry, during work being conducted, and possibly after work is completed. The method used will be determined by the potential hazards that arise due to the product stored or produced, suspected contaminants, the work to be performed, and the design of the confined space.
- When ventilating and/or purging operations are to be performed, the blower controls shall be at a safe distance from the confined space. When a ventilation system is operational, atmospheric tests shall be made before each work shift and as often as necessary to ensure that a safe environmental level is maintained.
- General ventilation may be used (with caution) for distributing contaminants from a local generation point throughout the workspace to obtain maximum dilution. However, special precautions shall be taken to include a method for providing breathable air to each worker for the time necessary for entry, work in the confined space, or when exiting. A method of maintaining communications shall also be provided.
- Local exhaust ventilation shall be provided when general ventilation is not effective due to restrictions in the confined space or when high concentrations of contaminants occur in the breathing zone of the workers. Local high concentrations of contaminants may occur during work activities such as welding, painting, and chemical cleaning. Exhaust systems shall be designed to protect workers in the surrounding area from the contaminated air.
- Respiratory protection may also be needed in addition to ventilation controls and the Qualified Person must specify the type selected.
- The first phase of the initial testing of the atmosphere shall be performed from outside the confined space before ventilation begins to determine what precautions are necessary in purging and ventilating. The second phase of initial testing shall be performed after ventilation equipment is in place to verify that no source outside of Confined Space area is contaminating the ventilation process.

- The testing of more remote regions (which may require use of extension probes) within the confined space may be performed once the immediate area within the confined space has been made safe.
- If flammable concentrations are present, all electrical equipment shall comply with the requirements of NEC (NFPA No.70) hazardous locations and the bonding requirements of Article 250 of NEC, 1978.
- Where continuous ventilation is not a part of the operating procedure, the atmosphere shall be tested until continuous acceptable levels of oxygen and contaminants are maintained for three tests at 5-minute intervals. Care shall be taken to prevent the re-circulation of contaminated air and the interaction of airborne contaminants.
- Energy isolation and lockout/tagout procedures shall be specified for each type of confined space.
- The confined space shall be completely isolated from all other systems by physical disconnection, or blinding off all lines, or double blocking and bleeding at a minimum.
- In continuous systems where complete isolation is not possible, such as sewers or utility tunnels, the specific written safety procedures that are approved and enforced by **REPOWER USA** shall be used.
- Blinds used to seal-off lines shall be capable of withstanding the maximum working pressure or load of the line (with a minimum safety factor of 4), shall be provided with a gasket on the pressure side to insure a leak proof seal, and shall be made of chemically non-reactive material.
- Shutoff valves serving the confined space shall be locked in the closed position and tagged for identification. In addition to blinding, the pumps and compressors serving these lines entering the confined space shall be locked out to prevent accidental activation.
- All blinds to be used, feed lines, drain lines, etc. shall be recorded on the entry permit. If a drain line is located within the confined space, a provision shall be made, when necessary, to tag it and leave it open.
Special procedures shall be determined by the Qualified Person and noted on the entry permit when the confined space is of a double-wall type construction, such as a water-jacketed or similar type.
- If electrical isolation is required, circuit breakers and/or disconnects will be locked in the open (off) position with a key-type padlock. The only key is to remain with the person working inside the confined space. If more than one person is inside the confined space, each person shall place his/her own lock on the circuit breaker. In addition to the lockout systems, there must be an accompanying tag that identifies the operation and prohibits use.
- Disconnecting linkages or removing drive belts or chains can achieve the mechanical isolation of moving parts. Equipment with moving mechanical parts shall also be blocked in a manner where no accidental rotation can occur.

- Other forms of stored energy (e.g. hydraulic, pneumatics) must also be isolated or released so no accidental release can occur.
- The procedures and processes used to clean the inside of a confined space shall be reviewed and authorized by the Competent Person. If the confined space contains a flammable atmosphere above the upper explosive limit, it shall be purged with an inert gas to remove the flammable substance before ventilating with air.
- The initial cleaning shall be done from outside of the confined space if at all possible.
- Special procedures should be adopted to handle the hazards created by the cleaning process itself. For example, if the confined space is steamed, it shall be allowed to cool prior to entry.
- Ventilation shall be maintained during neutralization procedures to prevent the buildup of toxic materials.
- Steam shall not be used as a cleaning method when the product stored is a liquid with an auto-ignition temperature. The steam will generate an ignition source.
- The pipe or nozzle of steam hose shall be bonded to the tank to decrease the generation of the static electricity that could accumulate in tanks during the steaming procedures.
- Equipment and tools to be used in a confined space shall be carefully inspected and shall meet the following requirements:
 - Hand tools shall be kept clean and in good repair.
 - Portable electric tools, equipment, and lighting shall be approved in accordance with 29 CFR Part 1910 Sub Part S and be equipped with a ground fault circuit interrupter that meets the requirements of 29 CFR 1910.309. All grounds shall be checked before electrical equipment is used in a confined space.
 - All electrical cords, tools, and equipment shall be of the heavy-duty type with heavy-duty insulation and inspected for visually detectable defects before use in a confined space.
 - Air-driven power tools shall be used when flammable liquids are present. The use of air-driven power tools will reduce the risk of explosion, but not eliminate it.
- However, explosions can arise by tools overheating (drilling), sparks produced by striking (percussion), grinding, or through the discharge of accumulated electrostatic charges developed from the flow of the compressed air.

- Lighting used in confined spaces shall be of the explosion-proof design and equipped with guards. Only equipment listed by the Underwriters Laboratories for use in Division 1, atmospheres of the appropriate class and group, approved by the U.S. Bureau of Mines (Mine Safety and Health Administration), or the U.S. Coast Guard shall be used. Electric cords shall not hang lighting, unless specifically designed for that purpose. The illumination of the work area shall be sufficient to provide for safe work conditions as referenced in the ANSI standard A11-1-1965, or the revision of 1970. Under no circumstances will matches or open flames be used in a confined space for illumination.
- Cylinders of compressed gases shall never be taken into a confined space. However, the cylinders that are part of self-contained breathing apparatus, emergency egress bottles, or resuscitation equipment are exempt from this rule.
- Ladders shall be adequately secured, or of a permanent type, which provides the same degree of safety as, cited in 29 CFR part 1910 Sub Part D.
- Scaffolding and staging shall be properly designed to carry the maximum expected load (safety factor of 4), shall be equipped with traction type planking, and shall meet the requirements of 29 CFR 1910.28.
- Electrical lines, junctions, and appendages will be in accordance with the National Electrical Code (NEC) and the National Fire Code (NFC) as cited in 29 CFR 1910.309.
- Only the hose lines and the components designed especially for compressed gas and working pressure shall be used, and such systems shall have a pressure relief valve outside the confined space.
- All the equipment that may be used in a flammable atmosphere shall be approved as explosion-proof or intrinsically safe for the atmosphere involved by a recognized testing laboratory such as the Mine Safety and Health Administration (MSHA) for methane and, for all cases, by the Underwriters Laboratories.

9.0 Rescue and Emergency Procedures

The Authorized Entry Supervisor **SHALL** have the responsibility in coordination with the **REPOWER USA** HSE Department and the On-Site HSE Coordinator to determine whether “Standby”* or “Available”** Rescue Services are required for the specific Confined Space to be entered. The criteria for this determination **SHALL** be based on the known or potential hazards, the Personal Protective Equipment (PPE) used, and the ability to self-rescue.

- The following requirements apply to **REPOWER USA** employees trained to enter the permitted Confined Spaces to perform rescue services:
- The location **SHALL** ensure that each member of the Rescue Service Team is provided with, and is trained in the proper use of the Personal Protective Equipment (PPE) and rescue equipment necessary for making rescues for the permitted Confined Space Entry at no cost to employee.

- Each member of the Rescue Service Team **SHALL** be trained to perform his/her assigned rescue duties and each member **SHALL** also receive the training required of the Authorized Entrants.
- Each member of the Rescue Service Team **SHALL** practice making permitted Confined Space Entry rescues. This training **SHALL** be completed at least every 12 months, using dummies, mannequins, or the actual person(s) and using representative spaces, with respect to the configuration, opening size, and accessibility, to simulate the types of permitted Confined Spaces from which a rescue might be needed.
- Each member of the Rescue Service Team **SHALL** be trained in basic First Aid and Cardiopulmonary Resuscitation (CPR). At least one member of the Rescue Service Team **SHALL** hold a current certification in First Aid and Cardiopulmonary Resuscitation (CPR).
- The following requirements apply when **REPOWER USA** has Contracted Rescue Service Teams (example: Local Fire Departments or Emergency Services) to enter the permitted Confined Spaces to perform rescue services:
 - Provide a copy of the Confined Space Entry Permit and Procedures for review.
 - Provide adequate time for the Contracted Rescue Service Teams (example: Local Fire Departments or Emergency Services) to review the permits and procedures, examine the Confined Space Entry site, and practice Rescue Procedures.
 - Inform the Rescue Services of the known hazards or the potential hazards they may confront
 - Provide the Rescue Services with access to all the permitted Confined Spaces from which rescue may be necessary so they can develop appropriate procedures and practice rescue operations.
- The following requirements apply to **REPOWER USA** when it is determined that Client/Host Rescue Service Team Personnel will be used to enter the permitted Confined Spaces to perform rescue services:
 - Review the Client/Host Rescue Service Team on-site rescue procedures.
 - Provide time for the Client/Host Rescue Service Team to practice rescue procedures at the permitted Confined Space Entry area with employer's on-site personnel.
 - Provide the Client/Host Rescue Service Team with a copy of the employer's Confined Space Permits and Procedures.
 - Ensure, in contract language, that the Client/Host agrees that the Client/Host Rescue Service Team will be available for use during any rescue or emergency at the employer's site on the Client/Host property for Confined Space Entry.
 - To facilitate a non-entry rescue by an Authorized Attendant and an Authorized Entry Supervisor, retrieval equipment and/or systems or methods **SHALL** be provided and used, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the Authorized Entrant(s). Retrieval equipment and/or systems **SHALL** meet or exceed the following requirements:

- Each Authorized Entrant **SHALL** use a chest or full body harness with a retrieval line attached to the center of the Authorized Entrant's back, near the shoulder level, or above the head. Wristlets may be used in lieu of the full body harness if the employer can demonstrate that the use of a full body harness is unfeasible or creates a hazard and that the use of wristlets is the safest and most effective alternative.

NOTE: Using wristlets is the least desirable method of lowering or raising Authorized Entrant(s) and should be considered only in "**extreme**" circumstances.

The other end of the retrieval line **SHALL** be attached to a mechanical retrieval device or a fixed point outside the permitted Confined Space in such a manner that the rescue can begin as soon as the Authorized Attendant becomes aware that a rescue is necessary. A mechanical retrieval device **SHALL** be available to retrieve Authorized Entrant(s) from vertical spaces more than 5 feet deep.

9.1 First Aid and Medical Provisions

- There shall always be someone in the area of the confined space that is currently trained in Cardiopulmonary Resuscitation (CPR) and basic first-aid procedures.
- Employees shall be aware of the location of the nearest first-aid equipment and how to obtain emergency assistance and medical attention. A Material Safety Data Sheet (MSDS) **SHALL** be made available to the medical facility treating an injured Authorized Entrant(s) if he/she has been exposed to a substance that requires an MSDS be kept on-site.

10.0 Recordkeeping

REPOWER USA shall maintain a written record of Confined Space Entry training for each employee and it shall be included with all other employee-training records. All records shall be maintained in accordance with the existing state and federal regulations. Confined Space Entry exposure records will be maintained with an employee's confidential Medical Records.

10.1 Confined Space and/or Hot Work Permit Disposition

The original copy of the permit will be inserted in a clear plastic envelope and displayed at the work site. One copy **must** be submitted to the **REPOWER USA** HSE Department. After the work has been completed, or the permit has expired, the original will be returned to the On-Site Supervisor/Manager. Unless any problems occur, the original will be retained for one year but then destroyed.

It is the On-Site Supervisor's responsibility to forward a copy to the **REPOWER USA** HSE Department for OSHA documentation.

10.2 Coordinating Entry by Multi Employers

During any situation that requires Confined Space Entry into a common area by more than one employer, the following procedures will be adhered to:


- The prime employer's Confined Space Entry Permitting System and procedures will have precedent.

- Each additional employer will furnish the required Authorized Attendants to oversee and maintain control of their employees.
- Each employer's Authorized Attendant will maintain communication with each of the other Authorized Attendant(s) assigned to the permitted Confined Space Entry.
- The prime employer's Authorized Entry Supervisor will exercise control of the entire permitted Confined Space.
- The prime employer's Authorized Entry Supervisor will appoint a Senior Authorized Attendant to assist with the coordination of multi-employer Authorized Attendants.

10.3 Review and Revisions

The **REPOWER USA** HSE Department has the responsibility for the review and revisions of the Confined Space Entry Permit Program and Procedures. The on-site review is the responsibility of the On-Site Supervisor and the On-Site HSE Coordinator.

- The entry permit **SHALL** be reviewed at least annually and the program and procedures revised as necessary to protect employees from Confined Space hazards.
- Reviews and revisions **SHALL** be immediate for any of the following reasons:
 - Any unauthorized entry of a confined space.
- Discovery of a hazard not covered by the current Confined Space Permit.
- Any employee and/or Client/Host complaint.
- Occurrence of any accidents/incidents/near misses.
- As necessary due to procedure enhancements or process changes.
- As regulations or standards change

	Section III RPSHSE 7.1.7B	Valid from: November 2008
---	--------------------------------------	---------------------------

Revision Profile

Rev.	Date	Name	Approval Signature	Remarks
0	11/08	Owens O'Quinn QHSSE Consultant	On File	ORIGINAL
0	11/08	Tammy Conekin	On File	ORIGINAL
1				
2				
3				
4				
5				

Original Review Progress

Date	Reviewer	Signature
11/08	J.K. Barrilleaux – Grammar/Technical Format <i>Evergreen QHSSE Solutions LLC</i>	On File
11/08	Owens O'Quinn – QHSSE Consultant <i>Evergreen QHSSE Solutions LLC</i>	On File
11/08	Tammy Conekin – Head of Service	On File



Section III 7.1.7 B RPSHSE – 7 B**Lockout - Tagout (LOTO)****Contents**

Section	Topic	Page No.
1.0	Introduction	2
2.0	Responsibilities	2
3.0	Equipment Requirements	4
4.0	General Procedures for Lockout/Tagout	4
5.0	Training	9

1.0 Introduction

The purpose of this procedure is to protect personnel from injury due to the unexpected energizing, startup, or release of the stored energy of equipment during the servicing or repair of machines and equipment. This standard establishes the minimum performance requirements for the control of such hazardous energy.

This procedure **does not** cover the minor tool changes and adjustments and the other minor servicing activities that take place during normal production operations and are routine, repetitive and integral to the use of the equipment.

Periodic inspections will be conducted at each facility to ensure that this procedure is being followed and that no new hazards have been identified or that no changes in the process require changes in the "Lockout/Tagout-Control of Hazardous Energy" Program. These reviews will be documented and retained as a part of the Job Site Safety Inspection (JSSI) and Job Safety Analysis (JSA). These inspections and reviews will be completed annually or when there has been an accident/incident/near miss, the identification of a new hazard, and/or changes in the facility process. The **REPOWER USA** Operations Manager and/or the **REPOWER USA** HSE Department will conduct these inspections in conjunction with the facility Job Site Safety Inspection (JSSI).

The enforcement of Lockout/Tagout - Control of Hazardous Energy procedures shall be the responsibility of the **REPOWER USA** Operations Managers and the **REPOWER USA** HSE Department. An on-site evaluation of employees' knowledge and the proper implementation of these procedures shall be conducted annually during training sessions, daily and pre-job safety meetings, and during the use of the Lockout/Tagout-Control of Hazardous Energy procedures.

2.0 Responsibilities

2.1 On-Site Field Supervisor

- The On-Site Field Supervisor will:
 - Be responsible for the identification of the energy sources that require control as well as the equipment and machinery, affected prior to any work, which requires testing, repair, or replacement.
 - Determine the employee(s) who are authorized to engage in lockout procedures.
 - Only these employees will be issued lockout/tagout equipment.
 - Ensure that Standard Operating Procedures (SOPs) and training in lockout/tagout requirements have been provided when:
 - Guards or safety devices are removed from equipment.
 - During the servicing of equipment or machinery.
 - When an employee must place any part of the body where it may be caught by moving machinery (cleaning or oiling parts, etc.).
 - When contact with any form of energy is possible, (electrical, hydraulic, pneumatic, chemical, thermal).

- During all confined space entries when applicable.
- Enforce the use of both locks and tags whenever energy isolation is required.
- Provide the procedures and documentation required for the release of lockout/tagout equipment including machine inspections, notification to employees, removal of lockout/tagout devices, and the testing or start-up of equipment or machines.
- Provide all affected employees the necessary information concerning the lockout/tagout system used by contractors on **REPOWER USA** project sites. The contractor's equipment and procedures may vary from those required in this procedure.
- Ensure that all affected employees have been trained in the identification of activities requiring energy control, lockout/tagout, or isolation procedures, testing, and reactivating equipment and machinery.

2.2 Operations and Maintenance (O&M)

The On-Site Field Supervisor will:

- Ensure employees use only those locks and tags authorized by Site Management. Obtain assistance from the On-Site Management or the HSE Department if uncertain about the application of a control procedure or equipment operation.

2.3 The On-Site HSE Coordinator/REPOWER USA HSE Manager and the HSE Department will:

- Assist the On-Site Management and the O&M Supervision with instructions on the control of hazardous energy sources.
- Assist in identifying the locks and tags approved for use at all **REPOWER USA** operated facilities, projects, and work sites.
- Approve, prior to use, any other type of lockout/tagout device not specified in a standard that must be utilized for employee safety (such as a specially designed valve handle cover). The On-Site Supervisor and the On-Site Client Representative may also approve the device prior to use.
- The On-Site Superintendent/Supervisor will ensure that affected employees have been informed of relevant hazards and follow the specified procedures.

2.4 Engineering and Maintenance

- Engineering and Maintenance personnel are to ensure that new equipment or overhauled equipment can accommodate locks for the subsequent application of this standard as required.

2.5 Employees

- All employees are to comply with the established procedures on controlling hazardous energy sources.
- In addition:
 - Employees are responsible for the equipment they are issued such as lock devices, keys, and tags.
 - An employee shall not attempt to operate any switch, valve, or other energy-isolating device when it is locked out or tagged out.

3.0 Equipment Requirements

- The following equipment considerations must be satisfied in order to effectively utilize this lockout/tagout procedure:
 - **Locks** will be issued by the On-Site Supervisor with one key given only to the individual responsible for application of a lockout procedure.
NOTE: Combination locks are prohibited for use in any lockout/tagout procedure of machines or equipment.
 - **Multiple-lock hasps** will be issued when lockout procedures require more than one lock to be used for lockout at a time.
 - **Warning Tags** are to accompany the placement of each lock. An identification tag must accompany every lock or multiple-lock hasp.
 - The tag will only be removed by the employee who placed it on the machine or equipment at the completion of the work requiring the lockout procedure. This tag is not reusable.
 - Various chain (to secure locks to valve handles) lengths and dimensions may be required to enable lockout. Maintenance personnel are required to provide this as necessary.
 - Equipment to cut or break chains, locks, or hasps (lock cutters, hacksaws, etc.) must be available with the On-Site Supervisor or the On-Site HSE Coordinator if an emergency requires the removal of a lockout device and the key is not available.

4.0 General Procedures for Lockout/Tagout

4.1 General checks prior to Job Start-up:

- Any repair, adjustment, cleaning, or lubrication activities on powered equipment.
- Any decontamination, cleanup, removal or treatment activities where there is a hazard from any energized system.
- Lockout of a piece of equipment that has been found unsafe to operate to prevent its use.
- Entry into a confined space where energized equipment or systems may endanger the safety of the worker(s).
- Installation or removal of equipment that may be activated by an energy source.

4.2 The following actions will be taken prior to Job Start-up:

- Inspect the equipment and identify all isolating devices to be certain which switch, valve, or other energy isolating devices apply to the equipment to be locked or tagged out.
- Notify affected employees that a lockout will be used.
- De-energize all equipment and systems:
 - Shut off all electrical power at the source.
 - Bleed off all hydraulic/pneumatic pressure and turn off all supply valves.
 - Lower or block any moving or suspended parts (such as rams on a compactor) to prevent its travel or cycling.
 - Shut off all fuel, water, steam, or other chemical feed lines and bleed the lines as appropriate (e.g. using flange blanks).
 - After ensuring that no personnel are exposed operate the controls to make certain the equipment will not operate to check if the energy sources are isolated.

NOTE: Return operating control(s) to 'neutral' or 'off' position after the test.

- Place a lock and tag on the power source switch, valve, etc. The device or equipment must accept a locking device, a safety tag is not sufficient by itself.
- Tags must indicate:
 - The name of the person who placed it.
 - The date the tag was affixed.
 - A brief explanation for the lockout.
- If more than one employee will be working on the equipment, each employee is to affix his/her personal lock on a multi-lock hasp.
- If the power source is beyond the physical control of the employee, the appropriate steps must be taken to ensure that the system is not energized until the employee is out of danger. This may include physically disconnecting the energy source.
- When locking devices/tags will be used at a client site, the client's representative is to be advised of the intended use and the lockout/tagout program requirements are to be clearly defined and coordinated.
- When equipment or machinery is to be restored to normal operations, check the area around the machines or equipment to ensure that no one is exposed.
- After all equipment and employees are clear, remove all lockout or tagout devices. Operate the energy isolating devices to restore energy to the machine or equipment.
- The lock(s) and tag(s) are to be removed by reversing the procedure. Only the individual(s) who placed the devices in service are permitted to take them out of service.
- This lockout/tagout tag shall be dated and carry an expiration time that will be valid for one shift only, normally 8 to 12 hours, with a maximum time of 12 hours. A new lockout/tagout tag shall be issued for each shift. The lockout/tagout tag shall be posted with the lockout/tagout device.
- Lockout/tagout tag(s) are terminated when changing conditions, such as gas leaks or oil spills, create a hazard. The On-Site Field Supervisor is responsible for determining when a new lockout/tagout tag must be issued.

4.3 Contractors

If outside personnel are involved in lockout/tagout activities, the contractor shall be informed of the Client/**REPOWER USA** lockout/tagout requirements. The contractor can follow the Client/**REPOWER USA** Lockout/Tagout procedure or use their own Lockout/Tagout procedure with prior approval from the Client/**REPOWER USA** On-Site Supervisor personnel.

The On-Site Supervisor must ensure that all personnel understand and comply with the restrictions and prohibitions of the energy control procedures used.

4.4 Special Circumstances

- **Multiple Lock Requirements**
 - If more than one employee is required to lockout equipment, each shall place their personal lock on the energy isolating device(s).
 - When an energy-isolating device cannot accept multiple locks, a multiple lock hasp is to be used.

- If a single lock is used in place of a multiple lock hasp to lockout the machine or equipment, the key is to be placed in a lockout box or cabinet which allows the use of multiple locks to secure it.
- Each employee will then use their personal lock to secure the box or cabinet and will remove their lock in the reverse order when it is permitted to take them out of service.
- **Removal of Locks by Others**
 - If the employee who placed a lock and tag is not available to remove it, the lock may be removed under the direction of the On-Site Supervisor, the On-Site HSE Coordinator, the On-Site Client Representative, and/or the HSE Manager.
 - This procedure for the removal of the locking device shall provide equivalent safety, as would removal of the device by the employee who attached it:
 - The On-Site Supervisor must verify that the employee who attached the locking device is not at the facility.
 - After the lock is removed, the employee shall be advised, as soon as possible, that the lock has been removed before resuming work.
- **Testing or Positioning Machines and Equipment**
 - In situations where lockout or tagout devices need to be temporarily removed from the energy isolating devices and the machine or equipment is energized to test or position that machine or equipment, the following sequence of procedures must be followed:
 - Clear the machine or equipment of tools and other non-essential materials.
 - Remove employees from the machine or equipment area.
 - Remove the locks and tags.
 - Energize and proceed with the testing or positioning.
 - De-energize all systems.
 - Re-apply energy control measures.
 - Proceed as with any other lockout/tagout procedure.

4.5 Specific Procedures

4.5.1 Electrical

- The On-Site Supervisor and/or the On-Site HSE Coordinator will be responsible for lockout/tagout approval, activating the breaker and installing and removing the operations hasp, lock, and **"Danger Do Not Operate"** tag.
- Before locking out a piece of equipment, approval from the lead employee is necessary. The breaker will be opened by the O&M personnel, and the switchgear will normally be racked out by Instrument & Electrical (I&E) technician.
- The On-Site Supervisor and/or the On-Site HSE Coordinator will be responsible for placing the multiple lock hasps through the breaker arm and the placement of operation locks on the hasp. (This is to be the lock installed and the last removed.) At this time, the operator will prepare the red/white **"Danger Do Not Operate"** tag and attach it to the hasp.

- The operations or maintenance technician performing the work will place his lock on the hasp. If more than one disassociated group of technicians is working on the same equipment or process loop, each group shall place their own lock on the hasp. Each technician, placing his lock on the hasp, shall sign the **"Danger Do Not Operate"** tag attached to the hasp. While the technician observes, the lead employee shall verify power isolation at a control station by attempting a start procedure. A stop procedure shall be initiated after the start proves the equipment inoperative and the lead employee shall attach a signed **"Danger Do Not Operate"** tag at a control station visible from the motor. In the case where equipment can be started from more than one location, test each location and tag each station.
- As each technician (or group) completes his work, that lock shall be removed from the hasp. The technician shall also sign-off the **"Danger Do Not Operate"** tag at both the hasp and the control station(s).
- The last technician to remove his lock from the hasp shall notify the lead employee that the breaker is clear. The lead technician shall check to be certain that the work is complete, then remove the operations lock and hasp and the **"Danger Do Not Operate"** tags from all locations.
- As each technician completes his shift of work, he shall remove his lock from the hasp, and then reinstall his lock at the start of his next shift. This will continue until job completion.
- Only the On-Site Supervisor, in agreement with the On-Site HSE Coordinator and the Client Representative and the **REPOWER USA** HSE Manager, shall authorize overnight or prolonged lockouts. The On-Site Supervisor shall notify the involved employees of overnight lockouts.
- If the work crew requires information pertaining to the equipment locked out by the On-Site Supervisor on the off-shifts and weekends, the On-Site Supervisor shall be contacted.

4.5.2 Steam-Air-Oil-Gas-Hydraulic and Pressure Systems

- The On-Site Supervisor and/or the On-Site HSE Coordinator shall be responsible for lockout approval, activating the breaker (as applicable), and installing and removing the operations hasp, lock and **"Danger Do Not Operate"** tag.
- Steam, air, oil, gas, hydraulic, and pressure systems can be locked out by chains attached to the valves, built-in lockout devices, or by designing special attachments for the valves. In the event the valves cannot be locked out, the valve handle must be removed and the valve tagged.
- The pressure between the locked out position and the machine in pneumatic and hydraulic power systems shall be reduced to zero; this will prevent and/or reduce the possibility of the machine cycling or the accidental release of hazardous materials or pressures.
- Where welding or cutting is to take place, all flammable liquids and gases shall be isolated or eliminated to prevent ignition.

4.5.3 Confined Space Entry

- The On-Site Supervisor and/or the On-Site HSE Coordinator shall be responsible for lockout approval, activating the breaker (as applicable), and installing and removing the operations hasp, lock and **"Danger Do Not Operate"** tag.
- The Confined Space shall be completely isolated from all other systems and equipment.
- Lines connected to the tanks upstream and downstream shall be physically disconnected and blanked off. **Never** use valves as a disconnect or blank.
- Adequate measures shall be taken to purge harmful materials, solids, liquids, or gases from the vessel.
- The permit shall be dated and carry an expiration time that will be valid for one shift only, normally 8 to 12 hours, with a maximum time of 12 hours. A new permit shall be issued for each shift. The permit shall be posted next to the entrance(s) with a copy on file at the facility.
- Permits are terminated when changing conditions, such as gas leaks or oil spills, create a hazard. The On-Site Supervisor is responsible for determining when a new Confined Space Entry Permit must be issued.

4.5.4 Miscellaneous

The purpose of such tagging is to communicate with other people working on the system and to serve as a check before re-commissioning the equipment. The following list is representative of the situations where the administrative procedures above should be followed:

- Valves are not in the normal operating mode.
- Valves that should not be used under normal operating conditions are being used.
- Switches and valves used to isolate control lines or equipment are undergoing maintenance.
- Defective or leaking valves.
- Equipment, tools, etc. are unsafe to use.
- Safety or emergency equipment will not function properly and is unsafe to use.

5.0 Training

REPOWER USA will provide training on lockout/tagout for all equipment or machines. Authorized and affected employees will be trained on the following:

- Requirements of 29 CFR 1910.147 "Control of Hazardous Energy".
- The limitations of Lockout/Tagout.
- Lockout/Tagout procedures for the isolation of energy sources.
- Where and how the unexpected energizing start-up or release of stored energy could occur and cause injury.
- Procedure for removing locks and tags.

- Procedures for restoring energy.
 - The training shall ensure that the purpose and function of the lockout/tagout program is understood and that the knowledge and skills required for the safe application, usage, and removal of energy controls which are locked out.
 - Training should specifically encompass the recognition of hazardous energy sources, the types and magnitudes of energy in the workplace, the methods and means necessary for energy control, and the purpose and use of the Lockout/Tagout program.
 - The training shall also include the rules and techniques to be used for authorization and the means that will be used for the enforcement of the program.
 - It should be emphasized that the tags and their means of attachment must be made of materials which will withstand the environmental conditions encountered in the workplace. Tags are essentially warning labels affixed to energy isolating devices and do not provide the physical restraint on those devices that is provided by a lock.
 - Authorized employees will be given training prior to any initial involvement in lockout/tagout procedures. Retraining will be given whenever there is a change in the job assignment or a change in equipment or processes that could create a new hazard.
- The **REPOWER USA** HSE Manager shall maintain a list of trained employees and the dates of their training which is documented and is appropriately certified and signed by employee and instructor.



Section III RPSHSE 7.1.7C

Valid from: November 2008

Revision Profile

Rev.	Date	Name	Approval Signature	Remarks
0	11/08	Owens O'Quinn QHSSE Consultant	On File	ORIGINAL
0	11/08	Tammy Conekin	On File	ORIGINAL
1				
2				
3				
4				
5				

Original Review Progress

Date	Reviewer	Signature
11/08	J.K. Barrilleaux – Grammar/Technical Format <i>Evergreen QHSSE Solutions LLC</i>	On File
11/08	Owens O'Quinn – QHSSE Consultant <i>Evergreen QHSSE Solutions LLC</i>	On File
11/08	Tammy Conekin – Head of Service	On File



Section III: 7.1.7C RPSHSE – 7C
Safe and Hot Work Permits

Contents

Section	Topic	Page No.
1.0	Introduction	3
2.0	Definitions	4
3.0	Procedures	4
4.0	Responsibilities	6
5.0	Permit Limitations	7
6.0	Permit Disposition	7

1.0 Introduction:

This **REPOWER USA** procedure has been developed to standardize and document the methods and responsibilities during any hot work operation. The purpose is fire protection and prevention for any situations in plant or field operations where there are or have been hydrocarbons or other flammable liquids present.

A Permit is **required in any classified area** before performing any function that requires the use of a open flame, or where sufficient heat or sparks might be generated to serve as a source of ignition where hydrocarbons or other flammables are or have been. Such activities include but are not necessarily limited to:

A Safety and Hot Work Permit is required in all WGHIT operations for any work in a **classified area** that requires the following:

- Welding.
- Cutting.
- Hot tapping.
- Burning.
- Grinding.
- Blasting.
- Opening energized electrical junction boxes.
- Drilling (electric or air).
- Buffing (electric or air).
- Operating conventional gasoline or diesel engine driven equipment.

NOTE: When conventional gasoline or diesel engine driven equipment is utilized in an area that requires a Hot Work Permit, the equipment must be continuously monitored while it is in operation.

- Operating unapproved battery operated equipment with switches or electric motors.
- Painting and other operations around spark-producing equipment
- Portable spark producing devices including heaters, spark ignited engines, vehicles and electrical hand tools. (Lighting process heaters does not require a Fire and Safe Work Permit, but does require compliance with safe lighting procedures including a gas check).

NOTE: Additional Safety Permits may be required, such as Confined Space Entry. A permit for **Confined Space Entry** is required for work in a confined space that may be hazardous due to the presence of flammable/toxic gas, lack of breathable atmosphere, etc. See specific Safety Standards.

2.0 Definitions:

2.1 Classified Area:

For purposes of this standard, classified areas are defined as the following:

- Areas within plant boundaries except in designated areas,
- Areas within **100** feet of production facilities, pipeline connections and valves, or wellheads if an open flame is involved.
- Areas within **20** feet of hydrocarbon facilities when the use of portable spark producing devices (including non-DOT approved vehicles), or the opening of energized electrical junction boxes is required.
- Areas within **20** feet of tanks or vehicles that transport hydrocarbons such as vacuum trucks or fuel tanks, or any other area deemed necessary by supervision.

2.2 Fire Watch:

The person(s) and associated fire protection equipment assigned to stand by during welding, cutting or open flame conditions. This will be the **only** function of this assignment.

3.0 PROCEDURES

3.1 General:

In normal operations, there is always a potential danger of fire or explosion due to the flammable nature of many of the products handled. The object of this procedure is to define a system of control that will allow work involving a possible source of ignition to be carried out in a safe manner. No one associated with the job shall have smoking materials (lighters, matches, cigarettes, etc.) on their persons at the job site.

It is obvious that all situations and circumstances cannot be covered by procedures and regulations. Therefore, On- Site Supervisors must:

- Develop full knowledge of the situation regarding any work to be performed,
- Determine what precautions are required above and beyond the minimums specified herein,
- Exercise sound judgment and make conservative decisions regarding the manner in which the work will be performed.

All plant and field units must operate and control the Safety, Hot Work and Entry permit system. This responsibility includes stocking permits, maintaining records, maintaining oxygen and gas detection devices, and acting as the final authority during the permitting process.

Employees themselves must also exercise good judgment and evaluate and question if necessary the precautions and conditions concerning their personal safety and that of other personnel and the facility itself. It is the responsibility of every individual to:

- Work in a safe manner.
- Question any work tasks or procedures that he/she may not understand.
- Report any unsafe work practices or circumstances witnessed to his/her immediate supervisor.

Access to the work areas covered by the permit(s) will be limited to members of the work party who are familiar with the hazards of the job, the work tasks required, and the precautions taken to do the work in a safe manner. All other unauthorized personnel must vacate the work area.

All members of the work team shall establish and maintain proper communications.

Safety Permits are automatically and immediately cancelled if, for any reason, conditions upon which the permit was issued change or other factors arise that could create an unsafe environment.

3.2 Specific Precautions:

It is essential, as a minimum, that the fire prevention and protection requirements detailed in OSHA CFR 1910.119(a) have been implemented prior to beginning any hot work operations. Individuals involved in preparation of the permits and execution of the work should familiarize themselves with the precautions detailed in this regulation.

3.3 Areas Where Permits are Required:

Permits are **required** in all process areas, warehouses, flammable storage buildings, storage buildings, pipe alleys, storage tank areas, laboratories, waste disposal facilities, tank truck loading and unloading racks, sewer systems, and any other areas or confined spaces where the possibility of fire or explosion hazard may exist.

3.4 Areas Where Permits are not Required:

Under normal conditions, Work Permits are not required for work in maintenance shops, offices, change house, and designated burning areas. Work Permits are not required for approved fabrication areas such as established plant and field fabricating shops. The On-Site Supervisor/Manager may designate a work area safe for the duration of specific jobs or projects without requiring that a permit be used. Such designated areas must be clearly marked or roped off.

New area projects where no hydrocarbons are present and all new equipment is used, a permit may be used stating "**New Construction - No Hydrocarbons Present**".

4.0 Responsibilities:

4.1 Operations and Maintenance (O&M):

Requesting and initiating the Safety Permit which includes a description of the work (specific as to what is to be done), where it is to be done, how it is to be done, and how long it will take. The description should be such that all personnel involved and the On-Site Supervisor/Manager must know exactly what is to be done. If there are any questions about the job, the O&M personnel should resolve them prior to completing the permit.

The permit shall indicate the following:

Note: If space on the form is not sufficient, write description on a separate sheet a paper and attach to the permit.

- Atmosphere testing, if required, of the covered area.
- Preparation of the equipment.
- Performing all required safety checks; Inspecting and placing fire extinguishers, fresh air equipment, and other required safety equipment.
- Completing the Permit including the date and time the work is approved to start.
- Re-inspecting and gas checking the work area as necessary.
- Warning other operating personnel in the vicinity not to perform any operation that is likely to change the conditions sufficiently to void the permit.
- Preventing other operations that may conflict with the permitted work.
- Instructing all personnel concerned to stop work if a change occurs that can create an unsafe condition.

4.2 On-Site Supervisor (or designee):

- Review the Permit and satisfy himself that it is safe to perform the detailed work.
- Approve the Permit including the date and time the work is approved to start.
- Ensure that all elements of the permit procedure are completed.

4.3 Operations and Maintenance will then:

- Review the completed form and verify that the permit requirements are complete before starting any work.
- Review the job and safety requirements in the presence of the work crew and ensure that all parties are knowledgeable in the work tasks to be performed and the safety precautions to be undertaken. Lead representatives sign the permit acknowledging review and understanding of the job and safety requirements.

NOTE: Depending on the type of operation, the O&M function may or may not be a separate function due to job size, location, type, etc. In a combined function, the On- Site Supervisor /Manager will be responsible for both functions.

4.4 Fire Watch:

The Fire Watch is responsible for no duties other than the following:

- Use of fire equipment as necessary.
- Continuously monitoring the area during and thirty (30) minutes after hot work (open flame, grinding, cutting, or welding).
- Stopping the hot work if sparks, flame or heat is projected outside the permitted area.
- Alerting personnel entering the permitted area of hazards, i.e. arc-flashes, grinding, cutting, overhead hazards, etc.

4.5 Contractors:

Must maintain a permanent record of all welders used, showing each welder's name, social security number, identifying mark, qualification record, date of last certification, and the testing authority.

Ensure that the welders are fully aware of all safety regulations and the contents of this standard.

4.6 Completion of Work:

Immediately after the work is completed, the work area and adjacent areas will be inspected to ensure there has been no spread of sparks or heat. The fire watch will remain at the work site for a period of thirty (30) minutes after hot work has ceased, to ensure that the area is secure.

The person(s) doing the work will return their copy of the permit to the supervisor after the job is complete and the area is secure.

5.0 Permit Limitations

Permits will be dated and issued for one shift only, normally 8 to 12 hours with a maximum time limit of 12 hours. Permits will be terminated when changing conditions, such as gas leaks or oil spills, create a hazard. The On-Site Supervisor/Manager may reinstate the Permit after the hazardous condition(s) has been corrected.

6.0 Permit Disposition

The original copy of the permit will be inserted in a clear plastic envelope and displayed at the work site. One copy must be forwarded to the QHSE Department. After the work has been completed, or the permit has expired, the original will be returned to the Supervisor/Manager in Charge. Unless any problems occur, the original permit will be turned over to the Manager/Supervisor in Charge for disposition. Otherwise, the original will be retained temporarily and may be destroyed after one week.

It is the Supervisor in Charge responsibility to forward a copy to the QHSE Department for OSHA documentation.

SAFETY AND HOT WORK PERMIT CHECKLIST

Refer to the Facility Safety Permit contained in each location's Safe Work Permit procedure. This permit shall be used for completion of any and all work requiring a Safety and Hot Work Permit as described in this standard. **Note:** The permit must be completed by the Qualified Person or the Supervisor.

Reference REPOWER USA HSE Manual Section III
RPSHSE – 7, 7A, 7B, & 7C Permit-to-Work

A Permit is required for any operation which requires welding, cutting (torching) or similar operation (such as soldering or brazing) where hydrocarbons and/or flammables are or have been present. The Permit must clearly state any special precautions which apply to the work to be done. If the Permit is used for work in confined spaces, additional permits are required.

NOTE: If Hot Work is to be done in a confined space, the Qualified Person responsible for completing the Confined Space Entry Permit shall sign the Hot Work Permit.



Section III Forms & Information

Valid from: November 2008

Section III 7.1.7 RPSHSE – 7 Permit-to-Work

Form 1 – Permit-to-Work Checklist

	Section III Forms & Information	Valid from: November 2008
---	--	---------------------------

Permit-to-Work Check List

Refer to the Facility Permit-to-Work contained in each location's Permit-to-Work procedure. This permit shall be used for the completion of all work requiring a Permit-to-Work as described in this procedure.

NOTE: The permit must be completed by the Qualified Person or the On-Site Field Supervisor.

A Permit-to-Work is required for any operation which requires welding, cutting (torching), or some similar operation (such as soldering or brazing) where hydrocarbons and/or flammables are or have been present. The Permit-to-Work must clearly state any special precautions that apply to the work to be done. If the Permit-to-Work is used for work in confined spaces, additional permits are required.

NOTE: If Hot Work is to be done in a confined space, the Qualified Person responsible for completing the Confined Space Entry Permit shall sign the Hot Work Permit.

NOTE: Inserted Hot Work, Electrical and Mechanical Permit-to-Work Checklist are for use when **REPOWER USA** has totally responsibility for on-site Permit-to-Work procedures of established facility.



Section III Forms & Information

Valid from: November 2008

Permit-to-Work

PERMIT MUST BE POSTED AT THE LOCATION SITE
PERMIT VALID FOR ONLY 12 HOUR SHIFT

Date Issues: _____ Time: (from) _____ (to) _____
(a.m./p.m.) (a.m./p.m.)

Permit issued to: _____ Date: _____
Name (PRINT)

Permit issued to: _____ Contact Telephone: _____
Signature

Type of Work: ☐ Welding ☐ Cutting ☐ Heating ☐ General HSE Work

Location: Area: _____ Process: _____ Equipment: _____

Type of Ignition Source: _____

PRECAUTIONS

REQUIRED

- ☐ CLEAN AREA
Remove or cover any combustibles within 35 feet
- ☐ FIRE WATCH
During operation and for 30 minutes post operation
- ☐ FIRE EXTINGUISHER
Water pressure type within 10 feet of work
- ☐ TEST ENVIRONMENT FOR FLAMMABLE OR EXPLOSIVE VAPORS
- ☐ GAS PRESENT
- ☐ OTHER

OPTIONAL

- ☐ WET DOWN
- ☐ FLASH/SPARK CURTAIN
- ☐ FIRE BLANKET
- ☐ PRECENTAGE: _____

APPROVAL: _____
ON-SITE SUPERVISOR (REPOWER USA)

PRINT NAME

APPROVAL: _____
ON-SITE HSE COORDINATOR

PRINT NAME



Section III Forms & Information

Valid from: November 2008



Section III Forms & Information

Valid from: November 2008

Section III

7.1.7 A RPSHSE – 7 A

Confined Space

Form 1 – Confined Space Entry Permit - Instructions

Confined Space Permit Instruction

The following instructions are to be used for the completion of the confined space entry permit in this appendix. Note that the permit must be completed and approved by a qualified person.

Qualified Person

An individual who is a full-time **REPOWER USA** Field Supervisor, or of a higher level, and has received certification as a Qualified Person by successfully completing the required training program.

Section I: Assessment of Hazards

- Complete each item by entering the information requested.
- The permit is only valid for the current shift. A new permit shall be issued for each subsequent shift.
- **Do not proceed** with completing the permit if any of the form exceptions exist which prevent routine confined space entry. Notify the **REPOWER USA** HS&E Department for further instructions.

Section II: Checklist

- Each item on this checklist must be addressed. Leave no blanks.
- Many of these checklist items can only be verified after they have been installed or inspected.

Section III: Personal Protective Equipment

- Identify the specific type of equipment to be used and provide details where additional information is to be specified.

Section IV: Emergency and Rescue Provisions

- Identify the provisions needed and the emergency phone numbers. Enter all emergency numbers clearly and legibly.

Section V: Special Safety Requirements/Emergency Procedures

- Specify any unique requirements, such as the need for nitrogen, blanketing, special ventilation, etc., and the requirements for emergencies, such as additional work force and equipment.
- Some requirements may be necessary before an entry is made, such as purging a tank or using dry ice to displace a flammable atmosphere.

Section VI: Personnel Assigned

- All personnel assigned to the entry work **MUST** print and sign their name in addition to specifying their exact duties.

Section VII: Training

- All employees participating in the entry must have completed the training requirements specified. Each item must be checked off indicating that the Qualified Person has determined each employee's eligibility to work on the project.

Section VIII: Atmospheric Testing

- In addition to oxygen percentage and flammability percentage tests prior to entry, various toxins may require evaluation. Enter the identity of the chemical and its allowable limit(s) (e.g., PEL, STEL, Ceiling, etc.).
- For each test conducted, enter the time taken and the location (depth) of the test from the point of entry.
- The Qualified Person must address results that are outside of the acceptable limits.
- Changes in conditions, work activities, or other factors may prompt continuous monitoring in addition to those samples taken at fixed locations.
- All equipment used for atmospheric testing must be maintained and calibrated properly to assure accuracy and the safety of personnel.

Section IX: Approvals

- The permit is prepared, with assistance of the Operations and Maintenance functions, and approved by the Qualified Person. The Qualified Person must sign and date the form indicating that the work and entry intended has been evaluated and the precautions necessary have been satisfied. Any emergency or situation which causes a discontinuation of work in the confined space requires a new entry permit to be completed before work can resume.

Section X: Distribution

- The Qualified Person shall distribute the permit as follows:
 - Facility/site copy: This copy is the "original" posted permit. It is retained after work is completed.
 - Facility/Project Manager: A copy of the permit is sent to the Facility Manager and Project Manager.
 - HS&E Department: A copy of the permit is sent to the HS&E Department.



Section III Forms & Information

Valid from: November 2008

(PERMIT REQUIRED ENTRY)

Section I. PERMIT INITIATION

Permit initiator:		Phone/pager Number	Permit Number
Date:	Start: AM PM	Expires: End of shift	AM PM
Location:		Equipment:	
Description of Work:			

Section II. ASSESSMENT OF HAZARDS

Note: The following conditions are prohibited:

- An atmosphere containing greater than (>) 23.0% oxygen.
 - An atmosphere > 10% of the Lower Explosive Limit (LEL).
- These conditions shall require additional evaluation prior to confined space entry:**

- An atmosphere Immediately Dangerous to Life or Health (IDLH).
- An atmosphere containing less than (<) 19.5% oxygen.
- An atmosphere that contains exposure to a known carcinogen in excess of accepted health/safety standards.

Prior to entry these condition must be met.

- Notification is provided to the On-site Field Superintendent/Supervisor, the Department/Operations Manager, the On-site HSE Coordinator, the Client Representative, the and **REPOWER USA HS&E Manager**.
- The scope of the job or task and the need to enter is reviewed with the Safety Department.
- Approval must be given by the **REPOWER USA HS&E Manager**, concurrent with the Competent Person's agreement to follow the procedures mutually specified and required for safe entry and subsequent work.

Section III. CHECKLIST (check each item)

	Yes	No	N/A
• All gas/liquid lines leading to and from the confined space have been disconnected or blinded and locked out.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• All vessels cleaned and purged?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Pneumatic/hydraulic/electrical systems have been disconnected and locked out?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• All grounding and bonding cables are in place.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Are non-sparking tools required and available?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• All lighting, fittings, and extension cords are approved explosion proof equipment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Ground Fault Circuit Interrupter (GFCI) checked and functioning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• All ignition sources have been isolated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Will hot work (welding, burning, etc.) be performed and has a hot work permit been issued?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Special warning/caution signs and entry permit posted.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Ventilation equipment identified and selected.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Breathing supply and alarms have been checked and are in the proper condition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• All respiratory equipment has been checked and is in the proper condition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• All safety harnesses and lifelines have been checked and are in the proper condition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Required protective clothing has been identified and selected.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Noise exposure has been evaluated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Are any engulfment hazards identified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Section III Forms & Information

Valid from: November 2008

Section IV. PERSONAL PROTECTIVE EQUIPMENT

EYES

- ☐ Chemical Goggles
- ☐ Face Shield
- ☐ Safety Glasses

EXTREMITIES

- ☐ Hard Hat
- ☐ Gloves
- ☐ Boots: specify _____
- ☐ Foot Coverings, Disposable: specify _____
- ☐ Safety Shoes

BODY

- ☐ Encapsulating Suit specify _____
- ☐ Other: specify _____
- ☐ Tyvek Suit (☐ White ☐ Polyethylene ☐ Saranex)
- ☐ Work Uniform

RESPIRATORY

- ☐ Self-Contained
- ☐ Air Line
- ☐ Air Line with Egress Bottle
- ☐ Cartridge Type _____
- ☐ Full-Face
- ☐ Half-Face

OTHER

- ☐ Hearing Protection
- ☐ Full-Body Harness and Life Line (for all entry)
- ☐ Communication Aids - Specify _____
- ☐ Dosimeter: specify _____
- ☐ Cooling Vest

Section V. EMERGENCY AND RESCUE PROVISIONS

- ☐ Fire Extinguisher(s)
- ☐ First Aid Supplies
- ☐ Pre-entry safety meeting
- ☐ Extraction Device(s)
- ☐ SCBA
- ☐ Emergency Alarm
- ☐ External Telephone Availability

Hospital: _____

Emergency Medical Services: _____

Transportation: _____

Section VI. SPECIAL

Special HSE Requirements/Emergency Procedures: _____

Section VII. PERSONNEL ASSIGNED

NAME	SIGNATURE	DUTIES
_____	_____	_____
_____	_____	_____
_____	_____	_____
Lead personnel:		
_____	_____	_____
_____	_____	_____

Section VIII. TRAINING

Supervision ☐ Yes ☐ No

Employee ☐ Yes ☐ No

Site Specific ☐ Yes ☐ No



Section III Forms & Information

Valid from: November 2008

(PERMIT REQUIRED ENTRY)

Section IX. ATMOSPHERIC TESTING

ITEM	PERMITTED LIMITS	PRE-ENTRY CHECK	RESULT/ DEPTH	RESULT/ DEPTH	RESULT/ DEPTH	RESULT/ DEPTH
Time		AM PM	AM PM	AM PM	AM PM	AM PM
Oxygen (min.-max.)	19.5% - 23.0%					
Flammability	≤ 1% LEL					
H2S (PEL)	10 ppm					
Toxic (specify)						
Other						

Section X. APPROVALS

☐ Verify Signs Posted

☐ Verify Permits Posted

Permit Prepared and Approved By:

Qualified Person


Date/Time

Work Completed: ☐ Yes ☐ No

Time: _____

XI. DISTRIBUTION:

- ☐ Site Copy (original posted form)
- ☐ Project Management
- ☐ REPOWER USA Management
- ☐ REPOWER USA HSE Department

	Section III Forms & Information	Valid from: November 2008
---	--	---------------------------

Section III

7.1.7 B RPSHSE – 7 B

Lockout - Tagout (LOTO)

Form 1 – Lockout/Tagout - Control of Hazardous Energy



Section III Forms & Information

Valid from: November 2008

Lockout/Tagout - Control of Hazardous Energy

EQUIPMENT: _____

DEPARTMENT: _____ DATE: _____

SUPERVISOR: _____

ENERGY SOURCES AND LOCATIONS (Electrical, Pneumatic, Hydraulic, Chemical, Thermal):

TYPE OF LOCK OR ENERGY CONTROL DEVICE: _____

AUTHORIZED EMPLOYEES: _____

OTHER EMPLOYEES: _____

OTHER INFORMATION: _____

Keep this record on file for future OSHA reference.



Section III Forms & Information

Valid from: November 2008

Section III

7.1.7 B RPSHSE – 7 B

Lockout - Tagout (LOTO)

Form 2 - Inventory of Employee Lock Activities Chart



Section III Forms & Information

Valid from: November 2008

Inventory of Employee Lock Activities Chart

EMPLOYEE NAME	BRAND OF LOCK AND/OR KEY NO	ISSUE DATE	RETURN DATE	COMMENTS



Section III Forms & Information

Valid from: November 2008

Section III

7.1.7 A RPSHSE – 7 A

Confined Space

Form 2 – Confined Space Classification Chart




Section III Forms & Information

Valid from: November 2008

Confined Space Classification Chart

	"A" Immediately Dangerous	"B" Dangerous	"C" Potentially Dangerous
OXYGEN (Percent in Air)	0 - 15.9 % 23.6% or More -OR-	16.0 % to 19.4% 21.5 % to 23.5% -OR-	19.5 % to 21.4% -AND-
Combustible Gas/Vapor [Percent of Lower Explosive Limit (LEL)]	20% or above -OR-	10% to 19% -OR-	Less than 10% -AND-
TOXICS	Immediately Dangerous to Life or Health (IDLH)	Above Permissible Exposure Limit (PEL)	Within Permissible Exposure Limit (PEL)
Hydrogen Sulfide (H ₂ S)	100 ppm or greater	10 ppm to 99 ppm	Less than 10 ppm
Tetraethyl Lead	N/A	2 ug/ft ³ or greater	Less than 2 ug/ft ³
Ammonia	500 ppm or greater	25 ppm to 499 ppm	Less than 25 ppm
Benzene	1,000 ppm or greater	1.0 ppm to 999 ppm	Less than 1.0 ppm
Total Petroleum Hydrocarbons	2,000 ppm or greater	300 ppm to 1,999 ppm	Less than 300 ppm
Other Toxic Substances	Refer to Manufacturer's Material Safety Data Sheets (MSDS)		
	"A" Immediately Dangerous	"B" Dangerous	"C" Potentially Dangerous
Required Respiratory Protection	Entry denied except for Emergency Rescue while wearing an air-supplied respiratory (SCBA) and full body harness	Entry prohibited	Respirator not required. Must wear full body harness with lifeline attached or readily available. (NOTE: reference: Retrieval/Fall Protection Equipment)
Never consider any space CLASS "C" just by the appearance or because a CLASS "C" type was the last entry made. People die in a Confined Space because they enter thinking it is safe when it is not.			
ALWAYS CONSIDER EVERY CONFINED SPACE TO BE CLASS "A" UNTIL IT HAS BEEN TESTED AND PROVEN OTHERWISE.			

	Section III Forms & Information	Valid from: November 2008
---	--	---------------------------

Section III:

7.1.7C RPSHSE – 7C


Safe and Hot Work Permits

Form 1

NO FORMS APPLICABLE

LEFT BLANK FOR FUTURE
INSERTATION AS
APPLICABLE

TRAINING WILL ADDRESS THIS GROUP

	Section III RPSHSE 7.1.8	Valid from: November 2008
---	---	---------------------------

Revision Profile

Rev.	Date	Name	Approval Signature	Remarks
0	11/08	Owens O'Quinn QHSSE Consultant	On File	ORIGINAL
0	11/08	Tammy Conekin	On File	ORIGINAL
1				
2				
3				
4				
5				

Original Review Progress


Date	Reviewer	Signature
11/08	J.K. Barrilleaux – Grammar/Technical Format <i>Evergreen QHSSE Solutions LLC</i>	On File
11/08	Owens O'Quinn – QHSSE Consultant <i>Evergreen QHSSE Solutions LLC</i>	On File
11/08	Tammy Conekin – Head of Service	On File



Section III: 7.1.8 RPSHSE – 8
Hazard Communication Program
"RIGHT TO KNOW"

Contents

Section	Topic	Page No.
1.0	Introduction	3
2.0	Policy	3
3.0	Chemical in the Workplace	4
4.0	Multi-Employer Work Sites	4
5.0	Hazard Evaluation	5
6.0	List of Hazardous Chemicals	6
7.0	Labeling and Other Identification Methods	6
8.0	Material Safety Data Sheets (MSDS)	11
9.0	Additional Information	13
10.0	Non-Routine Tasks	14

	Section III RPSHSE 7.1.8	Valid from: November 2008
---	---	---------------------------

1.0 Introduction

REPOWER USA employees work around chemicals and hazardous materials for various lengths of time and know that HAZCOM is the short form of the Occupational Safety & Health Administration (OSHA) Hazard Communication Standard. Hazard Communication is the **REPOWER USA** employee's safety net, providing you with the information about protection that you need to work safely with and around chemicals and hazardous materials.

REPOWER USA provides HAZCOM information and training for their employee's safety. The **REPOWER USA** employee's part is an ongoing commitment to stay up-to-date on chemical safety at work. What employees need to know may change everyday. For example new substances, new procedures, and new people are added. Or maybe an employee or a co-worker took an action that had serious consequences.

Everyone knows paying attention to road signs and traffic signals can save lives. However, did you know that reading warning labels, following the Material Safety Data Sheet (MSDS) instructions, and asking your On-Site Supervisor, the On-Site HSE Coordinator, the Department/Operations Manager and/or the HSE Department for directions can also save lives?

The Occupational Safety & Health Administration (OSHA) Hazard Communication Standard requires employers to inform their employees of the potential hazards in the workplace. As a dedicated member of the **TEAM** it is your responsibility to take a part in this training and to apply what you learn at the work site. Thus, Hazard Communication (HAZCOM) training is an ongoing process and takes continual commitment. It is the only way employers and employees can keep the safety net in place.

2.0 Policy

REPOWER USA is concerned about the increasing use of toxic and hazardous substances in the industrial processes. The best defense to counteract these concerns is to make sure that employees are given information regarding any toxic or hazardous substances they are required to use and are trained in the safe use of these substances. This Hazard Communication "**Right-to-Know**" Program is designed to provide employees with an effective tool to elevate their awareness concerning the potential hazards found in the workplace.

This program is designed to comply with the OSHA Hazard Communication Standard, Title 29 CFR 1910.1200 and 1926.59 and other applicable publications. This program applies to all the work operations where employees may be exposed to hazardous substances, whether under normal working conditions or during an emergency situation.

Employee inquiries regarding this program will evoke a prompt response from the On-Site HSE Coordinator or the HSE Manager. The **REPOWER USA** Hazard Communication Program is available upon request to employees, their designated representatives and OSHA Representatives and Clients.

This program shall inform employees of the Hazard Communications Standard, the hazardous properties of the chemicals with which they work, safe handling procedures, and measures to take for protection from these chemicals.

REPOWER USA provides access to the Hazard Communication Program to each employee by maintaining a copy of the Hazard Communications Standard at each work place and at the **REPOWER USA** Corporate Office. In some rare cases, a written copy of the **REPOWER USA** Hazard Communication Program shall be sent with those employees who travel between work sites with no primary location listed and/or without a copy of the program readily accessible.

3.0 Chemicals in the Workplace

There is an estimated 575,000 chemical products in today's industry. Chemical exposure may be the cause or contribute to many serious ailments, burns, and rashes. Some chemicals may also be safety hazards and have the potential to cause fires, and explosions and other serious accidents.

This OSHA standard is designed to make sure that the hazards of all chemicals imported into, produced, or used in U.S. workplaces are evaluated under uniform requirements, and that this information is transmitted to all affected employers and employees.

Chemical manufacturers and importers are required to convey the hazard information they learn from their evaluations to "downstream" employers by means of labels on the containers and the Material Safety Data Sheets (MSDS). It is the employer's responsibility to get this information to their employees.

4.0 Multi-Employer Worksite

In addition to the written Hazard Communication Program (**HAZCOM**) that is required of each employer who may have employees exposed to hazardous chemicals, there are other requirements that are applicable to a Multi-Employer Worksite (construction - maintenance) locations. Some of the requirements are, but not limited to:

- A multi-employer work-site means those establishments where employees of more than one employer are performing work and are exposed to hazardous chemicals at that specific site.

Where employees of more than one employer are exposed to a hazardous chemical, the employers **with the responsibility for creating and/or correcting the hazard SHALL** be responsible for determining the compliance with the Hazard Communication (HAZCOM) Standard. This shall include the methods the employer uses to make a readable copy of a Material Safety Data Sheet (MSDS) available. A list of the hazardous chemicals present at the work-site **SHALL** be compiled and maintained at there worksite. A copy of the compiled list of work-site hazardous chemicals **SHALL** be forwarded to the On-Site HSE Coordinator and the HSE Manager. The On-Site Supervisor and/or the On-Site HSE Coordinator will be responsible for obtaining all pertinent Material Safety Data Sheets (MSDS) for the applicable facility hazardous chemicals. The On-Site Supervisor and/or the On-Site HSE Coordinator with the HSE Manager shall review the Material Safety Data Sheets (MSDS) prior to commencement of each job. Material Safety Data Sheets (MSDS) will be retained as a part of any Industrial Hygiene Survey and viewed as pertinent for employee medical files.

- The HAZCOM Standard requires an employer on a multi-employer work-site to have **ALL** pertinent Material Safety Data Sheets (MSDS) readily available at a central location at the facility or work-site with a copy to the appropriate office and the HSE Manager. This requirement covers the hazardous chemicals the other employer's personnel may be exposed.
- The Material Safety Data Sheets (MSDS) access requirement pertains to **ALL** employers who introduce hazardous chemicals into the worksite. **ALL** employers and employees **SHALL** know how to retrieve the Material Safety Data Sheets (MSDS).

5.0 Hazard Evaluation

Chemical manufacturers and importers are required to review available scientific evidence concerning the hazards of the chemicals they produce or import, and to report the information they find to their employees, and to employers who distribute or use their products.

Downstream employers can rely on the evaluations performed by the chemical manufacturers or importers to establish the hazards of the chemicals they use.

Each chemical must be evaluated for its potential to cause adverse health effects and its potential to pose physical hazards such as flammability. Chemicals that are listed in one of the following sources are to be considered hazardous in all cases:

- 29 CFR 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA)
- Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment, American Conference of Governmental Industrial Hygienists (ACGIH).

In addition, chemicals that have been evaluated and found to be a confirmed or suspected carcinogen are listed in the following sources:

- National Toxicology Program (NTP), Annual Report on Carcinogens
- International Agency for Research on Cancer (IARC)
- As regulated by OSHA as a carcinogen

6.0 List of Hazardous Chemicals

It is the responsibility of **REPOWER USA** to compile a master list of all the hazardous chemicals used at job sites and continually update the list as necessary. A separate list should be compiled for each work area identifying the corresponding MSDS for each chemical and it should be posted and available for all employees. The HSE Manager will maintain the master list.

- **How to Identify Hazardous Chemicals**

The responsibility for determining whether a chemical is hazardous lies with the chemical manufacturer or importer. Employers are required to rely on the evaluations received from the suppliers through container labels and MSDS.

- **How to List Chemicals in the Workplace**

All hazardous chemicals known and used in our workplace will be listed using an identification number that appears on the MSDS and label for the chemical. The list should include common or trade names, Chemical Abstract Service (CAS) Registry numbers, and/or MSDS reference numbers, etc.

The master list is the inventory for which a Material Safety Data Sheet must be obtained and it must be made available to employees upon request.

- **Informing Employees of Other Hazards**

Employees **SHALL** be informed of the chemical hazards of non-routine work and the hazards associated with the chemicals in unlabeled pipes in their work areas. The primary methods to be used will include, but are not limited to:

- Pre-job planning meetings.
- Scheduled safety meetings.
- Tailgate safety meetings.
- Preparation and availability of procedures.
- HSE bulletins or postings of the specific information.
- Job Site Safety Analysis (JSA) and Job Site Safety Inspections (JSSI).
- Required annual training sessions.

7.0 Labeling and Other Identification Methods

7.1 OSHA Labeling Requirements

Effective November 25, 1985, OSHA, under the Hazard Communication Standard, required manufacturers, suppliers, and importers to label all containers of chemicals.

Labels required by OSHA **must** contain the following:

- Name of the hazardous chemical as it appears on the MSDS.
- Appropriate warnings in English. Note - There are current discussions to increase the warning awareness by the use of a number rating system.
- Name and address of the manufacturer, importer, or supplier.

Any containers or materials missing the above-required information should not be in the workplace or accepted into the facility. OSHA also requires that a target organ be identified on all the labels to aid the employee in identifying the required protection.

Labels on containers should not be destroyed, removed, or defaced unless immediately replaced with another label containing the required information.

7.2 OSHA Container Requirement

OSHA requires **stationary containers** and vessels be labeled with the name of the substance and an appropriate warning. Warnings can be placed directly on the container or on a batch sheet.

7.2.1 Transfer containers - must be labeled with the name of the substance and an appropriate warning. OSHA **exempts** transfer containers from labeling if all three of the following are met:

- The employee using the substance fills the container.
- The employee is the only person to use the container.
- Each work-shift will use all substances.

7.2.2 OSHA Exceptions to Labeling

- Hazardous wastes.
- Manufactured articles.
- Wood products.
- Consumer products.
- Food and Medication.

7.2.3 Labeling Systems

There are four (4) labeling systems to used in the U.S. (Over 65 exist worldwide). These systems are used to identify hazardous materials in transport, at storage terminals, and on individual product containers. These systems will assist the emergency response personnel to quickly identify products involved in a release.

The four labeling systems include

- **NFPA** (National Fire Protection Association)
- **HMIS** (Hazardous Materials Identification System)
- **ANSI** (American National Standard Institute)
- **DOT** (U.S. Department of Transportation)

7.2.4 NFPA Labeling System (Oldest System)

This system was designed to protect emergency response personnel from the dangers of hazardous materials stored in stationary containers.

NFPA labels contain four sections: Health Hazard, Fire Hazard, Reactivity, and Specific Hazard. The hazards of each section are rated and given numbers ranging from 0-4 with 0 being the least hazardous.

- **BLUE** = Health Hazard. Substances with a rating of 0 usually do not cause any health effects. A rating of 4 can cause death from inhalation in small amounts.
- **RED** = Fire Hazard. Substances with a 0 rating will not burn under normal conditions. A rating of 4 is for flash points below 73° F.
- **YELLOW** = Reactivity. Under NFPA, this definition is for reactivity under fire conditions. A rating of 4 is a substance that easily detonates. A chemical, such as sodium metal, that reacts explosively with water would only be rated as a 2.
- **WHITE** = Specific Hazards. These substances include water-reactive substances, corrosives, oxidizers, and radioactive substances.

7.2.5 HMIS Labeling System

HMIS is similar to NFPA in that it has the same color coding and numbering system. The HMIS label is rectangular in shape. The **WHITE** section uses codes "A" through "K", representing the types of protective equipment required for handling a substance. A code "X" signals the user to ask the supervision about the required personal protective equipment and procedures.

7.2.6 ANSI Labeling System (Most Popular System)

ANSI requires the following labeling information:

- Chemical name of the substance.
- A signal word: **DANGER**, **WARNING**, and **CAUTION**.
- Hazards posed by the substance (flammable, causes burns, absorbed through skin, etc.).
- Precautionary statement (harmful or fatal if swallowed, etc.).
- First-aid procedures.

7.2.7 DOT Label System (Transportation)

When chemicals are transported on public highways a DOT label is required on the container. Labels must be diamond-shaped and must measure a minimum of 4 inches on each side. DOT labels are in addition to but must not interfere with OSHA or EPA labels.

DOT Labels require the following on small packages

- 4-inch by 4-inch (minimum size) diamond-shaped label on all small container-packages up to 640 cubic feet
- The health or physical hazard is shown both by a pictogram and verbal information.
- Labels are to be color coded
- A United Nations (UN) class number is included in the bottom corner of the label
- Multiple hazards must be labeled for each substance.

7.2.8 EPA Requirements for Labeling

The Environmental Protection Agency (EPA) requires hazardous waste containers to be labeled with EPA markings in addition to the DOT requirements. The markings must be on the container and dated at the time the wastes are initially accumulated into the container.

The wastes transported out of a facility, require the generator's name, address, and the EPA identification number. Shipped waste must include the DOT shipping name, the UN hazard ID number, and the EPA waste number. The EPA number must contain the letter describing the waste's category, the three numbers describing the exact chemical waste or waste stream, the date accumulation began, and the shipping manifest document number.

7.2.9 Manufacturer's Labeling

The manufacturer's label provides the following information:

- Chemical Identity
- Hazards
- Manufacturer
- First-Aid Procedure
- Fire-fighting Information

7.2.10 Labeling (General Information):

- All chemical containers received from vendors **SHALL** be labeled and **SHALL** be delivered with a legible Material Safety Data Sheet (MSDS). The labels must be in English, legible, and prominently displayed on the container or readily available in the work area throughout each work shift. A copy of the Material Safety Data Sheet (MSDS) must be retained on location. In the event of damaged or weathered labels, replacement labels are to be obtained from the Vendor and reapplied. The On-Site Field Superintendent/Supervisor, On-Site Employee and On-Site HSE Coordinator shall check for damaged or weathered labels during daily walk-through inspections.

- Container Labeling for Bulk Purchased Chemicals – In Plant/On Platform/In Field **SHALL** be delivered with a legible Material Safety Data Sheet (MSDS).

The labels must be in English, legible and prominently displayed on the container and readily available in the work area throughout the work shift. Labels must contain the Manufacturer Identity, Hazard Warnings, and the current Contact Information.

- In Plant Labeling - In Plant labeling systems may use alternative methods from those that require specific hazard warnings. General, physical, and health hazards may be conveyed by In-Plant Labeling Systems as long as the:
 - Name of the label must be linked to the Material Safety Data Sheet (MSDS) available for that substance.
 - Personnel have immediate access to the Material Safety Data Sheet (MSDS).
 - Personnel understands the labeling system used
 - Training program is enhanced to address the target organ effects of those chemicals.
- All storage tanks that contain substances regulated by the Standard **SHALL** be labeled.
- It is not mandatory that the process vessels be labeled as long as the products and the general hazard warnings they contain are identified via the alternate labeling provision of the OSHA Standard. Alternative methods include signs, placards, process sheets, batch tickets, and operating procedures, etc. as long as the method identifies the applicable containers, conveys the identity of the chemical, and the appropriate hazard warnings. Contact the HSE Manager or the On-Site HSE Coordinator to ensure full compliance with the alternative labeling provisions.
- Each location is required to use the available labeling systems to generate labels for secondary containers. The On-Site Field Superintendent/Supervisor will be responsible for ensuring that proper labeling is used on secondary containers. When new chemicals are purchased, Material Safety Data Sheet (MSDS) **SHALL** be maintained at the work-site with copies sent to HSE Manager and On-Site HSE Coordinator.
- The information on the labels or signs identifying the substance **SHALL** appear as stated on the Material Safety Data Sheet (MSDS). They may also correspond to a consistent numbering system which correlates to a central sign specifying what the numbers mean.

- Anything that is received and contains hazardous material and is required to be labeled per the regulations of the United States Department of Transportation (DOT) (packages, rail cars and transport vehicles) **SHALL** not have the labels or markings removed until the hazardous materials are sufficiently removed to prevent any potential hazards.

8.0 Material Safety Data Sheets (MSDS)

8.1 MSDS Categories

8.1.1 Section I: Identification

Product information such as the material/trade name, the product number, common synonyms, the emergency and non-emergency phone numbers of the manufacturer, and the date prepared.

8.1.2 Section II: Ingredients/Identity Information

Hazardous chemicals in the product, the percentage of each, the Chemical Abstract Service (CAS) numbers, and the exposure limits (TLV and PEL), etc.

- Exposure limit: the average amount of chemical exposure allowed during an 8-hour workday without adverse health effects.
- Exposure limits include the OSHA Permissible Exposure Limits (PEL) and the ACGIH Threshold Limit Values (TLV). Exposure limits are monitored to protect employees.

8.1.3 Section III: Physical Properties (specific properties)

- **Boiling Point** - the temperature at which the product will begin boiling which is significant when dealing with liquids that can generate the sufficient vapors to create an explosion.
- **Vapor Pressure** - pressure exerted by a saturated vapor above its own liquid in a closed container (measured in mm Hg).
- **Vapor Density** - the weight of the vapors of the product in comparison to air, where the air is equal to 1. With a vapor density greater than 1 the vapors will sink to the ground (e.g., chlorine gas). With a vapor density less than 1 the vapors will rest (e.g., helium, gasoline). This is significant when dealing with leaks and spills.
- **Solubility** - the tendency of one substance to blend with another. It is often compared to water. This is significant when dealing with fire-fighting, emergency situations, and disposal.
- **Appearance and Odor** - the physical state of the product (e.g., solid, liquid, gas) and odor of the product (e.g., chlorine smells like bleach). This is significant in product recognition and recognizing the potential hazards in the work area.

- **Specific Gravity** - refers to how heavy the product is in comparison to water, with water equal to 1. With a specific gravity greater than 1 the product sinks (e.g., mercury). With a specific gravity less than 1 the product floats (e.g., most oils, and gasoline). This is significant when dealing with fire fighting, emergency situations, and disposal.
- **Melting Point** - temperature at which a product begins to melt.
This is significant when dealing with storage and transportation.
- **Evaporation Rate** - the rate at which a material will volatilize.
- **Volatility**: the percent of vapors emitted at a specified temperature.

8.1.4 Section IV: Fire and Explosion Hazard Data

This data is related to the likelihood that a chemical would explode or catch fire.

- **Flash Point** - the temperature at which a material will give off enough vapors to form an ignitable mixture with the air. If the flash point is less than ($<$) 100° F the chemical is flammable. If the flash point is at or above ($>$) 200° F the chemical is combustible.
- **Auto-ignition Temperature**: the temperature at which a material will ignite or catch fire without a source of ignition.
- **Flammable Limits**: the range of a vapor or gas concentration in the air that will burn or explode if an ignition source is present.
 - **Lower Flammable Limit (LFL)**, below which the propagation of a flame will not occur.
 - **Upper Flammable Limit (UFL)**, above which the propagation of a flame will not occur.

The remaining portions of this section describe the types of firefighting media and procedures required to fight a fire involving the chemicals listed on the MSDS. For example, if water is not to be used, the MSDS will report "Do not use water" in this section.

8.1.5 Section V: Reactivity Data

Provides information on chemical stability, incompatibility, and conditions the contributing to hazardous polymerization, reactivity refers to the other chemicals that this chemical should not come in contact with.

- **Bi-products** - the hazardous decomposition of the products that can be more toxic than the chemicals themselves. Examples include cyanide which is created by burning urethane foam, and carbon monoxide, which is created by the gasoline burning in automobile engines.

8.1.6 Section VI: Health Hazard Data

This contains the information concerning the potential health hazards associated with the chemical.

**8.1.7 Section VI: Symptoms of overexposure to hazardous chemicals
Primary Routes of Exposure**

- Ingestion
- Absorption (skin and eye contact)
- Inhalation

Acute Signs and Symptoms of Overexposure

These are effects that occur immediately. Examples include irritation, loss of consciousness, or death.

- **Chronic Signs and Symptoms of Overexposure** – the effects that occur from prolonged or repeated exposure to small quantities or low levels of the product over a period of days, weeks, or years. Examples include allergies, organ damage, reproductive problems, and cancer.
- **Carcinogenicity** – defined by whether the product causes cancer which publication this information can be found, and the medical conditions that can be aggravated by this chemical.
- **Emergency and First-Aid Procedures** – provides information in emergency situations when workers come in contact with the chemical (eyes, skin, inhalation, ingestion). Examples include whether or not to induce vomiting after ingestion, administer oxygen, or flush the contaminated area with water.

8.1.8 Section VII: Precautions for Safe Handling and Use

These are the appropriate actions to take during a chemical spill or its release into the air, for the disposal of the waste materials, and the handling and storing precautions. For example, some spilled chemicals can simply be absorbed with an inert absorbent and disposed of as a solidified, flammable waste. Other chemical spills, such as acids or bases, may require neutralization before any cleanup action taken.

8.1.9 Section VIII: Employee Protection Measures

These are recommendations regarding personal protective equipment: respiratory protection, protective clothing, eyes wear, gloves, etc. It also includes the type of ventilation required and work/hygiene practices.


9.0 Additional Information

- Manufacturers are required by OSHA to continually update their MSDS reflecting new product knowledge and health and safety characteristics.
- OSHA requires the MSDS to be provided by the chemical manufacturer to the purchaser with the initial shipment.
- OSHA requirements relating to MSDS information does not require a specific format. ANSI has issued a draft standard (Z400.1) that is designed to create uniformity in the format and terminology.

- All employees have the right to obtain a copy of the MSDS for the chemical or chemicals in the work area. Supervisors should be notified anytime a MSDS is required.
- **REPOWER USA** utilizes a Computer Based Material Safety Data Sheet (MSDS) Program for obtaining the current updated information. All pertinent Material Safety Data Sheet (MSDS) are maintained at each work site in a Material Safety Data Sheet (MSDS) Binder.
- All Material Safety Data Sheets (MSDS) are available for each employee and other designated personnel in 29 CFR 1910.1200 (e).
- Non-English speaking employees are furnished with the appropriate information in their own language. **REPOWER USA**, in situations where they are not the owner/operator will ensure that Non-English speaking employees are furnished with the appropriate information in their own language.

10.0 Non-Routine Tasks

When employees are required to perform hazardous non-routine tasks (e.g., cleaning tanks, entering confined spaces, etc.) on-the-job training shall be conducted regarding hazardous chemical exposure and the proper precautions to avoid exposure. The On-Site Field Superintendent/Supervisor and/or the On-Site HSE Coordinator shall perform a Job Site Safety Analysis (JSA) for non-routine tasks and discuss it with all on-site employees prior to the job's start-up.

	Section III RPSHSE 7.1.8A	Valid from: November 2008
---	--------------------------------------	---------------------------


Revision Profile

Rev.	Date	Name	Approval Signature	Remarks
0	11/08	Owens O'Quinn QHSSE Consultant	On File	ORIGINAL
0	11/08	Tammy Conekin	On File	ORIGINAL
1				
2				
3				
4				
5				

Original Review Progress

Date	Reviewer	Signature
11/08	J.K. Barrilleaux – Grammar/Technical Format <i>Evergreen QHSSE Solutions LLC</i>	On File
11/08	Owens O'Quinn – QHSSE Consultant <i>Evergreen QHSSE Solutions LLC</i>	On File
11/08	Tammy Conekin – Head of Service	On File



	Section III RPSHSE 7.1.8A	Valid from: November 2008
---	--------------------------------------	---------------------------

**Section III: 7.1.8A RPSHSE – 8A
Hazard Identification and Evaluation**

Contents

Section	Topic	Page No.
1.0	Introduction	3
2.0	Knowledge and Recognition of Hazards	4
3.0	Hazard Recording and Reporting	6
4.0	Corrective Action Follow-up	6
5.0	Management Responsibility	7

1.0 Introduction

Hazard Control begins with recognition and it ends with the implementation of a hazard control from one or more options. In the steps from recognition to control or elimination, one must apply several principles that are important. There are aids for thinking through hazard recognition and considering the use of the environment in which they occur. These aids are useful in envisioning a work place environment and other factors that contribute to an accident/incident/near miss or its severity.

A Hazard is defined as a condition or changing set of circumstances that present a potential for injury, illness, or property damage. It is the “potential or inherent characteristics of an activity, conditions or circumstances which can produce adverse or harmful consequences”. **Hazard Control** is any means of elimination or reducing the risk resulting from a hazard. **Hazard recognition** is perceiving or being aware that a hazard exists.

There are many sources of hazards. Personnel introduce some. All too often hazards arise from engineering activities such as planning, design, production, operations, or maintenance. Hazards are seldom introduced deliberately; they are usually created inadvertently, unknowingly, and unintentionally. Many factors may contribute to the introduction of hazards: pressure to meet design or production schedules, job stress, poor communication, and a lack of knowledge may influence hazard recognition and control. Also important is the lack of instruction, personnel, funds, management concern, and assistance from safety and health professionals.

In planning and designing process activities engineers may create hazards in sites, buildings, facilities, equipment, operations, and work place environments. A hazard may result from a computational error, the failure to envision the work place environment, making a poor assumption, or not envisioning how things will actually operate in the work place environment.

In production and distribution, it is not always possible to construct or produce items the way they are drawn on paper. Changing fasteners or connectors because those specified are not available could weaken a structural joint. Replacing one chemical with another may introduce toxic or flammable hazards.

Poor packaging design may contribute to the introduction of hazards during handling and shipping. Inadequate packaging could result in a release of hazardous materials into the work place.

Hazards in maintenance and repair may result in the insufficient, delayed, and improper maintenance and repairs of equipment and/or facilities.

Just controlling the hazards related to normal use is not sufficient.

Many designs fail to recognize hazards during setup, maintenance, and cleaning activities. For example, poor access to service points or the need to do servicing with high levels of energy present can be dangerous even though an approved and professional Lockout/Tagout System is in use. Hazards found during or resulting from cleaning, maintenance, and/or repair, not just normal operations or use, must be recognized.

Failure to provide manual power or inching controls for powered equipment may make service and setup activities dangerous. Failure to torque bolts correctly may create a hazard. Failure to clean up a work place before, during and after servicing and/or repair can introduce hazards. Errors in maintenance procedures or poorly written procedures can cause hazards.

Inadequate, poor, and/or no communications can introduce hazards. For example, a hazard may result when changes in design, operations, and procedures are not communicated adequately to those impacted by the changes. The way information is communicated adequately and the knowledge and understanding of the receivers is important. Instructions and user manuals need the knowledge of the designer and others. Too often, instructions are descriptions of how an item works, rather than a series of actions one must take to make something work correctly. Inadequate, poor, and/or no communications lead to errors, accidents/incidents/near misses, and losses.

The components of communications are essential in hazard control. The four communication components are sender, receiver, media, and the content of the message.

2.0 Knowledge and Recognition of Hazards

No one individual can be fully knowledgeable about all hazards. Several disciplines and specialists may be needed to work together to cover a particular project.

After one has developed the knowledge of hazards, there is a need to develop the skill of recognizing and understanding hazards. One must consider the work place environment and many different contexts. Only after hazards are recognized can one identify and select suitable controls. Using a set of priorities may be a helpful method for selecting controls for hazards.

The priorities, in order of importance, are:

- **Eliminate the Hazard**

The highest priority in hazard control is to eliminate the hazard. Hazards can be eliminated by making process or design changes or by substituting a non-hazardous material for a hazardous one. Sharp corners can be rounded or waste material removed.

- **Reduce the Hazard Level**

If the hazard cannot be eliminated, the degree of exposure to the hazard can often be reduced. Two approaches are reducing the degree of severity or reducing the probability of occurrence. Redundancy covers the probability of error or the failure of a component within the system or operation. Redundancy means providing more than one means to accomplish something, where each means is independent of the other.

- **Provide Safety Devices**

Safety devices can reduce hazards in many cases. Safety devices are features or controls that prevent personnel from being exposed to a hazard(s) that exists. One must always remember that safety devices do not remove the hazard(s), they only provide an automatic device that, once it is in place and working properly, requires no action on the personnel's part.

- **Provide Alerts and Warnings**

Another way to reduce hazard(s) is to alert or warn personnel of eminent or pending danger. These alerts or warnings require personnel to take some action that will prevent them from being exposed to or injured by a hazard. Personnel must remember that alerts or warnings do not remove a hazard but depend on human action to implement protection and are only effective when humans perceive and understand them and act correctly in response to them.

- **Provide Safety Procedures**

Additionally, a method of reducing the danger of exposure to work place hazard(s) is by using safety procedures. The HSE and Operational Procedures are actions that must be executed. Personnel must learn to use these HSE and Operational Procedures after they have been developed and published and personnel has been informed and trained. The HSE and Operational Procedures require designing to minimize danger to anyone using them. HSE and Operational Procedures should not introduce unsafe practices to personnel. Personnel training to identify hazard(s) and the development of skills in following HSE and Operational Procedures must be an integral part of the "Employee Hazard Reporting" Program.

- **Provide Personal Protective Equipment (PPE)**

Many factors must be considered when selecting and implementing controls for hazards. Risk, cost, kind or severity of loss, practicality and not introducing additional hazards are important. For the kind of loss, the first priority is to protect people and human life. Following these is protection of property, environment, and operations/production.

3.0 Hazard Recording and Reporting

All personnel reporting any hazard(s) **SHALL** locate and describe each hazard reported. The Assigned Responsible Personnel, the Operations/Maintenance Hazard Investigation Personnel, and the **REPOWER USA** HSE Manager will use the provided written questions and the clear detailed descriptions of the hazard for investigation and evaluation of the reported hazard. This information is vitally important to clearly understand and professionally approach a correction of the hazard.

The Classification of Hazard(s) will simplify the job of hazard ranking to set priorities. Properly classifying hazards places them in the correct perspective. The significant benefit of this classification is that the potential consequences and the probability of such consequences occurring are described without the need for long narrative descriptions. From this information, management personnel should be able to understand and evaluate the problems, assign priorities, and quickly reach decisions.

Unsafe conditions or deviations from the accepted practices must be described in detail. Machines and operations must be identified by their correct names. Locations must be accurately named or numbered. Specific hazards must be described.

4.0 Corrective Action Follow-up

When the Hazard Report is written, the Hazard Action Tracking Form filled in, the Hazard Investigation completed, and the Corrective Action determined the original Hazard Report begins to return benefits. However, the information acquired and the recommendations made are without value unless corrective action is taken. Information and recommendations provide the basis for establishing priorities and implementing programs that will reduce accidents/incidents/near misses, improve conditions, raise morale, and increase the efficiency and effectiveness of the total Employee Hazard Reporting System.

Corrective Action Follow-up information can be listed in the order in which they were reported or grouped and identified by the Assigned Responsible Personnel. These Corrective Action Follow-up recommendations then processed through the proper management personnel for approval.

In most cases, a definite time limit for compliance **SHALL** be set regarding each recommendation and the information on the standard follow-up sequence.

Recommendations should include the following four guides:

- Correct the cause whenever possible. **DO NOT** merely correct the results, leaving the problem intact. Immediately correct everything possible.

- Always focus on the statement “Delays are the breeding ground of accidents/incidents/near misses”.
- Report conditions beyond your area authority and suggest solutions.
- Inform management of the condition(s), the potential consequences of hazard(s) found, and any recommended solution to the situation.
- Take immediate action as needed. In any situation where permanent Corrective Action takes time, **DO NOT JUST IGNORE THE HAZARD.**
- Take any and/or all-temporary measures you can. Immediate Corrective Action examples are:
 - Securing the area
 - Implementing Lockout/Tagout Procedures
 - Post alert and/or warning signs

5.0 Management Responsibility

Management must realize that employees are keenly interested in the attention paid to correct faulty conditions and hazardous procedures. Recommendations approved by management should become part of the **REPOWER USA** HSE Program. At regular intervals, On-Site Supervisors are to report the Corrective Action progress to their Department/Operations Manager and the **REPOWER USA** H&E Manager. Post-Corrective Action Inspections report on what Corrective Actions are being made. All unsafe conditions that are not corrected are a clear indication of a breakdown in management communications and program applications.

Sometimes management will have to decide among several courses of action. Often these decisions will be based on cost effectiveness and the practical application.

	<p align="center">Section III Forms & Information</p>	<p align="right">Valid from: November 2008</p>
---	---	--

Section III:

7.1.8 RPSHSE – 8

Hazard Communication Program "RIGHT TO KNOW"

Form 1 – Material Safety Data Sheets (MSDS) Information

Material Safety Data Sheets (MSDS)**MSDS Categories****Section I: Identification**

Product information such as the material/trade name, the product number, common synonyms, the emergency and non-emergency phone numbers of the manufacturer, and the date prepared.

Section II: Ingredients/Identity Information

Hazardous chemicals in the product, the percentage of each, the Chemical Abstract Service (CAS) numbers, and the exposure limits (TLV and PEL), etc.

- Exposure limit: the average amount of chemical exposure allowed during an 8-hour workday without adverse health effects.
- Exposure limits include the OSHA Permissible Exposure Limits (PEL) and the ACGIH Threshold Limit Values (TLV). Exposure limits are monitored to protect employees.

Section III: Physical Properties (specific properties)

- **Boiling Point** - the temperature at which the product will begin boiling which is significant when dealing with liquids that can generate the sufficient vapors to create an explosion.
- **Vapor Pressure** - pressure exerted by a saturated vapor above its own liquid in a closed container (measured in mm Hg).
- **Vapor Density** - the weight of the vapors of the product in comparison to air, where the air is equal to 1. With a vapor density greater than 1 the vapors will sink to the ground (e.g., chlorine gas). With a vapor density less than 1 the vapors will rest (e.g., helium, gasoline). This is significant when dealing with leaks and spills.
- **Solubility** - the tendency of one substance to blend with another. It is often compared to water. This is significant when dealing with fire-fighting, emergency situations, and disposal.
- **Appearance and Odor** - the physical state of the product (e.g., solid, liquid, gas) and odor of the product (e.g., chlorine smells like bleach). This is significant in product recognition and recognizing the potential hazards in the work area.
- **Specific Gravity** - refers to how heavy the product is in comparison to water, with water equal to 1. With a specific gravity greater than 1 the product sinks (e.g., mercury). With a specific gravity less than 1 the product floats (e.g., most oils, and gasoline). This is significant when dealing with fire fighting, emergency situations, and disposal.
- **Melting Point** - temperature at which a product begins to melt. This is significant when dealing with storage and transportation.
- **Evaporation Rate** - the rate at which a material will volatilize.
- **Volatility**: the percent of vapors emitted at a specified temperature.

Section IV: Fire and Explosion Hazard Data

This data is related to the likelihood that a chemical would explode or catch fire.

- **Flash Point** - the temperature at which a material will give off enough vapors to form an ignitable mixture with the air. If the flash point is less than (<) 100° F the chemical is flammable. If the flash point is at or above (>) 200° F the chemical is combustible.
- **Auto-ignition Temperature**: the temperature at which a material will ignite or catch fire without a source of ignition.

- **Flammable Limits:** the range of a vapor or gas concentration in the air that will burn or explode if an ignition source is present.
- **Lower Flammable Limit (LFL),** below which the propagation of a flame will not occur.
 - **Upper Flammable Limit (UFL),** above which the propagation of a flame will not occur.

The remaining portions of this section describe the types of firefighting media and procedures required to fight a fire involving the chemicals listed on the MSDS. For example, if water is not to be used, the MSDS will report "Do not use water" in this section.

Section V: Reactivity Data

Provides information on chemical stability, incompatibility, and conditions contributing to hazardous polymerization, reactivity refers to the other chemicals that this chemical should not come in contact with.

- **Bi-products** – the hazardous decomposition of the products that can be more toxic than the chemicals themselves. Examples include cyanide which is created by burning urethane foam, and carbon monoxide, which is created by the gasoline burning in automobile engines.

Section VI: Health Hazard Data

This contains the information concerning the potential health hazards associated with the chemical.

Section VI: Symptoms of overexposure to hazardous chemicals

Primary Routes of Exposure

- Ingestion
- Absorption (skin and eye contact)
- Inhalation

Acute Signs and Symptoms of Overexposure

These are effects that occur immediately. Examples include irritation, loss of consciousness, or death.

- **Chronic Signs and Symptoms of Overexposure** – the effects that occur from prolonged or repeated exposure to small quantities or low levels of the product over a period of days, weeks, or years. Examples include allergies, organ damage, reproductive problems, and cancer.
- **Carcinogenicity** – defined by whether the product causes cancer which publication this information can be found, and the medical conditions that can be aggravated by this chemical.
- **Emergency and First-Aid Procedures** – provides information in emergency situations when workers come in contact with the chemical (eyes, skin, inhalation, ingestion). Examples include whether or not to induce vomiting after ingestion, administer oxygen, or flush the contaminated area with water.

Section VII: Precautions for Safe Handling and Use

These are the appropriate actions to take during a chemical spill or its release into the air, for the disposal of the waste materials, and the handling and storing precautions. For example, some spilled chemicals can simply be absorbed with an inert absorbent and disposed of as a solidified, flammable waste. Other chemical spills, such as acids or bases, may require neutralization before any cleanup action taken.

Section VIII: Employee Protection Measures

These are recommendations regarding personal protective equipment: respiratory protection, protective clothing, eye wear, gloves, etc. It also includes the type of ventilation required and work/hygiene practices.

Additional Information

- Manufacturers are required by OSHA to continually update their MSDS reflecting new product knowledge and health and safety characteristics.
- OSHA requires the MSDS to be provided by the chemical manufacturer to the purchaser with the initial shipment.
- OSHA requirements relating to MSDS information does not require a specific format. ANSI has issued a draft standard (Z400.1) that is designed to create uniformity in the format and terminology.
- All employees have the right to obtain a copy of the MSDS for the chemical or chemicals in the work area. Supervisors should be notified anytime a MSDS is required.
- **REPOWER USA** utilizes a Computer Based Material Safety Data Sheet (MSDS) Program for obtaining the current updated information. All pertinent Material Safety Data Sheet (MSDS) are maintained at each work site in a Material Safety Data Sheet (MSDS) Binder.
- All Material Safety Data Sheets (MSDS) are available for each employee and other designated personnel in 29 CFR 1910.1200 (e).
- Non-English speaking employees are furnished with the appropriate information in their own language. **REPOWER USA**, in situations where they are not the owner/operator will ensure that Non-English speaking employees are furnished with the appropriate information in their own language.



Section III Forms & Information

Valid from: November 2008

Section III:

7.1.8 RPSHSE – 8

Hazard Communication Program "RIGHT TO KNOW"

Form 2 – Master Hazardous Chemical List

(EXAMPLE LIST)

[illegible]



Section III Forms & Information

Valid from: November 2008

Section III

7.1.8 RPSHSE – 8

Hazard Communication Program "RIGHT TO KNOW"

Form 3 – Potential Hazardous Chemicals

Potential Hazardous Chemicals in the Workplace

Acids	Insecticides	Gasoline	Adhesives	Herbicides
Varnishes	Aerosols	Janitorial Supplies	Glues	Asbestos
Kerosene	Treatments	Battery Fluids	Lacquers	Greases
Benzene	Lead	Preservatives	Catalysts	Lye
Oils	Caustics	Oxalic Acid	Xylene	Paints
Inks	Coal Tar Pitch	Pesticides	Cleaning Agents	Solvents
Fungicides	Coatings	Plastics	Thinners	Fuels
Degreasers	Detergents	Strippers	Process Chemicals	
Resins	Surfactant	Dusts	Sealers	
Shellacs	Fiberglass	Solders	Flammable Liquids	



Section III Forms & Information

Valid from: November 2008

Section III:

7.1.8 RPSHSE – 8

Hazard Communication Program "RIGHT TO KNOW"

Form 4 - Hazard Categories and Effects

Hazard Categories and Effects

Health Hazards	Physical Hazards
Toxic and Highly Toxic Chemicals	
Carcinogenic	Combustible liquids
Acute exposure	Compressed Gas
Chronically exposure	Explosive
Reproductive toxin	Flammable Chemicals
Irritant	Organic peroxides
Corrosive	Oxidizers
Sensitizer	Pyrophorics
Target Specific Chemicals	Unstable (reactive)
	Water-reactive

Target Organ Effects

Type	Effect
Hepatotoxin	Chemicals which produce liver damage. Signs and Symptoms - Jaundice; liver enlargement. Chemicals - Carbon tetrachloride; nitrosamine.
Nephrotoxins	Chemicals which produce kidney, damage. Signs and Symptoms - Edema; proteinuria. Chemicals - Halogenated hydrocarbons; uranium.
Neurotoxin	Chemicals primarily affect the nervous system. Signs and Symptoms - Narcosis; behavioral changes; decrease in motor functions. Chemicals - Mercury; carbon disulfide.
Agents which act on the blood or hematopoietic system	Decrease hemoglobin function; deprive the body tissues of oxygen. Signs and Symptoms - Cyanosis; loss of consciousness. Chemicals - Carbon monoxide; cyanide.

Target Organ Effects (continued)

Type	Effect
Agents which damage the lung	Chemicals which irritate or damage the pulmonary tissue. Signs and Symptoms - Coughing; tightness in chest, shortness of breath. Chemicals - Silica; asbestos.
Reproductive toxins	Chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis). Signs and Symptoms - Birth defects; sterility. Chemicals - Lead, DBCP
Cutaneous hazards	Chemicals which affect the dermal layer of the body. Signs and Symptoms - the defatting of the skin, rashes, and irritation. Chemicals - Ketone, chlorinated compounds.
Eye hazards	Chemicals which affect the eye or visual capacity. Signs and Symptoms - Conjunctivitis; corneal damage. Chemicals - Organic solvents; acids.

	Section III Forms & Information	Valid from: November 2008
---	--	---------------------------

Section III:

7.1.8 RPSHSE – 8

Hazard Communication Program "RIGHT TO KNOW"

Form 5 – MSDS Information Request Form



Section III Forms & Information

Valid from: November 2008

MSDS Information Request Form

This form is to assist personnel in requesting the Material Safety Data Sheet information from the HSE Manager concerning the health and safety hazards of toxic substances found in the workplace.

PLEASE PRINT

1. Name: _____
2. Company: _____
3. Job Title/Craft: _____
4. Supervisor: _____

Briefly describe the substance you are requesting information about: _____

5. Trade Name: _____
6. Chemical Name or Ingredients (if known): _____
7. Manufacturer, Name & Address (if known): _____
8. Physical Form: ☐ Gas ☐ Solid ☐ Other (identify)
☐ Liquid ☐ Dust
9. Any other information that identifies the substance: _____
10. Circumstances surrounding your inquiry? Working with, near, etc. _____

Signature: _____

Person requesting MSDS

Date/Hour

MSDS issued: _____

Date/Hour

By



Section III Forms & Information

Valid from: November 2008

Section III

7.1.8 RPSHSE – 8

Hazard Communication Program "RIGHT TO KNOW"

Form 6 – HAZCOM Training Program

Training Program

HAZARD COMMUNICATION (HAZCOM) "RIGHT TO KNOW" PROGRAM

Training is an integral part of the Hazard Communication Program. Under the Hazard Communication Standard, effective May 23, 1988, all Companies are required to inform and train the affected employees at the time of their initial assignment to a work area where hazardous chemicals are present and whenever a new hazard is introduced into the work area.

The outline of topics presented in the training programs is the same for all employers, however, the actual information presented will be based on the specific hazard information conveyed by the labels and the MSDS for each particular workplace or work area.

REPOWER USA employees, who may be exposed to hazardous chemicals in the course of their routine responsibilities or in an emergency, **SHALL** be provided with the information and training about these potential hazards. Such information and training **SHALL** be provided at the time of the initial assignments, annually thereafter, and whenever a new hazard is introduced to the employee's work area. All trainings and new employee orientations **SHALL** be documented and maintained on file at the work-site and at the appropriate office and with the HSE Manager for retention in the employee's files.

Employees **SHALL** be trained in the following

- ❖ The provisions of the OSHA Hazard Communication Standard and all applicable State regulations.
- ❖ Any operations in employee work areas where hazardous chemicals are present.
- ❖ The location and availability of the **REPOWER USA** written Hazard Communication Program, including the required list(s) of hazardous chemicals and the MSDS.
- ❖ Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area.
- ❖ The physical and health hazards of chemicals in the work area.
- ❖ The measures employees can take for protection from hazards including work practices, emergency procedures and personal protective equipment.
- ❖ Details of the written Hazard Communication Program including an explanation of the labeling systems, the MSDS, and how employees can obtain and use this information.
- ❖ Upon completion of the Hazard Communication Program each employee will be given a test to determine his/her knowledge of the required program contents. The completed test will be filed with the HS&E Manager for retention and documentation.

REPOWER USA shall use the following outline for employee training

NOTE: Training will be offered to Non-English speaking employees in a manner they will be able to comprehend and demonstrate understanding.

- ❖ Provisions of the Hazard Communication Standard.
- ❖ Identification of Exposure.
- ❖ Defining Hazardous Chemicals in the workplace.
- ❖ Hazardous Chemicals Inventory List.
- ❖ Use and Interpretation of Material Safety Data Sheets.
- ❖ Interpretation and Procedures for Labeling
- ❖ Review of Existing Methods of Controlling Workplace Exposures.
- ❖ Proper use of Personal Protective Equipment (PPE).
- ❖ Signs and Symptoms of Chemical Exposure.
- ❖ Procedures for Chemical Exposure (general and site specific).
- ❖ Physical Characteristics of the Hazardous Chemicals.
- ❖ Examination of Program knowledge contents.



Section III Forms & Information

Valid from: November 2008

Section III

7.1.8 RPSHSE – 8

Hazard Communication Program "RIGHT TO KNOW"

Form 7 – Hazard Communication Flow Chart

Hazard Communication Flow of Information Chart

Responsible Generator of Information	Information available to Employer/Employee
Chemical Manufacturers/ Importers	Determine the hazards of each product.
Chemical Manufacturers/ Importers	Communicate the hazard information and the associated protective measures downstream to customers through labeling and the MSDS.
Employers	Identify and list the hazardous chemicals in their work place.
	Obtain from the manufacturers and distributors the MSDS and labels for each hazardous chemical.
	Develop and implement a written Hazard Communication Program based on the list of the chemicals, the MSDS, and label information.
	Communicate hazard information to employees through labeling, the MSDS, and training programs.



Section III Forms & Information

Valid from: November 2008

Section III:

7.1.8 RPSHSE – 8

Hazard Communication Program "RIGHT TO KNOW"

Form 8 – MSDS Acronyms & Definitions

MSDS Acronyms and Definitions

The following glossary presents brief explanations of acronyms and common terms frequently used by chemical manufacturers in their MSDS's

- **ACGIH** American Conference of Governmental Industrial Hygienists is an organization of professional personnel in governmental agencies or educational institutions engaged in occupational safety and health programs. ACGIH establishes recommended occupational exposure limits for chemical substances and physical agents. See TLV.
- **Acid** Any chemical that undergoes dissociation in water with the formation of hydrogen ions. Acids have a sour taste and may cause severe skin burns. Acids turn litmus paper red and have pH values of 0 to 6.
- **Acute Effect** Adverse effect on a human or animal that has severe symptoms developing rapidly and coming quickly to a crisis.
- **Acute Toxicity** Acute effects resulting from a single dose of, or exposure to, a substance. Ordinarily used to denote effects in experimental animals.
- **Adenocarcinoma** A tumor with glandular (secreting) elements.
- **Adenosis** Any disease of a gland.
- **Adhesion** A union of two surfaces that are normally separate.
- **Aerosol** A fine aerial suspension of particles sufficiently small in size to confer some degree of stability from sedimentation (e.g., smoke or fog).
- **Air-Line Respirator** A respirator that is connected to a compressed breathable air source by a hose of small inside diameter. The air is delivered continuously or intermittently in a sufficient volume to meet the wearer's breathing requirements.
- **Air-Purifying Respirator** A respirator that uses chemicals to remove specific gases and vapors from the air or that uses a mechanical filter to remove particulate matter. An air-purifying respirator must only be used when there is sufficient oxygen to sustain life and the air contaminant level is below the concentration limits of the device.
- **Alkali** Any chemical substance that forms soluble soaps with fatty acids. Alkalis are also referred to as bases. They may cause severe burns to the skin. Alkalis turn litmus paper blue and have pH values from 8 to 14.
- **Allergic Reaction** An abnormal physiological response to chemical or physical stimuli. Amenorrhea
Absence of menstruation.
- **Anesthetic** A chemical that causes a total or partial loss of sensation. Overexposure to anesthetics can cause impaired judgment, dizziness, drowsiness, headache, unconsciousness, and even death. Examples include alcohol, paint remover, and degreasers.
- **ANSI** American National Standards Institute is a privately funded, voluntary membership organization that identifies industrial and public needs for national consensus standards and coordinates development of such standards.
- **Antidote** A remedy to relieve, prevent, or counteract the effects of a poison. API American Petroleum Institute is an organization of the petroleum industry.

MSDS Acronyms and Definitions

- **Appearance** A description of a substance at normal room temperature and normal atmospheric conditions. Appearance includes the color, size, and consistency of the material.
- **Aquatic Toxicity** The adverse effect to marine life that result from being exposed to a toxic substance.
- **Asphyxiant** A vapor or gas that can cause unconsciousness or death by suffocation (lack of oxygen). Most simple asphyxiants are harmful to the body only when they become so concentrated that they reduce the oxygen in the air (normally about 21 percent) to dangerous levels (18 percent or lower). Asphyxiation is one of the principle potential hazards of working in confined and enclosed spaces.
- **ASTM** American Society for Testing and Materials is the world's largest source of voluntary consensus Standards for materials, products, systems, and services. ASTM is a resource for sampling and testing methods, health and safety aspects of materials, safe performance guidelines, and the effects of physical and biological and chemical agents.
- **Asymptomatic** Showing no symptoms.
- **Atm** Atmosphere, a unit of pressure equal to 760 mmHg (mercury) at sea level.
- **Atmosphere-Supplying Respirator** A respirator that provides breathable air from a source independent of the surrounding atmosphere. There are two types: air-line and self-contained breathing apparatus.
- **Auto-Ignition Temperature** The temperature to which a closed, or nearly closed container must be heated in order that the flammable liquid, when introduced into the container, will ignite spontaneously or burn.
- **BAL** British Anti-Lewisite - A name for the drug dimecaprol-a treatment for toxic inhalations.
- **Base** A substance that (1) liberate hydroxide (OH) ions when dissolved in water, (2) receives hydrogen ions from a strong acid to form a weaker acid, and (3) neutralizes in acid. Bases react with acids to form salts and water. Bases have a pH greater than 7 and turn litmus paper blue. See Alkali.
- **BCM** Blood-clotting mechanism effects.
- **Benign** Not recurrent or not tending to progress. Not cancerous.
- **Biodegradable** Capable of being broken down into innocuous products by the action of living things.
- **Biopsy** Removal and examination of tissue from the living effects.
- **BLD** Blood effects.

MSDS Acronyms and Definitions

- **Boiling Points-BP** The temperature at which a liquid changes to a vapor state at a given pressure. The boiling point usually expressed in degrees Fahrenheit at sea level pressure (760 mmHg, or one atmosphere). For mixtures, the initial boiling point or the boiling range may be given.

Flammable materials with low boiling points generally present special fire hazards. Some approximate boiling points	
Propane	-44 °F
Anhydrous Ammonia	-28 °F
Butane	31 °F
Gasoline	100 °F
Allyl Chloride	113 °F
Ethylene Glycol	387 °F

- **BOM, or BuMines** Bureau of Mines, U.S. Department of Interior.
- **Bonding** The interconnecting of two objects by means of a clamp and bare wire. Its purpose is to equalize the electrical potential between the objects to prevent a static discharge when transferring a flammable liquid from one container to another. The conductive path is provided by clamps that make contact with the charged object and a low resistance flexible cable which allows the charge to equalize. See Grounding.
- **Bulk Density** Mass of powdered or granulated solid material per unit of volume. C Centigrade, a unit of temperature.
- **Ceiling Limit (PEL or TLV)** The maximum allowable human exposure limit for an airborne substance which is not to be exceeded even momentarily. Also see PEL and TLV.
- **ca** Approximately.
- **CAA** Clean Air Act was enacted to regulate/reduce air pollution. CAA is administered by the U.S. Environmental Protection Agency.
- **Carcinogen** A substance or agent capable of causing or producing cancer in mammals, including humans. A chemical is considered to be a carcinogen if (a) It has been evaluated by the International Agency for Research on Cancer (IARC) and found to be a carcinogen or potential carcinogen; or (b) It is listed as a carcinogen or potential carcinogen in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition); or (c) It is regulated by OSHA as a carcinogen.
- **Carcinogenicity** The ability to produce cancer.
- **Carcinoma** A malignant tumor. A form of cancer.
- **CAS** Chemical Abstracts Service is an organization under the American Chemical Society. CAS abstracts and indexes chemical literature from all over the world in "Chemical Abstracts." "CAS Numbers" are used to identify specific chemicals or mixtures.

MSDS Acronyms and Definitions

- **Caustic** See Alkali.
- **cc** Cubic centimeter is a volume measurement in the metric system that is equal in capacity to one milliliter (ml). One quart is about 946 cubic centimeters.
- **Central Nervous System** The brain and spinal cord. These organs supervise and coordinate the activity of the entire nervous system. Sensory impulses are transmitted into the central nervous system, and motor impulses are transmitted out.
- **CERCLA** Comprehensive Environmental Response, Compensation, and Liability Act of 1980. The Act requires that the Coast Guard National Response Center be notified in the event of a hazardous substance release. The Act also provides for a fund (the Superfund) to be used for the cleanup of abandoned hazardous waste disposal sites.
- **CFR** Code of Federal Regulations. A collection of regulations that have been promulgated under United States Law.
- **Chemical** An element (e.g., chlorine) or a compound (e.g., sodium bicarbonate) produced by chemical reaction.
- **Chemical Cartridge Respirator** A respirator that uses various chemical substances to purify inhaled air of certain gases and vapors. This type of respirator is effective for concentrations no more than ten times the TLV of the contaminant, if the contaminant has warning properties (odor or irritation) below the TLV.
- **Chemical Family** A group of single elements or compounds with a common general name. Example: acetone, methyl ethyl ketone (MEK), and methyl isobutyl ketone (MIBK) are of the "Ketone" family; acrolein, furfural, and acetaldehyde are of the "aldehyde" family.
- **Chemical Name** The name given to a chemical in the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS). The scientific designation of a chemical or a name that will clearly identify the chemical for hazard evaluation purposes.
- **Chemical Pneumonitis** Inflammation of the lungs caused by accumulation of fluids due to chemical irritation.
- **CHEMTREC** Chemical Transportation Emergency Center is a national center established by the Chemical Manufacturers Association to relay pertinent emergency information concerning specific chemicals on requests from individuals. CHEMTREC has a 24-hour toll-free telephone number (800-424-9300) to help respond to chemical transportation emergencies.
- **Chronic Effect** An adverse effect on a human or animal body, with symptoms that develop slowly over a long period of time or that recur frequently. Also see Acute.
- **Chronic Exposure** Long-term contact with a substance.
- **Chronic Toxicity** Adverse (chronic) effects resulting from repeated doses of or exposures to a substance over a relatively prolonged period of time. Ordinarily used to denote effects in experimental animals.
- **Clean Air Act** See CAA
- **Clean Water Act** Federal law enacted to regulate/reduce water pollution. CWA is administered by EPA.

MSDS Acronyms and Definitions

- **CMA** Chemical Manufacturers Association. See CHEMTREC
- **CO** Carbon monoxide is a colorless, odorless, flammable, and very toxic gas produced by the incomplete combustion of carbon. It is also a by-product of many chemical processes. A chemical asphyxiant; it reduces the blood's ability to carry oxygen. Hemoglobin absorbs CO two hundred times more readily than it does oxygen.
- **CO₂** Carbon dioxide is a heavy, colorless gas that is produced by the combustion and decomposition of organic substances and as a by-product of many chemical processes. CO₂ will not burn and is relatively nontoxic (although high concentrations, especially in confined spaces, can create hazardous oxygen-deficient environments).
- **COC** Cleveland Open Cup is a flash point test method.
- **Combustible** A term used by NFPA, DOT, and others to classify certain liquids that will burn, on the basis of flash points. Both NFPA and DOT generally define "combustible liquids" as having a flash point of 100 °F (37.8 °C), but below 200 °F (93.3 °C). Also see "flammable." Non-liquid substances such as wood and paper are classified as "ordinary combustibles" by NFPA.
- **Combustible Liquid** Any liquid having a flash point at or above 100 °F (37.8 °C), but below 200 °F (93.3 °C), except any mixture having components with flashpoints of 200 °F (93.3 °C) or higher, the total volume of which makes up ninety-nine (99) percent or more of the total volume of the mixture.
- **Common Name** Any means used to identify a chemical other than its chemical name (e.g., code name, code number, trade name, brand name, or generic name). See Generic.
- **Compressed Gas:**
 - (a) A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 pounds per square inch (psi) at 70 °F (21.1 °C); or
 - (b) A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130 °F (54.4 °C) regardless of the pressure at 70 °F (21.1 °C); or
 - (c) A liquid having a vapor pressure exceeding 40 psi at 100 °F (37.8 °C) as determined by ASTM D-323-72.
- **Conc** See Concentration.
- **Concentration** The relative amount of a substance when combined or mixed with other substances. Examples: 2 ppm hydrogen sulfide in air, or a 50 percent caustic solution.
- **Conditions to Avoid** Conditions encountered during handling or storage that could cause a substance to become unstable.
- **Confined Space** Any area that has limited openings for entry and exit that would make escape difficult in an emergency, has a lack of ventilation, contains known and potential hazards, and is not intended nor designated for continuous human occupancy.
- **Conjunctivitis** Inflammation of the conjunctiva, the delicate membrane that lines the eyelids and covers the eyeball.
- **Container** Any bag, barrel, bottle, can, cylinder, drum, reactions a hazardous chemical. For the purposes of MSDS or HCS, pipes or piping systems are not considered to be containers.

MSDS Acronyms and Definitions

- **Corrosive** A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact. For example, a chemical is considered to be corrosive if, when tested on the intact skin of albino rabbits by the method described by the DOT in Appendix A to 49 CFR Part 173, it destroys or changes irreversibly the structure of the tissue at the site of contact following an exposure period of four hours. This term shall not refer to action on inanimate surfaces.
- **CPSC** Consumer Products Safety Commission has responsibility for regulating hazardous materials when they appear in consumer goods. For CPSC purposes, hazards are defined in the Hazardous Substances ACT and the Poison Prevention Packaging Act of 1970.
- **Curettage** Cleansing of a diseased surface. Cutaneous Toxicity See "Dermal Toxicity."
- **CWA** Clean Water ACT was enacted to regulate/reduce water pollution. It is administered by EPA.
- **Cyst** A sac containing a liquid. Most cysts are harmless. Cytology The scientific study of cells.
- **Decomposition** Breakdown of a material or substance (by heat, chemical reaction, electrolysis, decay, or other processes) into parts or elements or simpler compounds. Density The mass (weight) per unit volume of a substance. For example, lead is much more dense than aluminum.
- **Depressant** A substance that reduces a bodily functional activity or an instinctive desire, such as appetite.
- **Dermal** Relating to the skin.
- **Dermal Toxicity** Adverse effects resulting from skin exposure to a substance. Ordinarily used to denote effects in experimental animals.
- **DHHS** U.S. Department of Health and Human Services (replaced U.S. Department of Health, Education and Welfare). NIOSH and the Public Health Service (PHS) are part of DHHS.
- **Dike** A barrier constructed to control or confine hazardous substances and prevent them from entering sewers, ditches, streams, or other flowing waters.
- **Dilution Ventilation** Air flow designed to dilute contaminants to acceptable levels. Also see general ventilation or exhaust.
- **DOL** U.S. Department of Labor. OSHA and MSHA are part of DOL.
- **DOT** U.S. Department of Transportation regulates transportation of chemicals and other substances.
- **Dry Chemical** A powered fire-extinguishing agent usually composed of sodium bicarbonate, potassium bicarbonate, etc.
- **Dysmenorrhea** Painful menstruation.
- **Dysplasia** An abnormality of development.
- **Dyspnea** A sense of difficulty in breathing; shortness of breath.
- **Ectopic Pregnancy** The fertilized ovum becomes implanted outside of the uterus.
- **Edema** An abnormal accumulation of clear watery fluid in the tissues.
- **Endocrine Glands** Glands that regulate body activity by secreting hormones.
- **Endometrium** The mucous membrane lining the uterus.
- **Environmental Toxicity** Information obtained as a result of conducting environmental testing designed to study the effects on aquatic and plant life.

MSDS Acronyms and Definitions

- **EPA** U.S. Environmental Protection Agency.
- **Epidemiology** Science concerned with the study of disease in a general population. Determination of the incidence (rate of occurrence) and distribution of a particular disease (as by age, sex, or occupation) which may provide information about the cause of the disease.
- **Epithelium** The covering of internal and external surfaces of the body. Estrogen Principal female sex hormone.
- **Evaporation Rate** The rate at which a material will vaporize (evaporate) when compared to the known rate of vaporization of a standard material. The evaporation rate can be useful in evaluating the health and fire hazards of a material. The designated standard material is usually normal butyl acetate (NBUAC or n-Bu-Ac), with a vaporization rate designated as 1.0. Vaporization rates of other solvents or materials are then classified as:
 - **FAST** evaporating if greater than 3.0. Examples: Methyl Ethyl Ketone = 3.8, Acetone = 5.6, Hexane = 8.3.
 - **MEDIUM** evaporating if 0.8 to 3.0. Examples: 190 proof (95%) Ethyl Alcohol = 1.4, VM&P Naphtha = 1.4, MIBK = 1.6.
 - **SLOW** evaporating if less than 0.8. Examples: Xylene = 0.6, Normal Butyl Alcohol = 0.4, Water = 0.3, Mineral Spirits = 0.1.
- **Explosive** A chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.
- **Exposure or Exposed** State of being open and vulnerable to a hazardous chemical by inhalation, ingestion, skin contact, absorption, or any other course; includes potential (accidental or possible) exposure.
- **Extinguishing Media** The firefighting substance to be used to control a material in the event of a fire. It is usually identified by its generic name, such as fog, foam, water, etc.
- **Eye Protection** Recommended safety glasses, chemical splash goggles, face shield, etc. to be utilized when handling a hazardous material.
- **F Fahrenheit** is a scale for measuring temperature. On the Fahrenheit scale, water boils at 212 °F and freezes at 32 °F.
- **f/cc** Fibers per cubic centimeter of air.
- **FDA** U.S. Food and Drug Administration.
- **Fetal** Pertaining to the fetus.
- **Fetus** The developing young in the uterus from the seventh week of gestation until birth.
- **Fibrosis** An abnormal thickening of fibrous connective tissue, usually in the lungs.
- **FIFRA** Federal Insecticide, Fungicide, and Rodenticide Act requires that certain useful poisons, such as chemical pesticides, sold to the public contain labels that carry health hazard warnings to protect users. It is administered by EPA.
- **First Aid** Emergency measures to be taken when a person is suffering from overexposure to a hazardous material, before regular medical help can be obtained.

MSDS Acronyms and Definitions

- **Flammable** A chemical that includes one of the following categories:
 - (a) "Aerosol, flammable." An aerosol that, when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of the valve opening;
 - (b) "Gas, flammable." (1) A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of 13 percent by volume or less; or (2) A gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than 12 percent by volume, regardless of the lower limit;
 - (c) "Liquid, flammable." Any liquid having a flashpoint below 100 °F (37.8 °C), except any mixture having components with flashpoints of 100 °C (37.8 °C) or higher, the total of which make up 99 percent or more of the total volume of the mixture;
 - (d) "Solid, flammable." A solid, other than a blasting agent or explosive as defined in 1910.109(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. A substance is a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.
- **Flashback** Occurs when flame from a torch burns back into the tip, the torch, or the hose. It is often accompanied by a hissing or squealing sound with a smoky or sharp-pointed flame.
- **Flashpoint** The minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite when tested by the following methods:
 - (a) Tagliabue Closed Tester (see American National Standard Method of Test for Flash Point by Closed Tag Tester, Z11.24-1979 [ASTM D 56-79]).
 - (b) Pensky-Martens Closed Tester (see American National Standard Method of Test for Flash Point by Pensky-Martens Closed Tester, Z11.7-1979 [ASTM D 93-79]).
 - (c) Setaflash Closed Tester (see American National Standard Method of Test for Flash Point by Setaflash Closed Tester [ASTM D 3278-78]).
- **Foreseeable Emergency** Any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which could result in an uncontrolled release of a hazardous chemical into the workplace.
- **Formula** The scientific expression of the chemical composition of a material (e.g., water is H₂O, sulfuric acid is H₂SO₄, sulfur dioxide is SO₂).
- **Fume** A solid condensation of particle of extremely small diameter, commonly generated from molten metal as metal fume.
- **g** Gram is a metric unit of weight. One ounce U.S. (avoirdupois) is about 28.4 grams.
- **General Exhaust** A system for exhausting air containing contaminants from a general work area. Also see Local Exhaust.
- **Generic Name** A designation or identification used to identify a chemical by other than its chemical name (e.g., code name, code number, trade name, and brand name). Genetic Pertaining to or carried by genes. Hereditary.

MSDS Acronyms and Definitions

- **Gestation** The development of the fetus in the uterus from conception to birth; pregnancy.
- **g/kg** Grams per kilogram is an expression of dose used in oral and dermal toxicology testing to denote grams of a substance dosed per kilogram of animal body weight. Also see "kg" (kilogram).
- **Grounding** The procedure used to carry an electrical charge to ground through a conductive path. A typical ground may be connected directly to a conductive water pipe or to a grounding bus and ground rod. See Bonding.
- **Gynecology** The study of the reproductive organs in women.
- **Hand Protection** Specific type of gloves or other hand protection required to prevent harmful exposure to hazardous materials.
- **Hazardous Chemical** Any chemical whose presence or use is a physical hazard or a health hazard.
- **Hazard Warning** Words, pictures, symbols, or combination thereof presented on a label or other appropriate form to inform of the presence of various materials.
- **HCS** Hazardous Communication Standard is an OSHA regulation issued under 29 CFR Part 1910.1200.
- **Health Hazard** A chemical for which there is significant evidence, based on at least one study conducted in accordance with established scientific principles, that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals that are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents that act on the hematopoietic system, and agents that damage the lungs, skin, eyes, or mucous membranes.
- **Hemoglobin** An iron-containing conjugated protein or respiratory pigment occurring in the red blood cells of vertebrates.
- **Hematoma** A blood clot under the surface of the skin.
- **Hematopoietic System** The blood-forming mechanism of the human body.
- **Hematuria** The presence of blood in the urine.
- **Hepatotoxin** A substance that causes injury to the liver.
- **Highly Toxic** A chemical in any of the following categories:
 - (a) A chemical with a median lethal dose (LD50) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
 - (b) A chemical with a median lethal dose (LD50) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbit weighing between 2 and 3 kilograms each.
 - (c) A chemical with a median lethal concentration (LC50) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.
- **Hormones** Act as chemical messengers to body organs.
- **Hyperplasia** Increase in volume of tissue or organ caused by the growth of new cells.
- **IARC** International Agency for Research on Cancer.
- **Ignitable** Capable of being set on fire.
- **Impervious** A material that does not allow another substance to pass through or penetrate it.

MSDS Acronyms and Definitions

- **Incompatible** Materials that could cause dangerous reactions by direct contact with one another.
- **Ingestion** Taking in by the mouth.
- **Inhal** See Inhalation.
- **Inhalation** Breathing in of a substance in the form of a gas, vapor, fume, mist, or dust.
- **Inhibitor** A chemical added to another substance to prevent an unwanted chemical change.
- **Insol** See Insoluble.
- **Insoluble** Incapable of being dissolved in a liquid.
- **Intrauterine** Within the uterus.
- **Irritant** A chemical, which is not corrosive, but which causes a reversible inflammatory effect on living tissue by chemical action at the site of contact. A chemical is a skin irritant if, when tested on the intact skin of albino rabbits by the methods of 16 CFR 1500.41 for 4 hours exposure or by other appropriate techniques, it results in an empirical score of 5 or more. A chemical is an eye irritant if so determined under the procedure listed in 16 CFR 1500.42 or other appropriate techniques.
- **Irritating** As defined by DOT, a property of a liquid or solid substance which, upon contact with fire or exposed to air, gives off dangerous or intensely irritating fumes (not including poisonous materials). See Poison, Class A and Poison, Class B.
- **kg** Kilogram is a metric unit of weight, about 2.2 U.S. pounds. Also see "g/kg", "g", and "mg".
- **L** Liter is a metric unit of capacity. A U.S. quart is about 9/10 of a liter.
- **Lacrimation** Secretion and discharge of tears.
- **Label** Notice attached to a container, bearing information concerning its contents.
- **Lactation** The secretion of milk by the breasts.
- **LC** Lethal concentration is the concentration of a substance being tested that will kill.
- **LCL** Lethal concentration, low, lowest concentration of a gas or vapor capable of killing a specified species over a specified time.
- **LC₅₀** The concentration of a material in air that will kill 50 percent of a group of test animals with a single exposure (usually 1 to 4 hours). The LC₅₀ is expressed as parts of material per million parts of air, by volume (ppm) for gases and vapors, or as micrograms of material per liter of air (g/l) or milligrams of material per cubic meter of air (mg/m³) for dusts and mists, as well as for gases and vapors.
- **LD** Lethal dose is the quantity of a substance being tested that will kill.
- **LDL** Lethal dose low, lowest administered dose of a material capable of killing a specified test species.
- **LD₅₀** A single dose of material expected to kill 50 percent of a group of test animals. The LD₅₀ dose is usually expressed as milligrams or grams of material per kilogram of animal body weight (mg/kg or g/kg). The material may be administered by mouth or applied to the skin.
- **LEL or LFL** Lower explosive limit, or lower flammable limit, of a vapor or gas; the lowest concentration (lowest percentage of the substance in air) that will produce a flash of fire when an ignition source (heat, arc, or flame) is present. At concentrations lower than the LEL, the mixture is too "lean" to burn. Also see "UEL".
- **Lesion** Any damage to a tissue.
- **Lfm** Linear feet per minute, a unit of air velocity.

MSDS Acronyms and Definitions

- **Local Exhaust** A system for capturing and exhausting contaminants from the air at the point where the contaminants are produced (welding, grinding, sanding, other processes or operations). Also see General Exhaust.
- **M** Meter is a unit of length in the metric system. One meter is about 39 inches.
- **M³** Cubic meter is a metric measure of volume, approximately 35.3 cubic feet or 1.3 cubic yards.
- **Malaise** A feeling of general discomfort, distress, or uneasiness, an out-of-sorts feeling.
- **Malignant** Tending to become progressively worse and to result in death.
- **Mammary** Pertaining to the breast.
- **Mechanical Exhaust** A powered device, such as a motor-driven fan or air stream venturi tube, for exhausting contaminants from a workplace, vessel, or enclosure.
- **Mechanical Filter Respirator** A respirator used to protect against airborne particulate matter like dusts, mists, metal fume, and smoke. Mechanical filter respirators do not provide protection against gases, vapors, or oxygen deficient atmospheres.
- **Melting Point** The temperature at which a solid substance changes to a liquid state.
- **Menorrhagia** Excessive menstruation.
- **Menstruation** Periodic discharge of blood from the vagina of a nonpregnant uterus.
- **Metabolism** Physical and chemical processes taking place among the ions, atoms, and molecules of the body.
- **Metastasis** The transfer of disease from one organ or part to another not directly connected with it.
- **Meter** A unit of length; equivalent to 39.37 inches.
- **mg** Milligram is a metric unit of weight that is one-thousandth of a gram.
- **mg/kg** Milligrams of a substance per kilogram of body weight is an expression of toxicological dose.
- **mg/m³** Milligrams per cubic meter is a unit for expressing concentrations of dusts, gases, or mists in air.
- **Micron (Micrometer)** A unit of length equal to one-millionth of a meter; approximately 0.000039 of an inch.
- **Mist** Suspended liquid droplets generated by condensation from the gaseous to the liquid state, or by breaking up a liquid into a dispersed state, such as splashing, foaming or atomizing. Mist is formed when finely divided liquid is suspended in air.
- **Mixture** Any combination of two or more chemicals if the combination is not, in whole or in part, the result of a chemical reaction.
- **Mild** Mild.
- **ml** Milliliter is a metric unit of capacity, equal in volume to 1 cubic centimeter (cc), or approximately one-sixteenth of a cubic inch. One-thousandth of a liter.
- **mmHg** Millimeters of mercury (Hg) is a unit of measurement for low pressures or partial vacuums.
- **Molecular Weight** Weight (mass) of a molecule based on the sum of the atomic weights of the atoms that make up the molecule.
- **mppcf** Million particles per cubic foot is a unit for expressing concentration of particles of a substance suspended in air. Exposure limits for mineral dusts (silica, graphite, Portland cement, nuisance dusts, and others), formerly expressed as mppcf, are now more commonly expressed as mg/m³.

MSDS Acronyms and Definitions

- **MSDS** Material Safety Data Sheet.
- **MSHA** Mine Safety and Health Administration, U.S. Department of Labor.
- **Mutagen** A substance or agent capable of altering the genetic material in a living cell.
- **MW** See Molecular Weight.
- **N₂** Nitrogen is a colorless, odorless, and tasteless gas that will not burn and will not support combustion. The earth's atmosphere (air) is about 78 percent nitrogen. At higher concentrations, nitrogen can displace oxygen and become a lethal asphyxiant. See Asphyxiant.
- **Narcosis** A state of stupor, unconsciousness, or arrested activity produced by the influence of narcotics or other chemicals.
- **Nausea** Tendency to vomit, feeling of sickness at the stomach.
- **NCI** National Cancer Institute is that part of the National Institutes of Health that studies cancer causes and prevention as well as diagnosis, treatment, and rehabilitation of cancer patients.
- **NFPA** National Fire Protection Association is an international membership organization which promotes/improves fire protection and prevention and establishes safeguards against loss of life and property by fire. Best known on the industrial scene for the National Fire Codes - 16 volumes of codes, standards, recommended practices and manuals developed (and periodically updated) by NFPA technical committees. Among these is NFPA 704M, the code for showing hazards of materials as they might be encountered under fire or related emergency conditions, using the familiar diamond-shaped label or placard with appropriate numbers or symbols.
- **Neo** See Neoplasia.
- **Neonatal** The first four weeks after birth.
- **Neoplasia** A condition characterized by the presence of new growths (tumors).
- **Nephrotoxin** A substance that causes injury to the kidneys.
- **Neurotoxin** A material that affects the nerve cells and may produce emotional or behavioral abnormalities.
- **Neutralize** To eliminate potential hazards by inactivating strong acids, caustics, and oxidizers. For example, acids can be neutralized by adding an appropriate amount of caustic substance to the spill.
- **ng** nanogram, one-billionth of a gram.
- **NIOSH** National Institute for Occupational Safety and Health, U.S. Public Health Service, U.S. Department of Health and Human Services (DHHS), among other activities, tests and certifies respiratory protective devices and air sampling detector tubes, recommends occupational exposure limits for various substances, and assists OSHA and MSHA in occupational safety and health investigations and research.
- **Nonflammable** Not easily ignited, or if ignited, not burning rapidly.
- **Non-Sparking Tools** Tools made from beryllium-copper or aluminum-bronze greatly reduce the possibility of igniting dusts, gases, or flammable vapors. Although these tools may emit some sparks when striking metal, the sparks have a low heat content and are not likely to ignite most flammable liquids.

MSDS Acronyms and Definitions

- **NO_x** Oxides of nitrogen which are undesirable air pollutants. NO emissions are regulated by EPA under the Clean Air Act.
- **NPIRS** National Pesticide Information Retrieval System is an automated data base operated by Purdue University containing information on EPA registered pesticides, including reference file MSDS's.
- **NRC** National Response Center is a notification center that must be called when significant oil or chemical spills or other environment-related accidents occur. The toll-free number is 1-800-424-8802.
- **NTP** National Toxicology Program. The NTP publishes an Annual Report on Carcinogens. Odor A description of the smell of the substance.
- **Odor Threshold** The lowest concentration of a substance's vapor, in air, that can be smelled.
- **Olfactory** Relating to the sense of smell.
- **Oral** Used in or taken into the body through the mouth.
- **Oral Toxicity** Adverse effects resulting from taking a substance into the body by mouth. Ordinarily used to denote effects in experimental animals.
- **Organic Peroxide** An organic compound that contains the bivalent -O-O structure and may be considered a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms has been replaced by an organic radical.
- **Organogenesis** The formation of organs during development.
- **OSHA** Occupational Safety and Health Administration, U.S. Department of Labor.
- **Ovary** The female sex gland in which ova are formed.
- **Overexposure** Exposure to a hazardous material beyond the allowable exposure limits.
- **Oxidation** In a literal sense, oxidation is a reaction in which a substance combines with oxygen provided by an oxidizer or oxidizing agent. See Oxidizing Agent.
- **Oxidizing Agent** A chemical or substance that brings about an oxidation reaction. The Agent may:
 - 1) Provide the oxygen to the substance being oxidized (in which case the agent has to be oxygen or contain oxygen); or
 - 2) It may receive electrons being transferred from the substance undergoing oxidation (chlorine is a good oxidizing agent for electron-transfer purposes, even though it contains no oxygen).
- **Pathologic** Pertaining to or caused by disease. Pathology Scientific study of alterations produced by disease.
- **PEL** Permissible Exposure Limit is an occupational exposure limit established by OSHA's regulatory authority. It may be a time-weighted average (TWA) limit or a maximum concentration exposure limit.
- **Percent Volatile** Percent volatile by volume is the percentage of a liquid or solid (by volume) that will evaporate at an ambient temperature of 70° F (unless some other temperature is specified). Examples: butane, gasoline, and paint thinner (mineral spirits) are 100 percent volatile; their individual evaporation rates vary, but in time, each will evaporate completely.
- **pH** The symbol relating to the hydrogen ion (H⁺) concentration to that of a given standard solution. A pH of 7 is neutral. Numbers increasing from 7 to 14 indicate greater alkalinity. Numbers decreasing from 7 to 0 indicate greater acidity.

MSDS Acronyms and Definitions

- **Physical Hazard** Means a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.
- **Placenta** A structure that grows on the wall of the uterus during pregnancy, through which the fetus is nourished.
- **PMCC** Pensky-Martens Closed Cup. See Flashpoint.
- **Pneumoconiosis** A condition of the lung in which there is permanent disposition of particulate matter and the tissue reaction to its presence. It may range from relatively harmless forms of iron oxide deposition to destructive forms of silicosis.
- **Poison, Class A** A DOT term for extremely dangerous poisons-poisonous gases or liquids that, in very small amounts, either as gas or as vapor of the liquid, mixed with air, are dangerous to life. Examples: phosgene, cyanogen, hydrocyanic acid, nitrogen peroxide.
- **Poison, Class B** A DOT term for liquid, solid, paste or semisolid substance-other than Class A poisons or irritating materials-that are known (or presumed on the basis of animal tests) to be so toxic to humans that they are a hazard to health during transportation.
- **Polymerization** A chemical reaction in which one or more small molecules combine to form larger molecules. A hazardous polymerization is such a reaction that takes place at a rate that releases large amounts of energy. If hazardous polymerization can occur with a given material, the MSDS usually will list conditions that could start the reaction and since the material usually contains a polymerization inhibitor-the length of time during which the inhibitor will be effective.
- **ppb** Parts per billion is the concentration of a gas or vapor in air-parts (by volume) of the gas or vapor in a billion parts of air. Usually used to express extremely low concentrations of unusually toxic gases or vapors; also the concentration of a particular substance in a liquid or solid.
- **ppm** Parts per million is the concentration of a gas or vapor in air-parts (by volume) of the gas or vapor in a million parts of air; also the concentration of a particulate in a liquid or solid.
- **Prenatal** Preceding birth.
- **psi** Pounds per square inch (for MSDS purposes) is the pressure a material exerts on the walls of a confining vessel or enclosure. For technical accuracy, pressure must be expressed as psig (pounds per square inch gauge) or psia (pounds per square inch absolute; that is, gauge pressure plus sea level atmospheric pressure, or psig plus approximately 14.7 pounds per square inch). Also see mmHg.
- **Pul** See Pulmonary.
- **Pulmonary** Relating to, or associated with, the lungs.
- **Pulmonary Edema** Fluid in the lungs.
- **Pyrophoric** A chemical that will ignite spontaneously in air at a temperature of 13 °F (54.4 °C) or below.
- **Reaction** A chemical transformation or change. The interaction of two or more substances to form new substances.
- **Reactive** See Unstable.

MSDS Acronyms and Definitions

- **Reactivity** Chemical reaction with the release of energy. Undesirable effects-such as pressure buildup, temperature increase, formation of noxious, toxic, or corrosive byproducts-may occur because of the reactivity of a substance to heating, burning, direct contact with other materials, or other conditions in use or storage.
- **Reducing Agent** In a reduction reaction (which always occurs simultaneously with an oxidation reaction) the reducing agent is the chemical or substance which (1) combines with oxygen or (2) loses electrons to the reaction. See Oxidation.
- **REL** The NIOSH REL (Recommended Exposure Limit) is the highest allowable airborne concentration which is not expected to injure the workers. It may be expressed as a ceiling limit or as a time-weighted average (TWA).
- **Reproductive Toxin** Substances that affect either male or female reproductive systems and may impair the ability to have children.
- **Respiratory Protection** Devices that will protect the wearer's respiratory system from overexposure by inhalation to airborne contaminants. Respiratory protection is used when a worker must work in an area where he/she might be exposed to concentration in excess of the allowable exposure limit.
- **Respiratory System** The breathing system that includes the lungs and the air passages (trachea or windpipe, larynx, mouth, and nose) to the air outside the body, plus the associated nervous and circulatory supply.
- **Routes of Entry** The means by which material may gain access to the body, for example, inhalation, ingestion, and skin contact.
- **RCRA** Resource Conservation and Recovery Act is environmental legislation aimed at controlling the generation, treating, storage, transportation, and disposal of hazardous wastes. It is administered by EPA.
- **Sarcoma** A tumor that is often malignant.
- **Self-Contained Breathing Apparatus** A respiratory protection device that consists of a supply or a means of respirable air, oxygen, or oxygen-generating material, carried by the wearer.
- **Sensitizer** A chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical.
- **SETA** Setaflash Closed Tester. See Flashpoint.
- **Silicosis** A disease of the lungs (fibrosis) caused by the inhalation of silica dust.
- **Skn** Skin.
- **"Skin"** A notation (sometimes used with PEL or TLV exposure data) that indicates the stated substance may be absorbed by the skin, mucous membranes, and eyes-either airborne or by direct contact-and that this additional exposure must be considered part of the total exposure to avoid exceeding the PEL or TLV for the substance.
- **Skin Absorption** Ability of some hazardous chemicals to pass directly through the skin and enter the bloodstream.
- **Skin Sensitizer** See Sensitizer.

MSDS Acronyms and Definitions

- **Skin Toxicity** See Dermal Toxicity.
- **Solubility in Water** A term expressing the percentage of a material (by weight) that will dissolve in water at ambient temperature. Solubility information can be useful in determining spill cleanup methods and re-extinguishing agents and methods for materials.
- **Solvent** A substance, usually a liquid, in which other substances are dissolved. The most common solvent is water.
- **SO₂** Oxides of sulfur.
- **Species** On the MSDS's, species refers to the test animals-usually rats, mice, or rabbits-used to obtain the toxicity test data reported.
- **Specific Chemical Identity** The chemical name, Chemical Abstracts Service (CAS) Registry Number, or any precise chemical designation of a substance.
- **Specific Gravity** The weight of a material compared to the weight of an equal volume of water is an expression of the density (or heaviness) of a material. Insoluble materials with specific gravity of less than 1.0 will float in (or on) water. Insoluble materials with specific gravity greater than 1.0 will sink in water. Most (but not all) flammable liquids have a specific gravity less than 1.0 and, if not soluble, will float on water-an important consideration for fire suppression.
- **Spill or Leak Procedures** The methods, equipment, and precautions that should be used to control or clean up a leak or spill.
- **Splash-Proof Goggles** Eye protection made of a noncorrosive material that fits snugly against the face, and has indirect ventilation ports.
- **Spontaneously Combustible** A material that ignites as a result of retained heat from processing, or that will oxidize to generate heat and ignite, or that absorbs moisture to generate heat and ignite.
- **Squamous** Scaly or plate-like.
- **Stability** The ability of a material to remain unchanged. For MSDS purposes, a material is stable if it remains in the same form under expected and reasonable conditions of storage or use. Conditions that may cause instability (dangerous change) are stated; for example, temperatures above 150 °F; shock from dropping.
- **STEL** Short-Term Exposure Limit (ACGIH terminology). See TLV.
- **Stenosis** Narrowing of a body passage or opening.
- **Steroid** A complex molecule among which are the male and female sex hormones.
- **Subcutaneous** Beneath the layers of the skin.
- **Supplied-Air Respirators** Air line respirators of self-contained breathing apparatus.
- **Sys** System or systemic.
- **Systemic Poison** A poison that spreads throughout the body, affecting all body Systems and organs. Its adverse effect is not localized in one spot or area.
- **Systemic Toxicity** Adverse effects caused by a substance that affects the body in a general rather than local manner.
- **Synonym** Another name or names by which a material is known. Methyl alcohol, for example, is known as methanol or wood alcohol.

MSDS Acronyms and Definitions

- **Target Organ Effects** The following is a target organ categorization of effects that may occur, including examples of signs and symptoms and chemicals that have been found to cause such effects. These examples are presented to illustrate the range and diversity of effects and hazards found in the workplace, and the broad scope employers must consider in this area, but they are not intended to be all inclusive.

(a) Hepatotoxins	Chemicals that produce liver damage.
Signs and Symptoms	Jaundice; liver enlargement.
Chemicals	Carbon tetrachloride; nitrosamines.
(b) Nephrotoxins	Chemicals that produce kidney damage.
Signs and Symptoms	Edema; proteinuria.
Chemicals	Halogenated hydrocarbons; uranium.
(c) Neurotoxins	Chemicals that produce their primary toxic effects on the nervous system.
Signs and Symptoms	Narcosis; behavioral changes; decrease in motor functions.
Chemicals	Mercury; carbon disulfide.

(d) Agents that act on blood hematopoietic system	Decrease in hemoglobin function; deprive the body tissues of oxygen.
Signs and Symptoms	Cyanosis; loss of consciousness.
Chemicals	Carbon monoxide; cyanides.
(e) Agents that damage the lung	Chemicals that irritate or damage the pulmonary tissue.
Signs and Symptoms	Cough; tightness in chest; shortness of breath.
Chemicals	Silica; asbestos.
(f) Reproductive toxins	Chemicals that adversely affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis).
Signs and Symptoms	Birth defects; sterility.
Chemicals	Lead; DBCP.
(g) Cutaneous hazards	Chemicals that affect the dermal layer of the body.
Signs and Symptoms	Defatting of the skin; rashes, irritation

Chemicals	Ketones; chlorinated compounds.
(h) Eye hazards	Chemicals that effect the eye or visual capacity.
Signs and Symptoms	Conjunctivitis; corneal damage.
Chemicals	Organic solvents; acids.

- **Target Organ Toxin** A toxic substance that attacks a specific organ of the body. For example, overexposure to carbon tetrachloride can cause liver damage.
- **TCC Tag (Tagliabue) Closed Cup.** See Flashpoint.
- **TCL** Toxic concentration low, the lowest concentration of a gas or vapor capable of producing a defined toxic effect in a specified test species over a specified time.
- **TDL** Toxic dose low, lowest administered dose of a material capable of producing a defined toxic effect in a specified test species.
- **Temp** Temperature.
- **Ter** See Teratogen.
- **Teratogen** A substance or agent, exposure to which by a pregnant female can result in malformations in the fetus.
- **Tfx** Toxic effect(s).
- **TLV** Threshold Limit Value is a term used by ACGIH to express the airborne concentration of material to which nearly all persons can be exposed day after day without adverse effects. ACGIH expresses TLV's in three different ways:
 - **TLV-TWA:** The allowable Time-Weighted Average concentration for a normal 8 hour workday or 80-hour workweek.
 - **TLV-STEL:** The Short-Term Exposure Limit, or maximum concentration for a continuous 15-minute exposure period (maximum of four such periods per day, with at least 60 minutes between exposure periods, and provided the daily TLV-TWA is not exceeded).
 - **TLV-C:** The ceiling exposure limit-the concentration that should not be exceeded even instantaneously.
- **TOC Tag Open Cup.** See Flashpoint.

MSDS Acronyms and Definitions

- **Torr** A unit of pressure, equal to 1/760 atmosphere.
- **Toxic** A chemical falling within any of the following categories:
 - (a) A chemical that has a median lethal dose (LD₅₀) of more than 50 milligrams per kilogram but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
 - (b) A chemical that has a median lethal dose (LD₅₀) of more than 200 milligrams per kilogram but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each.
 - (c) A chemical that has a median lethal concentration (LC50) in air of more than 200 parts per million but not more than 2,000 parts per million by volume of gas or vapor, or more than two milligrams per liter but not more than 20 milligrams per liter of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.
- **Toxic Substance** Any substance that can cause acute or chronic injury to the human body, or which is suspected of being able to cause diseases or injury under some conditions.
- **Toxicity** The sum of adverse effects resulting from exposure to a material, generally, by the mouth, skin, or respiratory tract.
- **Trade Name** The trademark name or commercial trade name for a material or product.
- **transplacental** An agent that causes physical defects in the developing embryo.
- **TSCA** Toxic Substances Control Act (Federal Environmental Legislation administered by EPA) regulates the manufacture, handling, and use of materials classified as "toxic substances".
- **TWA** Time-Weighted Average exposure is the airborne concentration of a material to which a person is exposed, averaged over the total exposure time—generally the total workday (8 to 12 hours). Also see TLV.
- **UEL or UFL** Upper explosive limit or upper flammable limit of a vapor or gas; the highest concentration (highest percentage of the substance in air) that will produce a flash of fire when an ignition source (heat, arc, or flame) is present. At higher concentrations, the mixture is too "rich" to burn. Also see LEL.
- **ug** Microgram, one-millionth of a gram.
- **Unstable** Tending toward decomposition or other unwanted chemical change during normal handling or storage.
- **Unstable Reactive** A chemical that, in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or become self-reactive under conditions of shocks, pressure, or temperature.
- **USDA** U.S. Department of Agriculture.
- **Vapor** The gaseous form of a solid or liquid substance as it evaporates.

MSDS Acronyms and Definitions

- **Vapor Density** The weight of a vapor or gas compared to the weight of an equal volume of air is an expression of the density of the vapor or gas. Materials lighter than air have vapor densities less than 1.0 (examples: acetylene, methane, hydrogen). Materials heavier than air (examples: propane, hydrogen sulfide, ethane, butane, chlorine, sulfur dioxide) have vapor densities greater than 1.0. All vapors and gases will mix with air, but the lighter materials will tend to rise and dissipate (unless confined). Heavier vapors and gases are likely to concentrate in low places - along or under floors, in sumps, sewers, and manholes, in trenches and ditches - where they may create health hazards or fires.
- **Vapor Pressure** The pressure exerted by a saturated vapor above its own liquid in a closed container. When quality control tests are performed on products, the test temperature is usually 100 °F, and the vapor pressure is expressed as pounds per square inch (psig or psia), but vapor pressures reported as MSDS's are in millimeters of mercury (mmHg) at 68 °F (20 °C), unless stated otherwise. Three facts are important to remember:
 1. Vapor pressure of a substance at 100 °F will always be higher than the vapor pressure of the substance at 68 °F (20 °C).
 2. Vapor pressures reported on MSDS's in mmHg are usually very low pressures; 760 mmHg is equivalent to 14.7 pounds per square inch.
 3. The lower the boiling point of a substance, the higher its vapor pressure. Ventilation See General Exhaust, Local Exhaust, and Mechanical Exhaust.
- **Vermiculite** An expanded mica (hydrated magnesium-aluminum-iron silicate) used as sorbent for spill control and cleanup.
- **Viscosity** The tendency of a fluid to resist internal flow without regard to its density. Volatility A measure of how quickly a substance forms a vapor at ordinary temperatures.
- **Water Disposal Methods** Proper disposal methods for contaminated material, recovered liquids or solids, and their containers.
- **Water Reactive** A chemical that reacts with water to release a gas that is either flammable or presents a health hazard.
- **Work Area** A room or defined space in a workplace where hazardous chemicals are produced or used, and where employees are present.
- **Workplace** An establishment at one geographical location containing one or more work areas.
- **Zinc Fume Fever** A condition brought on by inhalation of zinc oxide fume characterized by flu-like symptoms with a metallic taste in the mouth, coughing, weakness, fatigue, muscular pain, and nausea, followed by fever and chills. The onset of symptoms occurs four to twelve hours after exposure.



Section III RPSHSE 7.1.9

Valid from: November 2008

Revision Profile

Rev.	Date	Name	Approval Signature	Remarks
0	11/08	Owens O'Quinn QHSSE Consultant	On File	ORIGINAL
0	11/08	Tammy Conekin	On File	ORIGINAL
1				
2				
3				
4				
5				

Original Review Progress

Date	Reviewer	Signature
11/08	J.K. Barrilleaux – Grammar/Technical Format <i>Evergreen QHSSE Solutions LLC</i>	On File
11/08	Owens O'Quinn – QHSSE Consultant <i>Evergreen QHSSE Solutions LLC</i>	On File
11/08	Tammy Conekin – Head of Service	On File



Section III 7.1.9 WGHSE – 9
Hazardous Waste Operation (HAZWOPER)

Contents

Section	Topic	Page No.
1.0	Introduction	3
2.0	General	3
3.0	Definitions	4

1.0 Introduction

In review of the **REPOWER USA** general Scope of Work, it is obvious that **REPOWER USA** employees will be involved in Hazardous Waste Operation and Emergency Response at various facilities. Therefore, this Policy and Procedure is to ensure each **REPOWER USA** employee has the appropriate level of Training knowledge to meet the Occupational Safety and Health Administration (OSHA) and the Environmental Protection Agency (EPA) requirements for required Training.

The following summarizes the involvement level of **REPOWER USA** employees at various Facilities.

1.1 The HAZWOPER training requirements for on-site workers who are not directly involved in cleanup activities are:

Workers, such as utility workers who must perform duties at a Hazardous Waste Site not yet characterized but where contamination is expected, fall under the scope of **29 CFR 1910.120**. These workers must work under the direction of an on-site supervisor and have a site-specific safety and health plan and must be fully trained and protected pursuant to the Occupational Safety and Health Administration (OSHA) **HAZWOPER** standard. When additional information becomes available through site characterization, which verifies that there is minimal or no risk of employee exposure to hazardous substances, a lesser degree of Personal Protective Equipment (PPE) and worker training may be acceptable.

When site characterization shows that the area to be serviced by workers is free of potential exposure or the proposed work assignments would not expose any of the work crew to hazardous substances, the activity can be carried out as a normal maintenance or construction operation.

The utility contractor is bound to provide at least the minimum number of training hours specified. On a Hazardous Waste Site that has many site-specific peculiarities the employer may need to train employees beyond the 24 to 40 hour minimum set by this policy and procedure. Employees must be provided with the training that prepares them for their job functions and responsibilities, as stated in the general requirements in **29 CFR 1910.120(e)**.

2.0 General

The Hazardous Waste Operations address those operations that have been identified by OSHA or EPA as Hazardous Waste Sites. When an employer can successfully demonstrate that their operation does not involve employee exposure or the reasonable possibility for employee exposure to a HSE hazard they may fall under the identified exceptions as outlined in **29 CFR 1910 and 1926**.

All the requirements of **Part 1910 and Part 1926 of Title 29 of the Code of Federal Regulations** apply pursuant to their terms to Hazardous Waste and Emergency Response Operations whether covered by these sections or not. If there is a conflict or overlap, the provision more protective of employee HSE shall apply without regard to **29 CFR 1910.5(c)(1)**.

Employers who are not required to have a permit or interim status because they are conditionally exempt small quantity generators under **40 CFR 261.5** or are generators who qualify under **40 CFR 262.34** for exemptions from regulation under **40 CFR Parts 264, 265, and 270** (excepted employers) are not covered by **29 CFR 1910.120(p)(1)** through **(p)(7)**. Exempted employers who are required by the Environmental Protection Agency (EPA) or the applicable country, federal, or state agency to have their employees engage in Emergency Response or who direct their employees to engage in Emergency Response are covered by **29 CFR 1910.120 (p)(8)** and cannot be exempted by **29 CFR 1910.120 (p)(8)(i)**.

3.0 Definitions

3.1 Buddy System

A system of organizing employees into work groups in such a manner that each employee of the work group is observed by at least one other employee in the work group. The purpose of the **Buddy System** is to provide rapid assistance to employees in the event of an emergency.

3.2 Clean-up Operation

An operation where hazardous substances are removed, contained, incinerated, neutralized, stabilized, cleared-up, or in any other manner processed or handled with the ultimate goal of making the site safer for people and/or the environment.

3.3 Decontamination

The removal of hazardous substances from employees and their equipment to the extent necessary to preclude the occurrence of foreseeable adverse health effects.

3.4 Emergency Response or Responding to Emergencies

A response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual aid groups, local fire departments, etc.) to an occurrence which results, or is likely to result, in an uncontrolled release of a hazardous substance.

NOTE: Responses to incidental releases of hazardous substances where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area or by maintenance personnel are not considered emergency responses within the scope of **29 CFR 1910.120**. Responses to releases of hazardous substances where there is no potential HSE hazard (i.e., fire, explosion, or chemical exposure) are also not considered emergency responses.

3.5 Facility

(a) any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly owned treatment works), well, pit pond, lagoon, impoundment, ditch, storage container, motor vehicle, rolling stock or aircraft, or (b) any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise came to be located.

NOTE: This does not include any consumer product in consumer use or any water-borne vessel.

3.6 Hazardous Materials Response (HAZMAT) Team

An organized group of employees, designated by the employer, who are expected to perform work to handle and control the actual or potential leaks or spills of hazardous substances and requiring possible close approach to the substance. The team members perform responses to the releases or potential releases of hazardous substances for the purpose of the control or stabilization of the incident. A **HAZMAT** team is not a fire brigade nor is a typical fire brigade a **HAZMAT** team, however, the team may be a separate component of a fire brigade or fire department.

3.7 Hazardous Substance

Any substance designated or listed under (a) through (d) of this definition, and when exposed, it results or may result in adverse effects on the health and safety of employees:

- (a) Any substances defined under **Section 101 (9) of CERCLA**.
- (b) Any biologic agent and other disease causing agent which, after the release into the environment and upon the exposure, ingestion, inhalation, or assimilation into an person either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be expected to cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction), or physical deformities in such persons or their offspring.
- (c) Any substance listed by the U.S. Department of Transportation (DOT) as hazardous materials under **49 CFR 172.101** and appendices.
- (d) Hazardous Waste as herein defined:
Hazardous Waste
 - (a) A waste or combination of wastes as defined in **40 CFR 261.3**
 - (b) those substances defined as hazardous wastes in **49 CFR 171.8**

3.8 Hazardous Waste Operation

Any operation conducted within the scope of **29 CFR 1910.120**.

3.9 Hazardous Waste Site

Any facility or location within the scope of **29 CFR 1910.120** at which hazardous waste operations take place.

3.10 Health Hazard

Any chemical, mixture of chemicals, or a pathogen for which there is statistically significant evidence, based on at least one study conducted in accordance with the established scientific principles, that acute or chronic health effects may occur in exposed employees. The term **health hazard** includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, and/or mucous membranes. It also includes stress due to temperature extremes. Further definitions of the terms used above can be found in **Appendix A of 29 CFR 1910.1200**.

3.11 Immediately Dangerous to Life and Health (IDLH)

Any atmospheric concentration of any toxic, corrosive, or asphyxiant substance that poses an immediate threat to life or would interfere with an individual's ability to escape from a dangerous atmosphere.

3.12 Oxygen deficiency

Any concentration of oxygen, by volume, below which atmosphere supplying respiratory protection must be provided. It exists in atmospheres where the percentage of oxygen, by volume, is less than 19.5% oxygen.

3.13 Permissible Exposure Level

The exposure, inhalation, or dermal permissible exposure limit specified in **29 CFR 1910, Subpart G and Z**.

3.9 Published Exposure Level

Any exposure limits published in "**NIOSH Recommendations for Occupational Health Standards**", dated 1986, which is incorporated by reference as specified in **29 CFR 1910.6**, or if none is specified, the exposure limits published in the standards specified by the **American Conference of Governmental Industrial Hygienists** in their publication "**Threshold Limit Values and Biological Exposure Indices for 1987-88**", dated 1987, which is incorporated by reference as specified in **29 CFR 1910.6**.

3.15 Post Emergency Response

Any portion of an emergency response performed after the immediate threat of a release has been stabilized or eliminated and the clean up of the site has begun. If the post emergency response is performed by the employer's own employees who were part of the initial emergency response, it is considered to be part of the initial response and not post emergency response. However, if a group of the employer's own employees, separate from the group providing the initial response, performs the clean-up operation then the separate group of employees would be performing the post-emergency response and subject to **Paragraph (q)(11) of this section of 29 CFR 1910.120**.

3.16 Qualified Person (QP)

Any person with specific training, knowledge, and experience in the area for which the person has the responsibility and the authority to control.

3.17 Site Safety and Health Supervisor (or official)

The individual located on a hazardous waste site who is responsible to the employer and has the authority and knowledge necessary to implement the site's Safety and Health Plan and verify compliance with the applicable safety and health requirements.

3.18 Small Quantity Generator


A generator of hazardous wastes who, in any calendar month, generates no more than 1,000 kilograms (2,205 pounds) of hazardous waste in that month.

3.19 Uncontrolled Hazardous Waste Site

Any area identified as an uncontrolled hazardous waste site by a governmental body, whether Federal, State, Local, or other or where an accumulation of hazardous substances creates a threat to the health and safety of individuals or the environment or both. Some sites are found on public lands such as those created by former municipal, county, or state landfills where illegal or poorly managed waste disposal has taken place. Other sites are found on private property, often belonging to generators or former generators of hazardous substance wastes.

❖ Examples

Are items such as, but not limited to, surface impoundments, landfills, dumps, and tank or drum farms.

	Section III RPSHSE 7.1.9A	Valid from: November 2008
---	--------------------------------------	---------------------------


Revision Profile

Rev.	Date	Name	Approval Signature	Remarks
0	11/08	Owens O'Quinn QHSSE Consultant	On File	ORIGINAL
0	11/08	Tammy Conekin	On File	ORIGINAL
1				
2				
3				
4				
5				

Original Review Progress

Date	Reviewer	Signature
11/08	J.K. Barrilleaux – Grammar/Technical Format <i>Evergreen QHSSE Solutions LLC</i>	On File
11/08	Owens O'Quinn – QHSSE Consultant <i>Evergreen QHSSE Solutions LLC</i>	On File
11/08	Tammy Conekin – Head of Service	On File



	Section III RPSHSE 7.1.9A	Valid from: November 2008
---	--	---------------------------

Section III 7.1.9A – RPSHSE – 9A
Emergency Action Plan

Contents

Section	Topic	Page No.
1.0	Introduction	3
2.0	Purpose	3
3.0	Identification of Emergency	4
4.0	General Guidelines	4
5.0	Emergency Response Procedures	5
6.0	Evacuation Procedures	6
7.0	General Procedures	7
8.0	Alarm Descriptions	7
9.0	Training	7

1.0 Introduction

Examples of the type of situations that require emergency procedures are:

- Fires
- Explosions
- Bomb threats
- Medical emergencies
- Oil spills
- Toxic or combustible gas releases
- Floods
- Hurricanes
- Earthquakes

On-Site Supervisors are responsible for ensuring that the Emergency Procedures are available for all emergency situations that may arise within their areas of operation.

In the event of a fire or other life-endangering situation, all employees not assigned specific emergency duties are to evacuate the facility immediately.

THIS SECTION CANNOT COVER ALL THE POTENTIAL SITUATIONS THAT MAY REQUIRE EMERGENCY PROCEDURES. CHECK WITH THE HSE DEPARTMENT, THE OPERATIONS MANAGER, THE PROJECT MANAGER, REVIEW SITE SPECIFIC HSE POLICIES AND PROCEDURES, DETERMINE THOSE POLICIES AND PROCEDURES THAT MAY BE APPLICABLE TO YOUR SPECIFIC WORK AREA.

2.0 Purpose

The purpose of an emergency action plan is to:

- Describe methods to deal with emergencies
- Define the role and actions of on-site personnel and management
- Define the responsibilities for utilizing and coordinating external resources to assist in dealing with emergencies
- Provide an orderly evacuation plan of personnel and the designated responsibilities for the notification of the police, fire authorities, emergency response teams, or other public assistance resources

3.0 Identification of an Emergency

Fires, explosions, gas releases, chemical spills, natural disasters, and other similar dangerous circumstances will be treated as emergencies. It is the responsibility of every individual on-site to immediately report any emergency that is discovered to the shift Operations Personnel.

Facilities that are not operated on a 24-hour/day basis are required to have **on-call** representatives to handle emergency situations.

Legal aspects, such as claims, should be promptly reported to the HSE Department for handling and processing.

4.0 Guidelines for Emergency Response

4.1 General

All the actions undertaken by **REPOWER USA** employees or personnel under **REPOWER USA** supervision will comply with all the pertinent Federal, State, and Local Regulations.

The priority of concern during an emergency situation is:

- HSE protection of personnel working in the emergency area
- Environment
- Facilities and Company property
- Minimum loss of production

4.2 Classification of an Emergency

The Operations Personnel will immediately notify the Management-in-Charge or the designee for an investigation of the situation and the classification of the emergency.

The recommended priority is as follows:

- **Incidental Emergency - No Assistance Required** - the On-site personnel and resources can handle this situation.
- **Incidental Emergency - Assistance Required** - the On-site staff needs additional personnel and/or resources from the outside.
- **Major Emergency** - Facility needs to be shutdown and evacuated.
- **False Alarm** - No emergency situation exists.

5.0 Emergency Response Procedures

5.1 Incidental Emergency – No Assistance Required:

- Operations Manager, Project Manager, Field Superintendent, or a designee is authorized to direct all actions
- Sound the facility **emergency alarm**

- Communicate the facts of the situation and the actions to be undertaken to all the individuals on the Emergency Notification List
- All the work in progress is to cease immediately and be secured as best possible. All the on-site personnel are to proceed to the designated emergency stations for directions
- Bring the emergency situation under control as quickly as possible
- If this cannot be done or the situation worsens, outside assistance must be obtained
- If at any time the situation gets out of control, the facility will be shutdown and evacuated as detailed below

5.2 Incidental Emergency – Assistance Required

- Operations Manager, Project Manager, On-Site Field Superintendent/Supervisor, or the designee has the authorization to direct all actions
- Sound the facility **emergency alarm**
- Communicate the facts of the situation and the actions to be undertaken to all the individuals on the Emergency Notification List
- Contact and request outside resources, as required
- All the work in progress is to cease immediately and be secured as best possible
- All the on-site personnel are to proceed to the designated emergency stations for directions
- Work to control the emergency situation as best as possible until the outside resources arrive
- Bring the emergency situation under control as quickly as possible
- If this cannot be done or the situation worsens, additional outside assistance must be obtained
- If at any time the situation gets out of control, the facility will be shutdown and evacuated as detailed below

5.3 Major Emergency

- Operations Manager, Project Manager, On-Site Field Superintendent/Supervisor, or the designee has the authorization to direct all actions
- Sound the facility **evacuation alarm** and shutdown the facility or operation
- Communicate the facts of the situation and the actions to be undertaken to all the individuals on the Emergency Notification List
- All the work in progress is to cease immediately and be secured as best possible
- All the on-site personnel are to evacuate the facility as detailed below
- **Emergency shut-down** essentially stops all facility operations and functions

- It is mandatory that all job sites have an emergency action plan and shut-down procedures
- All employees must become familiar and learn the shut-down procedures for their facilities
- It is the responsibility of all the supervisors to teach their employees the process required to shut-down their operation and function
- Refer to the On-Site Operations Manual for your facility for detailed shutdown procedures on the various systems if required
- **EXAMPLE:** Emergency plant shutdown (typical plant operation)
 - Manually pushing the ESD button on the main control panel
 - Manually pushing the ESD button at the station locations
 - Fire Detection systems
 - Combustible Gas Detection systems

5.4 False Alarm

- Operations Manager, Project Manager, On-Site Field Superintendent/Supervisor, or the designee is to note a report of the false alarm in the shift log book
- Operations Manager, Project Manager, On-Site Field Superintendent/Supervisor, or the designee is to review the investigation findings with the individual(s) who first reported the emergency situation
- Normal operation of the facility is to continue

6.0 Evacuation Guidelines

- Personnel evacuating the facility must use the most expeditious means available, as designated for their facility
- All the **non-essential** personnel must evacuate the facility immediately upon hearing the evacuation alarm and proceed to the designated safe area for staging
- All the remaining personnel will evacuate the facility and proceed to the designated safe area after the facility emergency shutdown sequence is initiated and all the non-essential personnel have been evacuated
- As soon as possible, the Manager-in-Charge or the designee will account for all the personnel on-site prior to the emergency signal and evacuation
- The Manager or designee will coordinate with any outside resources that are required and summoned to de-fuse the emergency situation
- If the facility is shutdown and evacuated, it will not be re-started until an investigation into the cause and effect of the emergency is concluded and management provides authorization

7.0 General Procedures

- As soon as possible, the Operations Manager, the Project Manager, the On-Site Supervisor, or the designee will appraise the situation to determine the cause and document any information needed to conduct a thorough investigation into the Root Cause of the emergency.
- The name and affiliation log for all personnel will be maintained on-site. This will be used to account for all personnel during and after an emergency.

NOTE: NO PERSONNEL PERMITTED ON-SITE UNLESS LOGGED-IN. THIS INCLUDES TIME THEY ENTERED AND TIME THEY DEPARTED.

- Any individual who is unclear about their duties and responsibilities should contact and obtain clarification from the On-Site Field Superintendent/Supervisor. The Manager-in-Charge or the designee should then be contacted if additional clarification is required.
- All reported emergencies will be investigated.

8.0 Alarm Descriptions

A typical sequence of alarms will signal emergency situations as follows:

- ❖ **Emergency Alarm** - Intermittent Siren Sound
- ❖ **Evacuation Alarm** - Continuous Siren Sound
- ❖ **All Clear Signal** - Series Two Long and Two Short Siren Sounds


LEARN ALARM SIGNALS IN YOUR AREA OF OPERATION AND WORK LOCATION.

9.0 Training

All on-site personnel must be trained in and be familiar with the Emergency Action Plan(s). This includes permanent employees, contract employees, and visitors to the facility.

The written emergency procedures are only effective if they are implemented and carried out properly. Drills are the best way to test the effectiveness of the procedures in place. Drills must be conducted and documented routinely. The results from these drills will be monitored and additional training conducted as required.

Personnel who are required and expected to respond to emergencies should receive training on a regular basis. Some personnel may require specialized training, such as OSHA's **HAZWOPER** regulations, which is required to respond to the spills or releases of hazardous substances. Consult with the HSE Department or the Department/Operations Manager for the current training requirements.

	Section III RPSHSE 7.1.9B	Valid from: November 2008
---	--	---------------------------


Revision Profile

Rev.	Date	Name	Approval Signature	Remarks
0	11/08	Owens O'Quinn QHSSE Consultant	On File	ORIGINAL
0	11/08	Tammy Conekin	On File	ORIGINAL
1				
2				
3				
4				
5				

Original Review Progress

Date	Reviewer	Signature
11/08	J.K. Barrilleaux – Grammar/Technical Format <i>Evergreen QHSSE Solutions LLC</i>	On File
11/08	Owens O'Quinn – QHSSE Consultant <i>Evergreen QHSSE Solutions LLC</i>	On File
11/08	Tammy Conekin – Head of Service	On File



	Section III RPSHSE 7.1.9B	Valid from: November 2008
---	--	---------------------------

Section III: 7.1.9B RPSHSE – 9B
Naturally Occurring Radioactive Material (NORM)

Contents

Section	Topic	Page No.
1.0	Introduction	3
2.0	Radiation	3
3.0	Precautions	9B

1.0 Introduction

Radiation has always been a natural component in our environment. There are two natural radiation sources: Cosmic rays external to the earth and radiation from the **Naturally Occurring Radioactive Materials (NORM)** found in the earth's crust.

A low-level radioactive scale can be produced in the course of some oil and gas operations. This occurs when **NORM** dissolves into the reservoir water. The production of oil and gas moves **NORM** to the surface where it can accumulate at low levels in processing and transport equipment. **NORM** is not found at all locations.

Past studies indicate that the actual health risk to personnel from external exposure to low levels of **NORM** is essentially nil; however, precautions should always be taken, as needed, to ensure personnel cleaning or servicing production equipment is not exposed to any significant buildup of **NORM**.

Naturally occurring radioactive material deposits may be found in the following areas:

- Piping, tubing, tank bottoms
- Sludge pits, brine, and sand filters
- Salt water disposal injection wells and equipment
- Soils at well sites
- Pipe cleaning and storage yards
- Wellheads, headers, treater units, separators
- Pumps within natural gas processing plants, produced water vessels, and other light hydrocarbon processing facilities.

2.0 Radiation

There are three primary categories of radiation that might be encountered in a field survey: (1) alpha , (2) beta , and (3) gamma. Each of these has unique properties that must be considered in selecting an instrument for use. Alpha particles are simply energetic helium ions, i.e., atoms that have lost their electrons. Because of their large size (compared to other forms of radiation) and high charge, they will not penetrate through much matter. Beta particles are ... They will penetrate through more material than alphas but generally can be stopped by a thin piece of metal.

Gamma radiation is simply high energy light and is the most penetrating of the radiation types. Very high energy gammas can penetrate through several centimeters of lead.

There are hazards associated with the exposure of humans to radiation but if the exposure is limited to low levels that hazard is not very serious. In fact, humans are exposed to natural background radiation every day.

Naturally Occurring Radioactive Materials can be found in the soil, building materials, certain foods, and even the human body. The unit used to quantify the radiation dose received by an individual is the Roentgen Equivalent of man (REM). The average dose, due to natural background radiation and natural radioactive materials in the environment, is about 0.2 REM/year to an individual in the United States.

The actual health risk from low levels of radiation is quite small. There is no direct evidence that low doses to radiation can threaten the health of humans. All of the estimates of the health risks associated with radiation have been extrapolated from studies of people who have received doses equivalent to hundreds of **REM**. It has been assumed that very low levels of radiation would affect the body in the same way as these very high doses, only with proportionately less damage. As radiation passes through matter, it may interact and lose energy. The damage done by radiation as it interacts with the body results from the way it affects molecules essential to the normal functioning of human cells. One of four things may happen when radiation strikes a cell: (1) the radiation may pass through the cell without doing any damage, (2) the cell may be damaged but repair itself, (3) the cell may be damaged so that it not only fails to repair itself but reproduces in damaged forms over a period of years, or (4) the cell may be killed. The death of a single cell may not be harmful since the body can readily replace most cells but problems will occur if so many cells are killed that the body cannot properly function. Incompletely or imperfectly repaired cells can lead to delayed health effects such as cancer, genetic mutations, or birth defects. Again, it is important to recognize that the risks from radiation are small. For example, the statistical risk of a cancer death from 7 milli **REM** of radiation is equivalent to that associated with smoking a single cigarette.

Radiation cannot be detected by any of the human senses. We cannot taste, smell, feel, see it, or hear it. Because of this, we must rely upon instruments that respond to an interaction between the radiation and the instrument itself. Radiation is nothing more than energetic particles or photons.

As the radiation passes through matter, it interacts with the material's electrons to lose some of the energy. This energy results in either the excitation or ionization of atoms. Depending upon the type of detector, either the excitation or the ionization is sensed, quantified, and the instrument produces a response that is proportional to the total amount of radiation that is present in the area being monitored or surveyed.

Portable survey instruments are calibrated to read out in either counts per minute (CPM) or in direct units of radiation intensity, such as milli Roentgen/hour (mR/hr) or micro-roentgen/hour (μ R/hr).

Instruments reading out in mR/hr and μ R/hr are used to measure extended radiation fields such as that experienced in the vicinity of radioactive materials storage or disposal sites. Instruments that read out in CPM are usually used to monitor for low-level surface contamination, particularly on hard non-porous surfaces.

One of the difficulties in measuring radiation is that there is always some background level of radiation present. This background will vary with location; some regions of the country will have higher backgrounds than others and brick buildings will have higher backgrounds than wooden buildings, etc. Because of this variation, when any survey instrument is used, a determination of local background must be made in an area that is not believed to contain any radioactive materials. Any reading significantly above the background (two to three times the background) is indicative of the presence of radioactive materials. Background levels throughout the United States will typically range between 5 and 9B0 μ R/hr. The United States Environmental Protection Agency (EPA) limits the radiation exposure to workers to 1mR/hr above the background. This action level is contained in the EPA's Standard Operation Safety Guides.

The detectors used in most portable survey instruments are gas-filled or scintillation devices. The gas-filled detectors measure the amount of ionization in the gas that is caused by the radiation entering the detectors. This is accomplished by establishing a voltage potential across a volume of gas. When the gas is ionized, the current that flows between the electrodes producing the potential can be measured. The amount of current is directly proportional to the amount of radiation that enters the detector. Scintillation detectors depend upon the light that is produced in a crystal plastic of certain compounds when the material's atoms are excited by interactions with the radiation.

The amount of light produced is measured and converted to an easily monitored electrical signal by a photomultiplier tube. There are gas-filled and scintillation detectors designed to detect all three of the radiation types of interest in field surveys.

The most obvious difference in the detectors used for different radiation types is the manner in which radiation can enter the sensitive volume of the detector. Many gamma survey instruments will not appear to have a detector but only an electronics box. This is because the gammas can easily penetrate the metal electronics enclosure and the detector is placed inside where it is protected from damage. The Ludlum Model 19 Micro R meter is an example of such a detector. Alpha and beta detectors must have thin entrance windows so that these particles can enter the sensitive volume.

Some gas filled detectors are designed with a thick metal shield so they can discriminate between betas and gammas; with the shield open, the detector is sensitive to both betas and gammas; with it closed, it will detect only gammas, since the shield absorbs the betas before they can interact with the detector.

A good survey meter should be portable, rugged, sensitive, simple in construction, and reliable. Portability implies lightness and compactness with a suitable handle or strap for carrying. Ruggedness requires that an instrument be capable of withstanding mild shock without damage. Sensitivity demands that an instrument will respond to the type of energy level of the radiation being measured. Rarely does one find an instrument capable of measuring all types of energies of radiation that are encountered in practice. Simplicity in construction necessitates the convenient arrangement of components and simple circuitry comprised of parts that may be replaced easily. Reliability is that attribute that implies the ability to duplicate responses under similar circumstances.

2.1 Ludlum Model 19 Micro R Meter

The Ludlum Model 19 Micro R Meter is designed to monitor low-level gamma radiation. The instrument utilizes an internally mounted sodium iodide scintillator crystal. The meter face has two scales, one in black representing 0-50 $\mu\text{R/hr}$, and one in red representing 0-25 $\mu\text{R/hr}$. The meter range is controlled with a six position switch: OFF, 5000, 500, 250, 50, and 25. The full-scale reading of the meter is equal to the switch setting; the red scale corresponds to the 25 and 250 position and the black scale to the other three positions. As an example, if the switch is in the 500 position and the meter pointer is aligned with the "30" scale marking, the radiation field is 300 $\mu\text{R/hr}$.

The Ludlum Model 19 is equipped with five additional switches or buttons. One button, labeled L, lights the meter face while depressed. This allows accurate readings in poor lighting conditions. The BAT button tests the battery condition. If the batteries are good, the meter pointer will deflect to the "batt OK" portion of the scale. The audio switch controls the audible signal; in the ON position, a "beeping" signal accompanies each radiation event that is detected. The switch marked with the F and S controls the meter response; the S (slow) position is used for most applications, although in conditions where the radiation level is changing rapidly, the F (fast) position will provide a better representation of the radiation level. The remaining button resets the detector to operate at high voltage should a transient pulse cause it to be disabled.

2.2 Detector Probes

Detector probes will fall into two major categories: gas-filled detectors and scintillation detectors. These have been briefly discussed in the introduction section. This section will describe a few of the most commonly used probes.

The Geiger-Mueller (GM) pancake probe is very common and is most valuable for monitoring for surface activity on equipment, bench-top, soil surface, and personnel. The probe may be used to monitor alpha, beta, or gamma radiation. The sensitive volume of the detector is covered with a thin mica window about 1.75 inch diameter. This window allows the detection of alphas and low energy betas. The fragile window is protected by a metal screen and care must be taken to avoid puncturing it.

End-window GM probes may also be used for alpha, beta, and gamma monitoring. These tubes are generally cylindrical, about 6-8 inches long and have mica entrance windows about 1 inch in diameter. The window usually does not have a protective screen and is easily punctured. Because of its configuration, this tube is not as convenient as a pancake probe for surface monitoring. Also, because of the smaller entrance window, it is less efficient for detecting alphas and betas.

Thin walled GM probes are used for beta and gamma detection. The tube is constructed within steel walls through which betas can pass. The tube is housed in a protective cage fitted with a moveable steel shield. With the shield in place, betas are absorbed and only gammas can be detected. When the shield is moved away from the cage opening, the detector is sensitive to both betas and gammas.

Scintillation probes are available for alphas, betas, and gammas. They differ in the type of scintillator used and the detector housing. Alpha detectors are made of thin activated zinc sulfide crystals. The beta detectors generally use thin scintillation plastic crystals. Gamma probes use thick crystals of activated sodium iodide. Beta and alpha probes have entrance windows of thin aluminized mylar. This window protects the detector from light, which would be sensed by the photomultiplier as if it were a high radiation field. Care must be taken not to puncture the window.

The alpha probes often have large surface areas (50-9B0 cm²) to allow the efficient detection of low levels of alpha contamination. The gamma detectors are usually housed in an aluminum shell. This shell is not easy to puncture and is quite rugged, although dropping it or banging it against a hard object may break the crystal or the photomultiplier.

2.3 Personnel Dosimeters

The amount of the radiation dose received by an individual working in a radiation field is measured by the use of personnel dosimeters. Two types that are frequently used are the direct reading dosimeter and the thermoluminescent dosimeter (TLD).

The direct reading dosimeter provides an immediate indication of the gamma radiation dose the wearer has received.

By checking his dosimeter periodically, the wearer can get an up-to-the-minute estimate of the total gamma dosage he/she has received. Only gamma radiation is measured. There is not way that beta radiation can penetrate the walls of the dosimeter to cause ionization.

Inside the detection chamber of the dosimeter is a stationary metal electrode with a movable quartz fiber attached to it. The dosimeter is charged so that both the electrode and the fiber are positively charged. Since both are positively charged, they repel each other, and the movable fiber moves as far away from the electrode as it can.

When gamma radiation causes ionization in the detection chamber, the negative ions move to the positively charged electrode or fiber. The action reduces the positive charge and allows the fiber to move a little closer to the stationary electrode. The movement of the fiber, then, is a measure of the amount of gamma radiation absorbed by the detector.

In direct reading pocket dosimeters, a scale is placed so that the hairline on the scale is the movable fiber. As the fiber moves, the scale indicates the total amount of gamma radiation absorbed by the dosimeter. A magnifying glass inside the dosimeter enables the scale to be read. This provides an immediate estimate of an individual's total gamma exposure.

Anyone who is instructed to wear a direct reading dosimeter should make sure that it is properly charged. When a dosimeter is properly charged, there is sufficient potential between the electrode and the fiber that the fiber is significantly displaced and the hairline on the scale reads near zero. In general, a dosimeter is adequately charged if it reads below 9BmR.

If a dosimeter is not properly charged, a charger must be used to charge it before it can be worn. The dosimeter is pushed into the charger, and the charger control is turned until the dosimeter is zeroed. The dosimeter must be checked again after it is taken out of the charger. Sometimes the hairline shifts when the dosimeter is removed from the charger and the dosimeter will have to be readjusted so that the hairline will end up at or near zero.

Since the direct reading dosimeter measures the whole-body gamma radiation dosage, it should be worn in the major trunk area. When using a dosimeter care must be taken not to bang or drop it. Rough treatment may cause the electrode to discharge completely, sending the hairline all the way upscale.

Thermoluminescent dosimeters (TLDs) are often used for beta and gamma whole-body measurements. Inside the TLD is a very small quantity of crystalline material called a detector chip that is used to measure beta and gamma exposure. A typical detector chip is approximately 1/8 inch across and 1/32 inch thick.

To understand how a detector chip measures radiation, we first need to go through a short review of electron energy levels. As we know, electrons in a solid material prefer to be in their ground energy state. This is especially true for a crystalline material. If radiation imparts enough energy to one of these electrons, the electron will jump up to a higher unstable energy level. However, since the electron prefers to be in the ground state, it will drop to the ground state and emit the extra energy in the form of heat, x-rays, or light.

In TLD material, there is an in-between state called a metastable state which acts as an electron trap. When radiation strikes the ground state electron, the electron jumps up and is trapped in the metastable state. It remains there until it gets enough energy to move it up to the unstable state. This energy is supplied when the TLD chip is heated to a high enough temperature. Then the electron will drop back down to the ground state, and, because the TLD chip is a luminescent material, it will release its extra energy in the form of light. The total quantity of light emitted by electrons returning to the ground state is proportional to the number of electrons that were trapped in the metastable state. The number of electrons trapped in the metastable state is proportional to the amount of beta and gamma radiation that interacts with the material. This means the amount of light emitted when the TLD is heated is proportional to the total amount of beta and gamma radiation interacting with the material.

In the photomultiplier tube, electrons are produced in the photocathode, multiplied across the dynodes, and finally collected on the anode. This then produces a pulse in the circuit that is proportional to the total amount of beta and gamma radiation absorbed by the TLD material.

There are several reasons for using TLDs instead of film badges. One reason is size. TLD chips are so small that they can be taped to the fingers to measure exposure to the extremities without interfering with work. A second reason is sensitivity. The TLD is generally more sensitive than a film badge, more accurate in the low mR range, and able to provide a better overall indication of the total beta/gamma dosage received. A third reason is that the TLD chip can be reused after it is read.

As with the direct reading dosimeter, the TLD is normally worn in the major body region to give the best indication of the whole-body dosage. There are times, however, when these devices might be worn on other parts of the body. For example, a TLD might be moved to an arm or a leg if these portions of the body might receive more radiation than the trunk area. An additional device such as a finger ring might also be used to measure an extremity dose. A finger ring contains a TLD chip to measure absorbed dose from beta and gamma radiation.

3.0 Precautions

- The proper protective equipment, including respiratory or breathing air, should always be worn when entering contaminated vessels.
- Avoid direct skin contact with the radioactive scale and solids to a reasonable extent.
- Eating, drinking, smoking, and chewing should not be allowed in the work area.
- Personnel should thoroughly wash hands and face following any skin contact that occurs, prior to eating or drinking, smoking, and at the end of the work.
- The number of personnel in the work area should be kept to a minimum.
- Surface contamination should be handled in the wet state to avoid inhaling NORM contaminated scale.
- Contaminated equipment that is to be opened should be removed from service, vented, and left to stand idle for four (4) hours before work commences.
- Sludge and scale removal activities will be conducted in well-ventilated areas.
- Contaminated protective equipment and clothing should be handled in accordance with the approved waste disposal procedures.
- Contaminated equipment, pipes, etc., should be disposed of in accordance with the approved waste and surplus equipment disposal procedures.



Section III Forms & Information

Valid from: November 2008

Section III

7.1.9 WGHSE – 9

Hazardous Waste Operation (HAZWOPER)

Form 1 – Definitions - HAZWOPER

Definitions

Hazardous Material

A substance or waste is defined as hazardous if it poses and unreasonable risk to health, safety and property when transported in commerce and is thus designated **"hazardous"**

There are a number of chemical and physical characteristics that can cause a material to be dangerous or harmful to human life, the environment, or both.

These include

- Explosivity
- Flammability
- Instability/Reactivity
- Oxidizing ability
- Toxicity (poison)
- Infectiousness
- Radioactivity
- Corrosivity

Some materials may exhibit more than one of these characteristics.

To determine whether a given material is considered hazardous and must be regulated for transportation, consult the list of hazardous materials that have been compiled by US Department of Transportation (DOT).

These lists are found in the **Hazardous Materials Table** and its appendix (49 CFR 172.101).

Whether you are preparing for transport, transporting, or receiving any material you should assume that it is **"hazardous"** until it is proven otherwise.

Flash Point

The lowest temperature at which a liquid produces enough vapors to mix with the surrounding air and form an ignitable mixture.

Hazard Materials Table - Classes and Divisions

One of the most important pieces of information furnished in the DOT Hazardous Materials Table is the hazard class or division to which each listed material belongs.

Hazardous materials are organized into nine classes based on the characteristics that make them hazardous. Several of the classes are subdivided into divisions. These classes and divisions are recognized internationally and are referred to as United Nations, or UN, classes or divisions. Do not confuse the UN classes and divisions with the UN identification numbers that are assigned to individual chemicals or groups of chemicals.

Grouping materials with similar hazards together makes it easier to deal with packaging, labeling, and responding to an emergency.

Class 9

Two special categories of hazardous materials are hazardous substances and hazardous wastes.

Hazardous Substances

A hazardous substance is any material that has been designated as a hazardous substance under the **Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)**, better known as **Superfund**.

Appendix to the Hazardous Materials Table

List of Hazardous Substances and Reportable Quantities.

It contains two tables of hazardous substances:

- **Table 1** - lists approximately 1,000 specific chemical elements or compounds plus and approximately 170 waste streams.
- **Table 2** - lists almost 800 radionuclides - the radioactive forms of elements.
The table also lists the reportable quantity, or RQ, of each substance. Any spill of an amount equal to or greater than the reportable quantity of a substance must be reported to the proper authorities.

Hazardous Wastes

Hazardous Wastes are any material that is subject to the hazardous waste manifest requirements of the U.S. Environmental Protection Agency (EPA).

Federal Hazardous Wastes are divided into two groups

- Listed wastes are hazardous by virtue of the process that generated them.
- Characteristic wastes are hazardous only if they exhibit a hazardous characteristic.

HAZMAT Employer

An employer that uses one or more of its employees in connection with any of the following:

- Transporting, loading, unloading, storing or handling hazardous materials in commerce.
- Causing hazardous materials to be transported or shipped in commerce.
- Representing the marking, selling, offering, reconditioning, testing, repairing, or modifying containers, drums, or packaging as qualified for use in the transportation of hazardous materials.

HAZMAT employers include the owner-operators of the motor vehicles, water vessels, railcars, or aircraft used to transport hazardous materials in commerce.

HAZMAT Employee

A person who is employed by a **HAZMAT** employer and who, in the course of employment, directly affects the hazardous materials safe transportation. This term includes an individual, a self-employed individual, or one employed by a **HAZMAT** employer who, during the course of employment:

- Loads, unloads, or handles hazardous materials
- Test, reconditions, repairs, modifies, marks, or otherwise represents containers, drums, or packaging as qualified for use in the transportation of hazardous materials
- Prepares hazardous materials for transportation
- Is responsible for safely transporting hazardous materials



Section III Forms & Information

Valid from: November 2008

- Operates a vehicle used to transport hazardous materials.

	Section III Forms & Information	Valid from: November 2008
---	--	---------------------------

Section III

7.1.9 WGHSE – 9

Hazardous Waste Operation (HAZWOPER)

Form 2 - DOT Training Categories



Section III Forms & Information

Valid from: November 2008

DOT Training Categories

TRAINING CATEGORIES	APPLIES TO	PURPOSE
General Awareness	All HAZMAT employees	Familiarization with DOT regulations; Recognize and identify hazardous materials
Function Specific	All HAZMAT employees	Knowledge and skills to fulfill specific job requirements
Safety Training	Either or both: 1. Handle or transport hazardous packages; 2. Potential for exposure	Personal protective measures; Emergency response information. Applies to Supervisors other affected employees.
Driver Training	Drivers of motor vehicles who carry hazardous materials	Pre-trip safety inspections; Operating emergency equipment; Loading and unloading; Procedures for highway hazards- tunnels, bridges, railroads, etc.

	Section III Forms & Information	Valid from: November 2008
---	--	---------------------------

Section III

7.1.9 WGHSE – 9

Hazardous Waste Operation (HAZWOPER)

Form 3 - Hazardous Materials Classes and Divisions

Hazardous Materials Classes and Divisions (Page 1)

DOT CLASS	DIVISIONS		COMMENTS
Class 1 EXPLOSIVES	6 Divisions	1.1 - most dangerous 1.6 - least dangerous	Classification codes consists of division No. plus upper case letter, for storage and transporting controls.
Class 2 GASES	3 Divisions	2.1 - Flammable Gas 2.2 - Non-Flammable, Non-poisonous, Compressed Gas 2.3 - Poisonous Gas	2.1 - readily ignite. 2.2 - hazardous due to high pressure, potential for human suffocation and cryogenic (freeze human tissue). 2.3 - poisonous when inhaled.
Class 3 Flammable Liquids; Combustible Liquids			Fl. Liq.- Flash point 141 degrees F or less. C. Liq.- Flash point above 141 and below 200 degrees.
Class 4 Flammable Solids; Spontaneously Combustible; Dangerous When Wet	3 Divisions	4.1- Flammable Solid 4.2- Spontaneous Combustible 4.3- Dangerous When Wet	4.1- Cause fire through friction and easily ignite or decomposition cause high heat. 4.2- Pyrophorics- ignites within 5 minutes of contact with air. Ignites below 130 degrees F; or self-heats with air causing ignition or temperature above 392 degrees F during 24-hr. period. 4.3- With water ignites or gives off flammable or toxic gas at a rate of 1 liter/kg or greater.
Class 5 OXIDIZERS	2 Divisions	5.1- Oxidizers 5.2- Organic Peroxides	Chemicals that provide excess O ₂ during combustion, enhancing fire or explosion. 5.1- By generating O ₂ , enhances combustion of other materials. 5.2- Derivative of hydrogen peroxide which contains O ₂ and H ₂ fuel to burn.
Class 6 POISONOUS MATERIALS; INFECTIOUS SUBSTANCES	2 Divisions	6.1- Poisonous materials 6.2- Etiological Agents	6.1- nongaseous materials very toxic to humans if swallowed, absorbed through skin, or inhaled. 6.2- Organisms or their toxins causing severe disabling or fatal diseases.

Hazardous Materials Classes and Divisions (Page 2)

DOT CLASS	DIVISIONS		COMMENTS
Class 7 RADIOACTIVE MATERIALS			
Class 8 CORROSIVE MATERIALS		Measured on pH scale of 0 to 14; 7 being neutral. Acids - pH less than 7 Bases - pH greater than 7.	Solid or liquid causing destruction to human skin on contact; or any liquid causing severe corrosion on steel or aluminum.
Class 9 Misc. HAZARDOUS MATERIALS- 1. HAZARDOUS SUBSTANCES 2. HAZARDOUS WASTES		SEE BELOW**	Hazardous Waste materials not included in Class 1-8; any material having anesthetic, noxious, or other similar property.



Section III Forms & Information

Valid from: November 2008

Section III

7.1.9A – RPSHSE – 9A

Emergency Action Plan

Form 1 – Fire Emergency Plan (EXMPLE)

Fire Emergency Plan

- If you see **SMOKE** or **FIRE**, immediately do all of the following:
 - Trip the nearest fire alarm (if provided) or report the fire by telephone, immediately to the Client Fire/Security and the **WGHIT** On-Site Field Superintendent/Supervisor
 - Call the Fire Department (**LOCAL FIRE DEPT NO.**) _____
 - Announce it to all personnel immediately
 - Follow the steps found below
 - **DO NOT** go to the Scene of the fire unless specifically instructed to do so

- **INFORMATION to be given to the FIRE DEPARTMENT**
 - What is on fire
 - Physical Address
 - Type of Occupancy or building
 - Where the fire is located
 - The telephone number
 - Listen to the Fire Department or 911 Dispatcher
 - **IF APPLICABLE, REMAIN ON THE TELEPHONE LINE UNTIL DISPATCHER HAS OBTAINED ALL THE CRITICAL INFORMATION**

- **Emergency Procedures shall be done in the following order:**
 - Trip the nearest fire alarm (if provided)
 - Isolate the fire by closing all the doors, if possible
 - Notify the fire department
 - Notify all personnel immediately
 - Extinguish the fire with a fire extinguisher, if possible
 - **DO NOT** fight a fire alone
 - If the fire continues to grow...evacuate
 - Never fight a fire without the proper training in the use of fire extinguishers and, using good sound judgement, the fire can be extinguished quickly, thus minimizing the hazard.

- **Evacuation Procedures:** If fire is detected or an announcement is made to evacuate
 - Stay Calm
 - Leave at the exit nearest to your location (Reference Evacuation Plan for your facility)
 - Close all the doors behind you as you leave the area, if possible
 - Insure the area is evacuated as you leave - check for your neighbor
 - **DO NOT** reenter the facility until receiving the clearance to do so
 - Employees should gather at the designated location for your facility Plan
 - Check-In with your manager to let them know that you are out of the building
 - Remain at the designated assembly area until notified by the authorities or until the **All Clear Signal** is sounded
- **Fire Drills**
 - Fire drills will be held and documented frequently

All incidents of this nature must be reported to the HSE Department within 24 hours.



Section III Forms & Information

Valid from: November 2008

Section III 7.1.9A – RPSHSE – 9A Emergency Action Plan

Form 2 – Medical Emergencies

Medical Emergencies

In the event of injuries, use the following procedures:

- Provide first aid for the injured to the extent that you are trained or qualified
- If there is an emergency, have another person get help for the injured
- Transport non-emergency injuries to the doctor's office
- An ambulance service is to be utilized only when the injury, due to its nature, rules out all other means of transportation
- **NOTE:** Call prior to the transport to ensure the doctor's availability and for alternate instructions in the event a hospital is recommended
- Return the operation to a safe condition (if this can be done safely) or shutdown the function or operation
- Notify your supervisor
- Secure the facility and control access to the area
- Do not discuss the incident with anyone other than your supervisor or Company safety personnel
- **DO NOT** relinquish control of the scene to anyone outside of **REPOWER USA** and/or Client personnel
- Handle the contractor or public incident accidents in the same manner, except that the Contractor's On-Site Supervisor or main office should be notified as soon as possible
- In the event of a public injury, the public law enforcement agency with jurisdiction should be notified



Section III Forms & Information

Valid from: November 2008

Section III

7.1.9A – RPSHSE – 9A

Emergency Action Plan

Form 3 - Vehicle Accident

Vehicle Accidents

If you are involved in an accident, IT MUST BE REPORTED and handled according to the following guidelines:

- If you are involved in an accident, **STOP**
- If the vehicles pose additional danger for injury or damage, set out emergency reflectors or flares in order to protect yourself and others
- Get help for injured persons. Render first aid care to the extent you are trained or qualified
- Notify the police and your supervisor as soon as possible by whatever means available.
- Obtain the necessary information at the accident scene to the best of your ability. At the least, obtain:
 - Name(s) of those involved
 - Driver's license numbers
 - Vehicle license plate numbers
 - Name(s) of the law enforcement agency responding to the accident. (Names and badge numbers would be desirable.)
 - Names and phone numbers of witnesses
- Return to the office and complete the Vehicle Accident Report with your supervisor

	Section III Forms & Information	Valid from: November 2008
---	--	---------------------------

Section III
7.1.9A – RPSHSE – 9A
Emergency Action Plan

Form 4 - Oil Spills

Oil Spills

In certain areas, Spill Prevention, Containment, and Countermeasure (SPCC) plans have been developed to comply with certain environmental regulations. **BECOME FAMILIAR WITH THESE PLANS.**

If a SPCC plan or other spill control plans are not in place, the following procedure should be used:

- Observe and judge
 - Whether or not a human life, property, or the environment is in danger
 - Whether or not the spill can be readily stopped or brought under control, without an undue risk to life
- Report the spill immediately to the On-Site Field Superintendent/Supervisor and the designated Client Representative and give an assessment of the situation.
- If it is safe to do so, get information on the spilled material, control entry to the spill site, communicate the need for any additional assistance or equipment, and watch over the area until help arrives.
- Take prompt action to alleviate any danger and stop or control the spill.
- **DO NOT** attempt to clean-up spills without direction and/or training.
- If trained at the First Responder Operations Level, dike around liquid spills to prevent drainage into the water supply and contact with other materials.
- Check the Material Safety Data Sheet (MSDS) for the personal protection equipment requirements and for disposal instructions and precautions.

THE ON-SITE FIELD SUPERINTENDENT/SUPERVISOR WILL BE RESPONSIBLE FOR NOTIFYING MANAGEMENT AND REQUIRED GOVERNMENT AGENCIES.

Incidents of this nature must be reported to the HSE Department within 24 hours.



Section III Forms & Information

Valid from: November 2008

Section III

7.1.9A – RPSHSE – 9A

Emergency Action Plan

Form 5 - Toxic or Combustible Gas Release

Toxic or Combustible Gas Release

Emergency procedures are required by regulation for certain toxic gases, one of the most common being hydrogen sulfide. In addition, regardless of the absence or presence of regulations, specific procedures may be developed for toxic or combustible gas releases at the discretion of management.

BECOME FAMILIAR WITH THOSE PLANS THAT ARE IN EFFECT IN YOUR WORK AREA FOR TOXIC OR COMBUSTIBLE GAS RELEASES.

In general, the following procedures should be used for toxic or combustible gas releases:

- Analyze the situation
- Determine if there is a threat to life due to the toxic gas or if there is an explosion/fire hazard due to an escape of the combustible gas or both
- Determine if the escaping gas can be stopped without undue risk
- Take prompt action to alleviate the danger to yourself and others, then property
- Stop the release (without undue risk to yourself) and evacuate the persons that could be affected
- The order of these actions should be based on your judgement of what minimizes the risk to life
- In the case of a gas release, all ignition sources, including vehicles, should be shut down
 - Account for all personnel
 - Isolate the leak area to prevent entry
 - Notify your supervisor and give an assessment of the situation. Communicate any need for extra assistance
 - Notify the local law enforcement agency if the public could be affected, such as near by residences or public highways



Section III Forms & Information

Valid from: November 2008

Section III 7.1.9A – RPSHSE – 9A Emergency Action Plan

Form 6 – Bomb Threat

Bomb Threats

In those circumstances which determined individuals plan to inflict damage or disrupt operations, regardless of the motive, it is extremely difficult to prevent them. Security plans should be drawn up to act as a deterrent, introducing obstacles and making access more difficult.

These plans should be drawn up in consideration of the available civil authorities and treated as confidential:

- Personnel should never place themselves in jeopardy to apprehend the intruders but should concentrate their efforts on containing the effects of an incident
- In the event a phone call warns of a bomb threat, the following may prove helpful
- The individual receiving the phone call should remain calm and quietly summon assistance while keeping the caller on the phone
- Keep interrupting the caller as often as possible by asking questions and asking the caller to repeat their message. This will help prevent the caller from completing the message and hanging up. Be polite and act very concerned
- Inform the caller that the detonation of a bomb could result in death or serious injury to innocent people
- Using the guideline form below in an attempt to record the details of the call



Section III Forms & Information

Valid from: November 2008

BOMB THREAT INFORMATION FORM

Time Call Received: _____ am/pm Date: _____

Exact words of caller: _____

Questions to ask:

1. When is the bomb going to explode? _____

2. Where is the bomb right now? _____

3. What kind of bomb is it? _____

4. What does it look like? _____

Description of caller's voice:

Male / Female: _____ Young / Old / Middle Age: _____

Accent: _____

Tone of Voice _____ Background Noise: _____

Is voice familiar? _____ Who did it sound like? _____



Section III Forms & Information

Valid from: November 2008

Section III

7.1.9A – RPSHSE – 9A

Emergency Action Plan

Form 7 - Facility Emergency Notification Form

FACILITY EMERGENCY NOTIFICATION FORM

POSITION/ NAME	OFFICE	HOME	CELL	OTHER
REPOWER Systems USA				
Head of Service/Operation Manager				
Field Supervisor(s)				
HSE Department				
Landowner				
EMERGENCY AGENCY/ FACILITY				
Fire Department				
Sheriff/Police				
Ambulance				
Nearest Hospital				
Nearest Doctor's Office				
Electric Company				
Gas Company				
Railroad Commission/ USCG, etc.				