UNIVERSITY OF MINNESOTA
University Health and Safety

CONFINED SPACE ENTRY PROGRAM

Effective: June 15, 2015

PURPOSE and SCOPE:
The purpose of this program is to establish safe confined space entry and work procedures for University of Minnesota employees whom are required to work in confined spaces. These procedures are intended to prevent harm to personnel while entering or working in a confined space exposed to potential hazards such as air contaminants, oxygen deficient or enriched atmospheres, engulfment hazards, or configurations which may impede employee escape or retrieval in the event of an emergency. Departments or units may maintain their own site-specific programs that are at least equivalent to this program.

Note: See the University of Minnesota’s Electrical Safety Program Standard on enclosed spaces for high voltage electrical vault entry procedures.

DEFINITIONS:

Attendant - an individual stationed outside one or more permit required confined spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's permit required confined space program.

Authorized Entrant - an employee who is authorized by the department to enter a permit required confined space. The authorized entrant must know the hazards they may encounter, be able to recognize signs and symptoms of exposure, and understand the consequences of exposure to the hazards.

Confined Space – A special configuration that can include any or all of the following properties:
- Has adequate size and configuration for employee entry; and
- Has limited or restricted means for entry or exit; and
- Is not designed for continuous employee occupancy.

Confined Space, Non-Permit Required – A confined space that:
- Does not contain a physical hazard capable of causing death or serious physical harm to entrants.
- Does not contain or have the potential to contain a hazardous atmosphere capable of causing death or serious physical harm to entrants.
Confined Space, Permit Required – A confined space that has one or more of the following characteristics:

- Contains or has the potential to contain a hazardous atmosphere.
- Contains a material that has the potential for engulfing an entrant.
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward or tapers to a smaller cross section.
- Contains any other recognized serious safety or health hazard.

Engulfment – The surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing.

Entry Supervisor – a person, designated by the department, who is responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, issuing confined space entry permits, and overseeing entry operations, and for terminating entry as required by this section.

Entry – Any part of the body entering through the plane of the confined space opening.

Hazardous Atmosphere – An atmosphere presenting a threat of death, acute injury, illness or disablement due to the presence of flammable, explosive, toxic, oxygen deficiency or enrichment, or otherwise injurious substances as follows:

- Flammable gas or vapor concentrations greater than 10 percent of its lower explosive limit (>10% LEL).
- Combustible particulate concentrations greater than 10 percent of the minimum explosive concentration of the particulate (>10% MEC).
- Atmospheric oxygen concentration either below 19.5 percent or above 23.5 percent.
- Toxic, corrosive or asphyxiate substance concentrations above Permissible Exposure Levels and/or Threshold Limit Values (> PEL and/or TLV).
- Any substance that is present at concentrations greater that the value established as Immediately Dangerous to Life and Health (> IDLH).

Oxygen Deficient or Enriched – An atmosphere containing less than 19.5% oxygen by volume or greater than 23% oxygen by volume.

Physical Hazards –
Confined space physical hazards include items such as heat exposures, electrical hazards, fall hazards, stored energy sources and excessive noise.
PROGRAM COMPONENTS:
- General Confined Space Requirements
- Training
- Atmospheric Testing
- Permit Required Confined Space Entry Procedures
- Non-Permit Required Confined Space Entry Procedures
- Confined Space Emergency Procedures
- Responsibilities
- Appendices

GENERAL CONFINED SPACE REQUIREMENTS
These provisions of the Confined Space Entry Program entail preventing unauthorized entries, identifying and evaluating hazards, establishing procedures for safe permit space entry, issuing and maintaining proper equipment, using outside attendants, establishing rescue and emergency procedures, identifying duties and job classifications of employees entering and/or working in confined spaces, establishing a system for issuing entry permits, developing post-entry procedures, and conducting post-illness/injury reviews.

The written plan and its elements will be updated in the following situations:
1. When there is reason to believe that provisions of the program may not protect employees.
2. When new processes and/or technologies are introduced.
3. When job duties mentioned in the program are changed.
4. When locations mentioned in the program are changed.
5. When requirements for written confined space entry programs have changed in accordance with applicable standards, codes and regulations.
6. When any other elements are changed.

ATMOSPHERIC TESTING:
All confined spaces must be atmospherically evaluated before entry is authorized.

Permit required confined spaces must be atmospherically monitored before entry and continuously throughout the authorized entry.

After the initial evaluation of non-permit required confined spaces and no hazards are found, continuous air monitoring is not required.

PERMIT REQUIRED CONFINED SPACE (PRCS) ENTRY PROCEDURES:
Safe entry into a permit required confined space can only be accomplished when work procedures account for all potential hazards. Based on the configuration of the confined space and the hazards which employees will be exposed, best work practices for safe confined space entry include the following:
A. Pre-entry Hazard Assessment –
Prior to entering a permit required confined space, the space must be thoroughly assessed by:

- Completing a Confined Space Evaluation Form (Appendix C), if not previously completed.
- Determining what, if any, hazards may be present including, but not limited to: entry/exit restrictions, chemical, mechanical, physical, entrapment, engulfment or hazards related to the task to be performed.
- Taking all necessary precautions that will minimize the risks based on the known or suspected hazards. This includes atmospheric testing of the confined space, lockout/tagout of energy sources, cleaning out of residual materials, purging lines, providing adequate means of entry/exit, etc.
- Conducting a hazard assessment of the work task(s) to be completed in the confined space to ensure all hazards that may be created by the work activities are accounted for and corrective actions taken. For example: If the work task includes welding or cutting, additional ventilation may be required to remove the smoke and fumes.
- Communicating the work plan with all the confined space entry team members.
- Evaluate whether or not the confined space entry can be completed safely within the scope of this program. If not, re-evaluate and contact your University Health and Safety representative for consultation.

B. Preparing for Confined Space Entry –
Take all necessary precautions that will minimize or eliminate the risks based on the known or suspected hazards:

- Place guards or barriers to protect employees and the public from fall hazards and to prevent unauthorized entry into the confined space.
- Provide an adequate means of entry/exit from the confined space.
- Close valves and isolate energy sources in accordance with lockout/tagout procedures. When applicable, purging the contents of the confined space.
- Ventilate the confined space. When using positive pressure ventilation, locate the ventilator intake in an area with a clean air source.
- Perform atmospheric testing. When practical, remote probes are to be used for initial atmospheric testing of the confined space from outside of the space. Atmospheric testing includes: oxygen level, flammable gases, toxic atmospheres and any additional testing for any suspected toxins.
- Review the Equipment Checklist (Appendix B) to make sure all needed equipment is available.
- Evaluate whether or not the confined space entry can be completed safely within the scope of this program. If a confined space entry cannot be completed safely within the scope of this program, contact your University Health and Safety representative for consultation.
C. Complete the Confined Space Entry Permit –

Before entering the permit required confined space, the Confined Space Entry Permit (Appendix A) must be completed. The entry permit verifies that pre-entry procedures have been completed and the confined space is safe to enter. The permit must be signed and dated by the trained confined space team entry supervisor on-site immediately prior to entry. The entry permit must be posted at the entrance(s) to the confined space or otherwise be immediately available on-site at all times while the confined space is being occupied.

- The duration of the entry permit cannot exceed the time required to complete the work assignment or a maximum of one work shift.
- The trained lead person must terminate an entry and cancel the entry permit when:
  1. An assignment is complete,
  2. The shift is completed,
  3. Or when a new hazard or condition exists. Note: The new hazard or condition must be noted on the cancelled permit and used when issuing a new permit.
- Copies of the completed entry permit should be placed in a job file and the original forwarded to your University Health and Safety representative.

D. Safe Confined Space Entry –

During entry and while working in a permit required confined space:

- Maintain an attendant outside the permit required confined space by the entrance to:
  1. Maintain communications with personnel in the confined space.
  2. Assist personnel in the confined space from the outside.
  3. Order an evacuation of the confined space when a hazardous situation develops.
  4. Summon emergency personnel when necessary. Note: At no time is the attendant to enter the confined space.
- When practical, continuously ventilate the confined space.
- Continue atmospheric testing of the confined space.
- When making a vertical confined space entry of greater than ten (10) feet, the following equipment must be utilized:
  1. Full body harness with attached lifeline.
  2. Hoist or other retrieval equipment.
- If a hazardous situation develops during the confined space entry, or if a serious potential risk for a hazardous confined space situation develops, or if the attendant instructs the entrants to exit the space, entrants must evacuate the confined space immediately.
NON-PERMIT REQUIRED CONFINED SPACE (Confined Space) ENTRY PROCEDURES:
A non-permit required confined space is a confined space that does not contain a hazardous atmosphere or have the potential to contain a hazardous atmosphere capable to cause death or serious harm to entrants.

Note: See Electrical Safety Program on enclosed spaces for high voltage electrical vault entry procedures.

CONFINED SPACE EMERGENCY PROCEDURES:
In case of emergency, the attendant must carry out the following responsibilities to ensure that no one, including oneself, is put at unnecessary risk while attempting a confined space rescue.

- **Always call for emergency assistance (911) before attempting to rescue the victim(s) in the confined space.** When contacting emergency assistance, explain the type of incident, location of the confined space and the hazards of the confined space.

- **Do not enter** the confined space until:
  1. Emergency Assistance has been called,
  2. Backup assistance is standing by to provide additional help, and
  3. The confined space atmosphere has been tested and cleared for safe entry.

- **Rescue/Retrieval** – Begin preparations/attempts to retrieve the victim(s) from **outside** the confined space after calling for emergency assistance.
  1. If a victim is wearing a full body harness with a lifeline attached, use a mechanical device to pull the victim from the confined space.

- **Prevent re-entry** – Isolate the confined space to prevent re-entry until the situation has been stabilized and rendered safe.

- Surrender all rescue activities to the rescue team (St. Paul/Minneapolis Fire Department) upon their arrival.

- Notify your immediate supervisor of the situation.

TRAINING:
All supervisors, entrants and attendant personnel assigned to enter confined spaces must be trained in safe confined space entry and emergency procedures prior to engaging in confined space entry operations. After the initial training has been completed, employees must be trained annually thereafter. Additional training may be required under any of the following conditions.

- Before a change in assigned duties,
- When there are changes in safe confined space entry or emergency procedures,
- When employee re-training is needed.
RESPONSIBILITIES:

Managers –
- Assure this Confined Space Entry Program is implemented by supervisors and employees assigned to enter confined spaces.
- Ensure the equipment necessary for safe confined space entry is readily available for employee use.

Supervisors –
- Assure the Confined Space Entry Program procedures are implemented by all entrants and attendants of confined spaces under their supervision.
- Ensure all employees assigned to a confined space entry have attended initial confined space entry training and annual refreshers thereafter.
- Identify and evaluate each confined space employees under their supervision are assigned to enter. Establish and maintain an inventory of all assigned confined spaces in their work area. Where practical, post confined spaces in their work area with identification labels.
- Plan each confined space entry by completing or reviewing the confined space evaluation form and identifying the hazards with the employees assigned to the confined space entry.
- Review each completed confined space entry permit for hazards identified. Submit expired permits to your University Health and Safety representative. If questions arise on the permit, consult with your University Health and Safety representative.

Entrants –
- Assist in the completion of the confined space entry permit prior to entry.
- Only enter assigned confined spaces.
- Know the hazards associated with confined space entry, particularly those associated with the confined space being entered.
- Know how to use all required equipment.
- Know the procedures for communicating with the attendant. Alert the attendant of hazardous or prohibited conditions.
- Know how to exit the space if necessary.
- Immediately report any unaccounted confined space hazards to your supervisor.
- Report any space required to be entered which may be a confined space, but not designated as a confined space to your supervisor.
- While in a permit required confined space, maintain communications with the attendant at all times. If directed to evacuate the confined space by the attendant, immediately evacuate the confined space.

Attendants –
- Keep unauthorized persons away from the space.
- Know the confined space hazards, including mode, symptoms and consequences of exposure.
• Use confined space air monitoring equipment to continuously survey the atmospheric conditions inside the confined space. Communicate any confined space hazardous atmospheric conditions observed immediately to entrants and order an evacuation of the confined space.
• Know the number and identify of authorized confined space entrants.
• Remain immediately outside the confined space while entrants remain in the confined space unless relieved by another attendant.
• Continuously maintain communications with confined space entrants, monitor their work status and order entrants to evacuate when a hazardous condition exists.
• Terminate the confined space entry and cancel the permit when entry operations are finished or if a prohibited condition arises.
• If necessary, perform non-entry confined space rescues. An attendant is NOT to enter a confined space under any conditions.
• Summon emergency responders when entrants need their services.

APPENDICES:
  A - Confined Space Entry Permit
  B - Equipment Checklist
  C - Confined Space Evaluation Form

Legal Reference: 29CFR 1910.146
**CONFINED SPACE ENTRY PERMIT**

**Appendix A**

<table>
<thead>
<tr>
<th>Date and Time Issued:</th>
<th>Date and Time Expires: (Upon completion of work or shift)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job Site/Space I.D.:</td>
<td>Work to be performed:</td>
</tr>
<tr>
<td>Equipment to be worked on:</td>
<td></td>
</tr>
</tbody>
</table>

### 1. Initial Atmospheric Check (with GX-2003, GX-2009 or similar models):

<table>
<thead>
<tr>
<th>Oxygen % Time</th>
<th>LEL % Time</th>
<th>H2S ppm Time</th>
<th>CO ppm Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>(&gt;19.5 and &lt;23.5)</td>
<td>(&lt;10 LEL)</td>
<td>(&lt;10)</td>
<td>(&lt;25)</td>
</tr>
</tbody>
</table>

### 2. Atmosphere Tester’s Name:

(Please Print)

### 3. Source Isolation/LOTO (Before Entry):

- Pumps or lines blinded, disconnected, or blocked:
  - N/A [ ] Yes [ ] No [ ]
- Hot works permit required:
  ![ ] [ ] [ ]

### 4. Ventilation of Space:

- Electric Blower (Mechanical Ventilation):
  - Yes [ ] No [ ]
- Anticipated Hazards (Atmospheric and Physical):
  - Direct reading gas monitor – tested (GX-86, GX-94 or GX-2003) [ ]
  - Safety harnesses and lifelines for all authorized entrants [ ]
  - Hoisting/Retrieval Equipment [ ]
  - Protective Clothing [ ]
  - All electric equipment listed Class I, Division I, Group D and Non-sparking tools (list examples of types): [ ]

### 5. Atmospheric Check After Isolation And Ventilation (with GX-2003, GX-2009 or similar models):

<table>
<thead>
<tr>
<th>Oxygen % Time</th>
<th>LEL % Time</th>
<th>H2S ppm Time</th>
<th>CO ppm Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>(&gt;19.5 and &lt;23.5)</td>
<td>(&lt;10 LEL)</td>
<td>(&lt;10)</td>
<td>(&lt;25)</td>
</tr>
</tbody>
</table>

### 6. Communication Equipment On Site and Tested:

Yes [ ] No [ ]

### 7. Rescue Procedure: **Call 911. Do not enter until atmosphere is tested to be safe and backup is standing by.**

### 8. AuthorizedEntrant, Attendant, & Entry Supervisor successfully completed required training through FM Safety

Yes [ ] No [ ]

### 9. Equipment:

- Direct reading gas monitor – tested (GX-86, GX-94 or GX-2003) [ ]
- Safety harnesses and lifelines for all authorized entrants [ ]
- Hoisting/Retrieval Equipment [ ]
- Protective Clothing [ ]
- All electric equipment listed Class I, Division I, Group D and Non-sparking tools (list examples of types): [ ]

### 10. Periodic Atmospheric Tests (with GX-2003, GX-2009 or similar models):

<table>
<thead>
<tr>
<th>Oxygen % Time</th>
<th>LEL % Time</th>
<th>H2S ppm Time</th>
<th>CO ppm Time</th>
</tr>
</thead>
</table>

We have reviewed the work authorized by this permit and the information contained here-in. Written instructions and safety procedures have been received and are understood. This permit is not valid unless all appropriate items are completed.

**Entry Supervisor Name (PRINT):**

**Entry Supervisor Approval - Before Entry (SIGNATURE):**

**Attendant(s):**

**Authorized Entrant Name(s):**

**Any comments or problems encountered during entry?** Yes [ ] No [ ]

If yes, please describe on back side of Permit.

This permit is to be kept at job site. Send original copy to University Health & Safety representative following job.
## Confined Space Entry Program

### Equipment Checklist

Appendix B

Check N/A for items that do not apply

<table>
<thead>
<tr>
<th>Entry Equipment</th>
<th>YES</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entry permit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calibrated direct reading multi-gas monitor to test oxygen, carbon monoxide, hydrogen sulfide, and Lower Explosive Limit (LEL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detector tubes with hand pump for suspected toxins</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH paper to test for corrosives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lockout/Tagout equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ventilation – electric blower with flexible ducts &amp; GFCI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guards/barriers to protect confined space opening</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ladder or other safe means of access and exit</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rescue, Retrieval, &amp; Fall Protection Equipment</th>
<th>YES</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hoist / tripod / davit / winch for retrieval &amp; fall protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full body harness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifeline, compatible with body harness &amp; hardware – for retrieval</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lanyard, compatible with body harness &amp; hardware – for fall protection in vertical confined space entry of greater than ten (10) feet.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cell phones / radios / access to phone line</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Aid /CPR Supplies</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Personal Protective Equipment</th>
<th>YES</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respirators, air purifying. (No confined space that requires the use of a SCBA or airline respirator is to be entered by Facilities Management employees.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protective clothing, gloves, hard hats, foot protection as needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eye &amp; face protection as needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hearing protection as needed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Work Equipment</th>
<th>YES</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>GFCI cord</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hot Work Permit and Equipment (May require additional ventilation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire Extinguisher</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lighting (Explosive Proof)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-sparking tools</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric equipment listed Class I, Division I, Group D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Localized exhaust ventilation for welding or chemical use</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Confined Space Evaluation Form
Appendix C

THE CONFINED SPACE MUST BE EVALUATED IN ITS TYPICAL CONDITION
(Prior to controlling any hazards)

<table>
<thead>
<tr>
<th>Date of Evaluation:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Space Location (Campus, Area/Building, Floor, Room):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Space Description:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Purpose of Entry:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Does the space have the following characteristics (#1 – #3)?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Is the space large enough and so configured that a person can enter and perform work?</td>
</tr>
<tr>
<td>2. Does the space have a limited or restricted means of entry or exit?</td>
</tr>
<tr>
<td>3. Is the space NOT designed for continuous human occupancy?</td>
</tr>
</tbody>
</table>

If ALL of questions 1-3 were answered “Yes”, the space IS a Confined Space.

Continue with questions 4-8 to determine if the Confined Space is a permit required or non-permit required space.

<table>
<thead>
<tr>
<th>4. Does the space contain, or have the potential to contain a hazardous atmosphere (including but not limited to: oxygen deficiency, explosive, carbon monoxide, hydrogen sulfide, chemical fumes/gases)? Specify hazards:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5. Does the space contain an engulfment hazard (i.e. sand, grain, water)? Specify hazards &amp; possible controls:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6. Does the space have inward converging walls that taper down to a smaller cross-section and could lead to entrapment or asphyxiation? Specify hazards &amp; possible controls:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7. Does the space contain any other recognized serious hazards (check those that apply):</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Mechanical hazards</td>
</tr>
<tr>
<td>□ Exposed or potential electrical hazards or electrical equipment</td>
</tr>
<tr>
<td>□ Gas or chemical lines</td>
</tr>
<tr>
<td>□ Fall hazards</td>
</tr>
<tr>
<td>□ Temperature extremes/heat stress</td>
</tr>
<tr>
<td>□ Liquid, sludge or residue</td>
</tr>
<tr>
<td>□ Other(s)</td>
</tr>
<tr>
<td>Specify hazards &amp; possible controls:</td>
</tr>
<tr>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8. Will hot works be conducted?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
</tbody>
</table>

This confined space is a:

☐ Permit Required Confined Space if:
  o Answered “Yes” to any question #4 - #7 and the hazards CAN NOT be controlled, Or
  o Answered “Yes” to question #8

☐ Non-Permit Required Confined Space if:
  o Answered “No” to all questions #4 - #8, Or
  o Answered “Yes” to #4 and the hazards can be controlled through forced air ventilation
  o Answered “Yes” to #5 - #7 and the hazards can be eliminated without entry into the space

Name: ___________________________ Department: ________________________________

☐ Check box if Special Considerations or Additional Information is continued on Page 2.