

## **CHAPTER 13 HAZARDOUS MATERIALS HANDLING**


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### 13.1 OBJECTIVES

The primary objectives of these procedures for hazardous materials handling during drilling operations are to ensure that:

- All personnel involved in the supervision of, or direct handling of hazardous materials, are fully aware of their responsibilities and comply with Government regulations and GSLM policies.
- The primary areas of risk to personnel in the direct and indirect handling of hazardous materials are known and understood.
- Adequate measures shall be taken to prevent or minimise risks associated with handling hazardous materials.

 Occupational Health, Safety and Welfare Act 1986, Explosives, Sections 5.12.25 to 5.12.51

### 13.2 RESPONSIBILITIES

Responsibilities for the receipt, storage, maintenance and handling of hazardous materials and equipment at the wellsite are summarised in the table below.

Task	Performed by	Verified by
Authorisation of receipt of materials at wellsite	DSV	DSV
Storage of drilling fluids chemicals	Drilling Fluids Contractor	DSV
Maintenance and handling of drilling fluids chemicals	Drilling Fluids Contractor	DSV
Receipt, storage, maintenance and handling of radioactive materials and equipment	Electric Logging Contractor	DSV
Receipt, storage, maintenance and handling of explosives	Electric Logging Contractor	DSV
Receipt, storage, maintenance and handling of hazardous chemicals	Drilling Fluids / Electric Logging Contractors	DSV
Receipt, storage, maintenance and handling of other contractor materials	Relevant Contractor(s)	DSV

**Table 85. Responsibilities for Receipt, Storage and Handling of Materials at Wellsite**

### 13.3 RADIATION


The following section describes the principles and guidelines for the use of radioactive materials and the hazards associated with their handling.

#### 13.3.1 Radiation Principles and Guidelines

The primary reference document for the use of radioactive sources for wellsite operations is the Schlumberger Radiation Control Manual, or alternative Electric logging Contractor's equivalent.

Operations involving the use of radioactive materials shall only be performed by fully trained and competent personnel. These personnel will follow the correct operational and safety procedures, in order to minimise the hazards and avoid significant risk to personnel and the environment.

Certain operations (e.g. radioactive tracer jobs) involve the use of unshielded radioactive fluids, and in such operations the risk of contamination co-exists with that of irradiation. For these operations, additional, special procedures shall be implemented to ensure safety.

 Schlumberger Radiation Control Manual (or alternate Logging Contractor's equivalent)

#### 13.3.2 Radiation Hazards

Ionising radiation cannot be detected directly by humans. Biological effects of radiation are:

- Massive instantaneous doses kill in a short time.
- The same total doses over a longer period can cause cancer and eventual death.

The above effects require that protection from ionising radiation includes the control of the total cumulative doses received, as well as checks on short term exposure at high dose rates.

All workers who may be exposed to occupational radiation shall be controlled and protected by a monitoring system which records their doses. The DSV shall ensure that the ALARPP system (As Low As reasonably Possible) shall be applied in order to provide the most effective control of radiation.

- Minimise field strength through shielding of sources and maintaining maximum distance.
- Minimise time of exposure.
- Set strict limits of acceptable dosage for various categories of workers who may be exposed to radiation, and monitor their cumulative doses.
- Strictly control access of all personnel to areas subject to radiation.

All Wireline Company personnel must wear approved film badges or dosimeters when handling radioactive sources.

#### **13.3.2.1 Radiation Hazard Controls**

The DSV shall ensure that only specifically trained and certified personnel are permitted to work with radioactive materials. At the wellsite this is usually the Electric Logging Contractor's engineer and other suitably qualified members of the logging crew. No unqualified person is permitted to work on, approach or in any way interfere with radioactive tools or protective radioactive container.

Exposure to ionising radiation is minimised by effective shielding. Different types of radiation have different shielding requirements. This is stated on the documentation arriving at the wellsite with the hazardous goods. It is the responsibility of the DSV to ensure all such documentation accompanies the goods.

Emergency shielding from gamma rays shall be achieved by the use of sacks of barite weighting material (i.e. when the source cannot be readily detached from the logging tool). Emergency shielding from neutron sources shall be achieved by immersing the source in a 55 gal drum filled with drilling fluid.

#### **13.3.2.2 Storage and Control of Radioactive Materials**

It is the responsibility of the DSV to ensure the correct storage of radioactive materials at the wellsite. Permanent storage facilities shall be provided for the storage of radioactive material.

The Electric Logging Contractor shall provide a dedicated radioactive storage container, which shall be used and controlled at the location as follows:

- The permanent store shall be located in a marked area on the location, away from normal personnel access, where the radiation level shall not exceed 1.0  $\mu\text{Sv}/\text{hour}$  at the perimeter of the marked out area.
- The storage facility shall be secured with a padlock, controlled by the radiation qualified personnel.
- The standard trefoil radioactive warning sign shall be exhibited on the storage container.

#### **13.3.2.3 Transport of Radioactive Sources**

The Electric Logging Contractor shall be responsible for transporting radioactive materials in appropriate vehicles and in the correct manner to and from the wellsite. Should any source be lost or damaged in transit, it shall be the contractor's responsibility to notify the DSV and the relevant authorities and make the necessary arrangements for recovery.

## 13.4 EXPLOSIVES

The following section describes the handling, storage, transport and basic safety requirements for explosives on the wellsite

### 13.4.1 Explosives used in Drilling Operations

Chemical explosives used in wireline activities are divided into two main categories: Low and High Explosives. The latter are subdivided into primary (1°) and secondary (2°) explosives. These are described in the table below.

Explosive		Detonated by	Handling and Storage
Deflagrating or Low Explosives		Exposure to heat or flame	<ul style="list-style-type: none"> <li>Suitable for sample takers and bullet guns</li> <li>May be transported with secondary (2°) explosives but not with primary (1°) explosives</li> </ul>
Detonating or High Explosives	1°	Hot wire, flame or percussion	<ul style="list-style-type: none"> <li>Extremely sensitive to stray electrical current, electromagnetic transmission (microwaves, radio transmissions), friction and impact. Can be detonated by any small disturbances.</li> <li>Store in properly grounded containers, handle only by properly trained personnel at wellsite</li> </ul>
	2°	High energy shock wave provided by High Explosives	<ul style="list-style-type: none"> <li>Extremely insensitive. Relatively safe to handle</li> </ul>

**Table 86. Categories of Explosives used in Drilling Operations**

### 13.4.2 Transportation of Explosives

Road transport of explosives is controlled by the Electric Logging contractor. The contractor shall be responsible for obtaining all necessary permits to import, store and transport explosives. The following must be adhered to:

- Explosives shall be securely stored and held in the vehicle, in wooden lined containers. Detonators shall never be transported in the same containers as explosives. Up to 25 Kg of explosives may be carried in the same vehicle as detonators, provided these are contained in an adequate, grounded separate container.
- Explosives transport containers shall only contain designated explosives.
- Loaded perforating guns shall be securely fastened to the floor of the vehicle.
- The vehicle shall carry prominent explosives warning notices in compliance with legislation.
- Smoking is strictly prohibited in and within the vicinity of a vehicle carrying explosives.
- Vehicles transporting explosives shall carry a minimum of two persons, one of whom shall be trained and certified in the handling of explosives.
- Vehicles designated for transport of explosives should be diesel powered.
- Vehicle refuelling should be avoided wherever possible. If unavoidable, maximum care should be exercised while refuelling.

- All road journeys shall be conducted using a suitable journey management control, which requires effective liaison between the Electric Wireline Logging Contractor's despatch office and the wellsite, from departure until arrival.

It is the responsibility of the DSV to ensure that the above guidelines are met, reporting any non conformnce to the DM.

### **13.4.3 Storage and Handling of Explosives**

The electric Wireline Logging Contractor shall provide a dedicated explosives storage container which shall be used and controlled on location as follows:

- The permanent store shall be located in a marked area on the location, away from normal personnel access, and at a safe distance from exhausts, welding equipment and any other source of ignition.
- The storage facility shall be secured with a padlock, controlled by the logging operator.
- Access shall be strictly subject to a Permit to Work system.

The logging operator shall be the sole person permitted access to the wellsite explosives store. The operator and the crew shall be the only personnel permitted to handle explosives at the wellsite. Storage and handling of the different types of explosives must be performed in accordance with the standards given in the table in section 13.4.1. The Logging Contractor shall ensure all necessary certificates of competence are obtained for each logging crew member, which shall be available on request.

The DSV shall ensure that the above storage and handling procedures are adhered to.

#### **13.4.3.1 Handling and Storage of Primary Explosives**

Primary explosives shall at all times be kept in a separately dedicated storage container, in accordance with the controls above. The segregation from other explosives shall be such that accidental detonation of primary high explosives cannot induce high order detonation of any other explosives in the same storage facility

Under no circumstances shall explosive devices fitted with primary high explosives be stored, even temporarily, at the wellsite. If any delay in the program requires cessation of operations after guns have been armed, they must be disarmed by the contractor's wireline engineer prior to storage or transportation.

The DSV shall ensure that the above procedures are adhered to.

### **13.4.4 Basic Wellsite Safety of Explosives**

The DSV shall ensure that the following precautions are adhered to at the wellsite during drilling operations:

- a) The loading and unloading of secondary high explosives (shaped charges, detonators) in perforating guns, or other explosive devices, shall be performed by the contractors personnel, trained and licensed on logging operations and explosives handling.

- b) The arming of any explosive device, with a primary high explosive detonator, shall only be performed by the Logging Contractor's engineer, immediately before introducing the device into the wellbore. Make-up and arming of explosive devices shall be performed in a designated area surrounded by a taped area.
- c) During all operations involving explosives, the number of persons present must be kept to a minimum. All personnel not directly involved in the operation shall be excluded from the area of operation, and remain at a safe distance.
- d) Underbalanced perforating or perforating in any well requiring pressure control equipment shall be avoided in the hours of darkness, due to the dangers of not detecting a broken strand in the wireline.
- e) Adequate precautions should be kept to prevent accidental discharge of electric blasting caps and/or ignitors from currents induced by galvanic currents, radio transmitters etc.
- f) Helicopter landing is not permitted whilst the Logging Contractor is handling live explosives. If necessary the explosives operations shall be halted until the helicopter has shut down or departed.
- g) Handling of explosives at night is only to be allowed if sufficient lighting is available. Smoking, open fires and naked lights of any kind (exposed incandescent material e.g soldering irons, etc.) are strictly prohibited within the safe distance of explosives and shooting equipment.
- h) Electrically initiated detonators are extremely sensitive to electrical energy, both in the form of stray currents and direct electromagnetic radiation. Potential sources of such currents and EM radiation, and the precautions to be taken are tabulated below.

Electrical Energy	Precaution
Faulty equipment/ incorrectly earthed electric generators	Faulty equipment wiring can set off guns at surface. The location and rig wiring shall be checked for damaged insulation, loose wires or hanging cables. Attention shall be given to the earthing of all electrical equipment.
Impressed current cathodic protection systems	All flowline/casing cathodic protection devices shall be switched off for the duration of the operation.
Welding equipment	Electric Arc Welding can cause unacceptable voltage differences or dangerous EMM radiation levels. All arc welding shall be stopped before electrical detonators are connected to guns, and remain shut down until the guns are fired, retrieved and inspected on surface.
Radio transmissions	All radio transmissions in the vicinity of the operation shall be suspended for the duration of the operation (See 'Radio Silence' below).
Static charge build-up of rig structure	No electrically detonated explosives shall be used during periods when threatened by electric storms

**Table 87. Precautions when Handling Explosives in the Vicinity of Electricity**

All non-essential electricity supplies and equipment which may cause stray currents shall be turned off during perforating operations. When connecting the electrical detonators to the guns and whenever the guns are less than 500 ft below surface, all non essential generators, including the generator of the logging unit, shall be stopped. AC rig generators may be kept operating if required for lighting and rig safety systems.

Prior to initiating any operation with electrically detonated explosive devices, the Logging Contractor's engineer shall connect a voltage monitor between the rig mass and wellhead (casing) to verify that stray currents have been eliminated.

### 13.4.5 Radio Silence

The DSV shall ensure that the radio silence procedures are enforced whenever operations involving the use of electro-explosive detonators are being carried out. These operations include; perforating, side wall sampling, formation interval testing, explosive backing-off (string shot), explosive cutting and setting of wireline set packers and bridge plugs. Radio shut-down requirements during operations with explosives apply within a 450 m (1500ft) radius of the wellhead.

Logging Operation	Making up or Rigging down and < 60 m (200') below Rotary Table	Explosives > 60 m (200') below Rotary Table	After inspection of retrieved tools and Before loading next, or after firing last charge (whilst still in hole)
<b>A</b> Perforating, sidewall sampling, FITs (not RFTs), explosive backing-off, explosive cutting	Full radio shut-down Hand held radios and mobile phones collected by DSV	No restrictions	Hand held radios and mobile phones should not be re-issued/ returned.
<b>B</b> Wireline set packers and bridge plugs	Hand held radios and mobile phones not allowed on rig floor, otherwise no restrictions	No restrictions	No restrictions

**Table 88. Radio Silence Procedures during Electric Logging Operations**

Receive-only radios can remain in operation during any of the operations listed in the table above. However the back-up UHF transmitter must be switched off while operations defined in 'A' (table above) are being carried out.

No operation defined in the table above shall be carried out during weather conditions which are likely to produce electrical discharges.



### 13.5 HAZARDOUS CHEMICALS

The following section describes the handling, storage and disposal of hazardous chemicals

#### 13.5.1 Safety Awareness

Every chemical stored or used at the wellsite shall be supplied with a current Materials Safety Data Sheet (MSDS). These shall be filed by the rig toolpusher at the wellsite, and kept in the Toolpusher's office, accessible to all site personnel at all times. The Toolpusher shall ensure that copies of relevant MSDS are issued to each personnel assigned to handle any chemical. The Toolpusher shall also ensure that copies of all MSDS sheets are sent to the nearest Hospital if required.

The relevant health and safety data on drilling fluid chemicals is also summarised on plasticised notices (Safety data Sheets) provided by each Drilling Fluids Contractor, for prominent display on site.

For each product the MSDS includes:

- First Aid information (i.e. relating to swallowing, inhaling or contact with eyes or skin).
- Spills and disposal procedures.
- Personal protection procedures.
- Storage and transport procedures.
- Fire precautions.

#### 13.5.2 Hazardous Chemicals Used

The following two categories of hazardous chemicals are typically used at the wellsite.

##### 13.5.2.1 Drilling and Completion Chemicals

Hazardous drilling and completion chemicals used at the wellsite are categorised as follows:

- PH adjusters.
- Bacteriacides.
- Corrosion inhibitors.
- Bromide Salts for heavy brines

Bromide Salts are not generally used in GSLM activities. However, the handling standards and procedures for hazardous chemicals apply equally to each category.

Not all drilling and completion fluid chemicals are classified as hazardous. However the majority of chemicals cause skin irritation as a minimum effect. All should be handled with care and knowledge, using appropriate levels of personal protective equipment, and in accordance with the relevant MSDS (also reference section 13.5.3).

**Note:** Of all hazardous drilling fluid chemicals, Caustic Soda (Sodium Hydroxide, NaOH) is the most widely used. Personnel handling Caustic Soda must be made aware that it takes only a small particle in the eye to cause permanent damage.

#### 13.5.2.2 Other Wellsite Chemicals

Non drilling fluid chemicals used at the wellsite are normally supplied and controlled by the following contractors:

- Electric Wireline Logging Contractor
- Cementing Contractor
- Drilling Contractor
- Mud Logging Contractor

All chemicals should be supplied with MSS. The most significantly hazardous chemical in use is the chemical cutter used by the Wireline Logging contractor, which contains an extremely reactive and toxic chemical. Rigid controls in the methods of storage, handling and application must be in place to ensure that the hazard is fully controlled and presents minimum risk to personnel or the environment.

A copy of the Logging Contractor's Procedures Manual must be available in each logging unit. It is the responsibility of the DSV to ensure that all relevant documentation is available.

- Chemical Cutters Procedures in the Schlumberger Procedures Manual, or alternate Logging Contractors equivalent document.

#### 13.5.3 Hazardous Chemicals Handling

The DSV shall ensure that the following personal protective equipment are available at the wellsite and are used by all personnel handling chemicals. The MSDS should state the required protective clothing which may include one or all of the following items:

- Dust respirator
- Chemical safety goggles or glasses
- Face shield
- Hard hat
- Chemically resistant gloves and/or cotton gloves
- Long protective clothing
- Neoprene protective apron
- Impervious safety boots

It is the responsibility of all personnel to ensure they are familiar with the health and Safety data relevant to the chemical(s) they are handling, via the MSDS and the displayed Safety data sheets on site. They should also ensure that safety equipment in their work area ( i.e. eye flushes, body showers etc.) are present and functional.

The Safety data sheets (section 13.5.1) provide all necessary information on the treatment of chemical contact of the body.

Operations personnel who are trained and assigned as First Aiders on site, shall also be familiar with the required responses to chemical effects, and shall ensure that specified safety apparatus is available and functioning on site.


#### **13.5.4 Hazardous Chemicals Storage**

All chemicals shall be stored in a designated area on pallets, and sufficient water-resistant covers shall be available to protect them in case of rain.

Those chemicals classified as hazardous shall be stacked separately from other chemicals, in a bunded area, and shall have a secure warning notice describing the chemical type(s) and major hazard(s), situated prominently next to them. Protecting these chemicals from rain and floodwater and preventing access by local wildlife, shall be a primary requirement.

#### **13.5.5 Hazardous Chemicals Disposal**

The safe disposal methods for both waste chemicals and their empty containers are dependant on the type of chemical, and shall be carried out in accordance with the following:

 Material Safety Data Sheet (MSDS) for each chemical.

CHAPTER 14  
WELLHEAD INFORMATION

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14.1 OBJECTIVES

The objective of Wellhead Information is to provide a schematic overview of, and appropriate vendor references to, GSLM wellhead equipment standards as applied to all wells. Reference should also be made to the schematics of wellhead standards for suspension and abandonment in Chapter 11 of this Manual.

## 14.2 RESPONSIBILITIES

As this Chapter primarily provides a description of wellhead equipment, very few responsibilities have been defined.

Task	Performed by	Verified by
Order wellhead equipment	DM	DM
Confirm wellhead equipment conforms to requirements of Drilling Program.	DSV	DM
Confirm all required wellhead equipment is on location.	DSV	DM
Callout wellhead technician (if required)	DSV/DM	DM

**Table 89. Responsibilities for Wellhead Equipment**

## 14.3 STANDARD WELLHEAD CONFIGURATIONS

The standard wellhead configurations listed below identify the required wellhead assemblies and pressure ratings for wells drilled in Tasmania.

### 14.3.1 Conventional Wells

Casing Scheme	Pressure Rating
13 3/8" x 9 5/8" x 7"	3000 psi, 5000 psi
9 5/8" x 7"	3000 psi, 5000 psi

**Table 90. Standard Wellhead Configurations for Conventional and Downsized Wells**

GSLM will utilise API rated wellhead equipment, specified for the service, supplied by recognised wellhead manufacturers, and where possible fabricated and supported by locally based companies (e.g. Wood Group Pressure Control Australia Pty. Ltd, Cameron Australasia Pty. Ltd.). All wellhead equipment will be installed, operated and maintained as per the suppliers documented procedures. The wellhead supplier will supply technical support.

**Thunderbolt**

ID	Task Name	Start	End	Duration	Finish
1	Thunderbolt	Tue 5/5/08	Tue 11/11/08	72 days	
2	Drilling Plan	Tue 5/5/08	Mon 5/12/08	6 days	
3	Landowner approval	Tue 5/5/08	Thu 7/3/08	2 days	
4	Acoustic Report	Tue 5/5/08	Mon 5/12/08	20 days	
5	Environmental Report	Tue 5/5/08	Wed 5/20/08	15 days	
6	Hydrology Report	Tue 5/5/08	Tue 7/1/08	7 days	
7	Drilling Program	Fri 15/6/08	Mon 25/6/08	10 days	
8	Mortgage	Sat 9/6/08	Mon 11/6/08	2 days	
9	ERP	Tue 5/5/08	Thu 14/6/08	9 days	
10	Rig fit for purpose PFI	Tue 5/5/08	Mon 10/6/08	13 days	
11	Insurances	Tue 5/5/08	Sun 10/6/08	5 days	
12	PFI service approval	Tue 5/5/08	Sun 10/6/08	5 days	
13	Community consultation	Tue 5/5/08	Tue 12/6/08	7 days	
14	TVD	Tue 5/5/08	Wed 6/6/08	1 day	
15	Equipment	Tue 5/5/08	Tue 11/11/08	70 days	
16	20" Conductor	Sat 23/6/08	Sat 20/6/08	20 days	
17	13 3/8" Casing	Thu 11/6/08	Thu 9/10/08	29 days	
18	9 5/8" Casing	Sun 5/10/08	Sun 26/10/08	21 days	
19	7" Casing	Tue 21/10/08	Tue 11/11/08	21 days	
20	Wellheads	Sat 23/6/08	Sat 20/6/08	20 days	
21	13 5/8" 5k BOP's	Thu 11/6/08	Thu 9/10/08	29 days	
22	Mud chemicals	Thu 25/6/08	Thu 9/10/08	14 days	
23	Drilling tools	Thu 18/6/08	Thu 9/10/08	21 days	
24	Drill bits	Sat 6/6/08	Sat 20/6/08	14 days	
25	Drilling water	Tue 5/5/08	Tue 12/6/08	7 days	
26	Cement	Thu 18/6/08	Thu 9/10/08	21 days	
27	Casing equipment	Thu 25/6/08	Thu 9/10/08	14 days	
28	Test tank	Sun 5/10/08	Sun 26/10/08	21 days	
29	Cellar Ring	Sat 13/6/08	Sat 4/10/08	21 days	
30	Rig computer & printer	Mon 20/6/08	Sat 4/10/08	5 days	
31	Office supplies	Thu 2/10/08	Sat 4/10/08	2 days	

**Equipment**

- 20" Conductor: 23/06 - 20/06
- 13 3/8" Casing: 11/06 - 09/10
- 9 5/8" Casing: 05/10 - 26/10
- 7" Casing: 21/10 - 11/11
- Wellheads: 23/06 - 20/06
- 13 5/8" 5k BOP's: 11/06 - 09/10
- Mud chemicals: 25/06 - 09/10
- Drilling tools: 18/06 - 09/10
- Drill bits: 06/06 - 20/06
- Drilling water: 05/05 - 12/06
- Cement: 18/06 - 09/10
- Casing equipment: 25/06 - 09/10
- Test tank: 05/10 - 26/10
- Cellar Ring: 13/06 - 04/10
- Rig computer & printer: 20/06 - 04/10
- Office supplies: 02/10 - 04/10



