

JOB SAFETY ANALYSIS –

Demonstration of ROV upon the request of Eastman for operate in freshwater environments of Boone Lake, Boone Dam, and the South Fork of the Holston River.

Company :	Kwok Tak Seng Inc.
School :	Kwok Tak Seng Catholic Secondary School
NAME OF DEPARTMENT :	IT SCHOOL TEAM
Team name :	KTS-Dolphin

TITLE OF JOB OR TASK: ENSURING PUBLIC SAFETY , MAINTAINING HEALTHY WATERWAYS AND PRESERVING HISTORY

TASK	HAZARDS	CONTROLS	PERSON-IN-CHARGE
1. Construction of ROV	1a) Potential injury to body parts due to unaware of small sharp fragments 1b) Potential tripping hazard on objects from ROV or tools 1c) Potential injury via inappropriate use of tools 1d) Potential operation risk <ul style="list-style-type: none"> ● Cut by pointy or sharp part of tools ● Burn by corrosive chemicals ● Breath in toxic substance ● Radiation from machines 	1a-1. Tidy the workstations regularly 1b-1. Keep all items securely attached to the ROV 1b-2. Return tools to appropriate position after using 1c-1. Avoid carelessness and pay attention when using the tools 1c-2. Use the right tool for the task 1c-3. Make sure tool users are qualified to use the hand tools 1d-1. Ensure proper PPE is worn by all members 1d-2. Wash hands after handling corrosive or toxic chemical and avoid unnecessary contact with skin and face 1d-3. Maintain an appropriate distance when the machines are operating	Chan Hong Sui
2. Assembling equipment at poolside control station	2a) Potential damage to mission-critical equipment through mishandling 2b) Potential injury to extremities of poolside crew members via dropping equipment	2a-1. Carefully lift the equipment and special care to breakable items 2a-2. Ensure equipment is carried by proper crew members 2b-1. Ensure proper PPE is worn by all poolside crew members 2b-2. Develop and follow a safety checklist	Kwok Tsz Him
3. Connecting electrical equipment and ROV to the control box	3a) Potential damage to the equipment and ROV due to incorrect connection of wires and cause short circuit 3b) Potential injury to poolside crew members via electrical discharge	3a-1. Double check power connections, fuses and tubing connection 3b-1. Members briefed on how to 'break down' safely 3b-2. Ensure all crew members are properly grounded and wearing correct PPE 3b-3. Double check that the power is switched off before connecting	Lai Tsz Ting
4. Connecting control box to external power and ROV surface tether	4a) Potential injury to poolside crew members via electrical discharge 4b) Potential damage to ROV system via voltage overload	4a-1. Double check power connections 4a-1. Notice poolside crew members before connecting 4b-2. Check voltage of the power source before connecting to the ROV	Tam Ching Yuen
5. Connecting the lift bag tubing	5a) Potential injury to poolside crew members due to high pressure	5a-1. Ensure the air pump is closed before connecting 5a-2. Check the tubing for holes or damages 5a-3. Double check the tubing connecting	Du Chun Hin
6. Transfer physical	6a) Potential injury to poolside crew members	6a-1. Develop and follow a safety checklist	Sit Yan Tung

ROV from station to poolside	<p>though dropping heavy components</p> <p>6b) Potential slipping hazard to crew members via wet floor</p>	<p>6a-2. Carry the ROV and tether cables by separate crew member</p> <p>6a-3. Ensure all crew members are extremely cautious when handling ROV, taking care to mind all tether cables and other hazards</p> <p>6b-1. Beware of the slippery floor</p> <p>6b-2. Ensure proper PPE is worn by all poolside crew members</p>	
7. Dry run of ROV	<p>7a) Potential injury to crew members due to unaware of sharp or moving parts of the ROV</p> <p>7b) Potential damage to ROV thrusters through running aquatic thrusters in open air</p>	<p>7a-1. Stick danger labels for moving objects and sharp parts</p> <p>7a-2. Cover or eliminate sharp edges</p> <p>7a-3. Cover two ends of Propellers with the shrouds</p> <p>7a-4. Notice poolside crew members before testing</p> <p>7b-1. Ensure ROV thrusters are not run at high speeds while in open air</p>	Wong King Ho
8. Putting the ROV into water	<p>8a) Potential danger to the poolside crew though falling into water</p> <p>8b) Potential damage to the ROV though sudden tension on surface tether</p> <p>8c) Potential injury to poolside crew members via electrical discharge</p>	<p>8a-1. Maintain at least 1 meter away from the poolside</p> <p>8a-2. Crouch down when working near the poolside</p> <p>8b-1. Lower the ROV with two members slowly</p> <p>8b-2. Address a member responsible for the release and retrieve of the tether</p> <p>8c-1. Ensure all wires/cables/plugs are properly insulated, and connected to the correct components</p>	Fung Ching Yiu
9. Operating of the ROV	<p>9a) Potential tripping hazard to poolside crew due to the communicating cable between land and water across the deck</p> <p>9b) Potential slipping hazard to crew members via wet floor</p> <p>9c) Exposed bare wire or motor may disconnect under tension</p> <p>9d) Loosen components of the ROV may fall off</p> <p>9e) Unauthorized person operating the ROV without permission, causing injuries to himself and damage the ROV</p>	<p>9a-1. Choose a brightly colored shroud for the tether to be easier to spot and avoid</p> <p>9a-2. Place all wires to the side of the pool deck, far away from the main path or evacuation pathway</p> <p>9b-1. Avoid running or jumping near the pool.</p> <p>9b-2. Put sign to alert others</p> <p>9b-3. Ensure proper PPE is worn by all poolside crew members</p> <p>9c-1. Seal all the connecting points between wire and motor</p> <p>9c-2. Extend the motor protecting case to cover the intercept of the wire and motor</p> <p>9c-3. Add cable strain relief to the exposed wire ends</p> <p>9d-1. Keep all items securely attached to the ROV</p>	Pong Hei Chung

		<p>9d-2. Test the attachment of the components on land</p> <p>9e-1. Only allow pilots who hold the operation key of the control panel to operate the ROV</p> <p>9e-2 the key switch will only be switch on after passing the safety checking of the ROV, to prevent wrong start up process (plug the cable into wrong plug hole)from damaging the ROV and operator.</p>	
10. Mission #1: Ensuring Public Safety (Dam Inspection and Repair)	<p>10a) Potential damage to the ROV as the tether cable of the ROV may struggle when inspecting along the dam</p> <p>10b) Potential damage to the micro-ROV as wire may struggle when it retracted</p> <p>10c) Potential pollution to the water though grout splattering out of the target area</p> <p>10d) Potential injury to marine animals via the scattered pieces of the broken screen along the way to the surface</p> <p>10e) Potential damage to the trash rack when installing the new screen</p> <p>10f) Potential injury to poolside crew member though handling small sharp fragments from the broken screen</p>	<p>10a-1. Add floating sponges to the tether</p> <p>10b-1. Retract the micro-ROV slowly</p> <p>10c-1. Confirm that the opening of the device is aligned with the voids underneath the dam</p> <p>10d-1. Beware of the marine animals around the screen</p> <p>10d-2. Return the broken screen to the surface slowly</p> <p>10e-1. Avoid releasing the screen strongly</p> <p>10f-1. Wear gloves when handling the broken screen</p>	Lo Wai Nam
11. Mission # 2: Maintaining Healthy Waterways	11a) Potential danger to small marine organism due to the gear of the appliances	11a-1. Make sure no small organisms are near the appliances before continuing the mission	Ng Hoi Ming
	11b) Potential danger to the trout fry as the transporter may kill the fish by not providing enough space to them	11b-1. Confirm that the trout fry has enough space to swim before starting to transport.	Lai Tsz Ting
12. Mission # 3: Preserving History	12a) Potential injury to crew to suffer strain when removing the heavy cannon from the ROV	<p>12a-1. Develop and follow a safety checklist</p> <p>12a-2. Operate with at least two crew members</p>	Pong Hei Chung
13. Retrieving the ROV	<p>13a) Potential damage to ROV via struggle of tether cable</p> <p>13b) Potential injury to poolside crew members via handling heavy object</p> <p>13c) Potential injury to crew members due to</p>	<p>13a-1. Retract the tether cable slowly and have a person in charge</p> <p>13b-1. Retrieve the ROV with at least two crew members</p> <p>13c-1. Stick danger labels for moving objects and sharp parts</p> <p>13c-2. Cover two ends of Propellers with the shrouds</p>	Du Chun Hin

	sharp or moving parts of the ROV		
14. Packing and disconnecting the ROV	<p>14a) Potential injury to crew members via exposed bare wire</p> <p>14b) Potential injury to crew members via handling heavy object</p> <p>14c) Potential injury to poolside crew members due to high pressure</p>	<p>14a-1. Seal all the connecting points between wire</p> <p>14b-1. Develop and follow a safety checklist</p> <p>14b-2. Carry the ROV and tether cables by separate crew member</p> <p>14b-3. Ensure all crew members are extremely cautious when handling ROV, taking care to mind all tether cables and other hazards</p> <p>14c-1. Range responsible crew member to disconnect the air pump and the lift bag</p>	Tam Ching Yuen
Required Training:	Required Personal Protective Equipment (PPE)		

Other Information:	<p>http://ehs.berkeley.edu/how-do-i-write-and-update-job-safety-analysis-jsa</p> <p>https://www.marinetech.org/files/marine/files/ROV%20Competition/2015%20files/HSE_Handbook_number_3_As_of_11_19_2013_AW.pdf</p> <p>http://www.safetyworksmaine.com/safe_workplace/safety_management/hazard_analysis.html</p>
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