Line and Equipment Opening / Oil Draining Procedure

<table>
<thead>
<tr>
<th>Objective</th>
<th>This procedure is established to describe the Safe Work Practice for safely opening lines and equipment for maintenance and turnaround.</th>
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<tbody>
<tr>
<td>Purpose</td>
<td>The purpose of this Safe Work Practice is to provide the procedures for safely opening lines and equipment in the ammonia refrigeration system. The steps in this procedure are to be followed when opening an ammonia line or connected equipment to inspect, remove, repair, clean, or reinstall the line or connected equipment. Examples of operations which could be considered line opening are: Removing a strainer basket Working on a transfer pump seal Removing a valve from a transfer line for repair Draining oil from an oil trap reservoir</td>
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<td>Concerns</td>
<td>Whenever ammonia refrigeration lines and equipment are taken out of service, care must be taken to prevent accidental leakage of ammonia. To minimize potential leakage from lines and equipment that contain ammonia, they should be pumped out before being opened. It should be assumed that the line or equipment could contain liquid ammonia unless absolutely proven otherwise. Among the incidents we are trying to prevent are: Injury to operator(s) during the line and equipment opening procedure Potential fire and explosion due to attaining a flammable atmosphere and providing an ignition source</td>
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<tr>
<td>Department</td>
<td>Engineering</td>
</tr>
<tr>
<td>Operator/ Responsibility</td>
<td>Plant Engineer - Mike Cannon Plant Manager - Steve Waters</td>
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<tr>
<td>Equipment / Location</td>
<td>One controlled pressure receivers located at southwest corner of facility behind evaporative condensers. Five screw compressors, in the engine room on the west end of the facility. One low temp recirculator in the engine room. One high temperature recirculator in the engine room. Ten Vogt tube ice machines in the icemaker room. Four evaporative condensers outside the southwest side of the engine room. Two evaporators in the storage freezer. Four evaporators in the blast freezer. Three evaporators in the rake room equipment.</td>
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<tr>
<td>Initial SOP development date</td>
<td>October 2002</td>
</tr>
<tr>
<td>Authorized by</td>
<td></td>
</tr>
<tr>
<td>Revision</td>
<td>No. 0</td>
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<td>Annual Review by</td>
<td></td>
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## Standard Operating Procedure (SOP)

### Task Flow

1. **Preparation**
   - Assemble equipment
   - Line and equipment opening procedures
   - Oil trap draining procedures

### Task

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<thead>
<tr>
<th>Task</th>
<th>Step</th>
<th>Comment</th>
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<tbody>
<tr>
<td><strong>Preparation</strong></td>
<td>1.</td>
<td>Be familiar with the emergency response procedures for the facility.</td>
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<td>2.</td>
<td>Know the location of the nearest eye wash/safety shower.</td>
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<td></td>
<td>3.</td>
<td>Know the location of the valves, which would be closed to isolate the line/equipment in an emergency.</td>
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<td>4.</td>
<td>Be familiar with ammonia first aid procedures.</td>
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<td>5.</td>
<td>Be familiar with the lockout / tag out procedures.</td>
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<tr>
<td><strong>Assemble equipment</strong></td>
<td>6.</td>
<td>Before going to the line and equipment opening procedures, assemble the following equipment:</td>
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<td></td>
<td></td>
<td>Elbow length rubber gloves</td>
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<td></td>
<td></td>
<td>Splash goggles and face shield</td>
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<td></td>
<td></td>
<td>Clean bucket containing water</td>
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<td></td>
<td></td>
<td>Valve wheel wrench for closing and opening valves</td>
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<td></td>
<td></td>
<td>Closed valve markers and locks</td>
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<tr>
<td></td>
<td></td>
<td>Emergency service bucket containing a full face type gas mask, eye wash bottle, pipe wrench</td>
</tr>
<tr>
<td><strong>Line and equipment opening procedures</strong></td>
<td>1.</td>
<td>Notify personnel and supervisors in the area that line and equipment opening procedures are to be carried out.</td>
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<td></td>
<td>2.</td>
<td>Ensure that a backup person (buddy-system) is available for the remainder of these procedures.</td>
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<tr>
<td></td>
<td>3.</td>
<td>Close and tag the isolation valve(s) in the liquid supply line and in the hot gas line for the lines/equipment to be taken out of service.</td>
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<td></td>
<td>4.</td>
<td>If the lines/equipment to be isolated are located on the discharge side of a pump or compressor, lockout and tag the pump or compressor motor disconnect.</td>
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### STANDARD OPERATING PROCEDURES – LINE AND EQUIPMENT OPENING/OIL DRAINING PROCEDURE

5. When possible use system suction to evacuate the line/equipment. If the line/equipment is not connected to a suction line, then using a hose properly approved, verified to be with in date and is for ammonia service work to the low suction side of the system, and evacuates the residual liquid ammonia.

6. After most of the frost has disappeared and the gauge reads zero psig, the liquid should be gone from the line/equipment. Close the valve and then remove hose, then reopen the hand valve to the atmosphere to verify there is no vapor present. Leave the valve port open and install tag showing valve is open so no pressure can rebuild in line/equipment.

7. When you have proven there is no residual vapor present in the line/equipment by open the valve port to the atmosphere, the work or procedure may begin.

8. After maintenance or procedure is complete, slowly and carefully, allow gas only from the suction side or hot gas line to flow into the line/equipment so any leaks can be detected prior to introducing any liquid ammonia back into the line/equipment. Remove all safety tags place all valves back into the open position and follow any associated SOP startup procedure that may be involved.

### Oil trap draining procedures

1. As the ammonia is compressed and the gas flows out to the system there will be a certain amount of compressor lubrication oil transferred into the refrigeration system piping. The oil draining procedure is necessary to maintain system efficiency and integrity. By system design there are oil collection points at which oil can be retrieved. This procedure provides a guideline to ensure that draining oil from pot is done safely, with minimal ammonia release to the atmosphere. This is a common occurrence in a mechanical refrigeration system and this procedure, while done on a periodic basis, still needs to be handled with great caution, as the system will be under pressure. **As always, treat ammonia with respect.**

2. There are numerous locations where oil pots will need to be drained on a regular basis. Most of these locations will be found on the “low pressure” side of our system. This means that there should only be approximately 30 pounds of ammonia pressure pushing the oil out of the system. Pay close attention to the frost or the lack of frost on the oil collection pot. When there is no frost present, this indicates the pot is full of oil and requires draining. Note that when the pot is empty the pot will be completely covered with frost and does not require draining. Verify that your system oil drain pots have safety relief valve protection installed. **Never isolate oil pots that are not equipped with a safety relief valve.**
### STANDARD OPERATING PROCEDURES – LINE AND EQUIPMENT OPENING/OIL DRAINING PROCEDURE

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<td><strong>3.</strong> At each location where oil is to be drained, there will be a small diameter pipe (typically ( \frac{1}{2} )”) that is pointed downward with a hand valve immediately before it. The pipe is pointed downward so that oil may be collected by means of a bucket.</td>
<td>A safety spring type closing drain valve is, by far, much safer than a hand valve that must be turned to open and or to close.</td>
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<td><strong>4.</strong> If there is a cap or plug after the hand isolation valve, remove the safety plug or cap slowly from the end of the small diameter drainpipe. Residual ammonia could be present if the isolation valve were to leak, (This plug is in place to prevent an accidental release of ammonia)</td>
<td>For steps 4 through 10, always be in a position on the updraft side of the oil drain bucket and wear gloves, and a full-face respirator.</td>
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<td><strong>5.</strong> Position a bucket under the drainpipe to catch the oil you are about to drain. This bucket should be able to sit firmly on the floor or ground, as the majority of our drain points are located at floor level.</td>
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<td><strong>6.</strong> If the spring type self-closing valve is not installed or is damaged one should be acquired and installed immediately. In most cases you will get a lot of foam, continuously allow foam to settle.</td>
<td>DO NOT, FOR ANY REASON, TAMPER WITH VALVE SAFETY CLOSING SPRING FEATURE OR FORCE VALVE INTO THE OPEN POSITION WHILE DRAINING OIL!</td>
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<td><strong>7.</strong> Allow the oil to continue draining slowly. As the oil drains and the pot empties you will notice there will be some short bursts of “foamy” oil that appears to have some gas or liquid mixed with it. This indicates that the majority of the oil has been drained and the valve can be closed.</td>
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<td><strong>8.</strong> Close the valve and re-insert the safety plug.</td>
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<td><strong>9.</strong> Carry the bucket of oil to the used oil container, located under the condensers, in the parking lot at the southwest corner of the building.</td>
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<td><strong>10.</strong> Carefully pour the oil into the used oil container.</td>
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