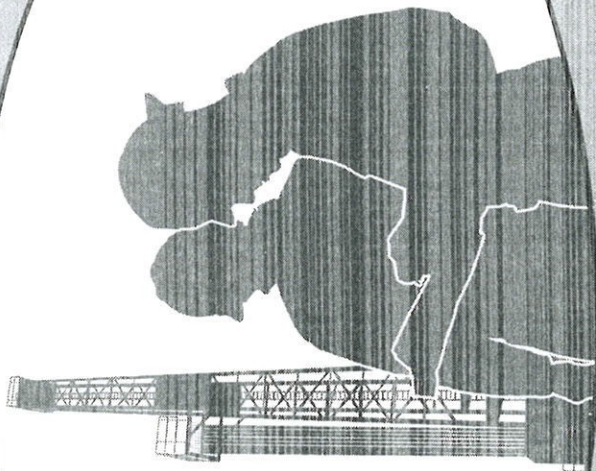


## Date: \_\_\_\_\_

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# RIG CHECK



INSPECTION FORM: 15

## STATIC HANGING LINES

**Purpose:** To ensure that static hanging lines are in good condition.

**For more information see:** API Recommended Practice 4G, 8B, and 54.



## Instructions

**LOCATION:** Identify the static lines located on the rig and list them for inspection.

**TYPE:** Indicate the type of line including size and manufacturer identification number.

**CABLE CONDITION:** Look for kinks that may have occurred during rig up, cuts in the line can result from impact by pipe or iron, and crushing of the cable or flat spots along the line where the internal core may have failed. Identify broken wires along the length of the line and replace as per company guidelines. Look for areas along the line where it may have rubbed against itself or the structure. Cables that have rust down inside the strands should be replaced.

**WIRE ROPE OR CABLE CLIPS:** Ensure that the size and number are correct for the size of line being used as per manufacturer recommendations. Check the installation if the cable clamps are correct and in compliance with good rigging practices. Make sure that any cable tail will not present a snag hazard or get fouled with other lines or traveling equipment.



**INSTALLATION:** Inspect for cracks, deformities, and wear. Shackles used to hang static lines over work areas should be the 4-part type with bolt and locking pin. Screw pin shackles should not be used to hang static lines overhead.

**ROUTING:** Check the routing of the static cable to ensure that it hangs freely without excessive contact with structural components of the mast. Pay particular attention to areas around the girts and racking board where the cable can become trapped. Check the length of the cable to ensure it has not been smashed by pipe or traveling equipment. Block hanging lines should be tied back out of the way and if the shackle is left attached it should be properly secured to prevent dropped objects. Temporary installations of top drive drilling units may exceed the load rating on the block hanging line and/or the hanger on top of the traveling block. Top drive drilling units, rotary hose and service loop clamps, and stabbing boards, can all be damaged by, or cause damage to static hanging lines.

**END CONNECTIONS:** Inspect thimbles and mechanical sleeve fittings for bending or deformities. Check for broken wires in and around factory installed mechanical sleeve fittings. When wire rope clips are used on static lines, the load rating of the cable may need to be reduced. Poured socket fittings done with Thermoset resin should be checked for cracks and broken resin in the fitting.



### Static Hanging Line Inspection

Mark with ☒ for OK. Mark with ☐ for bad

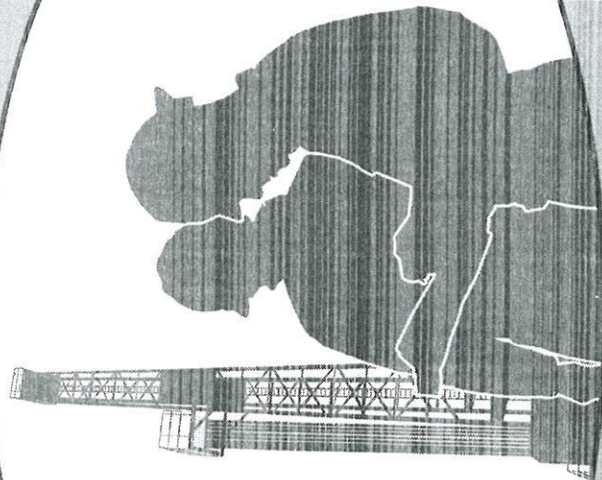
Name \_\_\_\_\_

Date: \_\_\_\_\_

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# RIG CHECK



## INSPECTION FORM: 16 SYNTHETIC WEB SLINGS

**Purpose:** To ensure that synthetic web slings are safe for use.

**For more information see:**  
29CFR1910.184 (i), manufacturer documentation.



## Instructions

**LOCATION AND TYPE:** Maintain a log of all lifting slings on the rig. Inspections prior to use and each year are required by federal regulation and are part of good safety practice. Slings should be marked by the manufacturer with the safe working load and the date of manufacture. These tags should not be taken off the sling or otherwise destroyed. **If tags are missing, the sling should be removed from service and destroyed.**

Slings should be stored in a clean dry place where they are out of direct sunlight and protected from the weather. In addition, slings should be stored away from heat and chemicals that may harden or damage the fibers. Slings should be hung up and not left on the floor or deck.

**INSPECTION:** Check each sling individually for the following conditions: wear, broken stitches, heat damage, chemical damage, holes or tears, cuts or snags, or damage to the end fitting. Mark any damage on the inspection form, mark the sling and remove it from use.

Start with the end eye or fitting. Inspect the chaff guard inside the eye if the sling has one. Look the eye over carefully to determine if it has been stretched or pulled over a large object. See if there is any evidence of knotting or twisting of the eye.

Move to the body of the sling looking for signs of snagging, broken threads, tears, or cuts. Make sure the sling has not been tightened

around a sharp corner that would cut the fabric. Synthetic web slings are manufactured with a red "tattle tale" yarn woven inside the strap itself. If you can see this red string, it means that the sling has been stretched or otherwise damaged and it should be taken out of service and destroyed.

Check for burn marks or melting that may have occurred around welding activities. Slings that are used around welding should be protected from the heat and the sparks and should never be installed on hot iron. Chemical exposure can also burn or harden synthetic slings.

Some companies use a color code system to identify what year a sling was inspected. Some larger slings may last for many years and would need to be inspected, recorded, and color coded for the current year. Use only marking paint recommended by the sling manufacturer to color code slings. Other paints may damage the sling and render it useless.



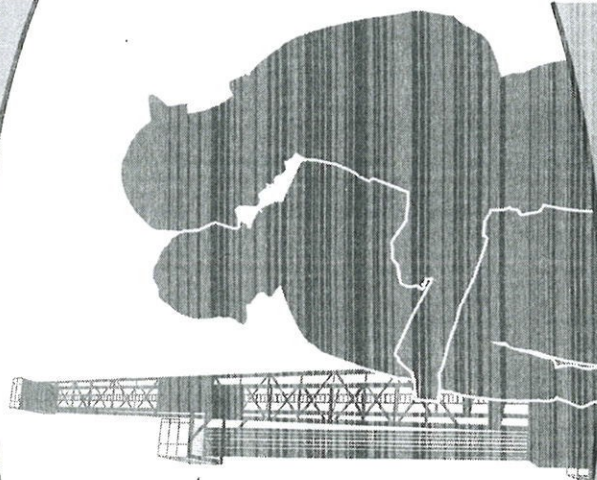


## Date:

☒ for bad[illegible]



# RIG CHECK



INSPECTION FORM: 17

## WIRE ROPE OR CABLE SLINGS

**Purpose:** To ensure that wire ropes are safe for use.

**For more information see:**  
29CFR1910.184 (f) and manufacturer information.



## Instructions

**LOCATION AND TYPE:** Maintain a log of all lifting slings on the rig. Inspections prior to use and each year are required by law. Good practice instructs that slings should be marked by the manufacturer with the safe working load and the date of manufacture. Tables of working load by size and type of wire rope should be available in case tags are damaged.

Slings should be stored in a clean dry place where they are protected from the weather. In addition, slings should be stored away from heat and chemicals that may remove the lubricants from the cable. Slings should be hung up and not off the floor or deck.

**INSPECTION:** Check each sling individually for the following conditions: wear, broken wires, heat damage, corrosion, kinks or doglegs, eye deformation, or damage to the end fitting. Mark any damage on the inspection form, mark the sling, and remove it from use.

Start with the end eye or fitting. Inspect the inside the eye for wear or broken wires. Look the eye over carefully to determine if it has been stretched or pulled over a large object. See if there is any evidence of knotting or twisting of the eye. Inspect the swaged fittings for cracks or bending paying close attention to where the wires enter the fitting.

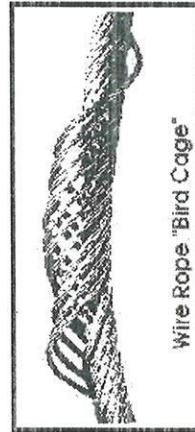
Move to the body of the sling, does it show any deformation such as kinking, knots, or crushing? Make sure the sling has not been tightened around a sharp corner that would

cut or break the cable. Ensure that there are not more than five randomly distributed broken wires in one strand in one lay length of rope. If more than 10 broken wires are found in one rope lay or the sling exhibits other damage, it should be taken out of service and destroyed.

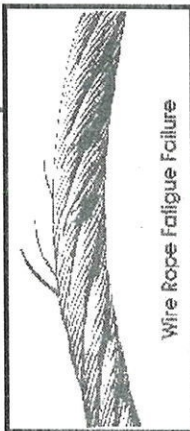
Check for burn marks or melting that may have occurred around welding activities. Slings that are used around welding should be protected from the heat and the sparks and should never be installed on hot iron. Check for corrosion from chemicals or exposure to water.

Look for flattening or crushing of the cable that would indicate damage to the internal wire rope core. Any damage to the internal core would be cause to take the sling out of service.

Some companies use a color code system to identify what year a sling was inspected. Some larger slings may last for many years and would need to be inspected, recorded, and color coded for the current year.



Wire Rope "Bird Cage"



Wire Rope Fatigue Failure



### Wire Rope Sling Inspection

Mark with ☒ for OK. Mark with ☐ for bad

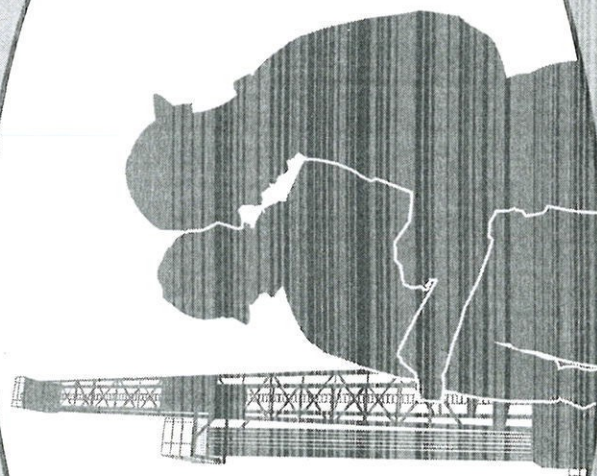
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Name \_\_\_\_\_

Date: \_\_\_\_\_

[illegible]

# RIG CHECK



INSPECTION FORM: 18

## CHAIN SLINGS

**Purpose:** To ensure that chains are in good condition and ready for use.

**For more information see:** 29CFR1910.184 and manufacturer documentation.



## Instructions

**LOCATION AND TYPE:** Maintain a log of all chain slings on the rig. Inspections prior to use and each year are required by law. Good practice instructs that slings should be marked by the manufacturer with the safe working load and the date of manufacture. These tags should not be taken off the sling or otherwise destroyed.

Chain slings should be stored in a clean dry place where they are protected from the weather and are away from moving equipment. Chains should be hung up and off left on the floor or deck.

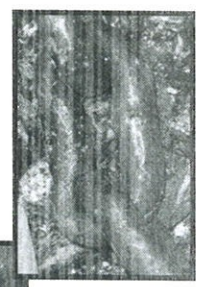
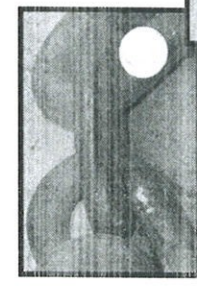
**INSPECTION:** Individually check each sling for the following conditions: inner link wear, bent link, stretched chain, gouges, heat damage, cuts or nicks, or damage to the end fitting. Mark any damage on the inspection form, mark the sling, and remove it from use.

Start with the end eye or fitting. Inspect the lift ring if the sling has one. Make sure that the lift eye is not distorted or pulled out of shape. Look the eye over carefully to determine if it has been stretched or pulled over a large object. See if there is any evidence of welding or cutting of the eye.

Move to the body of the sling for signs of nicks or bent links. Examine links for evidence of over pulling. Look for melting that may have occurred around welding activities. Chain slings that are used around welding should be protected from the heat and sparks and should never be arced or burned.

Look for wear or damage to end links used to attach the chain to the end fittings. Verify that the keeper pins are in place and that the link swivels and moves freely. Chain slings should not be welded by the link to equipment. Chain can be pulled tight down on a load resulting in very dangerous sling angles. Chain slings should have no more of a sling angle than cable slings used for the same purpose.

Examine end hooks for bending and misalignment. Chain hooks should fit snugly between the links and be sized properly for the chain.



**Worn and stretched chain links**



## Chain Sling Inspection

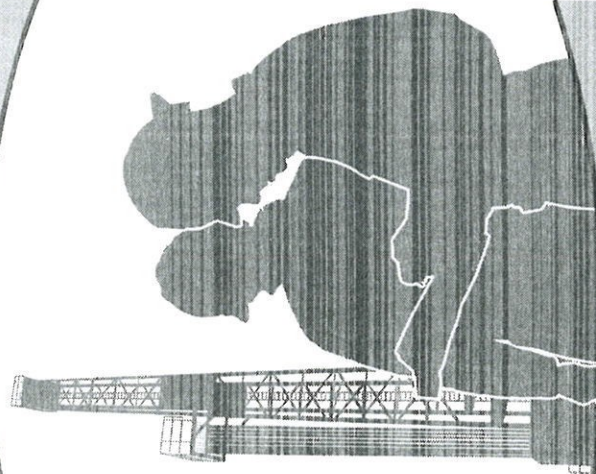
Mark with ☒ for OK. Mark with ☐ for bad

Date:

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# RIG CHECK



## INSPECTION FORM: 19 SHACKLES

**Purpose:** To ensure that shackles are in good condition and ready for use.

**For more information see:** manufacturer documentation.



## Instructions

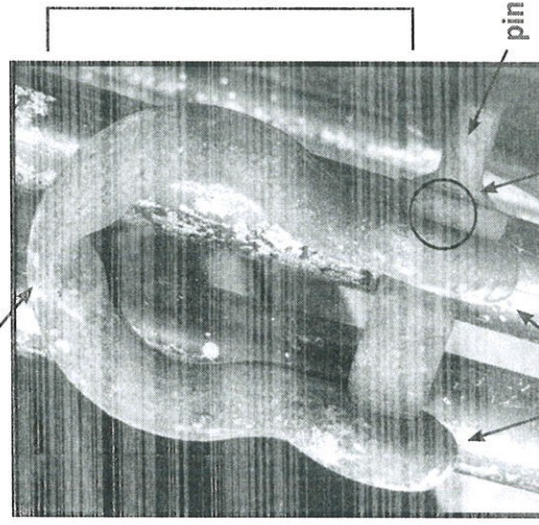
**LOCATION AND TYPE:** List all shackles with manufacturer and load rating. If a color code system is being used for lifting equipment, it should be applied to the shackles also.

**PINS:** Inspect the pin closely to ensure that the threads and shoulder are in good condition. Threads should not be damaged and components should screw together smoothly by hand pressure only. If tools are required to force the pin or bolt into the bow of the shackle, then one or more of the components has been damaged and should be taken out of service. Screw pins should "shoulder up" against the outside face of the shackle ear. Bending along the length of the pin may indicate that the shackle has been over loaded and it should be taken out of service and destroyed.

**SHACKLE BOW OR BODY:** Look for cracks, deep gouges, or other metal damage. If the shackle being inspected is in use, make sure that the load is properly set on the shackle and that the load rating of the shackle has not been exceeded. There should not be any weld damage or modification done to the shackle. Hold the body sideways and see if the shackle body has been twisted and if the alignment is correct. Check the inside of the bow for grooves and wear. Ensure that the opening between the ears has not been spread. If the shackle has been side-loaded, the body will be deformed and the ears will show bending.

**FOUR PART SHACKLES:** These are shackles that include a safety keeper or cotter key that prevents the nut from backing off the pin. The safety keeper or cotter pin should be the proper length and diameter to fit snugly in the hole through the pin. At no time should the shackle be assembled for use with just the safety pin installed; the nut must be in place and snug with the safety pin installed prior to loading the shackle. Four part shackles should be used in permanent or semi-permanent overhead installations and should be inspected weekly to ensure the safety pin and nut are secure and that the shackle has not been damaged by traveling equipment or other contact.

### Excessive Wear



Bow  
or  
Body

pin

"ears"

"shouldered up"



# Shackle Inspection

Mark with ☒ for OK. Mark with ☐ for bad

# Rig

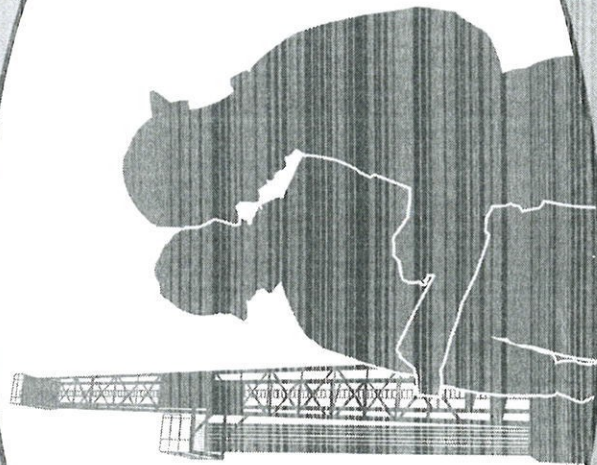
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# RIG CHECK



## INSPECTION FORM: 20 HAND TOOLS

**Purpose:** To ensure that hand tools are maintained and stored properly.

**For more information see:** 29CFR1910.242-3 and API Recommended Practice 54.



## Instructions

**LOCATION AND TYPE:** List each area of the rig to be inspected where hand tools are stored. For each type of tool follow the instructions below marking the form for: no damage, clean or rust/corrosion, stored properly, properly serviced.

**HAMMERS:** The handles should be secure and show no signs of splitting or breaking. The hammer head should not be "mushroomed" or show signs of splitting that may cause splinters to break off during use. Damaged hammer heads should be replaced not repaired. Do not attempt to trim up a mushroomed hammer head with a torch as this will affect the hardness of the metal and lead to more problems with splinters. Welded on steel pipe handles should be avoided.

**PIPE WRENCHES:** Inspect all pipe wrenches for damage to the wrench body. Pipe wrenches may have been struck on the back of the head causing cracks or deformation. The wrench jaws should move freely when the adjustment knob is turned. The jaw hook and heel teeth should be sharp and even. The retainer pin for the heel should be installed properly as supplied by the manufacturer. Steel handled wrenches should not show excessive damage or bending to the handle. Aluminum handled wrenches should not have signs of bending or deep gouges from a cheater pipe. This weakens the wrench and may cause it to fail under load.

**STRIKING WRENCHES:** Examine the box end of the wrench to ensure there are no cracks or broken areas. Wrenches that have been broken should not be welded up, but should be replaced. The striking area should not be mushroomed to the point that splinters or shards will break off when they are struck. No home built attachments should be added to the wrench, as this may cause heat damage making the wrench more brittle and prone to breakage.

**END WRENCHES:** Wrenches should not be bent or otherwise deformed. Teeth on box end wrenches should be sharp and well defined. Jaws on open end wrenches should not be bent or misaligned. End wrenches should not show signs of hammering on the handle as this causes sharp edges and weakens the handle.

**CUTTING TOOLS:** Cutting tools should be kept sharp and stored where they do not present a hazard. A good supply of replacement blades should be available for knives and saws.

**CHAIN TONGS:** The jaw heads on chain wrenches should be sharp and clean. The retainer should be installed properly and the chain should be flexible and free from side load damage. Severely bent handles or loose jaws would be reason to take the tongs out of service.

**SHOVELS AND RAKES:** Wooden handled tools should be free from splinters or broken handles. Shovels should be clean of chemicals or mud that may cause injury to others.



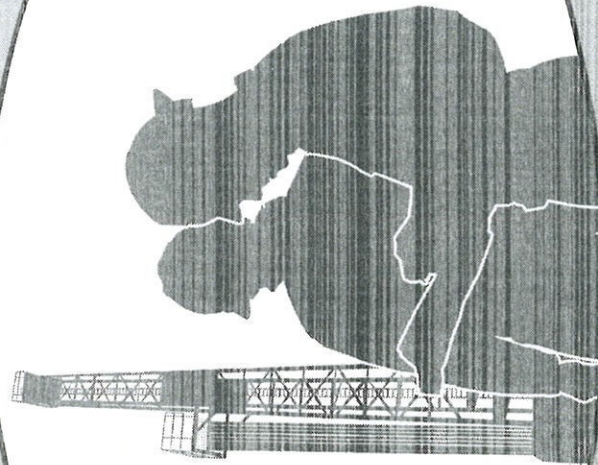
## Hand Tool Inspection

## Hand Tool Inspection

[illegible]



# RIG CHECK



INSPECTION FORM: 21

## POWER TOOLS

**Purpose:** To ensure power tools used around the rig are being maintained and stored properly.

**For more information see:**

29CFR1910.241-244,

API Recommended Practice 54



## Instructions

**LOCATIONS:** List each area where power tools are located. Examine the area considering each issue below.

**ELECTRICAL:** Tools should have the equipment manufacturer's label clearly visible. Labeling should include manufacturer's name, model #, voltage requirements, RPM, and warnings. Inspect the cord where it attaches to the machine. There should be a solid attachment with reinforced strain relief where the wire attaches to the motor. The cord should be 3-pronged or the tool must be double insulated and clearly marked. Grounded plugs should not have the third pin cut off. Plugs and cords should be in good condition and free of cracks or breaks. Fixed power tools should be mounted solidly and protected from accidental contact with the power switch. Inspect triggers or switches to ensure that they function properly; they should not stick or remain on after release of the trigger. Power on buttons should release quickly once the trigger has been touched.

**ATTACHMENTS:** Inspect guards and attachments on power tools to ensure they meet the manufacturers' requirements. Guards should be original and not be modified or otherwise changed contrary to the manufacturers design. Handles should be securely installed, and hand and trigger guards functioning properly.

**WEAR PARTS:** Wear parts (disks, grinding stones, blades, and bits) should be checked if appropriate for the machine, including RPM rating, belt speed, diameter, and other sizing elements required for safe operation. Never use parts that are not specifically recommended for the power tool you are using. Attachment mechanisms should not be changed from one tool to another. Always use the proper size nut, backer plate, or drive wheel recommended by the original equipment manufacturer.

**STORAGE:** Power tools should be stored in their original cases if available. Tools should be kept away from moisture and chemicals that could damage motors and plastic parts. Tools should not be stacked on shelves where employees may have trouble lifting and sorting the tools.

**AIR TOOLS:** Air tools should be inspected prior to each use and each month. Air tools must be kept oiled and in a dry place to prevent rust. Insure that there is a good supply of whip checks for each air hose connection. Each tool should be clearly labeled with the manufacturer's information. In addition, the components attached to the air tool should be properly labeled and compatible with the tool. Impact wrenches should be equipped with the proper impact type sockets. Special care should be taken to ensure that grinding disks and stones are rated for the very high RPM developed by air tools.



# Power Tool Inspection

Mark with ☒ for OK. Mark with ☐ for bad

#2

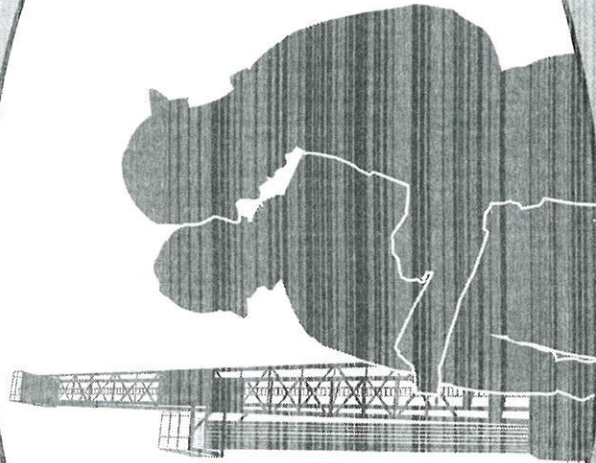
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# RIG CHECK



INSPECTION FORM: 22

## HOSE & FITTINGS

**Purpose:** To ensure that hoses used around the rig are in good working order and used properly.



## Instructions

**HOSE:** List each hose with a description of location and purpose so that another worker could locate it. Inspect based on the instructions below and note on the form.

**SERVICE RATING:** Each hose must be clearly marked with its pressure rating and service limitations. Some hoses may not be rated for high temperature or corrosive materials. Any hoses that are being used for purposes other than what they were designed for should be addressed.

**HOSE BODY:** Inspect the entire length of the hose all around. The hose should not be crushed or kinked or otherwise deformed. Check for swelling of the hose body that would indicate that the hose had been over heated or over pressured. Small cracks on the outside layer are common; however, cracks that expose multiple layers may need to be addressed and should be noted on the inspection. Look for signs of stretching or pulling of the hose, this may cause undue stress on the fittings. Check for damage that may have been caused by the hose being snagged along its length.

**END FITTINGS:** Carefully inspect each end of the hose to verify the integrity of the connection. The fitting should be seated all the way down into the hose and show no signs of movement. Fitting clamps and bands should be tight and located in the proper position on the fitting. The end fittings themselves should not be damaged and any locking mechanisms should be fully functional. Hose fittings and

connections should be tight and not leaking. Fittings must be rated for the same service as the hose and be installed correctly.

**HOSE RUNS:** Check the run of the hose to ensure it is not rubbing or chaffing on sharp edges. Check the hose run to ensure it does not interfere with doors, walkways, or overhead clearance. Hoses should not be run in rig ditches and should be protected from chemicals or heat sources such as steam piping or welding. Hoses should never be stretched tight from fitting to fitting, the hose must be allowed to expand and contract during use without putting a pull load on the fitting.

**STORAGE:** When not in use, hoses should be coiled and stored properly to prevent damage to the body of the hose or to the end fittings. Large diameter hoses should be coiled flat without kinks; they should not be transported in a junk basket where heavy iron equipment may damage them. Smaller hoses can be coiled and hung for storage and transport. Make sure that all hoses have been properly drained or flushed prior to storage or transport. If hoses have been used for hydrocarbon or chemical service, they should be plugged to prevent spills or employee contact from residue left in the hose.

**THIRD PARTY EQUIPMENT:** Third party hose runs should be checked as well to make sure they don't interfere with rig operations or create unsafe conditions for the rig crew.

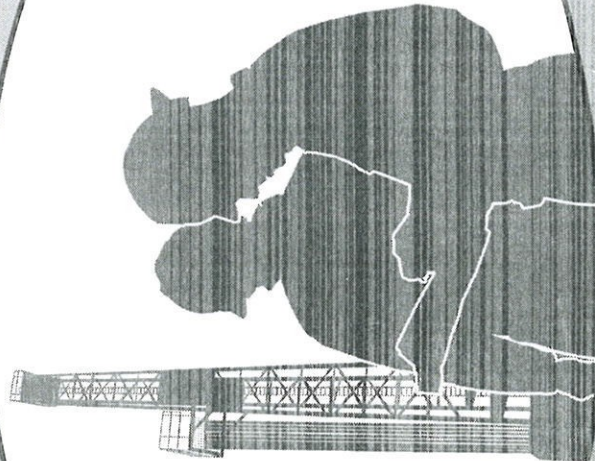


Rig #: \_\_\_\_\_ Name: \_\_\_\_\_ Date: \_\_\_\_\_

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# RIG CHECK



INSPECTION FORM: 23

## SAFETY CHAIN & WHIP CHECK

**Purpose:** : To ensure that hoses used around the rig are properly snubbed to prevent injury should the fitting fail and the hose whip out of control.

## Instructions

Good practice recommends that hoses longer than 3 feet should have secondary restraint if they are:

- High pressure high volume hoses (for example: Rotary hoses, vibrating hoses, cement hoses, circulating hoses)
- Compressed gas hoses (air hoses  $\frac{3}{4}$ " and larger, nitrogen transfer / service hoses)
- Energized fluid lines (steam hoses, water blasting, test pump lines)

**HOSE:** List each hose with a description of the location and purpose so that another worker could locate it. Inspect based on the instructions below and note on the form the: hose size and rating, clamp location, attachment point, condition of whip checks.

### SAFETY CHAINS AND CABLES (HOBBLER):

Ensure that the chain clamp is installed at the proper location on the hose. Most vibrating/rotary hoses have the clamp area marked 2 to 3 feet in from the coupling. The small eye on the coupling is for fit up of the connection only and is not a lifting eye and should not be used for secondary restraint. Safety chains should be attached securely to a dedicated pad eye or structural member that can withstand the impact of a sudden failure. Clamps used overhead should be placed where they do not interfere with running lines or tugger hoist lines. Restraints should never be placed around the coupling.

**WHIP CHECKS:** Whip checks are light weight cable devices used for smaller hoses in various applications. Air powered tools that use large volume air hoses should always be equipped with whip checks at each connection. The whip check should be installed before each connection is made and the cable should be installed to minimize the amount of slack in the cable. Whip check cables should not be used to hang hoses nor should they be used for any other purpose then intended. Whip checks should not be used for high pressure, high volume applications where safety chains or cables should be used. Whip checks can be used for moderate pressure <200 psi in smaller diameter <3 inch hose. Whip checks should be inspected for corrosion or damage in the wire rope or other defects.





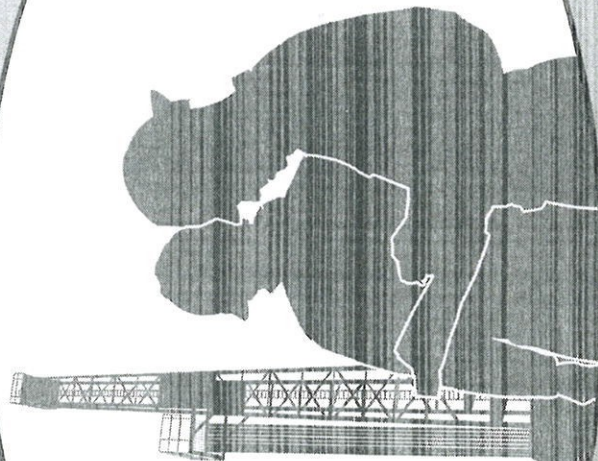
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Rig #: \_\_\_\_\_ Name: \_\_\_\_\_ Date: \_\_\_\_\_

Rig #: \_\_\_\_\_ Name: \_\_\_\_\_ Date: \_\_\_\_\_



# RIG CHECK



INSPECTION FORM: 24

## Material Safety Data Sheets (MSDS)

**Purpose:** To ensure that MSDS are up to date and appropriate communication has taken place regarding the handling of chemicals on the rig.

**For more information see:**

29CFR1910.1200, NIOSH HazCom Writer 2007-121C



## Instructions

**CHEMICAL STORAGE LOCATIONS:** List each area where chemicals are stored and make sure the locations are properly and clearly labeled.

**INVENTORY CURRENT:** Check that the inventory list matches the chemicals present. Efforts should be made to limit chemicals on the rig to those needed for day-to-day operations.

**DOCUMENT DATING:** Printed copies of MSDS should be clearly dated to determine if the information provided is current. Chemicals that are new to the system should be reviewed with all crews at weekly safety meetings. A brief run through of the data sheet, discussion of chemical use and storage, and proper PPE requirements for handling and mixing should be provided. Mud chemical companies can be of great assistance in providing updated training as they must provide MSDS information for all the chemicals they send out to the rig.

**RIGHT TO KNOW INFORMATION:** It is required that information regarding employees "Right to Know" about chemicals in the workplace be posted on the rig in the change house or the doghouse. Different states may have different requirements regarding the proper postings, so review laws closely if the rig has moved across state lines.

**EMERGENCY NUMBERS:** Numbers of chemical response information services should be posted along with other emergency numbers. When calling these information services, you should have all the information provided on the original packaging so the service can find and communicate the necessary information to emergency response personnel.

**REQUESTS:** MSDS should be attached to all new chemicals shipped to the rig. Always request current MSDS information when ordering or reordering chemicals. Chemical suppliers have an obligation to provide current information with any chemicals they offer for sale or transport. Revisit MSDS requests every week until the proper documentation has been provided. Prior to new mud companies coming on the rig, they should provide complete MSDS information for all chemicals they intend to use on your rig.



The HazCom Writer is a free software program from NIOSH designed to help companies write their OSHA and MSHA required HazCom plans and list all hazardous chemicals at a company's site. For more information visit: [www.cdc.gov/niosh/mining/products/product153.htm](http://www.cdc.gov/niosh/mining/products/product153.htm)



# Material Safety Data Sheet Inspection

# Material Safety Data Sheet Inspector

Mark with ☒ for OK. Mark with ☐ for bad

#2

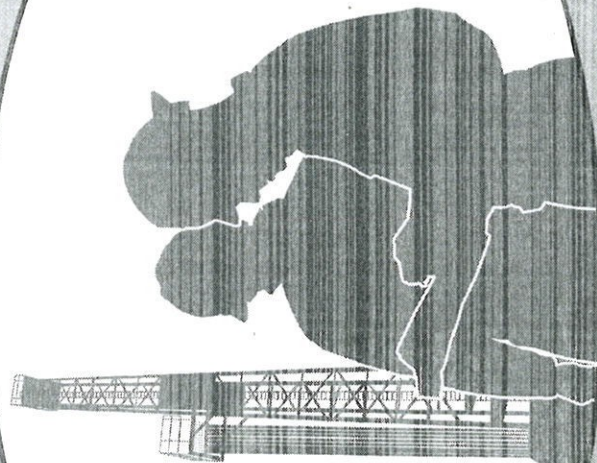
Name: \_\_\_\_\_

Date: \_\_\_\_\_

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# RIG CHECK



INSPECTION FORM: 25

## CHEMICAL STORAGE

**Purpose:** To ensure that chemicals are stored properly and do not present a hazard to employees or the environment.

**For more information see:**  
29CFR1910.1200



## Instructions

*Refer to Inspection Form 31: MSDS for information on how to check Material Safety Data Sheets. Always wear use protective equipment as listed in the MSDS when handling chemicals.*

**CHEMICAL STORAGE LOCATIONS:** List each area where chemicals are stored. Examine the chemicals and storage area for each issue below. Take the time to examine other areas of the rig for chemicals not in their proper location.

**STORED AS INSTRUCTED:** Every effort should be made to store chemicals on the rig as instructed by the manufacturer. Consideration for wet and dry locations, direct sun light, hot or cold locations, among other things, may be noted in the MSDS or on the packaging. Whenever possible store chemicals in their original containers.

**COMPATIBILITY:** Make sure that chemicals are not incompatible with other chemicals they are stored near. For instance, Caustic Soda should never be stored around acids or chemicals with a low PH. It should never be stored where it can be damaged by water. Pressurized containers should not be stored where they are subjected to heat that can cause them to over pressure. Special precautions should be taken with propane bottles and other compressed flammable gases to ensure they do not leak or relieve pressure in enclosed areas.

**SIGNS AND POSTINGS:** Ensure that storage areas are properly posted as to their contents and any warnings that may be necessary. Department of Transportation (DOT) markings may be required on buildings housing chemicals during rig moves or building transport. Cabinets and storage bins used for chemical storage must be labeled. Outside storage areas containing hazardous chemicals must have signs and be clearly defined.

**CONTAINERS AND MARKING:** The law requires that chemicals, regardless of the container they are stored in, must be clearly marked as to contents and health hazards. A system for marking and communicating chemical information should be part of the rig's safety program. Ensure that chemical storage on the rig complies with company rules.

**CHEMICALS MUST NEVER BE STORED OR TRANSPORTED IN WATER BOTTLES, CUPS, OR CANS THAT HAVE CONTAINED OR COULD CONTAIN FLUIDS FOR HUMAN CONSUMPTION.**

**SPILL REPORTING AND CLEAN UP:** Chemical spills can be a serious environmental exposure. Local, State, and Federal laws may apply to spills of highly hazardous chemicals. Ensure that any release of hazardous chemicals is reported to your supervisor. Always follow clean up and disposal instructions included in the appropriate MSDS.



# Chemical Storage Inspection

Mark with ☒ for OK. Mark with ☐ for bad

Rig #

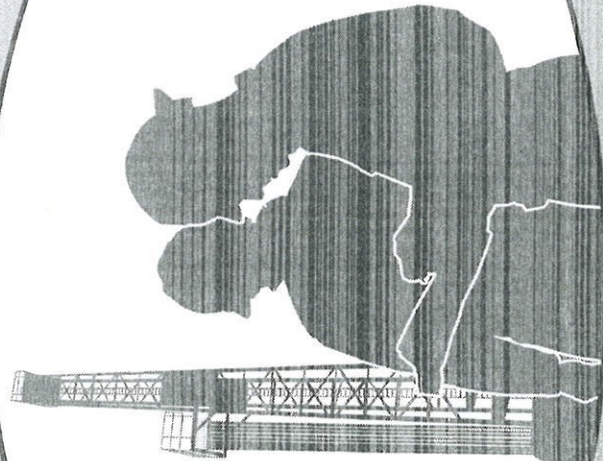
name

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# RIG CHECK



INSPECTION FORM: 26

## COMPRESSED GAS

**Purpose:** To ensure that gas cylinders are stored properly and do not present a hazard to employees.

**For more information see:**

29CFR1910.101 – 104, DHHS (NIOSH)  
Publication Number 2004-101, local  
emergency response agencies



## Instructions

*Refer to Form 31: MSDS Inspection for information on how to check Material Safety Data Sheets. Always wear use protective equipment as listed in the MSDS when handling chemicals.*

**STORAGE LOCATIONS:** List each area where compressed gas cylinders (bottles) are stored. Enclosed areas used for the storage of compressed gas cylinders should be ventilated to prevent an accumulation of gas. Gas cylinders should be stored upright and immobilized by chains or other means to prevent them from being knocked over. All stored compressed gas cylinders, including empty cylinders, must have the valves closed and the caps installed. Compressed gas cylinders should not be exposed to heat.

**IN USE CYLINDERS:** Dedicated racks should be available to hold nitrogen bottles that are used for backup on accumulator systems. Portable compressed gas cylinder racks for welding and cutting should be in good repair and the cylinders should have protection around the valves should the rack tip over. When moving gas cylinders from place to another, the gauges should be removed and the caps installed to protect the valve.

**COMPATIBILITY:** Compressed gas cylinders containing different type gases should be marked and stored separately so that they can be easily identified to avoid confusion. Stored oxygen and acetylene cylinders should have a

fire resistant partition between them; if this is not possible, they should be stored 20 feet apart.

**SIGNS AND POSTINGS:** Storage racks and areas should be clearly marked with the required placards and type of gas stored in each area with appropriate warning signs.

**CYLINDER INSPECTION:** Compressed gas cylinders should be clean and undamaged and the valve system functioning properly. The bottom of the cylinder should be protected from the ground and inspected for corrosion, pitting, cuts, gouges, digs, bulges, neck defects and general distortion. The cylinders must be clearly marked as to contents and expiration date, and the inspection date should be current. Compressed gas cylinders that have reached their expiration date should be removed and returned to a distributor for reconditioning or disposal.

**RIGHT-TO-KNOW INFORMATION:** Community Right-To-Know laws may apply to buildings and storage sheds that would need to be marked for the purpose of emergency response. Information regarding local requirements can be found by contacting the local fire department or emergency response agency.



# Compressed Gas Inspection

Mark with ☒ for OK. Mark with ☐ for bad

# # Rig

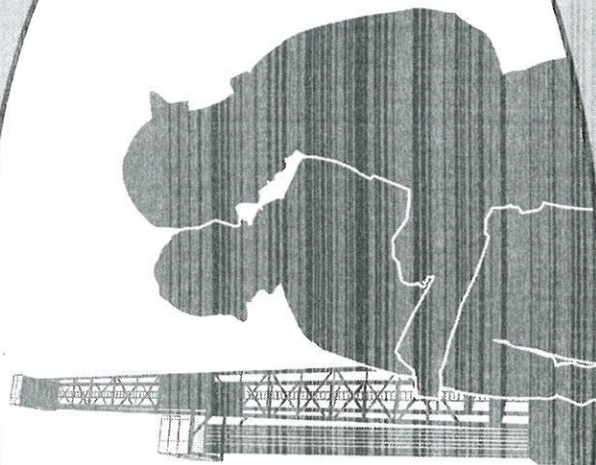
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# RIG CHECK



## INSPECTION FORM: 27 FIXED LADDERS

**Purpose:** To ensure that fixed ladders around the rig are of the proper size and configuration required to provide safe access for employees.

**For more information see:** 29CFR1910.27 and OSHA Stairways and Ladders Guide (publication 3124).

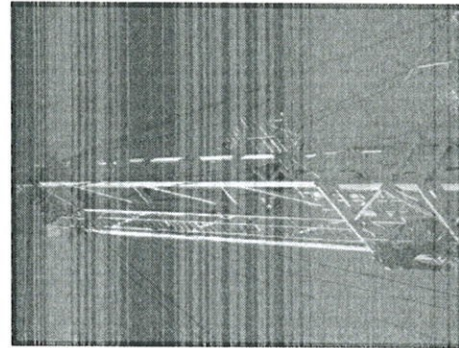


## Instructions

Keep track of all current fixed ladders on the rig to facilitate thorough and accurate inspections and maintenance. Fixed ladders both outside on the rig and inside of tanks and substructures should be listed for inspection and maintenance.

**LOCATION/USE:** Write the location of each fixed ladder and its use. This description can be used for identification. Examples of use include: limited access for maintenance or for more regular use during the course of the day.

**ANCHOR POINTS:** Inspect the connection for any cracked welds or bent brackets. Anchor points are places where the fixed ladder attaches to the main structure and can be welded, bolted or a combination of both. Check that bolts are tight and the connection does not move at the attachment point. Check that the top and bottom of the ladder are attached to prevent movement when getting on and off the ladder.



**SIDE RAILS AND RUNGS:** Check that the rungs of the ladder are straight, evenly spaced, and firmly attached to the side rails. Check that rungs are a minimum of  $\frac{3}{4}$  inches in diameter for metal ladders and welded solid to the side rails. Any loose or missing rungs should be replaced immediately. Make sure that rungs and side rails are free of burrs and snags that may grab a user's glove.

**LANDINGS:** Check that all access points to fixed ladders are open and clear of debris. Any signs regarding access to the ladder should be posted at these points. Check that fixed ladder side rails extend at least 3.5 feet above the top level of access. If the top access of the ladder presents a fall hazard, make sure the opening is gated or chained off to prevent falls through the opening.

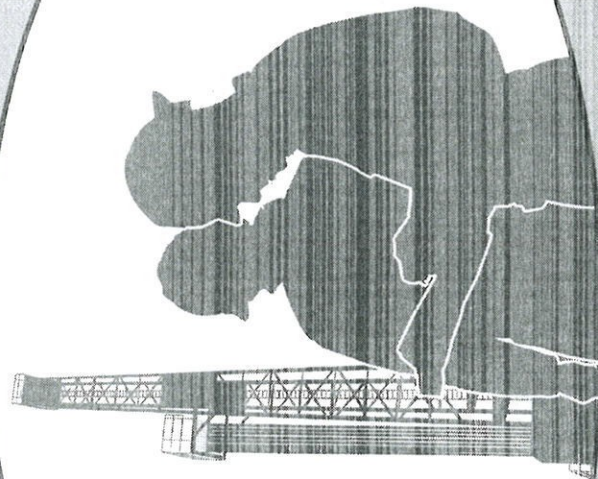
**FALL PROTECTION:** For ladders that exceeds 20 feet in unbroken length, make sure some type of fall protection is available. This can be a ladder cage, retractable life line ("SRL"), or cable follower system.



[illegible]



# RIG CHECK



INSPECTION FORM: 28

## PORTABLE LADDERS

**Purpose:** To ensure that portable ladders around the rig are in good condition and the proper size for safe access for employees.

**For more information see:** 29CFR1910.25-26 and OSHA Stairways and Ladders Guide (publication 3124).



## Instructions

Keep track of all current portable ladders on the rig to facilitate thorough and accurate inspections and maintenance.

**LOCATION/USE:** Write the location and general use of each portable ladder on the rig. Portable ladders should be stored close to the point of use if possible. The use may be for limited access or for more regular use during the course of the day. Check that ladders are stored by hanging them up or placing them in a designated rack where they will not be damaged by other rig activities. Damaged ladders must be removed from service and replaced.

**FEET & LEVELERS:** Check the area of the ladder where it sets down on the supporting surface. Check the feet for any missing or bent traction devices. Check that rivets are tight and the connection does not move at the attachment point unless it is designed to do so.

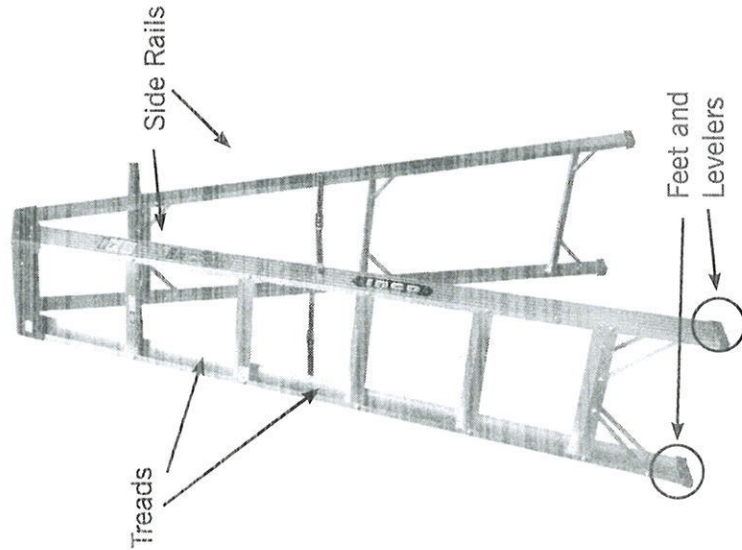
**SIDE RAILS:** Check that the ladder side rails are free of dents and damage, and without snags which could catch a glove. Check that the rails do not have holes drilled into them or contain non-factory-approved attachments. For extension ladders, test that the side rails move up and down freely.

**TREADS & RUNGS:** Check that the treads/rungs of the ladder (where feet are placed) are straight, evenly spaced, and firmly attached to the side rails. Remove from service any ladders with missing or damaged treads and notify your supervisor. Check that treads and rungs are free of burrs and snags that may grab a user's glove.

**HINGES & ATTACHMENTS:** Check step ladder hinge points for misalignment or damage.

Examine factory attachments to be sure they are in place and functioning properly. Bent or "sprung" ladders should be taken out of service.

**VISIBLE RATING:** Ladders must be marked with ladder size, type, maximum length, number of sections (if appropriate), highest standing level, total length of sections (if applicable), model number, manufacturer's name, manufacturer's location, and date of manufacture. Usage guidelines and other warning statements must also be placed on the ladders in specific locations depending on ladder type. Ladders appropriate for electrical work should be available and clearly identified. Check that ladders are available which are appropriate for the rig workers at that site.





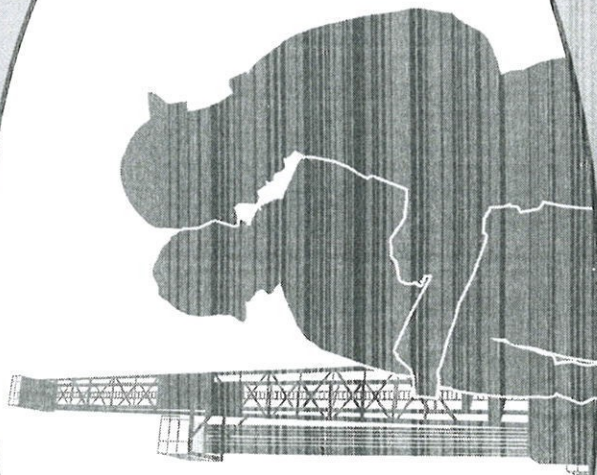
Rig #: \_\_\_\_\_ Name: \_\_\_\_\_ Date: \_\_\_\_\_

Rig #: \_\_\_\_\_ Name: \_\_\_\_\_ Date: \_\_\_\_\_

[illegible]



# RIG CHECK



INSPECTION FORM: 29

## FIXED PLATFORMS

**Purpose:** To ensure that platforms around the rig are of the proper size and configuration required to provide safe working surfaces for employees.

For more information see: 29CFR1910.23.



## Instructions

**LOCATION/USE:** List each fixed platform for easy identification along with the original designed purpose of the platform.

**SUPPORT STRUCTURE:** Check that frame work is straight and spaced to provide adequate support for grating or decking. Check that knee braces or angle braces are straight, undamaged, and do not have any cuts or welds that would weaken the original design. Check that there are not any additional equipment or tools hanging from the support structure beyond what it was designed to hold.

**HINGES & ATTACHMENTS:** Check for weld cracks or deformities that could fail when the platform is in use. Ensure that properly sized pins and keepers are installed and secure. On fold-down platforms, check for pinch points and heavy lifting exposure when rigging up or down.

**WORKING SURFACE:** Check that the working surface of the platform is even and free from dents or level changes that would create trip hazards. Check that the surface is not worn to the point that it fails to provide reasonable slip protection for normal work activities. Make sure the walking or working area is not cluttered with tools or equipment.

**GUARD RAILS:** Check that rails have a solid top rail, mid rail, and 4" kick plate on the bottom to prevent tools from being knocked off the platform. Removable rails that have the potential to be snagged and pulled out of their sockets when lifting loads should be drilled and safety bolted into the pin pockets.



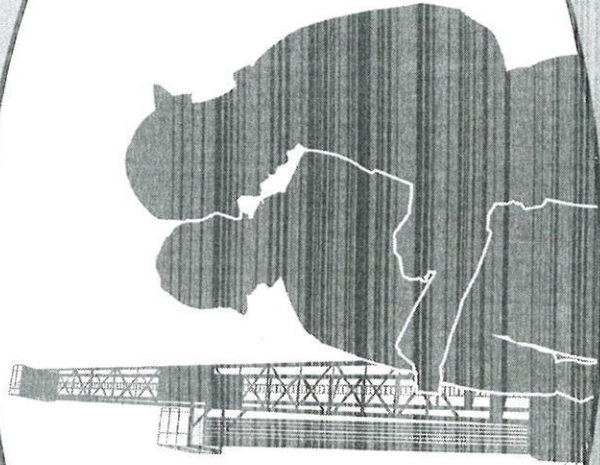
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# RIG CHECK



## INSPECTION FORM: 30 DROPPED OBJECTS

**Purpose:** To ensure that overhead equipment is properly secured to prevent injuries from falling objects.

**For More Information:** IADC Health, Safety, and Environmental Reference Guide.



## Instructions

**RIG LOCATION:** : List each area of the rig below and check: lights, welds and attachments, safety cables, secured tools, cable or line rubbing, and sheaves. Inspect based on the instructions below and note on the form.

**MAST OR DERRICK:** All lights should be securely mounted and a safety cable attached. Counter weight sheaves and hoist line sheaves should be mounted to a dedicated cross member with a 4-part shackle (bolt, nut with keeper pin). Chains, wire rope, and soft line used during rig moves should be removed from the derrick to prevent it from becoming fouled in the traveling equipment. Stabbing boards and other work platforms should be securely attached and have a safety cable for both the track and the fold down platform. Wooden bumper blocks under the crown should be wrapped in expanded metal to prevent broken pieces from falling to the rig floor. Inspect the horizontal girts for tools or materials that may have been left behind following repairs.

**RACKING BOARD:** Inspect the racking board for any broken welds or cracks. The board should be straight and show no signs of contact with traveling equipment. The board and fingers should have safety chains installed to prevent them from falling if they are broken off. Check the board area for loose tools, water bottles, or shackles. Inspect the board and fingers for damage from tugger lines where they may be sawing into the iron causing damage. Make sure lights, winches, and cameras are properly mounted and equipped with safety cables.

**TRAVELING EQUIPMENT:** : The block hanging attachment should not have an unsecured shackle or sling riding along with the block. Check the areas around the top drive and swivel for tools and loose items. Top drive drilling units should be checked for safety wires on the bolts and safety cables on moving parts. Inspect die holders to ensure broken dies will not fall to the rig floor. Look for areas on the traveling assembly where tugger lines may be rubbing and causing damage. Check hinges and pins on access platforms and guard openings. Hoses and service loop connections should be secured and safety cables installed.

**SUBSTRUCTURE:** : Look for loose tools on platforms or on beams above the cellar area. Check lights for proper mounting and safety cables. Suspended platforms should have a locking device to prevent the loss of scaffold boards, platform pieces, or hand rails. Check all fixed shackles and sheaves same as the mast.

**DRILL FLOOR:** Areas around the drill floor should be checked for equipment or tools that could be knocked over the side to work areas below. Removable handrails that may be snagged when lifting with the hoist should be safety pinned. Equipment and tools stored on or hanging from hand rails should be secured to prevent dropped objects. Storage areas that are above walking and working surfaces should be properly guarded to prevent items from falling or being knocked off the edge.



## Dropped Objects Inspection

Mark with ☒ for OK. Mark with ☐ for bad

# #rig

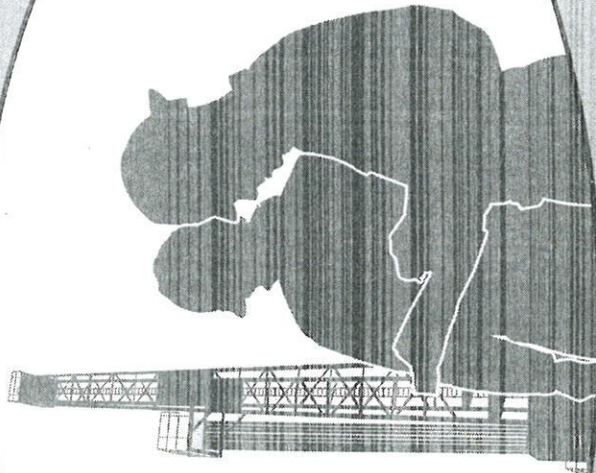
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# RIG CHECK



INSPECTION FORM: 31

## HOUSEKEEPING

**Purpose:** To ensure that areas around the rig are kept clear to provide safe access for employees and that hazardous conditions are addressed.

**For more information see:** 29CFR1910.141 and API Recommended Practice 54.



## Instructions

**LOCATION:** Note the name of each area of the rig and inspect for the following issues.

**WALKING & WORKING SURFACES:** Inspect areas for oil, grease, mud, and standing water. Check that tools and equipment are not left lying in areas where employees are walking. Make sure that any mats or absorbent materials used on floors and walkways are clean and lying flat so they do not create a trip hazard.

**STAIRS & LADDERS:** Check that they are clear of ropes, hoses, chains and electrical cords. Check hand rails and ladder rungs for grease or mud.

**EATING AREAS:** Check that eating areas are kept clean and food requiring refrigeration is not left out. Items left in coolers or refrigerators should be dated and outdated items should be removed and disposed of at least twice a week. No food or beverages are to be consumed in areas where chemicals or other contaminants are present.

**POTABLE WATER:** Make sure that drinkable water sources are clearly marked and were replenished during the current shift. Disposable cups should be provided and the use of a common cup is prohibited. Check that individual bottled water is marked by the user after it is opened and partial bottles are disposed of at the end of each shift. Water not safe for drinking must be clearly marked.

**TOILET FACILITIES:** Check that toilet facilities are kept clean and are well ventilated. Check that vents are screened off to prevent insects and animals from gaining access. Food and drinking water are not to be stored in or around toilet facilities. Check that an area for cleaning hands is available and working.

**COMMON AREAS:** Check that change rooms are clean and well ventilated. Wet or damp clothing must be allowed to dry before use. Check that the area is free of trip hazards. Where employees must change foot wear, a bench or seating area should be provided.

**WASTE DISPOSAL:** Look for waste containers around the rig, and check that they are secure from insects/animals and are emptied daily. When handling chemical wastes such as sacks or cans, the same PPE used for mixing should be used for waste disposal. Check that disposal areas or containers are equipped to prevent trash from blowing around or being scattered by animals. If applicable, ensure that waste streams are properly segregated.

**OIL LEAKS & OVERFLOWS:** Check areas where oil leaks or where drips occur for proper absorbent material. Also check installed catch basins. Absorbents should be changed on a regular basis to prevent fire and contamination issues. Oily waste should be managed properly to ensure other waste streams are not contaminated if they are to be handled off location.



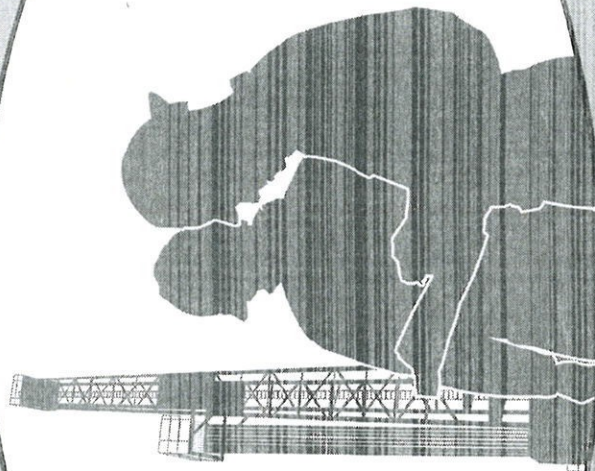
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# RIG CHECK



INSPECTION FORM: 32

## TUBULAR STORAGE

**Purpose:** To ensure that drill string components are stored properly.

**For more information see:** 29CFR1910.176 and API Recommended Practice 54.



## Instructions

**LOCATION ON RIG:** List the areas of the rig where drill string components are stored. Inspect components based on the instructions below and note on the form.

**RACKS:** Racks should be level and have a solid footing. The welds on the racks should be inspected for cracks and breaks. Where racks are hooked together end-to-end, they should be pinned, or overlapped to prevent pipe from falling through the connection. If racks need to be blocked, they should have support in enough places to prevent bowing or sagging of the structure when the rack is fully loaded. Make sure that blocking is not crushed or broken and supports both sides of the rack. Ensure that stop pins are in place, straight, and standing upright. Racks that are integral to pipe baskets should have the bridging components properly attached and locked into place.

**STOPS AND CHOCKS:** A system should be in place for blocking and/or wedging the pipe to prevent it from rolling. The bottom layer of pipe should be held in position with pins in the pipe rack. Successive layers should each have blocking on both ends to prevent movement. The chocks can be made of steel, plastic, or wood. Whatever the material, the chocks should be nailed or otherwise secured to prevent the pipe from rolling.

**STRIPPING:** Stripping or strapping refers to the material used to separate the successive layers of pipe as they are stacked on the rack.

Stripping may be sections of old drilling line or 2x4's or 2x6's and should be a consistent thickness. Whatever is used, it must be sized for the pipe that is being stacked and provide support for the layers above. Do not use stripping to bridge gaps between the pipe or the racks. Lower layers of pipe should be tight with no gaps before the next layer is installed. The upper layers should not extend beyond the lower layers; the stripping should never be loaded without support from below. Stripping should be laid with sufficient overlap to prevent pipe from falling down between sections.

**THREAD PROTECTORS:** Pipe stored on racks should have thread protectors installed at all times. The end connections should not be pushed with a forklift or other equipment without thread protectors installed.

**HEAVY PIPE:** Special care must be taken when stacking heavy tubular goods. The preferred method is to only stack drill collars on the first layer. If drill collars must be moved over drill pipe, the stripping must be strong enough to handle the load – three or more rows of stripping may be necessary.

**DOWN HOLE TOOLS:** : Special tools may require different handling. All of these tools along with the handling subs should be inspected.



## Tubular Storage Inspection

Mark with ☒ for OK, Mark with ☐ for bad

# Rig #

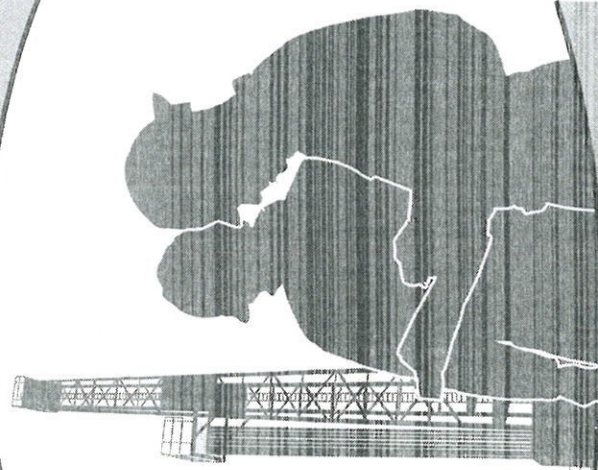
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# RIG CHECK



INSPECTION FORM: 33

## PINS AND KEEPERS

**Purpose:** To ensure that pins and keepers are installed correctly for efficient and safe operation.

**For more information see:** factory specifications from manufacturer.



## Instructions

**LOCATION/TYPE/#:** Note the locations and type of pins and keepers on the rig. Write the quantity inspected for many in one location.

**PIN DIAMETER:** Check that the point taper on the pin is completely through the assembly with the outside diameter of the pin in contact with the internal diameter of the connection.

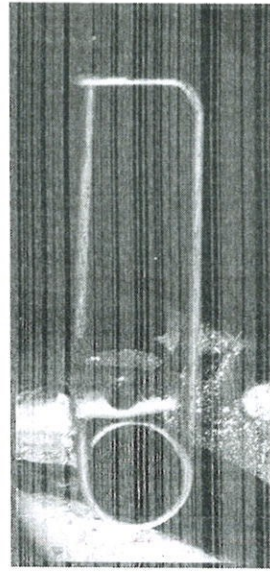
**PIN LENGTH:** Check that pins are not so long that they can be bent or otherwise damaged making them difficult or impossible to remove.

**PIN CONDITION:** Check that the pin head has a stop collar or stop pin to prevent the pin from being driven too far into the connection. Make sure that the head of the pin is not mushroomed to the point that fragments could be broken off as the pin is being driven. Also inspect the pointed end of the pin for damage caused by excessive hammering. If the pin must be hammered to the point where mushrooming occurs, the connection is misaligned.

**PIN INSTALLATION:** Check that pins are not in an area where they can be impacted by equipment or pipe which may shear the safety keeper and drive the pin out of the connection. For example, pins in the mast across from the racking board may be struck by a lost stand of pipe and driven out of their connection. In these situations the pin should be installed so any impact would drive the pin into the connection rather than out. In addition, the pin should not present a snag hazard for hanging or hoist lines on the rig. There are generally two types

of safety keepers used on assembly pins: safety pin and safety bolt. They should be inspected for proper fit and condition. Keepers should not have other items attached to them, and should not present a snag hazard.

**SAFETY PIN:** Confirm that the pins are inspected for damage and in good shape prior to installation. If the keeper is in good shape when installed, any damage noted during the inspection would indicate some type of problem or interference. Check that the keeper is not hard against the shoulder of the pin pocket, but is loose and free to move without binding.



**SAFETY BOLTS:** Check that the safety bolts are sized to fit the pin safety hole closely, without binding, and without the need for numerous washers. The bolts should be long enough to get the entire nut onto the bolt with at least 2 threads showing through the nut. Check that the safety bolt is not installed without nuts, particularly in overhead applications.



## Pin and Keeper Inspection

Mark with ☒ for OK. Mark with ☐ for bad

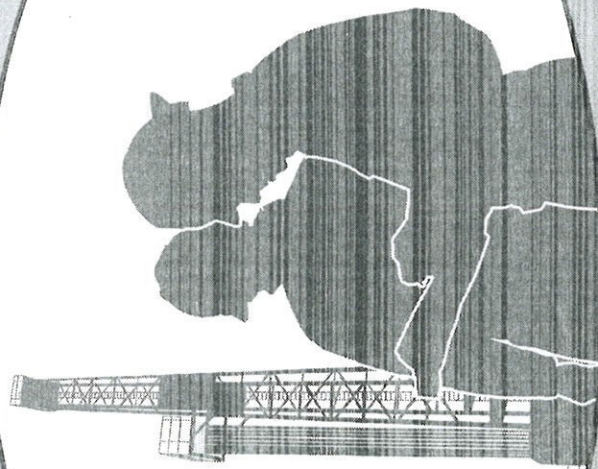
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# RIG CHECK



INSPECTION FORM: 34

## MACHINE GUARDING

**Purpose:** To ensure that mechanical installations around the rig are properly guarded and maintained to eliminate injuries to employees.

**For more information see:** 29CFR1910.212-219, API Recommended Practice 54.



## Instructions

**This inspection is visual only. An approved electrician is the only person who should modify or repair electrical equipment.** Always de-energize electrical equipment before performing maintenance work.

**LOCATION:** List each area of the rig inspected.

**CENTRIFUGAL PUMPS:** Check the electric motor for broken or missing fan guards. Inspect the coupling area for potential exposure to rotating parts. Coupling guards should be secure and not move when operating. The stuffing box area and shaft should be smooth and free of burrs that could entangle gloves or other clothing.

**AGITATORS AND MUD MIXERS:** Inspect for potential contact. Pay close attention to the area above tank gratings and walkways where hoses or electrical cords could become tangled in couplings. Check chemical mixers or other rotating equipment that may be used for adding chemicals to the mud system for potential contact.

**AUGERS AND CONVEYORS:** Cuttings augers and conveyors present unique guarding challenges to protect employees from these powerful machines. Gratings and guards for this type of equipment should be securely fastened. Inspection hatches and cleanouts should be secured and lockout procedures should apply to any service or inspections that require removal or opening of hatches or guards.

**BELT GUARDS:** Inspect all belt guards to ensure that they are installed properly and that all bolts and braces are in place and tight. Make sure that there are no worn spots on the guard that would indicate rubbing or chaffing by moving equipment. If guards make noise or if the guard shows signs of movement the machine should be shut down and repaired immediately.

**WINCHES AND CABLES:** Nip points are created by a cable being wrapped on a drum. Areas where employees may come in contact with the cable should be protected with a guard that only allows room for the cable to enter. Level wind devices for hoist winches should have a handle that prevents the operator from placing his hand directly on the cable. Sheave guards on the crown block and traveling block should be inspected for abnormal wear and secure attachment to prevent dropped objects.

**LABELING AND SIGNS:** Equipment that starts automatically or is controlled remotely should have a sign clearly visible that identifies how the equipment is energized. Warning signs should be posted to ensure employees follow proper energy isolation protocol when servicing equipment.

**EXCLUSION ZONES:** Areas that cannot be effectively guarded should be closed off as an exclusion zone while in operation. For example, under the rotary table during drilling operations and around automated pipe handling systems.



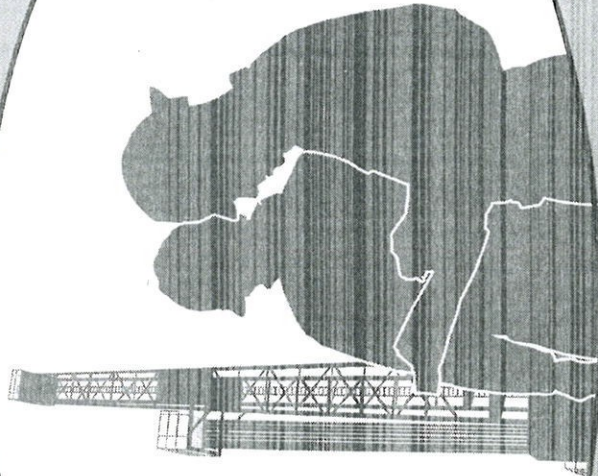
## Rig #: \_\_\_\_\_ Name: \_\_\_\_\_ Date: \_\_\_\_\_

Rig #: \_\_\_\_\_ Name: \_\_\_\_\_ Date: \_\_\_\_\_

Rig #: \_\_\_\_\_ Name: \_\_\_\_\_ Date: \_\_\_\_\_



# RIG CHECK



## INSPECTION FORM: 35 LOAD PATH WELDS

**Purpose:** : To visually ensure that load path welds are not damaged.

**For more information see:**

API Recommended Practice 4G and 54.



## Instructions

Develop a systematic plan with the crew to conduct a focused visual inspection of the load path. Additional light and tools for scraping and brushing the welds should be available. The inspection plan should address access to the area, necessary fall protection, and in some cases energy isolation and lockouts. Rig operations may need to be stopped or modified to ensure the safety of the inspector.

**RIG COMPONENT:** For each major rig component of the load path, note any: weld damage, bent structures, corrosion, cuts or holes, modifications, fluid build-up, and freeze damage. Specific instructions for each component are below.

**SUBSTRUCTURE:** Starting on the bottom, look over the horizontal base beams of the structure. Look for any broken or cracked welds. Check for damage that occurred during rig moves, such as bent or torn iron. Look for areas of corrosion or rusting where fluid or debris has accumulated. Move up through the diagonal bracing looking for cracks or breaks in the main support structure. Keep an eye out for torch cut holes or modifications that may jeopardize the integrity of the structure and note them on the form. In self-elevating structures, look carefully around sheaves and raising lines for damage. Look for areas where beams have been "boxed in" or have plates welded on them where fluids can become trapped causing corrosion and or freeze damage. Areas around rotary beams, drawworks support beams, and the dead line anchor should be cleaned and inspected.

**MAST SHOES AND A-LEGS:** Clean and inspect the starting leg and A-leg pin assemblies both above and below the rig floor. Look for torn welds around guide plates caused by misalignment during rig up/down. Closely inspect areas that may accumulate debris and liquids. Look for areas where rust build-up between plates is pushing them apart. Look for "bulging" of enclosed beams that would indicate freeze damage.

**MAST STRUCTURE:** Clean and inspect each weld area systematically as you move up through the mast. Look at each weld, top and bottom, for any deformities in the structural components where they may have been impacted. If reinforcing plates or angles have been stitch welded to the main structure, look for build-up of rust and corrosion that may be forcing the surfaces apart. Check welds on attachment and hangers that may be installed for hoist sheaves. Structural members that support top drive rails or similar equipment should be checked for damage resulting from vibration or misalignment.

**RAISING LINE SHEAVES:** Look for bending or cracks in the sheave bearing shaft where it is attached to the main structure of the mast.

**CROWN BASE:** Inspect pad eyes and other attachments to the bottom of the crown block. Bumper block retainers can be damaged from incidental contact and could present a dropped object hazard. Check for deformation in crown base beams and water table connection plates on top of the mast or derrick legs.



# Load Path Weld Inspection

Mark with ☒ for OK. Mark with ☐ for bad

Rig #:

Name:

Date:

Rig Component	Weld Damage	Bent Structures	Corrosion	Cuts or Holes	Modifications	Fluid Build-up	Freeze Damage	Comments
Substructure								
Mast Shoes and A-legs								
Mast Structure								
Raising Line Sheaves								
Crown Base								



## Quick Guide Resources

#	Inspection Form	For More Information	
Emergency Response			
1	Emergency Response Plan	29CFR1910.38 IADC Health, Safety & Environmental Reference Guide	www.osha.gov www.iadc.org
2	Emergency Equipment	29CFR1910.1030, 29CFR1910.51 IADC Health, Safety & Environmental Reference Guide	www.osha.gov www.iadc.org
3	Alarms & Shutdowns	29CFR1910.165, 29CFR1910.37-38	www.osha.gov
4	Fire Extinguishers	29CFR1910.157 NFPA Standard 10 API Recommended Practice 54	www.osha.gov www.nfpa.org www.api.org
5	Eye Wash Stations	29CFR1910.151(c) ANSI Z358.1 (2009)	www.osha.gov www.ansi.org
6	First Aid Kits	29CFR1910.151(b) ANSI Z308.1 (2009)	www.osha.gov www.ansi.org
Electrical Safety			
7	Energy Isolation	29CFR1910.147 API Recommended Practice 54 IADC Health, Safety & Environmental Reference Guide	www.osha.gov www.api.org www.iadc.org
8	Electrical Systems	29CFR1910.141 API Recommended Practices 54, 500, 505	www.osha.gov www.api.org
Fall Protection			
9	Harness & Lanyards	29CFR1910.66 (Appendix C) ISO Standard ICS 13.340.60	www.osha.gov www.iso.org
10	Retractable Lifelines	29CFR1910.66 (Appendix C)	www.osha.gov
Stairways & Walkways			
11	Stairways & Landings	29CFR1910.23, 29CFR1910.24 OSHA Stairways and Ladders Guide	www.osha.gov www.osha.gov/Publications/ osha3124.pdf
12	Handrails & Guardrails	29CFR1910.23 OSHA Stairways and Ladders Guide	www.osha.gov www.osha.gov/Publications/ osha3124.pdf
13	Gratings & Walkways	29CFR1910.23	www.osha.gov
Lines & Slings			
14	Auxilliary Hoisting Lines	API Recommended Practice 54	www.api.org
15	Static Hanging Lines	API Recommended Practices 54, 4G, 8B	www.api.org
16	Synthetic Web Slings	29CFR1910.184 (i) Manufacture documentation	www.osha.gov
17	Wire Rope or Cable Slings	29CFR1910.184(f) Manufacture documentation	www.osha.gov
18	Chain Slings	29CFR1910.184	www.osha.gov
19	Shackles	Manufacturer documentation	



#	Inspection Form	For More Information:	
Tools			
20	Hand Tools	29CFR1910.242-3 API Recommended Practices 54	www.osha.gov www.api.org
21	Power Tools	29CFR1910.241-244 API Recommended Practices 54	www.osha.gov www.api.org
Hoses			
22	Hoses & Fittings	None	
23	Safety Chain & Whip Check	None	
Chemical Hazards			
24	MSDS	29CFR1910.1200 NIOSH HazCom Writer	www.osha.gov www.cdc.gov/niosh
25	Chemical Storage	29CFR1910.1200	www.osha.gov
26	Compressed Gas	29CFR1910.101-104 NIOSH Safety Checklist Program for Schools – Compressed Gas Local Emergency Response Agencies	www.osha.gov www.cdc.gov/niosh
Ladders & Platforms			
27	Fixed Ladders	29CFR1910.27 OSHA Stairways and Ladders Guide	www.osha.gov www.osha.gov/Publications/ osha3124.pdf
28	Portable Ladders	29CFR1910.25-26 OSHA Stairways and Ladders Guide	www.osha.gov www.osha.gov/Publications/ osha3124.pdf
29	Fixed Platforms	29CFR1910.23	www.osha.gov
Other			
30	Dropped Objects	IADC Health, Safety & Environmental Reference Guide	www.iadc.org
31	Housekeeping	29CFR1910.141 API Recommended Practice 54	www.osha.gov www.api.org
32	Tubular Storage	29CFR1910.176 API Recommended Practices 54	www.osha.gov www.api.org
33	Pins & Keepers	See factory specifications from the manufacturer	
34	Machine Guarding	29CFR1910.212, 29CFR1910.219 API Recommended Practices 54	www.osha.gov www.api.org
35	Load Path Welds	API Recommended Practices 54, 4G	www.api.org



**Appendix: 4**

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# MATERIAL SAFETY DATA SHEET

## CRUDE OIL

MSDS No.  
**RS296**

Version: 5

Rev. Date  
**05/13/2002**

**IMPORTANT:** Read this MSDS before handling and disposing of this product and pass this information on to employees, customers, and users of this product.

### 1. PRODUCT and COMPANY IDENTIFICATION

<b>Material Identity</b>	Crude Oil		
<b>Trade Name(s)</b>	Oriente, Cano Limon, Line 63, Shell-Ventura, SJV Light, Rainbow, West Texas Inter-Cushing, Peace River-Canadian, Federated Crude-Canadian, Pembina Crude-Canadian, Forcados, Cabinda, Basrah Light, Basrah, Arab Medium, Elang Crude, Girassol		
<b>Other Name(s)</b>	Earth Oil, Petroleum Oil, Rock Oil, Zafiro		
<b>Chemical Description</b>	This material is a C1 to C50 hydrocarbon liquid which contains approximately .9 to 2.8 wt% sulfur compounds		
<b>Manufacturer's Address</b>	BP West Coast Products LLC Carson Business Unit 1801 E. Sepulveda Boulevard Carson, California 90749-6210	BP West Coast Products LLC Cherry Point Business Unit 4519 Grandview Road Blaine, Washington 98230	
<b>Telephone Numbers</b>	Emergency Health Information:	1 (800) 447-8735	
	Emergency Spill Information:	1 (800) 424-9300 CHEMTREC (USA)	
	Other Product Information:	1 (866) 4BP-MSDS (866-427-6737 Toll Free - North America) email: bpcares@bp.com	

### 2. COMPONENTS and EXPOSURE LIMITS

<u>Component<sup>1</sup></u>	<u>CAS No.</u>	<u>% Composition By Volume<sup>2</sup></u>		<u>ACGIH TLV</u>	<u>Exposure Limits</u>		
					<u>OSHA PEL<sup>3</sup></u>	<u>Units</u>	<u>Type</u>
CRUDE OIL, PETROLEUM	8002-05-9	EQ	100	N/AP	N/AP		
which contains:							
BUTANE	106-97-8	AP	0.8 to 1	800	800	pm	TWA
HEXANE (N-HEXANE)	110-54-3	AP	0.3 to 1	50 skin	50	ppm	TWA
ISOPENTANE	78-78-4	AP	0.3 to 1.5	N/AP 600	750 600	ppm ppm	STEL TWA
PENTANE	109-66-0	AP	1.5 to 2.5	N/AP 600	750 600	ppm ppm	STEL TWA
Other applicable exposure guidelines:							
COAL TAR PITCH VOLATILES, AS BENZENE SOLUBLES <sup>(4)</sup>	65996-93-2			0.2	0.2	mg/m3	TWA
OIL MIST, MINERAL	8012-95-1			10 5	N/AP 5	mg/m3 mg/m3	STEL TWA
STODDARD SOLVENT	8052-41-3			100	100	ppm	TWA

Stoddard Solvent exposure limits are listed as an exposure guideline for hydrocarbon vapors that may be similar to those derived from crude oil.

Since specific exposure standards or control limits have not been established for this material, the exposure limits shown here are suggested as minimum control guidelines.

<sup>1</sup> Carcinogen displayed after Component Name. Listed by <sup>(1)</sup> NTP, <sup>(2)</sup> IARC, <sup>(3)</sup> OSHA, <sup>(4)</sup> Other

<sup>2</sup> See Abbreviations on last page

<sup>3</sup> The OSHA exposure limits were changed in 1993 due to a federal court ruling. ARCO has chosen to list the 1989 OSHA exposure limits in this document as they are generally more stringent and therefore more protective than the current exposure limits. (Refer to 29 CFR 1910.1000).

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### 3. HAZARD IDENTIFICATION

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#### IMMEDIATE HAZARDS

##### **DANGER**

**HIGHLY FLAMMABLE! OSHA/NFPA Class 1B flammable liquid. KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME! CONTAINS PETROLEUM DISTILLATES!** Avoid breathing vapors or mists. Use only with adequate ventilation. If swallowed, do not induce vomiting since aspiration into the lungs may cause chemical pneumonia. Obtain prompt medical attention.

May cause irritation or more serious skin disorders! May be harmful if inhaled! May cause irritation of the nose, throat, and lungs, headache, dizziness, drowsiness, loss of coordination, fatigue, nausea and labored breathing. May cause irregular heartbeats. Avoid prolonged or repeated liquid, mist, and vapor contact with eyes, skin, and respiratory tract.

Wash hands thoroughly after handling.

Sulfur compounds in this material may decompose to release hydrogen sulfide gas which may accumulate to potentially lethal concentrations in enclosed air spaces. Vapor concentrations of hydrogen sulfide above 50 ppm, or prolonged exposure at lower concentrations, may saturate human odor perceptions so that the smell of gas may not be apparent. **DO NOT DEPEND ON THE SENSE OF SMELL TO DETECT HYDROGEN SULFIDE!**

Long-term tests show that similar crude oils have produced skin tumors on laboratory animals.

Crude oils contain some polycyclic aromatic hydrocarbons which have been shown to be carcinogenic after prolonged or repeated skin contact in laboratory animals.

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#### Routes of Exposure

#### Signs and Symptoms

##### **Inhalation (Primary)**

Vapors or mists from this material, at concentrations greater than the recommended exposure limits in Section 2, can cause irritation of the nose, throat, and lungs, headache, dizziness, drowsiness, loss of coordination, fatigue, nausea and labored breathing. Airborne concentrations above the recommended exposure limits are not anticipated during normal workplace activities due to the slow evaporation of this material at ambient temperatures.

Exposure to moderate airborne concentrations of hydrogen sulfide (less than 50 ppm) can result in irritation of the eyes, nose and throat, headache, dizziness, shortness of breath, nausea and nervousness. Exposure to hydrogen sulfide vapor above 200 ppm may cause irritation of mucous membranes, inflammation of the lungs, accumulation of fluid in the lungs, irregular heartbeats, unconsciousness with convulsions or impaired breathing with suffocation. Exposure to higher concentrations of hydrogen sulfide vapor (above 500 ppm) may cause rapid death.

##### **Eye Contact**

May cause slight eye irritation.

##### **Skin Contact**

Moderate skin irritation may occur upon short-term exposure.

Exposure to sunlight may increase the degree of skin irritation.

Absorption through the skin may occur and produce toxic effects (see Summary of Chronic Hazards).

##### **Ingestion**

May cause irritation of the mouth, throat and gastrointestinal tract leading to nausea, vomiting, diarrhea, and restlessness. May cause headache, dizziness, drowsiness, loss of coordination, fatigue, nausea and labored breathing.

**ASPIRATION HAZARD:** Aspiration into the lungs may cause chemical pneumonia. This material can enter the lungs during swallowing or vomiting and may cause lung inflammation and damage which in severe cases may be fatal.

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**Summary of Chronic Hazards and Special Health Effects**

Personnel with preexisting central nervous system (CNS) disease, skin disorders, or chronic respiratory diseases should be evaluated by an appropriate health professional before exposure to this material.

Prolonged/repeated skin exposure, inhalation or ingestion of this material may result in adverse dermal or systemic effects. Avoid prolonged or repeated exposure. May be harmful if absorbed through the skin. Prolonged or repeated contact may create cancer risk, organ damage, and adversely affect reproduction, fetal development and fetal survival. Avoid all skin contact.

Neurotoxic effects have been associated with n-hexane, a component of this material. Avoid prolonged or repeated exposure.

See Section 11 for Additional Toxicological Information.

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**4. EMERGENCY and FIRST AID**

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<b>Inhalation</b>	Immediately remove personnel to area of fresh air. For respiratory distress, give oxygen, rescue breathing, or administer CPR (cardiopulmonary resuscitation) if necessary. Obtain prompt medical attention.
<b>Eye Contact</b>	Flush eyes with clean, low-pressure water for at least 15 minutes, occasionally lifting the eyelids. If pain or redness persists after flushing, obtain medical attention.
<b>Skin Contact</b>	Immediately remove contaminated clothing. Wash affected skin thoroughly with soap and water. If irritation persists, obtain medical attention.
<b>Ingestion</b>	Do not induce vomiting since aspiration into the lungs may cause lipid pneumonia. Obtain prompt medical attention.

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**Emergency Medical Treatment Procedures**

See above procedures. Personnel with pre-existing central nervous system disease, skin disorders, chronic respiratory diseases, or impaired liver or kidney function should avoid exposure to this product.

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**5. FIRE and EXPLOSION**

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<b>Flash Point (Method)*</b>	Based on NFPA Petroleum, Crude	AP 20°F to 90°F
<b>Autoignition Temperature (Method)*</b>		N/DA
<b>Flammable Limits (% Vol. in Air*)</b>	<b>Lower</b>	AP 1 +
	<b>Upper</b>	AP 8 +

\* At Normal Atmospheric Temperature and Pressure

+ Based on NFPA 325

**NFPA Hazard Rating:**

**Health:** 2 = Moderate

**Fire:** 3 = High

**Reactivity:** 0 = Insignificant

**Special:**

**Fire and Explosion Hazards**

**HIGHLY FLAMMABLE!** This material releases flammable vapors at or below ambient temperatures. When mixed with air in certain proportions and exposed to an ignition source, these vapors can burn in the open or explode in confined spaces.

Flammable vapors may travel long distances along the ground before reaching a point of ignition and flashing back.

Open top tanks involved in a fire have a potential for "boil-over" if water or water-in-oil emulsion is at the bottom of the tank. Boil-over may result in a large expulsion of burning oil from the tank, greatly increasing the fire area.

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**Extinguishing Media**

Foam, Dry chemical, Carbon dioxide (CO2)

Water and water fog can cool the fire but may not extinguish the fire.

**Special Firefighting Procedures**

For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment. This may include self-contained breathing apparatus to protect against the hazardous effects of combustion products and oxygen deficiencies. Cool tanks and containers exposed to fire with water. If firefighters cannot work upwind to the fire, respiratory protective equipment must be worn unless and until atmospheric monitoring indicates that such protection is not required. Improper use of water and extinguishing media containing water may cause frothing which can spread the fire over a larger area. Water fog or spray are of value for cooling tank shells and surfaces exposed to fire, but may not achieve extinguishment.



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**6. ACCIDENTAL RELEASE MEASURES**

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**Precautions if  
Material is Spilled  
or Released**

Contain spill, evacuate non-essential personnel, and safely stop flow. On hard surfaces, spilled material may create a slipping hazard. Equip cleanup crews with proper protective equipment (as specified in Section 8) and advise of hazards. Clean up by recovering as much spilled or contaminated materials as possible and placing into closed containers. Consult with an environmental professional for the federal, state and local cleanup and reporting requirements for spills and releases.

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**7. HANDLING and STORAGE**

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**Handling,  
Storage and  
Decontamination  
Procedures**

Store and transport in accordance with all applicable laws. KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME! KEEP CONTAINERS CLOSED, PLAINLY LABELED AND OUT OF CLOSED VEHICLES! Containers should be able to withstand pressures expected from warming or cooling in storage. Ground all drums and transfer vessels when handling. Store in cool (80°F or below), well-ventilated location. All electrical equipment in storage and/or handling areas should be installed in accordance with applicable requirements of the National Electrical Code (NEC).

KEEP OUT OF REACH OF CHILDREN!

Empty containers retain some liquid and vapor residues, and hazard precautions must be observed when handling empty containers.

For determining National Electrical Code (NEC) Hazardous (Classified) location requirements for electrical installations, consider this material Class 1, Group D.

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**8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

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**Engineering  
Controls**

Where possible, use adequate ventilation to keep vapor and mist concentrations of this material below the Occupational Exposure Limits shown in Section 2. Electrical equipment should comply with National Electrical Code (NEC) standards (see Section 7).

**Respiratory**

Where there is potential for exposure to hydrogen sulfide gas in excess of the permissible exposure limit, a NIOSH/MSHA-approved supplied-air respirator operated in positive pressure mode should be worn.

If hydrogen sulfide gas is not present in excess of permissible exposure limits, a NIOSH/MSHA-approved air-purifying respirator with an organic vapor cartridge may be permissible under certain circumstances where airborne concentrations of hydrocarbon vapor may exceed the exposure limits in Section 2. Where work conditions may generate airborne mists of the material, also use a high-efficiency particulate pre-filter. Consult a health and safety professional for guidance in respirator selection. Respirator use should comply with OSHA 29 CFR 910.134.

**CAUTION:** The protection provided by air-purifying respirators is limited. Use a positive pressure air-supplied respirator if there is any potential for an uncontrolled release, if exposure levels are not known, or if concentrations exceed the protection limits of the air-purifying respirator.

**Eyes**

Eye protection should be worn. If there is potential for splashing or spraying, chemical protective goggles and/or a face shield should be worn. If contact lenses are worn, consult an eye specialist or a safety professional for additional precautions. Suitable eye wash water should be available in case of eye contact with this material.

**Skin**

Avoid all skin contact with this material. If conditions of use present any potential for skin contact, clean and impervious clothing such as gloves, apron, boots, and facial protection should be worn. Neoprene, Nitrile, Butyl Rubber or Viton glove material is recommended. When working around equipment or processes which may create the potential for skin contact, full body coverage should be worn, which consist of impervious boots and oil-resistant coated Tyvek suit or other impervious jacket and pants.

Non-impervious clothing which accidentally becomes contaminated with this material should be removed promptly and not reworn until the clothing is washed thoroughly and the contamination is effectively removed. Discard soaked leather goods.



**Other Hygienic and Work Practices**

Use good personal hygiene practices. If skin contact should occur, material should be removed from the skin with a waterless hand cleaner, and the affected area should then be washed with a mild soap and water. Wash hands and other exposed areas thoroughly before eating, drinking, smoking or using toilet facilities.

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**9. PHYSICAL and CHEMICAL PROPERTIES**

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<b>Boiling Point:</b>	AP -54°F to 1100°F
<b>Viscosity Units, Temp. (Method):</b>	N/DA
<b>Dry Point:</b>	N/AP
<b>Freezing Point:</b>	N/DA
<b>Vapor Pressure, Temp. (Method):</b>	AP 1 to 2 at 100°F (REID-PSIA)
<b>Volatile Characteristics:</b>	Appreciable
<b>Specific Gravity (H<sub>2</sub>O = 1 @ 39.2°F):</b>	AP 0.88
<b>Vapor Sp. Gr. (Air = 1.0 @ 60°F - 90°F):</b>	N/DA
<b>Solubility in Water:</b>	Negligible
<b>PH:</b>	N/AP
<b>Appearance and Odor:</b>	Thick light yellow to dark black colored liquid. Petroleum hydrocarbon odor.
<b>Other Physical and Chemical Properties:</b>	Total sulfur = approx. 1.1% - 2.8% Hydrogen sulfide content is less than 5 ppm dissolved in liquid Vanadium = approx. 210 ppm

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**10. STABILITY and REACTIVITY**

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<b>Stability</b>	Stable
<b>Hazardous Polymerization</b>	Not expected to occur.
<b>Other Chemical Reactivity</b>	N/AP

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<b>Conditions to Avoid</b>	Heat, sparks, and open flame.
<b>Materials to Avoid</b>	Strong acids, alkalis, and oxidizers such as liquid chlorine and oxygen.
<b>Hazardous or Decomposition Products</b>	Burning or excessive heating may produce carbon monoxide and other harmful gases or vapors including oxides of sulfur and nitrogen.

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**11. TOXICOLOGICAL INFORMATION**

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<b>Toxicological Information</b>	The information found in this section is written for medical, toxicology, occupational health and safety professionals. This section provides technical information on the toxicity testing of this or similar materials or its components. If clarification of the technical content is needed, consult a professional in the areas of expertise listed above.
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<b>Prolonged/Repeated Exposures</b>	IARC has determined there is "limited evidence for the carcinogenicity in experimental animals of crude oil" and "inadequate evidence for the carcinogenicity in humans of crude oil." IARC concludes that "crude oil is not classifiable as to its carcinogenicity to humans (Group 3)."  Crude oil administered orally to pregnant rats during gestation produced increased number of resorptions and decrease in fetal weight and length.
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Exposure to N-hexane at concentrations considerably higher than the current permissible exposure limit has reportedly been associated with peripheral neuropathy.

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**12. ECOLOGICAL INFORMATION**

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Not Available

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**13. DISPOSAL CONSIDERATIONS**

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<b>Waste Disposal Methods</b>	Maximize recovery for reuse or recycling. Consult environmental professional to determine if state or federal regulations would classify spilled or contaminated materials as a hazardous waste. Use only approved transporters, recyclers, treatment, storage or disposal facilities. Comply with all federal, state and local laws pertaining to waste management.
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**14. TRANSPORT INFORMATION**

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<b>UN Proper Shipping Name</b>	Petroleum crude oil
<b>UN Hazard Class</b>	3
<b>UN Number</b>	UN1267
<b>UN Packing Group</b>	PGI

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**15. REGULATORY INFORMATION**

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**SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (SARA), TITLE III****Section 311/312 Hazard Categories:**

Immediate (acute) health hazard  
Delayed (chronic) health hazard  
Fire hazard

No chemicals in this product exceed the threshold reporting level established by SARA Title III, Section 313 and 40 CFR 372.

**TOXIC SUBSTANCES CONTROL ACT (TSCA)**

All components of this product are listed on the TSCA Inventory.

**COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT (CERCLA)**

This material is covered by CERCLA's PETROLEUM EXEMPTION.

(Refer to 40 CFR 307.14)

**CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 - PROPOSITION 65****PROP 65 WARNING LABEL:**

Chemicals known to the State to cause cancer, birth defects, or other reproductive harm are found in gasoline, crude oil, and many other petroleum products and their vapors, or result from their use. Read and follow label directions and use care when handling or using all petroleum products.

**WARNING:**

This product contains the following chemical(s) listed by the state of California as known to cause cancer or birth defects or other reproductive harm.

MINERAL OILS, UNTREATED <sup>(C)</sup>

Other Prop 65 chemicals will result under certain conditions from the use of this material. For example, burning fuels produces combustion products including carbon monoxide, a Prop 65 reproductive toxin.

<sup>(C)</sup> = Carcinogen



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**16. OTHER INFORMATION**

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**General  
Comments**

The information and conclusions herein reflect normal operating conditions and may be from sources other than direct test data on the mixture itself.

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Abbreviations:	EQ = Equal	AP = Approximately	N/P = No Applicable Information Found
	LT = Less Than	UK = Unknown	N/AP = Not Applicable
	GT = Greater Than	TR = Trace	N/DA = No Data Available

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Prepared by: Product Stewardship

**Disclaimer of Liability**

The information in this MSDS was obtained from sources which we believe are reliable. HOWEVER, THE INFORMATION IS PROVIDED WITHOUT ANY WARRANTY, EXPRESS OR IMPLIED, REGARDING ITS CORRECTNESS.

The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. FOR THIS AND OTHER REASONS, WE DO NOT ASSUME RESPONSIBILITY AND EXPRESSLY DISCLAIM LIABILITY FOR LOSS DAMAGE OR EXPENSE ARISING OUT OF OR IN ANY WAY CONNECTED WITH THE HANDLING, STORAGE, USE OR DISPOSAL OF THE PRODUCT.

This MSDS was prepared and is to be used only for this product. If the product is used as a component in another product, this MSDS information may not be applicable.

## **Appendix: 5**

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**KEYERA****Hydrogen Sulfide MSDS****Material Safety Data Sheet****1. Product and Company Identification**

Product Name: Hydrogen Sulfide,  
Synonym: H<sub>2</sub>S, Hydrogen Sulphide  
Product use: Refining into sulfur or fertilizer production.  
Manufacturer: Keyera  
Address: Suite 600, Sunlife Plaza West  
144 – 4<sup>th</sup> Avenue SW  
Calgary, AB, T2P 3N4  
Emergency Contact: 1-866-377-7110

**2. Hazards Identification****EMERGENCY OVERVIEW**

This product is **extremely toxic and flammable** and will be easily ignited by heat, sparks or flames. Explosive mixtures form when vapors mix with air. Vapors may travel to a source of ignition and flash back. May be fatal if inhaled – high concentrations can cause immediate death. Hydrogen Sulfide that is an extremely toxic and flammable gas at low concentrations. Exposures to hydrogen sulfide above 100 ppm are immediately dangerous to life and health (IDLH) and may be fatal. Exposures to hydrogen sulfide between 10 ppm and 100 ppm may produce irritation to the respiratory tract. Refer to North American Emergency Response Guide (NAERG) 117.

**POTENTIAL HEALTH EFFECTS/ROUTES OF EXPOSURE**

**Eye:** This product is a severe eye irritant.  
**Skin:** This product is a moderate irritant of the skin.  
**Ingestion:** This product is extremely unlikely to be swallowed and more likely to be inhaled.  
**Inhalation:** Harmful or fatal if inhaled. At high concentrations (500 - 1000 ppm), hydrogen sulfide acts as a systemic poison, causing unconsciousness and death. In lower concentrations (50 – 500 ppm), hydrogen sulfide acts as a respiratory irritant, and may cause fluid in the lungs or bronchial pneumonia. The rotten egg odor of hydrogen sulfide is not a reliable indicator for warning of exposure, since olfactory fatigue (loss of smell) readily occurs, especially at concentrations above 50 ppm.

**3. Composition/Information on Ingredients**

Ingredient Name	%	CAS No.
Hydrogen Sulfide	100	7783-06-4

Hydrogen Sulfide is a naturally occurring constituent of natural gas. The listed components are provided as guidance based on the available knowledge of the commingled stream.



**KEYERA**

## Hydrogen Sulfide MSDS

### 4. First Aid Measures

<b>Eyes:</b>	In case of contact with eyes, immediately flush with clean, low-pressure water for at least 20 minutes. Hold eyelids open to ensure adequate flushing. Seek medical attention.
<b>Skin:</b>	Remove contaminated clothing. High pressure releases may inject gas under the skin and requires immediate medical attention. Wash contaminated areas thoroughly with soap and water (waterless hand cleanser may be used if water is not readily available). Obtain medical attention if irritation or redness develops.
<b>Ingestion:</b>	This product is naturally a gas and is unlikely to be ingested and more likely to be inhaled. Rinse mouth with water. Do not induce vomiting. Never administer liquids to an unconscious person.
<b>Inhalation:</b>	Ensure your own safety and use the appropriate respiratory protection to immediately remove the victim to an area free of inhalation hazards. If Hydrogen Sulfide is present or there is a potential for it to be present, all rescuers must wear positive pressure, full face shield, self contained breathing apparatus. Give CPR or artificial respiration as needed and give oxygen if breathing is difficult. Keep victim at rest and get immediate medical attention.

### 5. Fire Fighting Measures

#### FLAMMABLE PROPERTIES

Extremely Flammable Gas

#### HAZARDOUS COMBUSTION PRODUCTS

Irritating gases of incomplete combustion such as carbon monoxide, carbon dioxide sulfur dioxide may be produced.

#### FIRE AND EXPLOSION HAZARDS

This product is **EXTREMELY FLAMMABLE**. DO NOT ATTEMPT TO EXTINGUISH A LEAKING GAS FIRE UNLESS THE LEAK CAN BE STOPPED. Vapors will ignite easily in the presence of any source of ignition over a wide range of concentrations and even at very low temperatures.

#### EXTINGUISHING MEDIA

**Small Fires:** Dry chemical, CO<sub>2</sub>, water spray or regular foam.

**Large Fires:** Water spray, fog or regular foam. Move containers from fire area if possible without risk.

#### FIRE FIGHTING INSTRUCTIONS:

Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers. Consider initial downwind evacuation for at least 800 meters (1/2 mile). Cool containers with large quantities of water until well after the fire has been put out. Do not direct the water stream at the source of the leak or safety devices as icing may occur. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire. Fight fires from





**KEYERA**

## **Hydrogen Sulfide MSDS**

maximum distance and for massive fires, use unmanned hose holders or monitor nozzles. If this is not possible, withdraw from the area and let the fire burn. Approved self-contained breathing apparatus (SCBA) with full-face piece and full protective firefighting clothing should be worn.

### **UNUSUAL FIRE & EXPLOSION HAZARDS**

This product in purer concentrations will be heavier than air and may collect in lower lying areas. Burning occurs with a slightly luminous flame and very little noise. Pressurized containers of gas may explode due to heat generated by fires.

## **6. Accidental Release Measures**

### **ACTIVATE SITE SPECIFIC EMERGENCY RESPONSE PLAN, IF AVAILABLE.**

**Small Leaks:** Isolate spill or leak area immediately for at least 30 meters (100 feet) in all directions and protect downwind for 100 Meters (330 feet). Remove all ignition sources. Ventilate area of leak. Stop flow of gas. Do not attempt to extinguish a fire unless the leak can be stopped. Isolate area until gas has dispersed.

**Large Leaks:** Isolate spill or leak area immediately for at least 300 meters (1000 feet) in all directions and protect downwind for 2 kilometers (1.3 miles). Keep unauthorized personnel away and stay upwind. The proper use of water spray may effectively disperse product vapors, preventing contact with ignition sources or areas /equipment that require protection.

**Evacuation:** Fire: Evacuate unnecessary personnel and any without appropriate personal protection.

**Caution:** Ensure your own safety and use the appropriate respiratory protection. An approved self-contained breathing apparatus (SCBA) with full-face piece may be required. Clean-up crews must be properly trained and must utilize proper protective equipment.

## **7. Handling and Storage**

### **HANDLING PRECAUTIONS**

Handle as an extremely toxic flammable gas. Keep away from all sources of heat, sparks, open flame or any sources of ignition as well as flammable materials or oxidizers. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition. Use only with adequate ventilation and avoid breathing vapors. Ground and bond all lines and equipment. Use intrinsically safe electrical equipment.

### **STORAGE PRECAUTIONS**

Avoid storage in confined locations or near incompatible materials listed in Section 10 and flammable materials, oxidizers or materials that support combustion.

### **WORK/HYGIENIC PRACTICES**

Use good personal hygiene practices. Avoid skin exposure and wash hands before eating, drinking, smoking, or using toilet facilities. Do not eat, drink or smoke in areas of use or storage. Promptly remove contaminated clothing, allow all gasses to dissipate and launder before reuse. Use care when laundering to prevent the formation of flammable or toxic vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

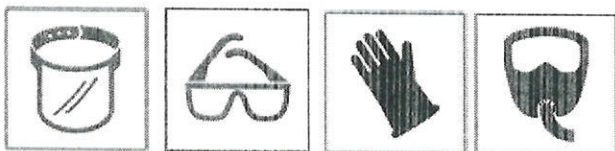


## 8. Exposure Controls / Personal Protection



### ENGINEERING CONTROLS

Ensure adequate ventilation to keep vapor and gas concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Ventilation system and other electrical equipment must be approved for flammable areas. Quick drench facilities and/or eyewash stations should be provided within the immediate work area for emergency use.



### PERSONAL PROTECTIVE EQUIPMENT

**Eye/Face Protection:** Wear safety glasses with side shields when handling this product.

**Skin Protection:** Avoid skin contact. In the event of rapidly escaping gas wear appropriate gloves to prevent cryogenic burns

**Respiratory Protection:** Ensure your own safety and use the appropriate respiratory protection. Air purifying respirators are not adequate to protection for this product. If concentrations of Hydrogen Sulfide are high enough to warrant supplied air the workplace needs to be assessed for flammability and hydrogen sulfide.

### Exposure Limits

Ingredient Name	CAS No.	Occupational Exposure Limits
Hydrogen Sulfide	7783-06-4	ACGIH TLV-TWA 1 ppm ACGIH TLV-STEL 5 ppm

ACGIH – American Conference of Governmental Industrial Hygienists

TLV – Threshold Limit Value

TWA – Time Weighted Average

STEL – Short Term Exposure Limits

## 9. Physical and Chemical Properties

Appearance and state:	Colorless gas
Odor:	Rotten Egg Odor. The sense of smell is paralyzed at approximately 100ppm.
Odor Threshold:	0.05 ppm
Flash Point:	Flammable Gas
Auto Ignition:	260°C
Lower Explosive Limit (%):	4.3%
Upper Explosive Limit (%):	45.0%
Boiling Point:	-60.4°C
Melting Point:	-85.5°C





**KEYERA**

## Hydrogen Sulfide MSDS

Vapor Pressure:	1875 kPa @ 20 °C
Vapor Density (Air = 1):	1.19
Specific Gravity:	Not available
Solubility (H <sub>2</sub> O):	Soluble in water
Percent Volatiles:	Not available
pH	Not available
Evaporation Rate:	Variable
Octanol/Water Coefficient:	Not available

### 10. Stability and Reactivity

#### STABILITY

Stable

#### CONDITIONS TO AVOID (STABILITY)

Hydrogen Sulfide reacts as an acid and a reducing agent. Explodes on contact with oxygen difluoride, bromine pentafluoride, chlorine trifluoride, dichlorine oxide, silver fulminate. May ignite and explode when exposed to powdered copper in oxygen. May react similarly with other powdered metals. Ignites on contact with metal oxides and peroxides (barium peroxide, chromium trioxide, copper oxide, lead dioxide, manganese dioxide, nickel oxide, silver oxide, silver dioxide, thallium trioxide, sodium peroxide, mercury oxide, calcium oxide). Ignites with silver bromate, lead(II) hypochlorite, copper chromate, nitric acid, lead(IV) oxide and rust. May ignite if passed through rusty iron pipes. Reacts exothermically with bases. The heat of the reaction with soda lime, sodium hydroxide, potassium hydroxide, barium hydroxide may lead to ignition or explosion of the unreacted portion in the presence of air / oxygen. Material is stable under normal conditions but can rapidly become volatile. Avoid high temperatures, open flames, sparks, welding, smoking and other ignitions sources.

#### INCOMPATIBLE MATERIALS

Explodes on contact with oxygen difluoride, bromine pentafluoride, chlorine trifluoride, dichlorine oxide, silver fulminate. May ignite and explode when exposed to powdered copper in oxygen. May react similarly with other powdered metals. Ignites on contact with metal oxides and peroxides (barium peroxide, chromium trioxide, copper oxide, lead dioxide, manganese dioxide, nickel oxide, silver oxide, silver dioxide, thallium trioxide, sodium peroxide, mercury oxide, calcium oxide). Ignites with silver bromate, lead(II) hypochlorite, copper chromate, nitric acid, lead(IV) oxide and rust.

May ignite if passed through rusty iron pipes. Reacts exothermically with bases. The heat of the reaction with soda lime, sodium hydroxide, potassium hydroxide, barium hydroxide may lead to ignition or explosion of the unreacted portion in the presence of air / oxygen. Keep away from strong oxidizers, ignition sources and heat.

#### HAZARDOUS DECOMPOSITION PRODUCTS

When heated to decomposition, it emits highly toxic fumes of oxides of sulfur. Incompatible with many materials including strong oxidizers, metals, strong nitric acid, bromine pentafluoride, chlorine trifluoride, nitrogen triiodide, nitrogen trichloride, oxygen difluoride and phenyl diazonium chloride. Avoid physical damage to containers; sources of ignition; storage near nitric acid, strong oxidizing materials, and corrosive liquids or gases.

**KEYERA****HAZARDOUS POLYMERIZATION**

Will not occur

**Hydrogen Sulfide MSDS****11. Toxicological Information**

Chemical Name	CAS No.	LD50	LC50
Hydrogen Sulfide	7783-06-4	Not applicable	380 mg/cu m/410 min

**POTENTIAL HEALTH EFFECTS**

**Acute effects:** At high concentrations (500 - 1000 ppm), hydrogen sulfide acts as a systemic poison, causing unconsciousness and death. In lower concentrations (50 – 500 ppm), hydrogen sulfide acts as a respiratory irritant, and may cause fluid in the lungs or bronchial pneumonia. The rotten egg odor of hydrogen sulfide is not a reliable indicator for warning of exposure, since olfactory fatigue (loss of smell) readily occurs, especially at concentrations above 50 ppm. If rapidly escaping gas comes in contact with skin this product may result in frostbite and dermatitis.

**Chronic effects:** Chronic exposure to hydrogen sulfide of 50 ppm or greater may include bronchitis and inflammation of the mucous membrane of the respiratory system. At 250 ppm hydrogen sulfide, chronic effects may include bronchial pneumonia and pulmonary edema.

**Sensitization:** Not available.

**Mutagenicity:** Not mutagenic.

**Reproductive effects:** Not known to cause reproductive effects.

**Carcinogenicity:** Ingredients are not identified as carcinogens by IARC, NTP or ACGIH.

**Target organs:** Eyes, respiratory system, central nervous system (CNS).

**12. Ecological Information**

This product is volatile and disperses rapidly. It is inherently toxic to aquatic organisms and is considered persistent.

**13. Disposal Considerations**

Vent through a flaring system. Preferred waste management priorities are recycle, reprocess or incinerate with heat recovery.

**14. Transport Information**

<b>PROPER SHIPPING NAME:</b>	Hydrogen Sulfide
<b>TDG CLASS:</b>	2.3 (2.1)
<b>TDG IDENTIFICATION NUMBER:</b>	UN1053
<b>TDG SHIPPING LABEL:</b>	Poison gas
<b>NAERG:</b>	Guide 117





**KEYERA**

**Hydrogen Sulfide MSDS**

## **15. Regulatory Information**

### **WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)**

Workplace Hazardous Materials Information Systems (WHMIS): This product has been classified in accordance with the hazard criteria of the CPR (Controlled Product Regulations), and the MSDS contains all of the information required by the CPR.



**Class A – Compressed Gas**

**Class B1 – Flammable Gas**

**Class D1A – Very Toxic Materials Causing Immediate and Serious Toxic Effects**

**Class D2B – Materials Causing Serious and Other Toxic Effects**

**CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA)**

All components of this product are listed on the Canadian DSL Inventory.

## **16. Other Information**

Prepared for: Keyera Health and Safety  
Issue Date: January 3, 2011  
More Information: (403) 205-7698  
Technical Preparation by: Deerfoot Consulting Inc.

### **Disclaimer of Expressed and Implied Warranties**

The information presented in the Material Safety Data Sheet is based on data believed to be accurate as of the date this Material Safety Data Sheet was prepared. However, neither Keyera, Deerfoot Consulting Inc nor any of their subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use.

**Appendix: 6**

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## OSHA

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Safety and Health Information Bulletins / Potential Health Hazards Associated with Handling Pipe used in Oil and Gas Production

### OSHA Hazard Information Bulletins

#### Potential Health Hazards Associated with Handling Pipe used in Oil and Gas Production

January 26, 1989

MEMORANDUM FOR:

REGIONAL ADMINISTRATORS

THRU:

LEO CAREY  
Director  
Office of Field Programs

FROM:

EDWARD BAIER  
Directorate of Technical Support

SUBJECT:

Health **Hazard Information Bulletin:** Potential Health Hazards Associated with Handling Pipe used in Oil and Gas Production

The State of Louisiana, Department of Environmental Quality has recently issued a notification concerning a potential health hazard associated with handling pipe used in oil and gas production that may be contaminated with radioactive scale from naturally-occurring radioactive materials (NORM). (Copies attached)

The concern is the possible inhalation and/or ingestion of scale particles contaminated with radium-226 and possibly other radioactive material that may be airborne during welding, cutting or reaming of pipe containing the radioactive scale. The State of Louisiana is using the term for this material Technological Enhanced Natural Radiation (TENR), which is a subgroup of a larger group, referred to as naturally occurring radioactive materials or NORM.

The investigation and regulatory control impact of most of these sources may have been overlooked by Federal and State agencies in the past, while string controls were placed on X-ray and other man-made sources of radiation.

Compliance Officers should be aware of the potential radiation hazard to workers due to TENR in the oil and gas industry.

Attachments

State of Louisiana  
DEPARTMENT OF ENVIRONMENTAL QUALITY



October 20, 1988

## RADIATION ASSOCIATED WITH OIL AND NATURAL GAS PRODUCTION AND PROCESSING FACILITIES

### I. INTRODUCTION - Technologically Enhanced Natural Radioactive Material (TENR) Naturally-occurring radionuclides are ubiquitous in the environment.

Under various circumstances, the radionuclides, primarily from the uranium and thorium decay series, can contaminate the environment to the extent that pose real or potential public health risks. The investigation and regulatory control of the impacts of most of these sources have been overlooked by federal state agencies in the past, while stringent controls were placed on X-ray and other man-made sources of radiation. This lack of strict controls has been due in part, to the fact that the federal government has limited jurisdiction over TENR, and control was previously left up to the states, which often times did not have adequate programs or staff to deal with the problem. TENR is a subset of a larger grouping referred to as naturally-occurring radioactive materials (NORM). Regulations to deal with NORM are being developed by a task force of the Conference of Radiation Control Program Directors (CRCPD) and have been through drafts to date.

It should be noted, however, that considerable work has been done by the CRCPD, the EPA, and individual states. The CRCPD established a task force to assess the potential for problems nationwide with NORM and make recommendations for implementation of effective control measures. Included in the two documents published were identification of specific TENR problems, a national inventory of NORM, and an evaluation of exposure pathways to man.

Additional work by EPA and individual states included a comprehensive health effects study related to the use of slag from elemental phosphorus plants for purposes in Idaho; an assessment of the phosphate mining industry in Florida, including an evaluation of guidelines for homes built on reclaimed mining land; complete radiation profiles of wet-process phosphoric acid production, natural gas processing, lignite mining and alumina production in Louisiana.

Much of this work was performed during the late 1970's and early '80's, and many of the recommendations have not been acted on by the EPA and other federal agencies. There does, however, appear at this time to be a resurgence of interest in the NORM area, particularly by the CRCPD and several interest states which make up the Conference membership. A federal-state committee was recently established and will make formal recommendations relative to the current situation with NORM and the need for future activities.

While there are over 100 naturally occurring radionuclides, public health problems are usually limited to the 30-odd radionuclides in the uranium and thorium series because of their relative abundance and toxicity, and they are generally the result of some technological enhancement of the isotopes.

The increased incidence of bone cancer in radium dial painters and lung cancer in fluoroscopy and uranium miners are examples of undesirable health effects due to exposure to these radionuclides. Other examples of increased population exposure to radiation include the radon problems in several western states due to construction over radioactive tailings and the use of reclaimed phosphate mining land in Florida.

Of particular interest to Louisiana is the growing awareness of related problems of the radioactivity content of produced waters and contamination of equipment and facilities in the oil and natural gas production and processing industries.

### II. PRODUCED WATERS

The occurrence of environmentally high concentrations of radioactivity, specifically radium isotopes in oil field production waters (also called oil field brines, produced water, produced wastewater or formation water) is well documented [1, 2, 3, 4, 5, 6]. It appears that the radionuclides are leached from the clay minerals and are associated with the decay of uranium and thorium atoms [5, 8].

The radium levels observed in most saline produced waters from the Gulf Coast Region exceed proposed and existing radium discharge limits applied to oil and gas sectors [3]. Radium 226 and 228 activity was found in all 41 samples of brines in one survey [5]. Activity ranged from 19 to 2800 pCi/l (picoCuries/liter;  $1 \text{ pCi} = 1 \times 10^{-12} \text{ Ci}$ ). Seventy-six percent of the samples tested contained 50 pCi/l of total radium. Produced water samples from Louisiana platforms exhibited total activities of 605-1215 pCi/l in a recent study [7].

EPA [3] reports that average open ocean surface waters contain about 0.05 pCi/liter; coastal waters probably do not generally contain much higher than 1 pCi/liter; proposed drinking water standards restrict the permissible Ra-226 content to less than 5 pCi/liter (averaged); NRC regulations governing the operation of licensees permit no more than 30 pCi/liter in liquid discharges to unrestricted access areas. Fifty pCi/liter is the level of activity that distinguishes between hazardous and nonhazardous wastes under proposed EPA regulations.

It has been estimated that production water from the Levee Oil Field (coastal Louisiana) contributed up to 1.76 Curies of radium to the marsh around the field over a 5-year period [3]. It is our understanding that some fields have been in production for 40 years or more. It is therefore possible that the total radium released to the environment at these old fields could be in excess of 10 Curies over the lifetime of the fields.

### III. TENR CONTAMINATION OF EQUIPMENT AND FACILITIES

Recent Investigations have Identified radioactive "scale" resulting from the production of oil and associated brines which contained Ra-226 concentrations up to 100,000 pCi/gm [9]. Environmentally high concentrations of naturally-occurring radionuclides (e.g. Ra-226, Pb-210) in precipitates collected from the bottom of water separators and from ditches and pits used for disposal of production water have also been reported [1].

DEQ's Nuclear Energy Division (NED) has recently obtained information indicating radium-226 radioactivity of up to 8,700 pCi/gm in soil contaminated with radioactive scale at pipe storage areas [10, 11, 12]. Natural background radium-226 activity in Louisiana soils ranges from less than one to about 7 pCi/gm. EPA has proposed a cleanup limit for radium-226 in uranium mill tailings of 5 pCi/gm (above background) in the top 15 cm (6 in.) of soil and 15 pCi/gm at or below the top layer [10]. The Conference of Radiation Control Program Directors has proposed remedial action above 6 pCi/gm [10].



Contaminated piping from refineries has been found in scrap iron yards in New Orleans, Baton Rouge, and Lake Charles. The State of Mississippi has found contaminated pipe used in the construction of bleachers at schools. And, NED has found the concentrations of radium in oil field production ponds to be elevated. Readings made recently in a pipe reaming area at a pipe yard in Houma were such that monitoring of employees would be required if it were a licensed nuclear installation [10].

The magnitude of the problem is difficult to estimate, but it is not unrealistic to expect contamination at all oil and gas production sites and pipe handling facilities.

#### IV. CONCERNS

The following is a list of some of the questions and concerns we have that are related to TENR-contamination in the oil and gas industry:

1. There are basically no regulations governing the handling and disposal of TENR-contaminated materials except for uranium mill tailings.
2. TENR-contamination in varying degrees of severity may exist at every oil and gas production site and pipe handling facility in the state, and may have entered in substantial quantities into scrap yards and metal reclamation facilities.
3. Radium-226 has a half-life of 1620 years, so these contaminated sites will be of concern for centuries. Many of these sites, especially the pipe yards, are near city limits and could easily be used for residential or commercial purposes. If buildings were constructed over radium-contaminated soil, the resulting radon concentrations could pose a serious health threat.
4. The environmental consequences and health risks associated with disposal of TENR-contaminated oil field wastes (e.g., incineration and land farming) are largely unknown.
5. Workers employed in the area of cutting and reaming oil field pipe may be exposed to dust particles containing levels of alpha-emitting radionuclides that could pose very serious health risks.
6. Billions of gallons of produced water carrying TENR contamination are being released annually to the environment, particularly in coastal Louisiana. We have very little information on the fate and effects of the materials in the aquatic and terrestrial environments and on potential movement of TENR materials through food chains leading to human consumption.
7. There are some very difficult questions concerning potential liabilities for environmental contamination, workplace exposure to radioactive materials, and necessary remedial measures.

#### V. RECOMMENDED ACTION PLAN

1. Develop and disseminate an interim policy for handling TENR materials and protection for those working with contaminated pipe and equipment. (Done)
2. Develop preliminary pathways and potential health effects of exposure to TENR-contaminated materials (inhalation, ingestion, external exposure), as well as fish and shellfish consumption, if applicable.
3. Define and initiate a small strategic sampling effort to answer immediate information needs.
4. Establish a task force to assist in dealing with the TENR-contamination problem.
5. Research and develop legal framework for regulating TENR-contaminated materials.
6. Develop and implement strategies for characterizing and mitigating the problem. This is a nationwide problem, shared by all states in one degree or another. It is therefore important to share information with other states and attempt to develop strategies and solutions which have wide applicability.
7. Identify potential sources of financial, human, and material resources that could be applied to the problem.
8. Obtain funding to deal with the problem.

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State of Louisiana  
DEPARTMENT OF ENVIRONMENTAL QUALITY

BUDDY ROEMER  
GOVERNOR

PAUL H. TEMPL  
SECRETARY

October 20, 1988

TECHNOLOGICALLY ENHANCED NATURAL RADIOACTIVE MATERIAL  
INTERIM POLICY  
PIPE SCALE

PURPOSE:

The purpose of this Interim policy is to establish radiation protection procedures with regard to handling, storing and disposing of technologically-enhanced radioactive material (TENR) found in pipe scale or soil contaminated by the cleaning of pipe scale. The guidance given is to be used in the development of procedures which will minimize exposure to the radioactive materials while the extent of the potential hazard is evaluated.

SCOPE:

This interim policy applies to any person who engages in activities which technologically alter the natural sources of radiation or their potential exposure to man. There are presently no firm methods to deal with the problem on a permanent basis.

CONTROL OF MATERIAL:

Due to the large volumes of waste involved, there is no easy solution to the disposal of TENR-contaminated equipment or soil. The basic consideration, at this time, is to consolidate the contaminated material and separate it from non-contaminated material in an attempt to keep volumes as low as possible. This serves to facilitate retrieval when an acceptable disposal method becomes available and to keep exposure to individuals as low as is reasonably achievable.

Consolidated materials should be stored in a controlled area which has a low occupancy. A radiation area survey should be performed and, if required, the area should be posted in accordance with Section 422 of the Louisiana Radiation Regulations.

Contaminated items should not be transferred to other individuals.

RADIOLOGICAL PRECAUTIONS:

The following precautions should be taken to minimize exposure to TENR-contaminated materials:

Employees and contractors should be advised of the presence of this contamination and of procedures to minimize exposure.

Direct skin contact with radioactive scale and solids should be avoided to the extent reasonably possible.

Eating, drinking, smoking and chewing should not be allowed in the work area where work is being performed on contaminated equipment or where contaminated soil is being handled.

Personnel should thoroughly wash their hands and face after working with contaminated equipment, and before eating, drinking, or smoking, and at the end of the day.

The number of personnel in the work area should be kept to a minimum.

If possible, openings on contaminated equipment should be sealed or wrapped in plastic. Work on contaminated equipment, such as cutting, grinding, blasting, welding, drilling, or polishing should be kept to a minimum.

If work requires any action that might produce dust or if loose contamination is suspected, the following additional precautions should be taken:

- A. A respirator appropriate for radioactive particulates should be worn.
- B. Suitable coveralls and gloves should be worn.
- C. Activities should be conducted in well-ventilated areas to which access has been restricted.
- D. Plastic ground covers should be utilized to the extent possible to contain contaminants and facilitate cleanup.
- E. Gloves, respirators, coveralls, and rags should be decontaminated or placed in double bags, sealed and held for proper disposal.
- F. The need for Personnel Monitoring and Bioassay should be evaluated and provided if necessary. In addition to the general guidance given for pipe scale, there may be other industrial operations, such as vessel entry, dismantling of equipment, refurbishing of equipment or transportation, which may also require precautionary procedures. For additional information or clarification, contact the Department of Environmental Quality, Nuclear Energy Division at 925-4518.



UNITED STATES  
DEPARTMENT OF LABOR



Occupational Safety and Health Administration  
200 Constitution Ave NW  
Washington, DC 20210  
☎ 800-321-6742 (OSHA)  
TTY  
[www.OSHA.gov](http://www.OSHA.gov)

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