Jobsite Safety Analysis

2023-2024 ROV ORCA Operation

Safety Information from Jesuit High School

Task	Hazard	Controls
1.Enter/Exiting Pool Deck Area	Risk of slipping and falling due to wet surfaces	Move careful on the pool deck and be aware of possible tripping hazards
2.System setup and deployment	Injury in TCU deployment Finger injury from ROV	Two members deploy TCU Handle ROV with labeled handholds only
3.Power up checks	Electrocution	On/off switch for power.
4.Pool side operations	Finger injury from ROV Tether tripping hazard Sunburn risk	Hands on / Hands off callouts Follow tether management protocol Wear sunscreen at all times
5.System breakdown	Finger injury from ROV	Confirm ROV is fully shutdown before handling Vent air compressor before handling Handle ROV with labeled handholds only

Required Training:	Required Personal Protective Equipment (PPE)
• ROVOTICS Deck Crew Training • Tether Management Training • ROVOTICS Operational Safety Checklist	• Closed toed non slip shoes • Eye protection • ROVOTICS Operational Safety Checklist

Operational and Safety Training Log

Name	Date	Type of Training
Declan Cooley	1/20/2024	Tether Management Training
Caden Kroettinger	1/20/2024	Tether Management Training
Harry O'Hagin	1/20/2024	Operational Safety Training
Alex Betran	1/27/2024	Operational Safety Training
Harry O'Hagin	1/27/2024	Tether Management Training
Caden Kroettinger	1/27/2024	Operational Safety Training
Declan Cooley	1/27/2024	Operational Safety Training
James Randall	1/27/2024	Operational Safety Training
Grant Muñoz	2/10/2024	Operational Safety Training
Luke Gatlin	2/10/2024	Operational Safety Training
Charlie Kim	2/17/2024	Operational Safety Training
Luke Gatlin	2/3/2024	Tether Management Training
Grant Muñoz	2/3/2024	Tether Management Training
Jack Frings	3/2/2024	Operational Safety Training
Ethan Bullard	3/9/2024	Operational Safety Training
Ian Kim	3/9/2024	Operational Safety Training

Operational Safety Checklist

Pre-Power-Procedure (Pilots & deck crew)

- Area clear and safe (no tripping hazards, items in the way)
- Verify power switches and circuit breakers on TCU are off
- Tether flaked out on the deck and free from damage
- Tether connected to TCU and secured
- Tether connected and secured to ROV
- Tether strain relief connected to ROV
- Verify the electronics housing sealed
- Visually inspect electronics for damaged wires, loose connections
- Fasteners are tight on the electronics housing
- Thrusters free from obstructions
- Power source connected to TCU
- Vacuum test electronics housing (see vacuum test procedure)
- Verify vacuum check port is securely capped

Vacuum test procedure (Deck crew)

- Verify MEH housing fasteners are secure and visually inspect front cover seal.
- Verify PSE screws are secure.
- Verify screw caps on all cameras are secure
- Connect vacuum hand pump to ROV electronics housing
- Pump electronics housing to -35 kPa (vacuum), this is 10 inches of Hg on the gauge.
- Verify electronics chamber holds -35 kPa (vacuum) for 15 minutes
- Remove vacuum pump and securely cap vacuum check port
- Stow vacuum hand pump back in case

Power Up Procedure (Pilots & Deck Crew)

- Verify TCU receiving 48V nominal
- Control computers up and running
- Ensure deck crew members are attentive
- Call out, "Power On"
- Power on TCU
- Call out, "performing thruster test"
- Perform thruster test/verify thrusters are working properly (joystick movements correspond with thruster activity)
- Switch between each camera to verify video feeds and proper camera positioning.
- Test any electrical or pneumatic tools that require pilot control

Launch Procedure (Pilots & Deck Crew)

- Place ROV in water
- Visually check for bubbles
- If there are bubbles from the electronic housings, remove ROV from water immediately and call out "electronics leak*. Proceed with Leak Detection Protocol
- The deck crew calls out "Ready to Launch"
- Deck crew members handling ROV call out "Hands Off!"
- Co-pilot calls out "Thrusters Engaged" and pilot begins mission

ROV Retrieval (Pilots and Deck Crew)

- Pilot calls "ROV Surfacing"
- The deck crew calls out "ROV Surfaced. Disable thrusters"
- Co-Pilot disables thrusters and calls out "Thrusters disabled
- The deck crew calls "Hands On", and removes ROV from the water
- After securing the ROV on deck, the deck crew calls out "ROV Secured on Deck"
- Co-Pilot powers down TCU if the team is demobilizing from the pool deck.

Leak Detection Protocol (Pilots and Deck Crew)

- Power down system and remove ROV from water if running a mission. Recover ROV by pulling to the surface using the tether if required.
- Visually Inspect to determine source of leak. Do not disassemble any part of the ROV until the leak is located.
- Install pressure testing equipment and use soapy water to verify the leak source.
- Create a plan to repair the leak and check all systems for damage and proper operation.
- Document the cause of the leak and implement corrective action or design changes as required

Loss of Communication (Pilots and Deck crew)

- Cycle power on TCU to reboot ROV
- If no communications, power down ROV, retrieve via tether
- If communication restored, confirm there are no leaks, resume operations
- If communication is not restored, begin troubleshooting procedures, Isolate the issue. Is there a hardware or software cause? Proceed to analyze/ isolate cause
- Document the cause of the failure and implement corrective action or repair as required.

Pit Maintenance (All Team Members)

- Pit is organized and free of garbage.
- Verify all tools and cables are neatly stored and there are no trip hazards.
- Check electrical cords and correct any possible electrical hazards
- Clean Thrusters with Deionized Water
- Inspect Tether Power and Network Connectors
- Check supplies and organize a shopping list if anything is needed for repair or upkeep.
- Verify TCU, ROV and tether are clean, dry and properly stored. Protective caps for electrical connectors should be in place
- ROV, TCU and tether have been readied for use on the next mission run

Inspect and Test Pneumatics (Pilots and Deck Crew)

- Verify all pneumatics lines are properly connected to the air source, TCU, and ROV
- Verify that the compressor is switched on
- Activate pneumatics system and open main valve
- Verify there are no leaks and pneumatic lines are securely connected while under pressure
- Test tools and adjust pressure regulator to 2.75 Bar (40PSI