

## Job Safety Analysis

The Corporation of Offshore Reconnaissance & Polar Submersion is presenting their ROV, The Admiral, to complete the numerous tasks on Europa and in the Gulf of Mexico. The following is the JSA meant for this mission:

| Task  | Hazard   | Recommendations   |
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| <b>Task 1</b><br><br><ol style="list-style-type: none"><li>1. Temperature of the vent water</li><li>2. Thickness of ice</li><li>3. Depth of the sea</li><li>4. Connect the ESP cable to the power &amp; communication hub</li></ol> | <ol style="list-style-type: none"><li>1) The Vernier temperature probe could possibly break off if repeated contact persists.</li><li>2) The depth sounder could also fracture if it were to collide with any obstructions that the ROV comes into contact with.</li><li>3) The cable connected to the ESP may get tangled around the ROV.</li></ol> | <p>Ensure that all equipment is secured properly and has some form of protection.</p> <p>Constantly monitor subsystems and sensitive sections of the ROV to guarantee safety and efficiency is maintained at the highest levels.</p>                                    |
| <b>Task 2</b><br><br><ol style="list-style-type: none"><li>1. Identify 4 cube serial numbers</li><li>2. Transport 4 cubes to collection basket</li></ol>  | <ol style="list-style-type: none"><li>1) The claw on the ROV could possibly detach while flipping a cube, therefore causing it to drag off of the exterior of the ROV by the wires connecting it.</li><li>2) The cubes may potentially get pinned on the claw, therefore causing the hydraulic fluid to leak.</li></ol>                              | <p>Take the time to observe every aspect of the ROV, not only looking for methods to improve it, but also searching for areas where objects may become wedged on it.</p> <p>This scrutiny will guarantee that the ROV will be able to maneuver at optimal capacity.</p> |

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| <p><b>Task 3</b></p> <ol style="list-style-type: none"> <li>1. Collect oil samples (2)</li> <li>2. Return oil samples to the surface</li> <li>3. Analyze the gas chromatograph data</li> <li>4. Determine the origin of the oil</li> </ol>                   | <ol style="list-style-type: none"> <li>1) The hydraulic piping connecting to the claw may potentially rupture within the process of transporting materials to the surface of the water.</li> <li>2) The oil sample may be compromised if it separates from the ROV during its ascent to the extraction zone.</li> </ol> | <p>Take extra precautions- use extra material, if necessary- in order to ensure that the ROV has no loose parts and will remain together throughout the entirety of the mission.</p> |
| <p><b>Task 4</b></p> <ol style="list-style-type: none"> <li>1. Take a picture of two coral colonies</li> <li>2. Determine the growth, stability, and health of the coral</li> <li>3. Retrieve two coral samples and transport them to the surface</li> </ol> | <ol style="list-style-type: none"> <li>1) The driver could potentially collide with the coral samples and/or colonies, damaging them.</li> </ol>  | <p>Ensure the ROV does not get too close to the coral colonies and the claw is programmed to close slowly enough so as not to damage the coral sample.</p>                           |
| <p><b>Task 5</b></p> <ol style="list-style-type: none"> <li>1. Install the flange onto the wellhead</li> <li>2. Secure with 1" bolt</li> <li>3. Install the cap over the flange</li> <li>4. Secure with 2-1" bolts</li> </ol>                                | <ol style="list-style-type: none"> <li>1) Incorrectly connecting the flange, therefore losing it in the process.</li> <li>2) Incorrectly installing the bolt, displacing it or the flange.</li> </ol>   | <p>Ensure proper placement of the flange, bolt, and cap on the wellhead to prevent damage to any of the game pieces and to maintain a consistent work pace.</p>                      |