



Division:
Corporate

Business Unit
/Area: N/A

Protocol No.:
COR 03-S2-PR

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Date: 03 - 12/6/16

Hot Work Protocol

Purpose

This Devon Energy EHS Protocol defines what is required to protect workers during hot work operations, defines area classification, and lists special concerns for hot work activities.

Scope

This protocol applies to all Devon operated equipment, facilities and all Devon employees.

Contractors will have their own program that meets or exceeds Devon’s Hot Work Protocol.

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1.0 RESPONSIBILITIES

Division/Business Unit Leadership

- Reinforce adherence to this protocol and provide resources for application of the protocol.
- Ensure employees responsible for hot work duties receive required training.

Line Supervisor

- Understand how this protocol applies to personnel in their area of responsibility.
- Ensure employees have training, skills, knowledge and understanding to comply with this protocol.
- Check periodically to ensure the requirements of this protocol are being met.

Environmental, Health, and Safety

- Provide technical resources and tools for protocol application.
- Monitor compliance through the audit process.

Devon Employees

- Adhere to the requirements of this protocol.
- Identify and report gaps in this protocol.
- Complete required training.

Contract Company Representative

- Comply with regulatory requirements and follow the Devon EHS protocols.

2.0 TERMS AND DEFINITIONS

2.1 Hot Work Terms and Definitions

Cad welding - a form of thermite welding used to bond wire to metal.

Electrically Classified area - a location in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures, which requires electrical equipment to be gas tight (see National Electrical Code and American Petroleum Institute [API] Recommended Practice [RP] 500).

Combustible material - a substance that can be ignited and burned (e.g., cardboard boxes, filters, paper trash, ground cover like dry grass and brush, textiles, plastics, paper).

Designated safe hot work area (non-permit-required area) - an area that is free of combustible and flammable materials and that is constructed of noncombustible or fire-resistant construction materials. A designated safe hot work area cannot be located in an electrically classified area.

Fire watch - an individual assigned to monitor the hot work activity.

Flammable - capable of igniting easily, burning intensely or spreading flame rapidly.

Greenfield - facilities and locations which have not contained hydrocarbon materials, and are not connected to an existing facility, equipment, or piping system that has contained hydrocarbon materials.

Hot tap - a technique of attaching connections, such as weld-o-let or split tees, to equipment in service by welding.

Hot work - using tools and/or equipment that may create an arc, spark, or open flame (e.g., electric or gas welding, cutting, brazing, burning, grinding, use of an oxyacetylene torch, or similar operations, including manually lighting production equipment).

Intrinsically Safe - equipment that is safe to use in an electrically classified area or a potentially hazardous area that may contain fuel in the atmosphere, such as flammable gasses or vapors, or combustible dust.



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Lower Explosive Limit (LEL) - a concentration (lowest percentage of the substance in air) that will produce a flash of fire when an ignition source (such as heat, arc, or flame) is present. At concentrations lower than the LEL, the mixture is too lean to burn.

Isolation - using one of the following methods to isolate piping or equipment:

- Disconnected equipment with blind flange installed.
- Full-thickness blind skillet with gaskets on the pressure side.
- Spectacle blind with gaskets on the pressure side.
- Use of a block valve in conjunction with Lockout/Tagout.

Occupational Exposure Limits (OEL) - an 8-hour time weighted average exposure limit, designated by Devon.

Permissible Exposure Limit (PEL) - an 8-hour time weighted average exposure limit, designated and enforceable by the United States Occupational Safety and Health Administration.

Permit Issuer - individual who has completed the required training and is authorized to write Hot Work Permits.

Permit receiver - individual who has requested a Hot Work Permit, for work tasks that will be performed.

Purge - remove the contents within pipe or equipment and replace it with another gas or liquid.

Render inert - change the contents of an enclosure, vessel, or piping by using an inert substance (i.e., nitrogen or water) to render the atmosphere incapable of supporting combustion.

Unclassified area - a location that is not electrically classified as a Class I, Division 1, or Division 2 area. (See API RP 500.)

2.2 General Terms and Definitions

Area - individual operating fields or components that collectively comprise a Region, Areas normally include an area office.

Area Office - a field office with assigned employees that support an area. (e.g., Cuero, Artesia, etc.).

Business Unit - individual components that collectively comprise a Division. Business Units may also be referred to as Basins.

Contract Company Representative - a contractor who is assigned responsibilities, oversight and acts as Devon's on-site representative following and implementing the protocol steps as an employee would, for a specific task that requires adherence to Devon EHS Protocols.

Division - the division operations of Devon are Canada, Corporate, Marketing & Midstream, and U.S.

Enterprise Classification Structure - is part of Devon's strategic plan for managing information assets. The ECS is the published list of all records classes, the period of time for retaining each and their designated disposition.

Facility - a collection of structures, piping, valves, vessels, tanks, compression, and processing equipment located in close geographic proximity, that are involved directly in the development, production, processing or delivery of oil and gas to market (e.g., a tank battery, drill site, well-site, compressor station, pipeline, and gas plant).

Field EHS - a titled position that provides EHS guidance and support within a Division.

Line Supervisor - a titled position that has assigned authority and responsibility for financials, production, maintenance, projects and personnel for a defined area.

Person-in-Charge (PIC) - a person that has been authorized by Devon to perform specific tasks to comply with this Devon protocol and/or regulatory requirements related to EHS. The PIC is defined in all protocols in the second column of the protocol section.



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Region/District - individual components that collectively comprise a Division.

3.0	PROTOCOL	
3.1	Potentially Hazardous Areas Areas where flammable petroleum gas and/or volatile liquids are produced, processed (i.e., compressed, stored, transferred, pumped).	
Step	Person In Charge(PIC)	Action
3.1.1	Line Supervisor	Designate areas listed below as potentially hazardous areas, which will require the completion of a Hot Work Permit before beginning hot work activities. <ul style="list-style-type: none"> • Areas within 75 feet (23 meters) of aboveground hydrocarbon/flammable containing equipment • Areas within 35 feet (11 meters) of combustible materials • Areas within 35 feet (11 meters) of vehicles that transport hydrocarbons/produced water (e.g., vacuum trucks) Note: This refers to other Hot Work activities taking place in the area of these vehicles, not the activities of the vehicle itself.
3.2	Hot Work Hazard Assessment The Hot Work Hazard Assessment is used to determine if a Hot Work Permit is required.	
Step	Person In Charge (PIC)	Action
3.2.1	Employee/Contract Company Representative	Determine if the work to be conducted is considered "Hot Work". Hot work examples include, but are not limited to the following: <ul style="list-style-type: none"> • welding (e.g., arc, cad, mig, tig, arch gouge, oxy/act, etc.) • chipping • cutting/burning • flaming (e.g., freeing seized bearings, etc.) • grinding • hot tapping of lines or vessels • soldering/brazing • using spark producing equipment • using vehicles and moving equipment inside a tank's secondary containment or firewall • sandblasters or hot oilers, and other spark producing operations • manually lighting production equipment • opening energized electrical equipment in an electrically classified area. Note: See step 3.2.4 for exception requirements.
3.2.2	Employee/Contract Company Representative	Request a Hot Work Permit, if one of the hot work activities (listed above) is being performed in the following location: <ul style="list-style-type: none"> • potentially hazardous area (Step 3.1.1)



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		<ul style="list-style-type: none"> on partitions, walls, floors, or ceilings of any building on equipment that contains or may contain a flammable or combustible substance or its residue
3.2.3	Employee/Contract Company Representative	<p>The following hot work activities do not require a hot work permit, if initial and continuous LEL monitoring is conducted prior to and during the tasks, with results less than 10% and monitoring equipment has been calibrated in accordance with the manufactures recommendations:</p> <ul style="list-style-type: none"> use of internal combustion engines (e.g., vehicles, weed eater, generators, mowers etc.) use of non-explosion proof electrical equipment (e.g., heaters, coils, power tools, extension cords, motors, lights, etc.) use of battery powered devices (e.g., cellular telephones, computers, test equipment, diagnostic tools, pagers, flashlights, etc.) which are not intrinsically safe. <p>Note: If the production equipment is housed inside a non-pierced (vapor-tight) enclosure, the task will be considered hot work only when located within the electrically classified area.</p> <p>Note: Vehicles in transit on established roads are exempt. If the vehicle is parked and left running, equipment is open, or there is a leak initial and continuous LEL monitoring will be required.</p>
<p>Greenfield Facility Construction Hot Work activities on new facilities construction requires an initial authorization prior to beginning hot work activities.</p>		
3.2.4	Employee/Contract Company Representative	<p>Request a Hot Work Permit prior to beginning hot work at green facility construction sites when the hot work activities meet the following conditions:</p> <ul style="list-style-type: none"> Within 75 feet of existing aboveground hydrocarbon equipment or lines, Within 75 feet of unground hydrocarbon containing equipment that has been uncovered, When hot work is being performed adjacent to or on walls, partitions, ceilings, or roofs of combustible construction, or During burn ban conditions.
3.2.5	Onsite Employee/Contract Company Representative	<p>Review precautions implemented to prevent inadvertent fires for greenfield construction activities when a Hot Work Permit is not required, and Hot Work is being performed within 35 feet of combustible materials. Initial authorization and precautions will be documented on a Job Safety Analysis, Work Permit, or an equivalent document.</p>
<p>Lighting Fired Production Equipment Manually lighting fired production equipment is considered hot work, which has its own unique hazards. Division and areas are required to develop and implement Standard Operating Procedures for manually lighting fired production equipment that will manage the exposure of the hot work hazards associated with the task.</p>		
3.2.6		<p>Develop a Standard Operating Procedure for manually lighting fired production equipment. At a minimum include the requirements listed below</p>



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- Steps to isolate the fuel gas valves for the pilot and the main burner.
- Purging process that lists adequate time for the equipment to purge in accordance with the manufactures instructions.
- Initial and continuous LEL monitoring to verify the atmosphere outside the equipment does not exceed an LEL of 10%.
- Stopping the lighting operations if the LEL exceeds 10% outside of the equipment.
- Wearing the following additional PPE: Face shield, Nomex Hood and Leather or FR Gloves.
- Verifying that the fuel gas regulator is set per manufactures operating instructions.
- Inserting the "torch" inside the fire box, fire tube, fire chamber, before opening the gas valve to the burner.
- Lighting the pilot light first.
- Standing to the side of the burner when inserting the torch into the fire box.
- Training individuals lighting fired equipment on the manufactures lighting instructions.
- The torch is long enough to reach the burner without having to put any part of the hand, arm or body in the equipment.

3.3 Hot Work Area Preparation

Equipment Isolation

Step	Person In Charge (PIC)	Action
3.3.1	Employee/Contract Company Representative	Comply with the Lockout/Tagout Protocol and equipment specific isolation procedures related to equipment associated with the hot work operations.
3.3.2	Employee/Contract Company Representative	<p>Move all combustible and/or flammable materials that can be moved, out of the hot work area. If it is not possible to move the combustible and/or flammable materials the following precautions should be taken: Protect combustibles, where relocation is impractical, by:</p> <ul style="list-style-type: none"> • Using fire-resistant covers • Using tight covers (replace if necessary) on all open containers • Rendering contents inert <p>Note: Where cutting or welding is done near walls, partitions, ceiling or roof of combustible construction, fire-resistant shields or guards shall be provided to prevent ignition. Wherever there are floor openings or cracks in the flooring that cannot be closed, precautions shall be taken so that no readily combustible materials on the floor below will be exposed to sparks which might drop through the floor. The same precautions shall be observed with regard to cracks or holes in walls, open doorways and open or broken windows.</p> <p>Note: If welding is to be done on a metal wall, partition, ceiling or roof, precautions shall be taken to prevent ignition of combustibles on the</p>



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		<p>other side, due to conduction or radiation, preferably by relocating combustibles. Where combustibles are not relocated, a fire watch on the opposite side from the work shall be provided.</p> <p>Note: Cutting or welding on pipes or other metal in contact with combustible walls, partitions, ceilings or roofs shall not be undertaken if the work is close enough to cause ignition by conduction.</p>												
3.3.3	Employee/Contract Company Representative	Isolate all drains and sumps that could contain hydrocarbons/flammables. Pump out all open sumps and securely cover them to prevent sparks and slag from entering the sumps.												
<p>Hot Work in Burn Ban Additional precautions included for Burn Ban conditions apply to welding, grinding or open flame hot work activities.</p>														
3.3.4	Permit Issuer	Consider alternate methods to hot work and use whenever possible in burn ban conditions. If hot work is unavoidable in burn ban conditions additional precautions shall be taken upon approval.												
3.3.5	Permit Issuer	Follow local, state or regional regulations during burn ban conditions when work being performed involves welding, grinding or an open flame. Note: Manually lighting fired production equipment is exempt from burn ban condition requirements identified in this section.												
3.3.6	Permit Issuer	<p>Request initial approval each day for hot work from the individual listed in the table below. Implement controls listed in step 3.3.7 when local, state or regional regulations do not exist.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Sustained Wind Speed</th> <th>Approval Level</th> <th>Perimeter (see step 3.3.7)</th> </tr> </thead> <tbody> <tr> <td>0-20 mph</td> <td>Superintendent</td> <td>35 feet (11 Meters)</td> </tr> <tr> <td>20-30 mph</td> <td>Operations Manager</td> <td>35 + Spark Enclosure</td> </tr> <tr> <td>30 + mph</td> <td>Appropriate VP</td> <td>35 + Spark Enclosure</td> </tr> </tbody> </table>	Sustained Wind Speed	Approval Level	Perimeter (see step 3.3.7)	0-20 mph	Superintendent	35 feet (11 Meters)	20-30 mph	Operations Manager	35 + Spark Enclosure	30 + mph	Appropriate VP	35 + Spark Enclosure
Sustained Wind Speed	Approval Level	Perimeter (see step 3.3.7)												
0-20 mph	Superintendent	35 feet (11 Meters)												
20-30 mph	Operations Manager	35 + Spark Enclosure												
30 + mph	Appropriate VP	35 + Spark Enclosure												
3.3.7	Employee/Contract Company Representative	<p>Establish perimeter clear of vegetation and other combustibles using the distances established in step 3.3.6.</p> <p>Note: If unable to clear the perimeter of vegetation for the appropriate distance, the vegetation should be soaked with water.</p>												



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3.4	Permit Issuance	
Permit writing is the process where risk related to hot work activities are identified, and evaluated. In addition, the permitting process allows for the identification and verification of engineering controls, administrative controls, and PPE controls that are needed to perform the task in a safe manner.		
Step	Person In Charge (PIC)	Action
3.4.1	Line Supervisor	Assign duties of writing Hot Work Permits to individuals who have completed the hot work training and validation in section 5.0 of this protocol.
Work Site Review		
3.4.2	Permit Issuer	Provide on the permit a clear description or sketch of the equipment, work area, and work to be performed. Note: These documents may be attached to the permit.
3.4.3	Permit Issuer, Permit Receiver & Fire Watch	Conduct a pre-work inspection of the work site for potential fire and other hazards. <ul style="list-style-type: none"> All combustible and/or flammable materials that can be moved must be moved out of the hot work area. Eliminate or mitigate other identified potential hazards to reduce risk. Verify that sprinkler system inside buildings is not impaired when welding inside buildings with sprinkler system.
3.4.4	Permit Issuer	Check all hazardous energy sources for isolation before hot work begins. When issuing a Hot Work Permit inside a confined space, such as a tower, vessel, tank, manhole, furnace firebox, etc., isolation can be achieved through one of the following methods: <ul style="list-style-type: none"> Blinding Physical disconnecting lines to vessel Double block and bleed.
3.4.5	Permit Issuer	Notify other personnel in the area that hot work operations are to be conducted.
3.4.6	Permit Issuer	Verify all equipment used in hot work operations is in proper working condition and grounded prior to beginning hot work.
3.4.7	Permit Issuer	Verify all drains and sumps that could contain hydrocarbons have been isolated as per the Lockout/Tagout Protocol.
Atmospheric Testing		
Atmospheric testing is required to verify that a flammable atmosphere does not exist in the area where the hot work activity will be conducted. The manufacturer's instructions should be reviewed and followed during testing. Atmospheric testing is not required when the only hazard is combustible materials.		
3.4.8	Permit Issuer	Verify the meter has been calibrated within the manufacturer's recommended calibration frequency. Record the monitor serial number and manufacture on the Hot Work Permit.
3.4.9	Permit Issuer	Perform and record the following atmospheric tests in the following order: <ul style="list-style-type: none"> oxygen content,



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		<ul style="list-style-type: none"> flammable vapor concentrations (LEL), and any potentially toxic material concentrations in the hot work area (e.g., H₂S, CO). <p>Note: Atmospheric testing is not required when the only potential hazard is combustible materials.</p>								
3.4.10	Permit Issuer	Check the surrounding area and equipment, tanks, piping, containers, low points, sumps, drains, and areas between equipment.								
3.4.11	Permit Issuer	<p>Stop the hot work permitting process and determine cause if the test results do not meet the criteria listed below:</p> <table border="1"> <tr> <td>Oxygen</td> <td> 19.5 to 23.5% atmospheric concentrations for employee work areas. Note: When inerting piping or process equipment, concentration must be below 14% inside the piping or equipment, however atmospheric concentrations outside in employee work areas must remain between 19.5 to 23.5%. </td> </tr> <tr> <td>LEL</td> <td> 10% or less. Note: Any reading between 1 and 10% LEL must be fully investigated to identify and understand the source and determine if a Hot Work Permit should be issued. </td> </tr> <tr> <td>H₂S</td> <td>10 ppm or less.</td> </tr> <tr> <td>Toxic Level</td> <td> Above the Permissible Exposure Limit (PEL) or Occupational Exposure Limit (OEL) Note: For PEL, see MSDS. </td> </tr> </table>	Oxygen	19.5 to 23.5% atmospheric concentrations for employee work areas. Note: When inerting piping or process equipment, concentration must be below 14% inside the piping or equipment, however atmospheric concentrations outside in employee work areas must remain between 19.5 to 23.5%.	LEL	10% or less. Note: Any reading between 1 and 10% LEL must be fully investigated to identify and understand the source and determine if a Hot Work Permit should be issued.	H ₂ S	10 ppm or less.	Toxic Level	Above the Permissible Exposure Limit (PEL) or Occupational Exposure Limit (OEL) Note: For PEL, see MSDS.
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LEL	10% or less. Note: Any reading between 1 and 10% LEL must be fully investigated to identify and understand the source and determine if a Hot Work Permit should be issued.									
H ₂ S	10 ppm or less.									
Toxic Level	Above the Permissible Exposure Limit (PEL) or Occupational Exposure Limit (OEL) Note: For PEL, see MSDS.									
3.4.12	Permit Issuer	Designate a trained individual to continuously monitor the atmosphere during the hot work operation and record monitoring results after each break on the Hot Work Permit.								
3.4.13	Permit Issuer/Line Supervisor	Stop the work on location and cancel the permit if the LEL increases to 10%, the Oxygen level moves outside the required range, or a toxic level exceeds the exposure limit during the hot work operations, the follow steps must be taken.								
3.4.14	Permit Issuer	Investigate and determine the source of the high reading. Isolate the source of the increased concentration.								
3.4.15	Permit Issuer	Start the hot work permit process at the beginning to issue a new Hot Work Permit.								
NORM Testing										
3.4.16	Permit Issuer	When working in an area where NORM has been detected or suspected, sample for NORM and implement controls following the EHS NORM Implementation Plan.								
Fire Watch										



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3.4.17	Permit Issuer	Assign a fire watch who will monitor for accidental fires during welding, cutting, grinding, and/or open flame activities. Note: Assigned fire watch(s) will have no other responsibilities.								
3.4.18	Fire Watch	Stop hot work activities if any of the following occur: <ul style="list-style-type: none"> Sparks, flame, or heat is projected outside the permitted area, or any other hazard/unsafe condition develops or is detected that endangers personnel or equipment. Note: Only attempt to extinguish incipient stage fires.								
3.4.19	Permit Issuer	Post a fire watch for at least 30 minutes after the actual hot work has ceased or completed to ensure that hot slag does not cause hot spots or fires.								
Fire Control										
3.4.20	Permit Issuer	Select and specify on the permit the number, size, and type of fire extinguisher(s) required to properly protect workers performing hot work. <table border="1" data-bbox="613 947 1495 1167"> <thead> <tr> <th>Class</th> <th>Service</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>ordinary combustible materials, such as wood, cloth, paper, rubber, and many plastics</td> </tr> <tr> <td>B</td> <td>flammable liquids, combustible liquids, petroleum greases, tars, oils, oil-based paints, solvents, lacquers, alcohols, and flammable gases</td> </tr> <tr> <td>C</td> <td>fires that involve energized electrical equipment</td> </tr> </tbody> </table> Note: The quantity of fire extinguishers will be based on the size and complexity of the hot work operation. For example, having multiple hot work activities on multiple levels may require more than one fire extinguisher.	Class	Service	A	ordinary combustible materials, such as wood, cloth, paper, rubber, and many plastics	B	flammable liquids, combustible liquids, petroleum greases, tars, oils, oil-based paints, solvents, lacquers, alcohols, and flammable gases	C	fires that involve energized electrical equipment
Class	Service									
A	ordinary combustible materials, such as wood, cloth, paper, rubber, and many plastics									
B	flammable liquids, combustible liquids, petroleum greases, tars, oils, oil-based paints, solvents, lacquers, alcohols, and flammable gases									
C	fires that involve energized electrical equipment									
3.4.21	Fire Watch	Maintain fire extinguishing equipment in a ready and available status during the hot work activities.								
Emergency Preparedness										
3.4.22	Permit Issuer	Establish an emergency communication plan and assembly points during the pre-task tailgate.								
Training Verification										
3.4.23	Permit Issuer	Verify that employee and contractors who are assigned hot work duties have the training, knowledge and skills to safely perform their assigned duties. Examples of job task training are listed below. <ul style="list-style-type: none"> Fire Watch <ul style="list-style-type: none"> able to communicate effectively with the workforce trained in the use of fire extinguishing equipment familiar with the facilities and the procedures for sounding an alarm in the event of a fire. Worker 								



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		<ul style="list-style-type: none"> understand the Hot Work Protocol knowledgeable on the type of hot work being performed familiar with the facilities and procedures for sounding an alarm in the event of a fire.
Permit Duration		
3.4.24	Permit Issuer	Write Hot Work Permits with a maximum duration of 12 hours (on the date of issue) or one complete work shift.
3.4.25	Permit Issuer	Ensure that permits are not extended to span crew changes for either the person performing the hot work or for the supervisor.
Posting Hot Work Permit		
3.4.26	Permit Issuer	Post the Hot Work Permit in the immediate vicinity of the actual work site while hot work operations are in progress. Note: A Hot Work Permit is valid only for specific type of work and location described on the permit.
Cancellation of the Hot Work Permit		
3.4.27	Employees	Stop all hot work activities when one of the following occur: <ul style="list-style-type: none"> an actuation of an ESD system the sounding of a fire or gas alarm, or the detection of any other non-permit, unsafe condition at the worksite.
3.5	Special Considerations	
Step	Person In Charge (PIC)	Action
Atmospheric Storage Tanks and Pressure Vessels		
3.5.1	Permit Issuer	Review requirements for Hot Work on Atmospheric Storage Tanks and Pressure Vessels (Appendix A) when hot work will be performed on these types of equipment.
Hot Tapping		
3.5.2	Employee/Contract Company Representative	Avoid hot tap operations if possible.
3.5.3	Employee/Contract Company Representative	Follow the Natural Gas O&M Manual Hot Tapping Procedure (192.627) or equivalent when performing hot tapping activities.
Hot Work Involving the Use of Test Plugs or Plumber Plugs		
3.5.4	Permit Issuer / Line Supervisor	Consult the Pipe Plugging Practices (Appendix B) for additional information on hot work involving pipe plugs.
Confined Space Hot Work Requirements		
3.5.5	Employee/Contract Company Representative	Set gas cylinders and welding machines outside the confined spaces when welding or cutting is being performed in any confined spaces. Before operations are started, heavy portable equipment mounted on wheels shall be securely blocked to prevent accidental movement



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3.5.6	Employee/Contract Company Representative	Shut off the fuel gas and oxygen supply to the torch outside the confined space whenever the torch is not to be used for over a 1 hour time period. Where practicable the torch and hose shall also be removed from the confined space.
3.5.7	Employee/Contract Company Representative	Remove electrodes from holders and locate holders so that accidental contact cannot occur when arc welding is suspended for a time period over 1 hour.
3.5.8	Permit Issuer	Provide general mechanical ventilation when welding or cutting is done in a confined space that is less than 10,000 cubic feet per welder, or in a confined space having a ceiling height of less than 16 feet. The minimum rate will be 2,000 cubic feet per minute per welder. Note: 10,000 ft ³ is equal to 1,781 Bbl.

4.0 RECORDKEEPING

Step	Person In Charge (PIC)	Action								
4.1	Employee/Contract Company Representative	Forward all Hot Work Permits and training records to Line Supervisor for filing.								
4.2	Line Supervision	File the records from Section 4.1 as noted below:								
		<table border="1"> <thead> <tr> <th>Record</th> <th>File Location & Number</th> <th>Retention Period</th> <th>Records Management Enterprise Classification Structure Code</th> </tr> </thead> <tbody> <tr> <td>Hot Work Permits</td> <td>See Field Office File Directory</td> <td>CY + 3 years (CY = Current Year)</td> <td>EH45</td> </tr> </tbody> </table> <p>Note: The Records Management Enterprise Classification Structure Code is listed as a reference, which should be used when records are sent to stored records.</p>	Record	File Location & Number	Retention Period	Records Management Enterprise Classification Structure Code	Hot Work Permits	See Field Office File Directory	CY + 3 years (CY = Current Year)	EH45
Record	File Location & Number	Retention Period	Records Management Enterprise Classification Structure Code							
Hot Work Permits	See Field Office File Directory	CY + 3 years (CY = Current Year)	EH45							

5.0 TRAINING REQUIREMENTS

Step	Person In Charge (PIC)	Action
5.1	Line Supervisor	Verify that all Devon affected employees involved in hot work operations have completed the Hot Work Awareness Training before assigning them hot work duties.
5.2	Line Supervisor	Verify that the Permit Issuers have completed training on the Hot Work Protocol and have successfully passed the Hot Work Permit Issuer Training. This training is restricted to only Devon Energy employees and contractors who are acting as the Contractor Company Representative.
5.3	Line Supervisor	Ensure contractors performing hot work duties have the necessary experience and required regulatory training for the task and are trained on their procedure or provided awareness level training on the Devon protocol. Contractors who are issuing hot work permits under their protocol/permit, must provide proof of training, and include the Devon Energy specific requirements into their permitting process.



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6.0

REFERENCES

American National Standards Institute (ANSI), Standard Z87.1

American Petroleum Institute (API)

- RP 12R1, Setting, Maintenance, Inspection, operation and Repair of Tanks in Production Service
- RP 500, Classification of Locations for Electrical Installations at Petroleum Facilities
- RP 2201, Practices for Welding or for Safe Hot Tapping on Equipment in Petroleum & Petrochemical Industries
- RP 2209, Pipe Plugging Practices
- RP 2009, Safe Welding, Cutting and Hot Work Practices in the Petroleum Industry
- Specification 12D, Field Welded Tanks for Storage of Production Liquids
- Specification 12F, Shop Welded Tanks for Storage of Production Liquids
- Code 510, Pressure Vessel Inspection Code
- Code 570, Piping Inspection Code
- Standard 650, Welded Steel Tanks for Oil Storage
- Standard 653, Tank Inspection, Repair, Alteration and Reconstruction
- Standard 1104, Welding of Pipelines and Related Facilities

American Society of Mechanical Engineers (ASME), Boiler and Pressure Vessel Code, Section IX, Welding and Brazing

NFPA 70, National Electrical Code, Article 500 Hazardous (Classified) Locations, Class I, II, and III, and Division 1 and 2

OSHA 29 CFR 1926 Subpart J, Welding and Cutting

OSHA 29 CFR 1910 Subpart Q, Welding, Cutting, and Brazing



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Appendix A – Hot Work on Atmospheric Storage Tanks and Pressure Vessels

Atmospheric storage tanks and pressure vessels in the oil and gas industry present a significant explosion hazard if ignition sources are introduced. When repairs involving hot work are to be done, there are safety considerations that must be evaluated before beginning any work.

Commercial Drums and Chemical Barrels

Commercial drums and chemical barrels are usually made of light-gauge material and are not designed to withstand pressure. Pressure shall not be applied to any flathead drum. Welding or oxyacetylene cutting on a closed drum (with or without bung closure) shall be prohibited.

Pre-Work Evaluation

The metal condition, characteristics, and wall thickness of atmospheric storage tanks and pressure vessels must be determined before any hot work begins inside or outside the tanks/vessels. The suitability and compatibility of the metals to be joined must be considered before any repair is attempted.

Preferred Hot Work Methods

There are several methods available to safely accomplish hot work on atmospheric storage tanks and pressure vessels. Some of the methods are listed below in order of preference:

1. All connections must be isolated, disconnected, blinded, double blocked and bled, and energy sources locked/tagged out. The tank or vessel and associated piping then shall be depressurized, drained, thoroughly cleaned, and rendered vapor-free.
2. For external hot work, the tank or vessel must be drained and cleaned and the vapor space continuously purged with steam or other inert gas.
CAUTION: COOLING OF SEALED TANKS MAY CREATE A VACUUM AND DAMAGE THE TANKS.
3. Additional vapor freeing or inerting of the vapor space shall be done if hot work on the tanks is to be done on the deck or on the top.
4. Welding on tanks that contain flammable/combustible liquids or produced water shall only be done at least 3 ft. (0.9 m) below the liquid level. The liquid level must be monitored to ensure that welding remains at least 3 ft. (0.9 m) below the liquid level line.
5. Thickness measurements in the welding area shall be taken to limit the possibility of burn-through.
6. Welding or other hot work on "live" tanks is considered similar to hot tapping, and all the same approvals shall be obtained in advance.
7. Welding or hot work on the top of, or in the vapor space of, tanks or vessels containing hydrocarbons shall be prohibited.

Prohibited Hot Work

Hot work or hot tapping on pressure vessels while under pressure shall be prohibited in the following circumstances:

- Areas where metal is laminated
- Where high-tensile-strength alloy steels or if steel requires stress-relieving or post weld heat treatment
- When in hydrogen service



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Appendix A – Hot Work on Atmospheric Storage Tanks and Pressure Vessels, continued

- Where flammable/air mixtures are present
- When the chemicals in the vessel decompose with heat (e.g., acids or chlorides)
- In caustic or amine service with specifications for stress relieving
- When unsaturated hydrocarbons (e.g., ethylene) are in the vessel
- On compressed air receivers or vessels in oxygen service

Storage Tank Repair

The following specification atmospheric storage tanks shall be repaired in accordance with API RP 12 R1, "Setting, Maintenance, Inspection, Operation and Repair of Tanks in Production Service":

- API-12B, "Specification for Bolted Tanks for Storage of Production Liquids"
- API-12D, "Specification for Field Welded Tanks for Storage of Production Liquids"
- API-12F, "Specification for Shop-Welded Tanks for Storage of Production Liquids"

Tanks fabricated to API Standard 650 or its predecessor (API standard 12C) shall be maintained in accordance with API Standard 653, "Tank Inspection, Repair, Alteration and Reconstruction."



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Appendix B - Pipe Plugging Practices

1.0	Pipe Plugging Practices Considerable preparations and special precautions (<i>Pre-Job Safety Review</i> and a <i>Hazard Assessment</i>) are required when test/plumbers plugs are used. Reference: Consult the American Petroleum Institute Publication 2209 entitled "Pipe Plugging Practices." Follow the steps in the table below to assure minimum risk in the use of test/plumbers plugs.	
1.1	Line Supervisor	Verify with the PIC the line to be worked on.
1.2	Line Supervisor	Isolate the block valves as per the Lockout/Tagout Protocol to isolate the section of line to be worked on.
1.3	Line Supervisor	Purge lines of flammable materials using standard industry purging methods.
1.4	Line Supervisor	Install blinds or double block and bleed method to isolate the line and prevent pressure build up.
1.5	Line Supervisor	Cold cut the line.
1.6	Line Supervisor	Clean the inside of the line, of any hydrocarbon residual, along with scale and sludge.
1.7	Line Supervisor	Install the proper plugs. Note: Install the plug far enough back in the line to eliminate damage to the neoprene seal by the welding heat.
1.8	Line Supervisor	Attach vent hoses to plugs to assure that pressure will not build up behind the plug. Ensure that the vent hose is not crimped, is of sufficient length to safely discharge all releases downwind of the welding, and is positioned so that the end is visible to individuals at the welding scene.
1.9	Line Supervisor	Secure crows feet connection with safety clips to prevent accidental separation and leads at the connection.
1.10	Line Supervisor	Pick up spills around the welding area and remove using vacuum truck.
1.11	Line Supervisor	Remove contaminated soil from the welding location and dispose of it properly.
1.12	Line Supervisor	Sufficient firefighting equipment shall be readily available if a fire occurs.
1.13	Line Supervisor	Test the plugs with a combustible gas detector around the circumference of the plug and at each threaded connection to detect possible hydrocarbon leakage.
1.14	Line Supervisor	Halt welding operations upon an indication of liquid discharge or pressure build up.



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Attachment A - Approval, Review, and Modification History

Revision Number	Approved/Revised/Reviewed By	Approval/Revision/Review Date	Description (Initial Approval, Revision or Review along with further details of revision if needed)
00	Richard Luedecke	2/6/12	Initial Approval
01	Richard Luedecke	6/05/12	Revision - Modified the definition of combustible material to specify ground cover like dry grass and brush instead of grass; included vehicles that transport produced water with vehicles that transport hydrocarbons; changed "on-line production equipment" to "above ground production equipment"; added an exemption for vehicles traveling on established roads within 10 foot of above ground hydrocarbon equipment; clarified that opening energized equipment was hot work when in an electrically classified area, added a section on Green Facility Construction; clarified the Burn Ban condition approval; removed the requirement to have a pumped monitor and the requirement to perform atmospheric monitoring if the only hazard is a combustible material; clarified steps 3.4.12-3.4.14; removed the requirement to have an 20 lb. ABC extinguisher, and changed it to require the appropriate extinguisher; added permit start time/permit valid time to permit; added specific requirement for lighting fired production equipment, instead of only performing LEL monitoring.
02	Richard Luedecke	07/30/14	Revision - Specify that daily approval is required to perform hot work during a burn ban (3.3.6)
03	Richard Luedecke	12/06/16	Modified step 3.2.3 to allow for the removal of step 3.2.4. Added a "date" field for the Hot Work Permit. Added language that clarified who can receive the Devon Energy Permit Issuer training course. In conjunction with the permit issuer training, added details for what the performance level general contractors must have when issuing a hot work permit using the contractors program.

Hot Work Permit

DIVISION:	FIELD OFFICE:	DATE:
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DESCRIPTION OF HOT WORK AND HOT WORK LOCATION

HOT WORK REQUIREMENTS (CHECK BOXES THAT APPLY)

WORK SITE REVIEW	COMMUNICATION	EMERGENCY PREPAREDNESS
<input type="checkbox"/> Combustible Material Removed / Isolated <input type="checkbox"/> Lockout/Tagout Implemented <input type="checkbox"/> Lines Isolated <input type="checkbox"/> Lines Blinded <input type="checkbox"/> All Liquids Drained <input type="checkbox"/> Drains covered <input type="checkbox"/> Drains Sealed / Drip-pans Empty <input type="checkbox"/> Adjacent Areas Protected from Sparks <input type="checkbox"/> Confined Space Entry (See 3.5.5 in Hot Work Protocol) <input type="checkbox"/> Equipment Grounded <input type="checkbox"/> NORM Check	<input type="checkbox"/> Job Planning Complete <input type="checkbox"/> Pre-work Inspection Complete <input type="checkbox"/> All Personnel Trained <input type="checkbox"/> Tailgate Safety Meeting <input type="checkbox"/> Protocols and Work Procedures Reviewed <input type="checkbox"/> MSDS Reviewed	<input type="checkbox"/> Emergency Plans Reviewed <input type="checkbox"/> Assembly Points Established <input type="checkbox"/> Spill Control Measures <input type="checkbox"/> ESD(s) Located Fire Phone #: _____ Medical Phone #: _____ GPS Coordinates: and/or Physical Address:
PPE EQUIPMENT	ADDITIONAL SAFETY CONTROLS	BURN BAN REQUIREMENTS
<input type="checkbox"/> Additional Protective Clothing <input type="checkbox"/> Face Shield <input type="checkbox"/> Fire Retardant Clothing <input type="checkbox"/> Gloves <input type="checkbox"/> Hearing Protection <input type="checkbox"/> Personal Monitor (4 Gas/Single) <input type="checkbox"/> Respirator <input type="checkbox"/> Safety Glasses / Goggles	<input type="checkbox"/> Explosion Proof Equipment <input type="checkbox"/> Fall Protection <input type="checkbox"/> Fire Blanket <input type="checkbox"/> Fire Extinguisher (Ready & Available) Size_____ Type_____ No._____ <input type="checkbox"/> Scaffolding <input type="checkbox"/> Wash Facilities <input type="checkbox"/> Water/Liquids Available (Heat Stress) <input type="checkbox"/> Other: _____	<input type="checkbox"/> Initial Authorization by: _____ <input type="checkbox"/> Wind Direction _____ <input type="checkbox"/> Wind Speed _____ mph <input type="checkbox"/> Perimeter _____ ft. <input type="checkbox"/> Water Available for Soaking if Perimeter Cannot be Established See Section 3.3.6 - 3.3.7 of the Hot Work Protocol for additional requirements during burn ban.

ATMOSPHERIC TESTING (Record Initial Monitoring, and monitoring after breaks.)

Manufacture:					Serial Number:			
Monitoring Results	Limits	____:____ am/pm	____:____ am/pm	____:____ am/pm	____:____ am/pm	____:____ am/pm	____:____ am/pm	____:____ am/pm
Oxygen	19.5-23.5%							
LEL	<10 %							
H ₂ S	<10 ppm							
Toxic	< PEL/OEL							

Signature of Person Performing Atmospheric Tests:	Date & Time:
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APPROVAL SIGNATURES	DURATION/CANCELLATION				
AUTHORIZED PERMIT ISSUER SIGNATURE <hr/> FIRE WATCH SIGNATURE (S) <hr/> FIRE WATCH SIGNATURE (S) <hr/> PERMIT RECIEVER SIGNATURE (S) <hr/> PERMIT RECIEVER SIGNATURE (S) <hr/> AUTHORIZED PERMIT ISSUER SIGNATURE & TIME OF COMPLETION:	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Permit Start Time:</td> <td style="width: 50%;"></td> </tr> <tr> <td>Permit Valid Until:</td> <td></td> </tr> </table> <p>This permit is valid for twelve (12) hours, end of current shift, end of job, or whichever event occurs first. Any unscheduled work stoppage and/or emergency condition nullifies this permit. The Fire Watch will terminate 30 minutes after Hot Work is complete.</p> <input type="checkbox"/> Work is complete. <input type="checkbox"/> Work site is clean and been made safe.	Permit Start Time:		Permit Valid Until:	
Permit Start Time:					
Permit Valid Until:					
	FIRE WATCH SIGNATURE & TIME OF COMPLETION:				