Job Safety Analysis

SEAL Robotics Job Safety Analysis (JSA) is comprised of the following three sections:

1) Safety in Workshop Tasks
2) Safety in Offsite Tasks
3) Use of Personal Protective Equipment (PPE)

Safety in Workshop Tasks

Task	Hazards	Controls
Operating manual hand-held tools (i.e. hammers, saws, screwdrivers, etc.)	1.a. Injury from tools 1.b. Dropping tools or other objects 1.c. Hitting others or objects in general vicinity 1.d. Foreign object entering eye	1.a. i. Has training 1.a. ii. Has proper PPE 1.a. iii. Correct tool is used for task 1.b. i. User is in fit condition to operate tool 1.b. ii. Objects being worked on are away from edge of work space 1.c. i. Check for people/objects in the way 1.c. ii. Alert others that a tool is in use 1.d. i. User is wearing safety glasses
Operating electrical hand-held tools/ small power tools (i.e. drills, heat gun, jig saws, etc..)	2.a. Injury from tools 2.b. Dropping tools or other objects 2.c. Hitting others or objects in general vicinity 2.d. Hair/ clothing becoming caught in moving parts of tool 2.e. Foreign object entering eye	2.a. i. Has training on specific tool in use 2.a. ii. Has proper PPE 2.a. iii. Correct tool is used for task 2.b. i. User is in fit condition to operate power tools 2.b. ii. Objects being worked on are away from edge of work space 2.c. i. Check for people/objects in the way 2.c. ii. Alert others that a tool is in use 2.d. i. Hair/clothing is tied back or secured 2.e. i. User is wearing safety glasses
Operating large power tools (i.e. table saw, drill press, bandsaw)	3.a. Injury from tools 3.b. Dropping tools or other objects 3.c. Hitting others or objects in general vicinity 3.d. Hair/ clothing becoming caught in moving parts of tool 3.e. Foreign object entering eye	3.a. i. Has training on specific tool in use 3.a. ii. Has proper PPE 3.a. iii. Correct tool is used for task 3.b. i. User is in fit condition to operate large power tools 3.b. ii. Objects being worked on are away from edge of work space 3.c. i. Check for people/objects in the way 3.c. ii. Alert others that a tool is in use 3.d. i. Hair/clothing is tied back or secured 3.e. i. User is wearing safety glasses
Soldering	4.a. Burns from soldering iron or molten solder 4.b. Inhaling fumes from solder	4.a. i. Has training with soldering 4.a. ii. User is in fit condition to solder 4.a. iii. User is wearing safety glasses 4.b. i. User is soldering in a well-ventilated area

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		4.b. ii. User doesn't stand directly over object(s) being soldered
Working with epoxy	5.a. Chemical burns from skin contact with epoxy 5.b. Inhaling fumes from epoxy	5.a. i. User has training using epoxy 5.a. ii. User is in fit condition to use epoxy 5.a. iii. User doesn't put epoxy near or on face or body 5.a. iv. User washes hands after handling epoxy 5.a. v. User has proper PPE 5.b. i. User is mixing and using the epoxy in a well-ventilated area 5.b. ii. User is not standing directly over what is being epoxied or epoxy that is being mixed 5. b. iii. User has proper PPE
Wiring and control box	6.a. Electrical shocking 6.b. Electrical shorting 6.c. Electrical fires	6.a. i. Ensure that the control box and other electronics are powered off 6.a. ii. User is properly grounded 6.b. i. Ensure that all wires are properly insulated 6.c. i. Ensure that wires are appropriate gauge for current load

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Safety in Offsite Tasks

Task	Hazards	Controls
Transporting ROV	1.a. Injury to self 1.b. Dropping ROV or other objects 1.c. Tripping over tether	1.a. i. Use proper lifting method 1.b. i. Ensure grip is secure and firm on object being carried 1.b. ii. Don't carry heavy objects alone 1.c. i. Tether is coiled and tied
Setting up control box	2.a. Electrical shocking 2.b. Tripping over cables	2.a. i. Ensure that the control box and other electronics are powered off 2.a. ii. User is properly grounded 2.b. i. Ensure that there is slack in cables and that people are aware of their existence
Preparing ROV for deployment	3.a. Injury on sharp edges 3.b. Tripping over tether	3.a. i. Hold ROV by the built-in handle 3.b. i. Ensure that tether is coiled in a small area away from the deck crew (apart from the appointed tether manager) 3.b. ii. No person is to step over the tether unless absolutely necessary
Deploying ROV	4.a. Injury on sharp edges 4.b. Tripping over tether 4.c. Falling into pool	4.a. i. Hold ROV by the built-in handle 4.b. **Follow Tether Management Protocol** i. Ensure that tether is coiled in a small area away from the deck crew (apart from the appointed tether manager) 4.b. ii. No person is to step over the tether unless absolutely necessary 4.c. i. When putting the ROV into the pool kneel to avoid falling in 4.c. ii. Stay away from edge of pool whenever possible
Operating ROV	5.a. Injury on sharp edges of props brought back by ROV 5.b. Tripping over tether 5.c. Falling into pool	4.a. i. Grab objects in way as to avoid edges and sharp surfaces 4.b. i. Ensure that tether is coiled in a small area away from the deck crew (apart from the appointed tether manager) 4.b. ii. No person is to step over the tether unless absolutely necessary 4.c. i. When retrieving props brought up by the ROV kneel to avoid falling into the pool 4.c. ii. Stay away from edge of pool whenever possible
Recovering ROV	6.a. Injury on sharp edges 6.b. Tripping over tether 6.c. Falling into pool	4.a. i. Grab ROV by the built-in handle 4.b. i. Ensure that tether is coiled in a small area away from the deck crew (apart from the appointed tether manager) 4.b. ii. No person is to step over the tether unless absolutely necessary 4.c. i. When retrieving the ROV from the pool kneel to avoid falling in 4.c. ii. Stay away from edge of pool whenever possible

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Use of Personal Protective Equipment (PPE)

1. Safety glasses
2. Closed-toed shoes
3. Earplugs (when needed)
4. Long pants (when needed)