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**PUMPING OF FLAMMABLE FLUIDS**

**AN INDUSTRY RECOMMENDED PRACTICE (IRP) FOR**

**THE CANADIAN OIL AND GAS INDUSTRY**

**VOLUME 8 - 2009**

**8.1.8 FIRE PROTECTION REQUIREMENTS**

**HOT ZONE**

Minimum requirements for PPE for personnel working in the **HOT ZONE**

Fire protection requirements for Fracturing using flammable fluids

Fire fighting equipment suppression capabilities and limitations

Minimum requirements for fire fighting units

Required fire protection for flammable fluid “Fire Protection Call-out Sheet”

Assigned rescue personnel

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Positioning of fire fighting equipment

**8.2.6 FIRE PROTECTION**

The authority to take charge in case of a fire emergency shall be assigned to an onsite

person. The establishment of a command structure is recommended.

(Refer to Section 8.9 “Fire Protection Requirements” and complete Section 8.9.8

“Fire Protection Call-out Sheet”).

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The hazard classification information for materials to be used on site shall also be

made available to the company contracted to or individuals assigned to provide fire

protection, in order that they may:

Ensure that the proper equipment is available on site including the requirement

for safety showers (refer to Section 8.10 “Mobile Safety Shower

Requirements”).

Be made aware of the type and volume of storage of flammable fluids and

chemicals, and

Be made aware of the contents of the chemical van and if it will be equipped with

its own fire protection system and if it will be placed outside of the **HOT**

**ZONE** during operations, or, alternatively, located off of the location, (refer to

Section 8.5.6 “Chemical Van”)

**8.9. FIRE PROTECTION REQUIREMENTS**

**8.9.1 SCOPE**

The scope of this section is to provide service companies and well operators with

guidelines on the fire protection requirements for personnel and equipment involved

in well-servicing activities.

Guidelines and standards based on scientific and industry-accepted practices have

been incorporated wherever possible.

There are few constraints that can be cited as the base criteria for determining fire

protection requirements. Each well servicing operation will have its own unique set

of requirements. Fire Fighters shall be trained as per Attachment 13.

**8.9.2 HOT ZONE**

The area having the highest risk potential to personnel involved in the well servicing

process, including the following components:

Blender

Fracturing Tank(s)

Chemical Van

Sand Truck

Coiled Tubing Unit

Particular attention must be paid to those areas of the well servicing process

involving the highest number of personnel, the amount of well servicing fluid in use,

and the difficulties likely to be encountered in isolating the fuel source. Therefore,

the blender “area” has been determined as having the highest hazard potential and

shall be referred to as the “**HOT ZONE**”

There are three critical factors involved in determining the hazards associated with

oilfield operations involving the use of flammable fluids. These are:

The presence of flammable vapours caused by the mixing procedures, or the

nature of a specific flammable fluid in relation to the temperature and

flashpoint of the fluid

The potential failure of high pressure containment systems and the release of

flammable fluids in an atomized state

The potential ignition sources that are present regardless of the precautions

undertaken to minimize these ignition sources

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Although dry chemical has quick “knock-down” capabilities, and is required in many

cases to extinguish energized liquid and/or gas fires, it does not have the capability

to secure fuel vapours or cool after suppression is achieved. Therefore, the ability to

generate large amounts of fire suppressant agents at the required rate is vital.

It is extremely important to the safety of personnel and fire fighters that the

standards for fire suppression rates set out in N.F.P.A. Standards 10 (Portable Fire

Extinguishers), 11 (Low Expansion Foam) and 18 (Wetting Agents), be used in

calculating requirements for fire fighting equipment and fire fighting personnel.

**8.9.3 MINIMUM PPE REQUIREMENTS FOR PERSONNEL WORKING**

**WITHIN THE HOT ZONE**

All personnel working within the HOT ZONE during blending of fluid, the pumping

operation, or clean-up operations (using a vacuum truck) are required to wear

Canadian Standards Association (C.S.A.) or Canadian General Standards Board

(CGSB) fire retardant or equivalent approved safety apparel. Bunker Gear and a fire

resistant balaclava, as well as fire resistant gloves should be worn when pumping

High Hazard or Special Consideration Flammable Fluids.

Fire fighters must wear personal protective equipment that conforms to National Fire

Protection Association, (N.F.P.A. Standards) 1971, 1972, 1973, and 1974.

**8.9.4 FIRE PROTECTION REQUIREMENTS FOR FRACTURING USING**

**FLAMMABLE FLUIDS**

The following table defines the minimum recommended fire protection requirements

for personnel safety/rescue. Additional fire suppression resources may be required

to provide for equipment protection.

**Number of Well Service Fluid Tanks**

**1 Tank 2 - - 4 Tank 5 or more storage**

**tanks or when**

**pumping energized**

**fluids and using 2 or**

**more storage tanks**

1 – Twin Agent Unit

or

1 – Continuous Foam Unit

with on board water

supply

1 – Continuous Foam

Unit with a 15.8 m3 (100

Bbl) water truck

Special Considerations

2 – Continuous Foam Units

with two 15.8 m3 (100 Bbl)

water trucks.

**Note:** Tank = 63 m3 (400 Bbl)

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**8.9.5 FIRE FIGHTING EQUIPMENT SUPPRESSION CAPABILITIES AND**

**LIMITATIONS**

There is a variety of oilfield fire fighting equipment available on the market. This

equipment falls into two basic categories:

The “Twin Agent” system.

Continuous Foam System

Either of these systems will provide suitable fire suppression capability to facilitate

personnel protection and rescue (if required) from the **HOT ZONE**

**Twin Agent System**

The Twin Agent System is a fire suppression system consisting of both dry chemical

(“Purple K”) and pre-mixed foam. Nitrogen is used to propel the fire suppressants

out through separate discharge hoses.

The advantages of the Twin Agent System are that it can be activated quickly for fire

suppression and rescue purposes, and it can be used independently or with a

continuous foam system.

**Continuous Foam System**

The Continuous Foam System consists of a centrifugal fire pump and a fire

suppressant chemical. When combined with supplemental water or onboard water,

these two suppressant agents produce a solution that is then pumped through a

discharge hose.

The delivery rate of the fire suppressant and fire equipment is pre-determined by

the NFPA standards, or the manufacturer’s specifications. The advantages of the

Continuous Foam System are:

Continuous foam system can be discharged a longer distance, supply more

efficient coverage and effectively secure the liquid spill to control re-ignition.

Fire fighters have more mobility thus ensuring a greater safety factor

**8.9.6 MINIMUM REQUIREMENTS FOR TWIN-AGENT / CONTINUOUS**

**FOAM SYSTEM**

**Twin-Agent Unit**

1,136 litres, (300 US gallons) pre-mixed A.T.C foam solution at 6 %

680 Kg. (1,500 lb) Purple "K" Dry Chemical System

30 m discharge hose with Twin-Agent application system

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Two fire-fighting personnel

**Continuous Foam System**

475 litres, (125 US gallons) chemical concentrate (suitable for on-site fluids)

1,900 litres per minute, (500 US gpm) centrifugal certified fire pump

Two fire-fighting personnel

680 Kg (1,500 lb) Purple-K Dry chemical system

Continuous Foam System with onboard water supply will have a minimum of

3,028 litres (800 us gal)

**8.9.7 FIRE PROTECTION CALL-OUT SHEET**

**FIRE PROTECTION CALL-OUT SHEET**

Fire Protection Company: Phone:

Fire Protection Company Representative: Phone

Producing Company: Phone:

Producing Company Representative: Phone:

Directions to Well Sites: Well Site LSD:

Sweet/Sour Well: % H2S

Bottom-hole Temperature: 0C

Immediate flow-back of well-bore fluids programmed: Yes No

**Type of fluids to be used (MSDS attached):**

Volume of liquids: m3

Number of tanks containing flammable fluids

Maximum temperature of flammable fluid on surface: 0C

Closed Cup Flash Point (mandatory): 0C

Highest percent of Methanol in tanks or carriers: %

Highest percent of Methanol for treatment: %

Overhead power-lines on location: Yes No

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**8.9.8 ASSIGNED RESCUE PERSONNEL**

A competent, properly equipped rescue team shall be available on-site whenever

High Hazard Flammable Fluids are to be pumped, (refer to Attachment 13 “Fire and

Rescue Training Requirements for Industrial/Oilfield Fire Fighters; Level II”). The

firefighting personnel shall assist in a fire exposed rescue attempt by controlling the

fire. However, the two person fire fighting team cannot provide fire fighting and

rescue duties simultaneously. When fire rescue is required, the minimum

requirement shall be two firemen and one dedicated rescue person. The rescue

person shall be prepared to initiate a fire rescue whenever personnel are working in

the Hot Zone. This requires suitable bunker gear and donned SCBA. The response

team shall have a written Emergency Plan that is reviewed, communicated and

practiced before the job in order to affect an emergency rescue. The emergency plan

shall contain the steps needed to respond to and recover a casualty as a result of an

incident. The fire fighting service company can be contracted to supply additional

rescue personnel or a third party company can supply the rescue person.

**8.9.9 POSITIONING OF FIRE FIGHTING EQUIPMENT**

The proper positioning of fire fighting equipment is of paramount importance, and

should be the first consideration when spotting equipment.

The most common problem encountered by fire fighting teams during well-servicing

procedures is the lack of space on location.

Care should be taken to ensure that the spacing of well-servicing equipment allows

easy egress for personnel involved in the well-servicing procedures, and adequate

access for fire fighting teams.

The following criteria should determine the positioning fire fighting apparatus:

Direction of the wind in relation to the **HOT ZONE** and Well Head

Equipment should be a minimum distance of 25m from any fuel source

Fire fighting equipment should be positioned so as to avoid any spillage of wellservice

fluid on the fire truck, should a rupture occur, and should not be

located directly in line of any plugs, valves, or other components of the

pressurized system.

Foam and dry chemical application hoses should be able to reach all well-servicing

and associated equipment on location. If this cannot be achieved, the hoses should

be capable of being moved to positions where they can reach this equipment.

All fire fighting equipment should be in place, inspected, and /or tested prior to any

other equipment being brought on site and the commencement of transferring,

heating, or blending procedures. The amount of hose required for foam application

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will depend on the total discharge rate required calculated from the total area of the

**HOT ZONE**.

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**ATTACHMENT 1: GUIDELINES FOR**

**CLASSIFYING FLAMMABLE FLUIDS**

**A-1.0 Introductions**

Several methods can be used to determine the hazards associated with the use of

flammable fluids. This Attachment deals with the measurement of fire hazard.

The American Society for Testing of Materials (ASTM) has two methods for

determining the fire potential of a flammable fluid. They are: the “open cup”

method and the “closed cup” method (see definition for flash point). The results

obtained by the open cup method are subject to evaporation of light-ends and may

be difficult to compare with results from the closed cup method.

The Committee that developed this IRP decided to use the open cup method as it

was deemed as the more appropriate method for measuring the potential fire hazard

of flammable fluids used in well servicing operations.

The flash point of a flammable fluid is the temperature at which there are sufficient

flammable vapours in the atmosphere to cause a flash fire when those vapours come

into contact with an ignition source. At the flash point temperature, there is

insufficient vapour to support continuous combustion and the fire quickly

extinguishes itself. The ignition temperature is the point where there is sufficient

vapour generated to support continuous combustion. Generally, the ignition

temperature is only a couple of degrees above the flash point temperature. Because

these two temperatures are so close together, the flash point temperature is

generally used to indicate the potential for continuous combustion. Testing methods

and purity of the liquid tested may vary, and as a result, flash points are intended to

be used as a guide only, not as fine lines between safe and unsafe. The Committee

recognized the need for a buffer between what could be considered a “reduced” fire

hazard, and what could be considered a “high” fire hazard. That buffer was

determined by the Committee to be 10o C below the open cup flash point

temperature.

The fire hazard of flammable fluids used in well servicing can vary, depending on

how the flammable fluid is being used, the ambient temperature, and flammable

fluid heating etc.

**Note:** IRP 4 Well Testing Fluid Handling notes API Standards for

determining the specific gravity of a fluid. The specific Gravity

of the fluid is then used to determine the hazard of the fluid

being handled.

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As WHMIS legislation requires the flash point of the fluid to be determined IRP 8

only recommends this method for determining the hazard of the fluid being handled.

**A-1.1 Classification of Fire Hazards**

The IRP Committee has used three classifications to define the level of fire hazard

associated with flammable fluids. These are:

**High Hazard Flammable Fluids** – are flammable fluids handled at a temperature

within 10o C (18o F) of the open cup flash point. For example, a liquid with a flash

point of 15o C (59o F) operating at a temperature above 5o C (41o F) should be

treated as a high hazard flammable fluid.

**Reduced Hazard Fluids** - are fluids handled at temperatures at least 10o C (18o F)

below the open cup flash point. For example, a liquid with a flash point of 15o C (59o

F) operating at a temperature of 5o C (41o F) or less should be treated as a reduced

hazard fluid.

**Special Hazard Fluids** – are flammable fluids with an open cup flash point of 0oC

(32oF) or less.

**A-1.2 Methanol and Methanol Water Blends**

Methanol is easily ignited and the flash point has been shown to be a poor indicator

of fire hazard. Fire testing of methanol/water mixtures and pure methanol has

demonstrated that methanol/water mixtures with 30% by volume or less methanol

can be considered as low hazard .Mixtures with higher than 30% v/v methanol

should be considered as high hazard flammable fluids. Methanol is considered to be

a polar solvent (miscible with water). Specialized extinguisher media (i.e., alcohol

type foam) is required to extinguish these fluids.

**A-1.3 Oils**

Crude oils, and any liquid hydrocarbons produced/returning from well operations,

are classified in the same manner as well servicing fluids per flammability limits

determined, reference section A-1.1. Additionally, the vapour pressure of the fluid

also impacts well servicing applications, and should be evaluated if they are to be

used for pumping service operations.

Currently, made under the Oil and Gas Conservation Act ERCB regulation AR 151/71

defines High Vapour Pressure Hydrocarbons and places limitations on their use:

*8.110(1) In this section a “high vapour pressure*

*hydrocarbon" means any hydrocarbon and stabilized*

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*hydrocarbon mixture with a Reid Vapor Pressure (RVP)*

*greater than 14 kilopascals.*

*8.110(2) Where the licensee or operator of a well uses a*

*high vapour pressure hydrocarbon in an operation at a*

*well other than in the hydraulic fracturing of a*

*formation, he shall observe the following rules:*

*(a) no open tanks shall be used for storing or*

*gauging or measuring the pumping rate;*

*(b) a minimum distance of 50 metres shall be*

*maintained between the wellhead and storage*

*tank;*

*(c) positive shut-off valves shall be installed*

*between the tank and pump and between the*

*pump and wellhead;*

*(d) a check valve shall be installed between the*

*pump and the well to prevent backflow from the*

*well;*

*(e) all surface lines downstream from the pump*

*shall be pressure tested to 10 000 kilopascals*

*above anticipated maximum pressure to be*

*encountered;*

*(f) no significant wastage shall occur.*

*8.110(3) High vapour pressure hydrocarbons shall not*

*be blended with propping agents for the purpose of*

*hydraulically fracturing a formation, but the board may,*

*on application, approve a given fracturing program if*

*conclusive evidence is submitted to show that there is*

*not another carrying fluid available that will be similarly*

*effective.*

**Note:** Reid Vapour Pressure (RVP) testing is standardized at 38o C

(100o F). The actual “operating” conditions may be significantly

different from the test results. The RVP value changes

dramatically as the crude weathers. The RVP test is typically

performed in a lab. The time between taking the sample and

performing the test can, in some instances, be several hours,

making the sample unrepresentative. It is recommended that

the open cup flash point test also be used to determine an

accurate indication of flammability for crude oils.

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**ATTACHMENT 13: FIRE TRAINING**

**REQUIREMENTS FOR INDUSTRIAL /**

**OILFIELD FIRE FIGHTERS**

**A-13.0 Introduction**

All Industrial/Oilfield Fire Fighters shall be trained to a level of competency

commensurate with the duties and functions that they are expected to perform,

including the operation of all the fire fighting and rescue equipment and systems

they are expected to use. **NFPA 600 Standard 2-3.1**

Industrial /Oilfield Fire Fighters shall meet the minimum skills and knowledge

requirements of a performance based training and education program. Skill levels

shall be obtained by meeting documented job performance requirements for each

site-specific task expected to be performed by the Fire Fighter before participating in

any emergency operations. **NFPA 600 Standard 2-3.2**\*

Industrial/Oilfield Fire Fighters shall not perform any duties they have not been

trained to perform. All Fire Fighters progressing through levels I, II, and III to

Senior Fire Fighter, shall be under the supervision of a Senior Fire Fighter.

Drills shall be conducted as often as necessary to evaluate the effectiveness of the

fire training and education program and the competence of the Fire Fighter in

performing assigned duties. Lessons learned shall be evaluated and documented and

additional training shall be provided as necessary to improve performance that is

below established standards. NFPA 600 Standard 2-3.8\*

**A-13.1 National Fire Protection Association (NFPA) Fire**

**Fighting Requirements**

**Training Industrial/Oilfield Fire Fighter IV (Senior)**

A Senior Fire Fighter must have as a pre requisite, Levels I, II, and III, and pump

operator training. Candidates receive classroom and practical instruction on

pumping engines, designs, accessories, and principles of operation according to the

training program.

**Industrial/Oilfield Fire Fighter III**

A Fire Fighter III must have as a minimum, the equivalency of Level I, II, III

according to NFPA 600 Standard 2-3. Fire Fighter III must be fully trained in LPG

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and LNG pressure fires. In addition to the required levels of training, a Fire Fighter

III shall have as a minimum, two (2) years of fire fighting experience and training

with competency levels in area of application.

**Industrial/Oilfield Fire Fighter II**

Fire Fighter II shall have Level I and II according to NFPA 600 Standard 2-3 as a

minimum standard of training. The Fire Fighter II must be fully trained in the

specific theory and operation of the equipment he/she will be required to operate.

**Industrial/Oilfield Fire Fighter I (Trainee)**

The Fire Fighter I Trainee shall have Level I according to NFPA 600 Standard 2-3, all

industry training certification and be fully orientated in the specific tasks he/she may

be required to perform. On the job training shall be under the direct supervision of

a Senior Fire Fighter.

**Training Records**

Training records shall include, but not be limited to, courses completed, subjects

studied, refresher courses completed, and other evaluations of skills and knowledge,

drill attendance records, and leadership or other special accomplishments related to

the fire fighters activities. NFPA 600 Standard 2-3.14.2

Fire personnel training certification may be supplied upon request.

**Physical Fitness**

Industrial /Oilfield Fire Fighters shall be required to meet the Medical and Physical

requirements as set out in the NFPA 600 Standard, 2-5.1.1\*.

**A-13.2 NFPA Standards**

**NFPA 600 Standard 2-3.-1**

A training and education program shall be established and maintained for all fire

brigade members to ensure that they are able to perform their assigned duties in a

safe manner that does not pose a hazard to themselves or other members. All

members shall be trained to a level of competency commensurate with the duties

and functions that they are expected to perform, including the operation of all of the

fire fighting and rescue equipment and systems they are expected to use.

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**NFPA 600 Standard 2-3.-2\***

Members shall meet the minimum skills and knowledge requirements of a

performance based training and education program. Skill levels shall be obtained by

meeting documented job performance requirements for each site-specific task

expected to be performed by brigade members before participating in emergency

operations.

**NFPA 600 Standard 2-3.-8\***

Drills shall be conducted as often as necessary to evaluate the effectiveness of the

fire brigade training and education program and the competence of fire brigade

members in performing assigned duties. Lessons learned shall be evaluated and

documented, and additional training shall be provided as necessary to improve

performance that is below established standards.

**NFPA 600 Standard 2-3.14.2**

Training records shall include, but not be limited to, courses completed, subjects

studied, refresher courses completed, and other evaluations of skills and knowledge,

drill attendance records, and leadership or other special accomplishments related to

fire brigade activities.

**NFPA 600 Standard 2-5.1.1\***

Prior to being accepted for fire brigade membership, employees shall be examined

and certified by a qualified physician as being medically and physically fit. The

medical and physical fitness requirements shall take into account the risks and the

tasks associated with the individual’s assigned fire brigade duties.

**NFPA 600 Standard 4-3.1**

The Industrial/Oilfield Fire Fighter must be properly trained on personal protective

equipment according to the NFPA 600 Standard, 4-3 Protective Clothing and

Protective Equipment, as well as H2S, W.H.M.I.S., T.D.G., and a level of First Aid

that is equivalent or greater than Standard First Aid.

Thermal protective clothing and protective equipment shall be available in sufficient

quantity and sizes to fit each brigade member expected to enter the hot and warm

zones. Thermal protective clothing and protective equipment meeting the following

requirements shall be required to be worn by all fire brigade members entering the

hot and warm zones.

Protective clothing shall be in accordance with NFPA 1971, Standard on Protective

Clothing for Structural Fire Fighting.

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Helmets shall be in accordance with NFPA 1972, Standard on Helmets for

Standard Fire Fighting.

Gloves should be in accordance with NFPA 1973, Standard on gloves for

Structural Fire Fighting.

Footwear shall be in accordance with NFPA 1974, Standard on Protective

Footwear for Structural Fire Fighting.

SCBA and PASS devices meeting the following requirements shall be provided for

and shall be used by all fire brigade members working in the HOT ZONE:

PASS devices shall be in accordance with NFPA 1982, Standard in Personal Alert

Safety Systems (PASS) for Fire Fighters.

Open-circuit type, self-contained breathing devices shall be in accordance with

NFPA 1981, Standard on Open-Circuit Self-Contained Breathing Apparatus for

Fire Fighters.

Closed-circuit type, self-contained breathing devices shall be NIOSH/MSHA

approved with minimum service duration of 30 minutes and shall operate in

the positive mode only.

Protective clothing and protective equipment shall be used and maintained in

accordance with manufacture’s instructions. A maintenance and inspection program

shall be established for protective clothing and protective equipment. Specific

responsibilities shall be assigned for inspection and maintenance.

**A-13.3 Use of Self Contained Breathing Apparatus (SCBA)**

Members using SCBA shall operate in teams of two or more who are in

communication with each other through visual, audible, physical, safety guide-rope,

electronic, or other means to coordinate their activities, and are in close proximity to

each other to provide assistance in case of an emergency.

Where members are involved in operations that require the use of SCBA or other

respiratory protective equipment, at least one member shall be assigned to remain

outside the area where respiratory equipment is required. This member shall be

responsible for maintaining a constant awareness of the number and identity of

personnel using SCBA, their location, function, and time of entry. Members with

SCBA shall be available for rescue.

All fire brigade members entering the **HOT ZONE** shall be provided with approved

protective hoods or a combination of ear flaps and collar that provide protection for

the ears and neck and interface with the self-contained breathing apparatus face

piece, thermal protective coat and helmet

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**A-13.4 Reference to Other NFPA Standards**

**(NFPA 10 - Standard for Portable Fire Extinguishers)**

Covers the selection, installation, inspection, maintenance, and testing of portable

extinguishing equipment.

**(NFPA 11 - Standard for Low – Expansion Foam)**

Covers the characteristics of foam-producing materials and the requirements for

design, installation, operation & maintenance of equipment and systems; minimum

requirements for flammable ad combustible liquid hazards in areas within buildings,

for storage tanks, and for indoor and outdoor processing.

**(NFPA 18 - Standard on Wetting Agents)**

Covers qualification tests, methods of evaluation, general rule application, and

limitations for use of wetting agents as related to fire control and extinguishments.

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**8.1.9 MOBILE SAFETY SHOWER REQUIREMENTS**

Capabilities and capacities of mobile shower units

Training and responsibilities of safety shower operators

PPE requirements for safety shower operators

Determining the number of safety shower units required

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**8.2.5 MOBILE SAFETY SHOWER REQUIREMENTS**

(Refer to Section 8.10 – Mobile Safety Shower Requirements)

The number of personnel inside the HOT ZONE shall be limited to the number of

shower heads that have sufficient water supply to meet the Provincial/Territorial

Regulations and ANSI- Z358.1 design requirements.

**8.7.2 FIRE PROTECTION**

Shut down all equipment not required during vacuum truck operations

Fire protection shall be maintained at a state of readiness during rig-out

Vent hose from vacuum truck to be directed downwind and away from any

possible ignition source such as hot manifolds

Remove product from all hoses prior to rig-out

Clean up all spills prior to demobilization

**8.10. MOBILE SAFETY SHOWER**

**REQUIREMENTS**

**8.10.1 SCOPE**

Shower units are intended to provide standby safety services for workers whenever

hazardous fluids (see WHMIS guidelines) are being pumped or handled. There are

several different designs of shower units available on the market.

The intent of this section is to recommend MINIMUM standards for:

The capabilities and capacities of the shower/eyewash units, and drench hoses

Training requirements for, and responsibilities of, the operators of these units

Equipment requirements for operators of the shower units

Factors determining the use of shower units

**8.10.2 CAPABILITIES AND CAPACITIES OF MOBILE SHOWER UNITS**

In order to meet the requirements set out in the O H & S Code Section 23 and the

First Aid Regulation Part 11, suitable on-site facilities shall be provided as defined in

Provincial/Territorial Regulations and ANSI – Z358.1 – 1998). On-board water

supplies are typically 1.9m3 – 2.3m3 (500 – 600 US gallons). Each person that could

be exposed to hazardous fluids requires 1.15m3 (300 US gallons) of potable water

available for safety shower use. Seasonal weight restrictions (road bans) may limit

the amount of water allowed on-board the mobile shower units. This factor will have

to be taken into account when determining the need for a supplemental potable

water supply.

ANSI Standard Z358.1 – 1998, Sections 4, 5 and 8, set out the following minimum

standards for shower units, eyewash units, and drench hoses:

Each shower head shall be capable of delivering a minimum of 76 liters per

minute (20 US gpm) of “flushing solution” for a minimum of 15 minutes. This

requires a minimum of 1.14m3 (300 US gallons) for each person exposed to

hazardous fluids.

Each eyewash unit shall be capable of delivering flushing fluid to the eyes at a

rate of not less that 1.5 liters per minute (0.4 US gpm) for 15 minutes

Each drench hose shall be capable of delivering a minimum of 11.4 liters per

minute (3 US gpm) of flushing fluid for a minimum of 15 minutes

The delivered flushing fluid temperature shall be “tepid”. Tepid is defined in the

ANSI Standard as “moderately warm; lukewarm”

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If the number of persons required to be in the **HOT ZONE** exceeds the on-board

water supply of a mobile shower unit, supplemental (tepid) potable water

shall be required.

Refer to ANSI Standard Z358.1 - (latest edition) for more information on the

performance requirements and inspection and maintenance of safety shower

equipment.

The following minimum standards should also be observed:

The showering area must be fully enclosed and heated and large enough to

comfortably accommodate one adult per shower head

The showering area shall be provided with forced air ventilation

The “recovery area” shall not be used for transportation of the victim, and may

only be used for first aid purposes until medical aid arrives at the scene. The

shower stalls must not be used as a “recovery area”

A First Aid Kit in accordance with Provincial/Territorial First Aid Regulations

Two self-contained breathing apparatus (SCBA)

The shower unit must be fully mobile in order to change position on location to

effectively compensate for changes in wind direction or movement of other

equipment on location

The shower unit must be separated from any potential hazard, shall not be

located within the **HOT ZONE** and be within 10 second walking distance from

the **HOT ZONE**.

Shower units located on tank trucks delivering acid or other fluids to the location

are to be used by the tank truck operator only and shall not be factored in

when determining the number of shower heads required to provide adequate

protection for personnel working in the **HOT ZONE**.

Ordinary showers installed in travel trailers etc. do not meet the ANSI standard and

shall not be not be factored in when determining the number of shower heads

required to provide adequate protection for personnel working in the **HOT ZONE**.

**8.10.3 TRAINING AND RESPONSIBILITIES OF SAFETY SHOWER**

**OPERATORS**

Operators of shower units shall be competent in the operation of the unit they will

be required to operate.

Operators of shower units shall have current and valid training certificates in the

following:

Standard First Aid/CPR

H2S Alive®

Pumping of Flammable Fluids

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Transportation of Dangerous Goods (TDG)

WHMIS

The shower unit operator’s duties and responsibilities shall be limited to the

following:

The administering of first aid to on-site personnel exposed to chemical/corrosive

substances

Provide assistance for on-site first aid

The safe operation of the shower unit; eyewash unit, and drench hose

Review of hazard awareness with all personnel

Instruction of personnel who may be exposed to hazardous materials in the

location and proper use of the emergency shower units

**8.10.4 PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS FOR**

**SAFETY SHOWER OPERATORS**

Operators of shower units shall be equipped with a complete acid/chemical resistant

wet suit including gloves, rubber boots, eye protection, Fire Retardant Clothing

(FRC) and a hard hat. FRC must meet CSA or CGSB Standards.

**8.10.5 DETERMINING FACTORS FOR THE NUMBER OF SAFETY SHOWER**

**UNITS REQUIRED**

The following should be taken into account when determining the number of shower

units, eyewash units, drench hoses and supplemental supply of potable water

required:

The number of personnel working in the HOT ZONE. The HOT ZONE area will

differ from job site to job site, and will have to be determined at the job site

Some acid job HOT ZONEs are on the rig floor when the treating iron is

suspended

The number of pumping units and volume of acid on-site

The shower unit(s), eyewash unit(s), and drench hose(s) should be on location

when the acid is being transferred, mixed, or under pressure on the surface.

This shall include the time when back pressure is being used to circulate the

acid to the bottom

The shower unit(s), eyewash unit(s), and drench hose(s) shall remain on location

until all pumping equipment has been rigged out

Pumping of Flammable Fluids

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