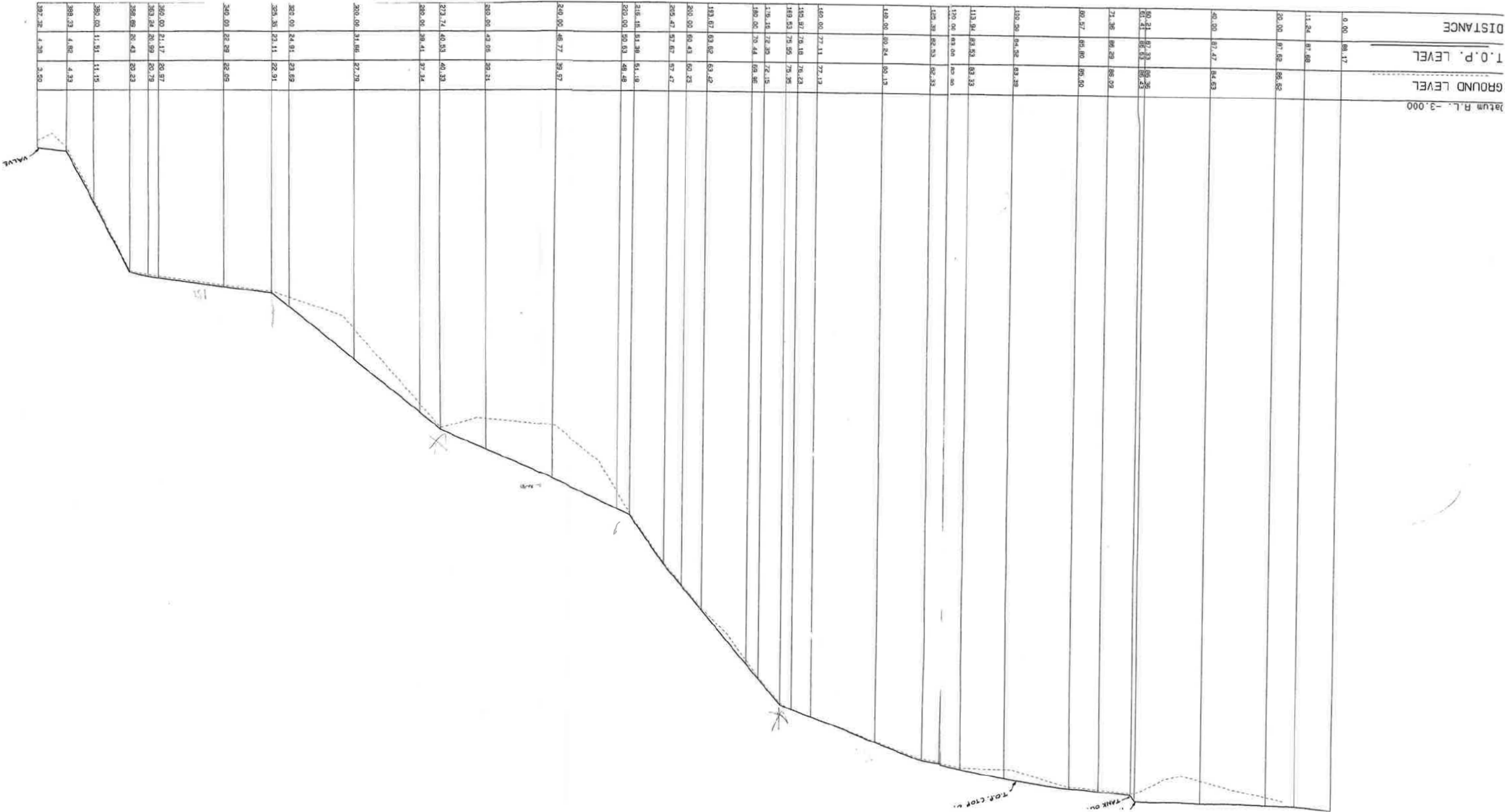
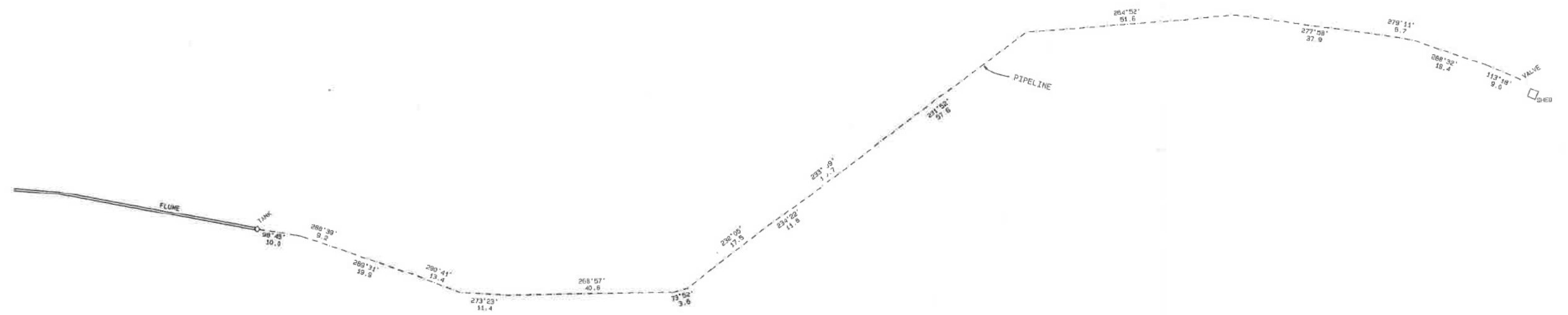






YH Series

4 Pole, Single Phase, Silent type
Generator output 6.6 – 29.2kVa



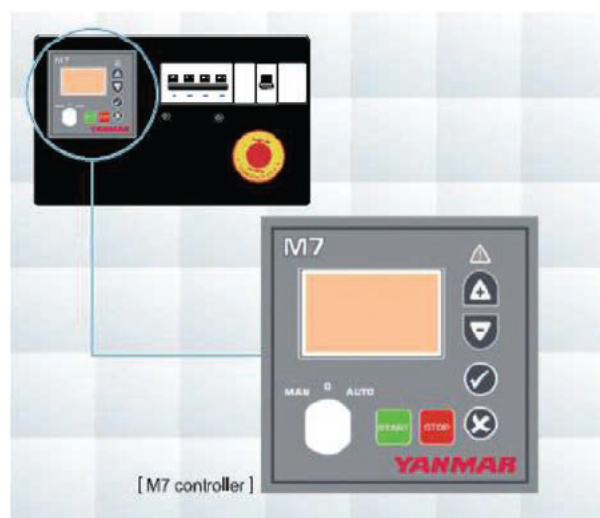
Optional large capacity fuel tank available (LT)

SPECIFICATIONS

Model			YH110DSLS	YH170DSLS	YH220DSLS	YH280DSLS	YH440DSLS
Generator	Phase and Pole		SINGLE PHASE, 4-POLE				
	Voltage		240				
	Output(Stand By Rating)	kVa	6.6	10.8	15.3	17.9	29.2
	Output(Prime Rating)	kVa	6.1	10.1	14.1	16.4	26.6
	Revolutions	min-1	1500				
	Frequency	Hz	50				
	Excitation		SELF EXCITED, BRUSHLESS				
	Sockets		2 X 15A		1 X 15A, 1 X 32A	2 X 15A, 1 X 32A	TBA
Engine	Type		YANMAR VERTICAL WATER COOLED, 4-STROKE DIESEL				
	Model		3TNV76-GGEH	3TNV88-GGEH	4TNV88-GGEH	4TNV84T-GGEH	4TNV98-GGEH
	Displacement	L	1.116	1.642	2.190	1.995	3.318
	Rated output(PRIME)		8.1	12.2	16.4	19.1	30.7
	Revolutions	RPM	1500				
	Combustion System		INDIRECT	DIRECT INJECTION			
	Cooling System		RADIATOR				
	Aspiration		NATURAL			TURBO-CHARGED	NATURAL
	Lubricating System		FORCED LUBRICATION WITH MULTI-STAGE TROCHOID PUMP				
	Starting System		ELECTRIC START				
	Fuel		DIESEL (BS2869 A1 or A2)				
	Lubricating oil		API GRADE:CD GRADE				
	Charging Dynamo	V-A	12V-40A				
	Recom Battery Capacity	V-AH	12-66		12-92		
	Fuel Consumption (75% Load)	L/HR	1.77	2.50	3.29	3.75	5.70
Unit	Dimensions	L-mm	1475		2100		
		W-mm	750		975		
		H-mm	1010 (1183-LT)		1217 (1277-LT)		
	Fuel Tank Capacity Standard	L	22		100		
	Fuel Tank Capacity Optional	L	100		190		
	Dry Weight	KG	591 (656-LT)	609 (674-LT)	775 (841-LT)	785 (851-LT)	870 (936-LT)
	Noise Level (±2,3 dBa)	dBa @ 7m	61	62	61	60	66

YH Series Control panel scope of supply

Control panel M7



The M7 controllers are able to control operation, monitoring and protection of the generator.
The controller unit consists of 2 different modules:

- 1) The VISUALISATION module
- 2) The MEASUREMENT module

Visualisation module

Provides information about the status of the device and at the same time, allows the user to interact with it. It consists on a backlight display and various LED's for monitoring the status of the controller and buttons that allow the user to control, program and configure the functions of the unit.

Measurement module

Controls and monitors the control board functions and it is connected to every sensor and actuator in the generator. This is located in the rear part of the control panel, in order to reduce the wiring and to avoid electromagnetic disturbance.

Both visualisation & measurement modules are connected by CAN communication bus and allow advanced intercommunication with other modules to the main controller.

Standard Features

GENERATOR INDICATIONS	M7
Voltage among phases	✓
Voltage among phases and neutral	✓
Amperage	✓
Frequency	✓
Apparent power (kVA)	✓
Active power (kW)	✓
Reactive power (kV AR)	✓
ENGINE INDICATIONS	
Coolant & temperature	✓
Oil pressure	✓
Fuel level	✓
Battery voltage	✓
Revolution speed	✓
Battery charge alternator voltage	✓
Unexpected shutdown	✓
Stop failure	✓
Low battery voltage	✓
Start failure	✓
Emergency Stop	✓
ENGINE PROTECTIONS	
High coolant temperature	P
Coolant temperature by sensor	Pro
Low coolant level	P
Low oil pressure	P
Low fuel level	A
Fuel level by sensor	Pro
Battery charge alternator failure	A
Over speed	P
Under speed	P
ALTERNATOR PROTECTIONS	
High frequency	P
Low frequency	P
High voltage	P
Low voltage	P
Short-circuit	P
Asymmetry among phases	P
Incorrect phase sequence	P
Reverse power	P
Overload	P
COUNTER INDICATIONS	
Total hour counter	✓
Partial hour counter	✓
Kilowatt meter	✓
Start valid counters	✓
Start failure counters	✓
Maintenance	✓
FEATURES	
Alarm history	Up to 100
External start	✓
Start inhibition	✓
Pre-heating engine control	✓
Gen-set contactor activator	✓
Programmable alarms	✓
Programmable outputs	✓
Multilingual	✓

(✓) Standard (A) Warning alarm without engine stop (P) Alarm with engine stop (Pro) Programmable

Note: All the protection are programmable to carry but "warning" or "engine stop with or without cooling."

Power Equipment/ Yanmar retains the right to change the technical specifications as required.

WORKPLACE OPERATIONAL SURVEILLANCE REPORT



Date: 2nd June 2021

Report Number: 004

Site: Real Journeys Glow Worm Cave Operations

Client Contact: [REDACTED]

Site Contacts: [REDACTED]

Report Prepared by: [REDACTED], Intesafety

Objectives of Visit: Conduct Workplace Observations based on the SAFER model.

Surrounding environment

Activity

Forces/energy

Equipment

Reactions

GENERAL STATEMENT ON FINDINGS:

A site visit to the Real Journeys Glow Worm Cave Operation based in Te Anau was completed as part of a verification check of the Real Journeys HSE systems. This was not an audit of vessels in the caving operation in line with Maritime New Zealand requirements. A summary of key HSE findings is below. A SAFER report is attached highlighting the status of the site relating to the H&S system, regulatory requirements and H&S best practice. At the time of the review there was a cave visit occurring and sections of this visit were observed.

S urrounding Environment	Active levels of controls evident. Good safety in design elements observed slips, trips and falls prevention – walkways and underground operations.
A ctivity	Active levels of controls and planning evident. Good use of risk management tools and training systems being used. Good emergency management in place. Refinements possible to SOPs training and competency evaluation.
F orces	Active levels of controls evident. Good levels of water and seismic monitoring and management in place with active monitoring occurring.
E quipment	Active levels of controls evident. Good checking and verification systems in place.
R eactions	Active levels of site engagement and management safety commitment evident.

SUMMARY OF FINDING'S:

Workplace Observations 2/6/21 <table><thead><tr><th>Category</th><th>AT RISK</th><th>OBSERVATION</th><th>SAFE</th></tr></thead><tbody><tr><td>Reactions</td><td>0</td><td>1</td><td>2</td></tr><tr><td>Equipment</td><td>0</td><td>1</td><td>15</td></tr><tr><td>Forces/Energy</td><td>0</td><td>0</td><td>7</td></tr><tr><td>Activity</td><td>0</td><td>2</td><td>14</td></tr><tr><td>Surrounding Environment</td><td>0</td><td>0</td><td>6</td></tr></tbody></table>		Category	AT RISK	OBSERVATION	SAFE	Reactions	0	1	2	Equipment	0	1	15	Forces/Energy	0	0	7	Activity	0	2	14	Surrounding Environment	0	0	6	Safe Work Observations Summary <table><thead><tr><th>Category</th><th>Percentage</th></tr></thead><tbody><tr><td>SAFE</td><td>72%</td></tr><tr><td>OBS</td><td>17%</td></tr><tr><td>AT RISK</td><td>11%</td></tr></tbody></table>		Category	Percentage	SAFE	72%	OBS	17%	AT RISK	11%	Site SAFER Analysis <table><thead><tr><th>Category</th><th>AT RISK</th><th>OBSERVATION</th><th>SAFE</th></tr></thead><tbody><tr><td>Reactions</td><td>1</td><td>1</td><td>8</td></tr><tr><td>Equipment</td><td>2</td><td>5</td><td>35</td></tr><tr><td>Forces/Energy</td><td>1</td><td>2</td><td>10</td></tr><tr><td>Activity</td><td>2</td><td>5</td><td>50</td></tr><tr><td>Surrounding Environment</td><td>1</td><td>2</td><td>25</td></tr></tbody></table>		Category	AT RISK	OBSERVATION	SAFE	Reactions	1	1	8	Equipment	2	5	35	Forces/Energy	1	2	10	Activity	2	5	50	Surrounding Environment	1	2	25
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Number of Observations for Inspection		47	Total % of observations to Date at Real Journeys Sites 89% SAFE (Safe/OBS)		Total Number of Observations to Date at Real Journeys	178																																																							

Findings
Legend:

SAFE
= Good standards observed met/compliant

OBSERVATION
= Improvement opportunity for consideration,
generally conditions considered adequate (safe)

AT RISK
= Unsafe condition, action required. Priority rating
LOW, MEDIUM, HIGH, VERY HIGH

1. SURROUNDING ENVIRONMENT

(Ground Conditions, Weather, Environmental hazards, Work Area, Housekeeping etc)

ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
1.1	Housekeeping	SAFE	Good housekeeping maintained throughout the vessel and cave operation.	Maintain.	-	 
1.2	Buildings	SAFE	The Te Anau terminal and caves buildings are well maintained and in good condition and hold all the correct code compliance certificates where applicable.	Maintain.	-	

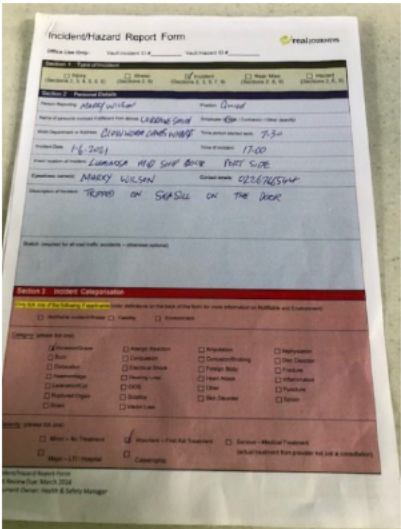
ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
1.3	Wharf Access	SAFE	Good area segregation by use of railing and signage is provided on the caves wharf. Anti-slip surfaces have been used to prevent slips, trips, and falls.	Maintain.	-	
1.4	Wharf Segregation	SAFE	Good control of water access areas preventing inadvertent access.	Maintain.	-	

ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
1.5	Cave Lighting	SAFE	The cave is lit throughout the operation where people are required to walk on the internal walkway.	Maintain.	-	 

ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
1.6	Edge Protection – Vessel	SAFE	There is evidence of slips trips and falls prevention throughout the operation, various areas include, step marking on doors, gridded design of cave walkway, wharf anti slip coatings/coverings and step flashing lights on the vessels.	Maintain.	-	 

2. ACTIVITIES

(Procedures, SWP, MSDS, Permits, Risk Assessments, Communication, Change Management, Training)

ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
2.1.	Risk Assessment – Caves	SAFE	There is a significant risk management program in place at the caves. This system in part replicates what can be seen in underground mines. There are systems for: - Active and latent seismic monitoring - Water monitoring - Flood monitoring - Cave entrance monitoring There is a mature system in place to monitor conditions. Fire or explosion in underground mines and tunnels WorkSafe	Maintain.	-	
2.2.	Near Miss/Hazard Reporting	SAFE	Good examples of hazard reporting in the workplace.	Maintain.	-	

ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
2.3.	Drills – Cave	SAFE	There are routine drills completed in the cave for emergencies. Emergency services have also visited the site to provide familiarisation and emergency response guidance. Fire or explosion in underground mines and tunnels WorkSafe	Maintain. Including emergency services routinely in drills and site walkthroughs to aid in understanding of the cave environment.	-	
2.4.	Emergency Planning – Cave	OBSERVATION	There is an emergency plan for the site which is adequate but can be improved. Mines Rescue is the organisation that would be involved in any rescue in the cave and best practice for underground operations would dictate involving them in emergency planning for the caves. New Zealand Mines Rescue Service Profile – New Zealand Mines Rescue Service	Include Mines Rescue in any underground emergency planning and exercise regimen.	-	
2.5.	Worker Welfare Facilities	SAFE	All areas in the vessel, Te Anau Office and cave building were in good condition.	Maintain.	-	

ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
2.6.	Safety Communication	SAFE	Good worker engagement in Real Journeys. Example in the photo is the Real Journeys Cavers Facebook forum which covers general cave operations including safety elements. Latest initiative has been to place chairs at platforms inside the caves for older people so they can rest if needed, excellent idea.	Maintain.	-	

2.7. Cave Communications

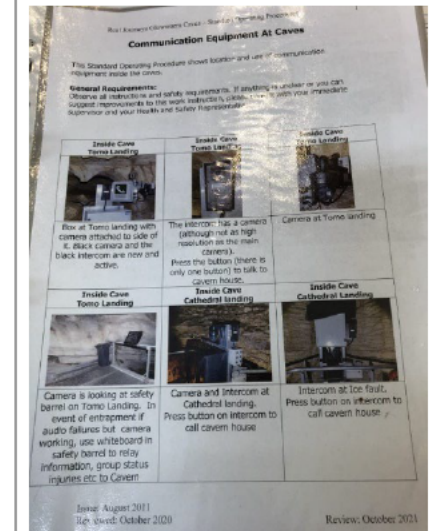
SAFE

There are multiple communication systems used at the caves.

- CCTV with white board
- Intercom
- Mining TEPEPHONE
- Radios

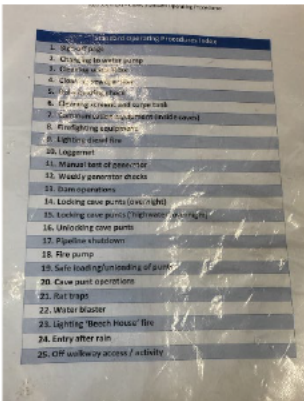
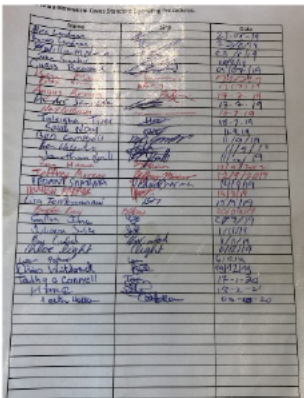
Critical requirement for caving operations.

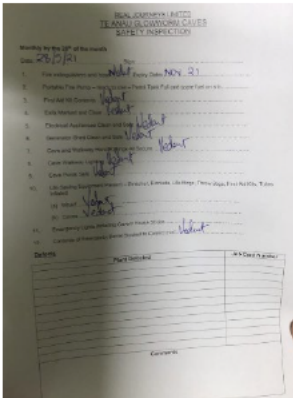
Maintain.
Ensure the routine testing program is maintained and that this is recorded.



ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
2.8.	Vault HSE Software	SAFE	Vault is used extensively throughout the cave operation. There is significant paper reporting occurring, however this is being loaded into VAULT.	Increase use of VAULT system and provide training in its use.	HIGH	
2.9.	Induction	SAFE	Good induction system in place on the vessel and at the cave prior to entry.	Maintain.	-	 
2.10.	Vessel Security	SAFE	The vessel is secured at the Te Anau wharf and gates are secured after work hours to provide additional security.	Maintain.	-	

ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
2.11.	Cave Security	SAFE	The entrance to the cave is secured by a lockable gate which is positioned at the end of the cave tours.	Maintain.	-	

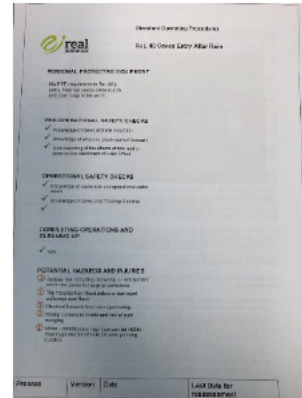
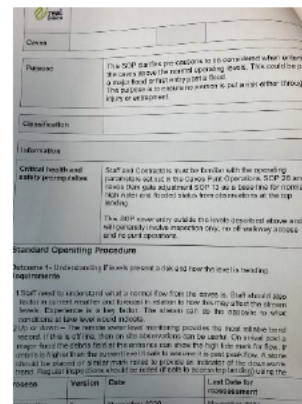
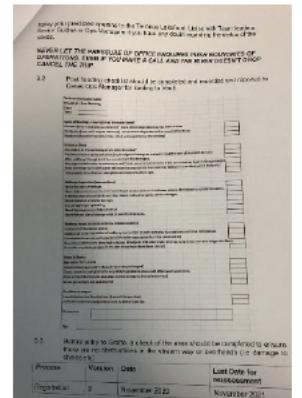
ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
2.12.	SOPs – Operational Control	SAFE	A significant number of SOPs are in place (25 currently) and much detail has been included. SOPs are read and signed off on by each cave guide before they can undertake supervised guiding until they are considered competent to complete these by themselves. Bottom photo shows signoff of SOPs by guides.	Maintain.	-	 
2.13.	Training Understanding	OBSERVATION	Some workers are not native English speakers and may have difficulty comprehending English, testing ensures comprehension/understanding is verified, including those who are Native English speakers.	Consider using a simple multi choice and YES/NO test sheet to confirm understanding of SOPs. Consider a separate sign-off area for SOPs proving competency by a manager/supervisor before guides are able to take groups unsupervised.	HIGH	

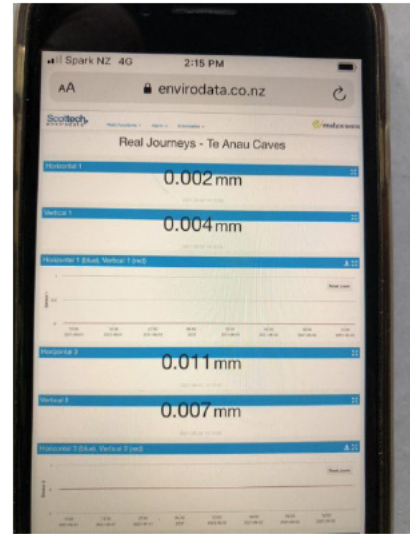
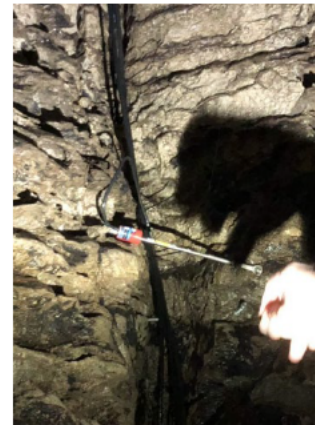
ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
2.14.	Cave Inspections – Measuring and Monitoring	SAFE	A Monthly cave inspection checklist must be completed by the 18 th of each month. Key area are lifesaving and emergency response equipment.	Maintain. Ensure as part of testing, pumps are run and equipment is physically checked, opened and used where appropriate to verify serviceability.	-	

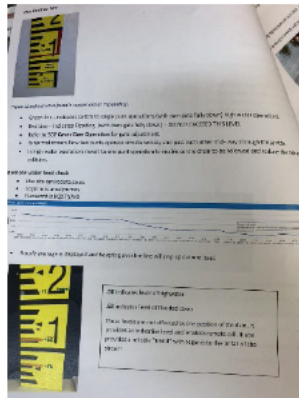
3. FORCES/ENERGY

(Energies controlled- electrical, mechanical, gravitational, hydraulics, stored energy. People not in the firing line, body motion/posture)

ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
3.1	Cave Entrance Management	SAFE	There is an active cave entrance management system including monitoring and controlling loose rock fall and vegetation. An active slip area is currently under observation and a tree management program, is in place.	Maintain. Consider use of Trigger Action Response Matrix for escalation and de-escalation all cave environmental conditions.	-	

ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
3.2	Cave Management	SAFE	An SOP showing the requirements for entering the cave after rain.	Maintain. Consider use of Trigger Action Response Matrix for escalation and de-escalation of all cave environmental conditions.	-	 
3.3	Cave Management	SAFE	A post flooding checklist required to be completed after each flooding event to ensure conditions are safe to re-enter. This is checked by the Te Anau Manager.	Maintain. Consider use of Trigger Action Response Matrix for escalation and de-escalation all cave environmental conditions.	-	

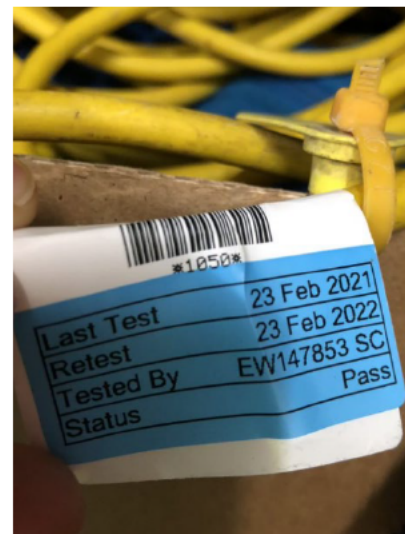
ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
3.4	Water Monitoring	SAFE	Live water level monitoring of the caves via EnviroData. This allows forecasting of likely flood conditions and GO/NO GO triggers for safe cave operations.	Maintain. Consider use of Trigger Action Response Matrix for escalation and de-escalation all cave environmental conditions.	-	
3.5	Seismic Monitoring	SAFE	There are various technical and physical measures to measure cave movement with the Caves. These are layered to provide means of establishing movements with the strata.	Maintain. Ensure technical and physical cave monitoring systems continue to be maintained according to specifications and that these are recorded. Consider use of Trigger Action Response Matrix for escalation and de-escalation all cave environmental conditions.	-	

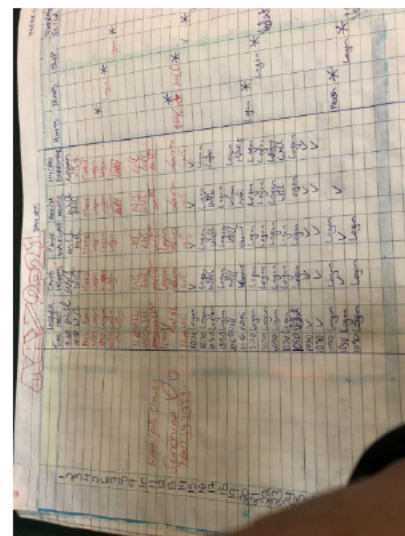
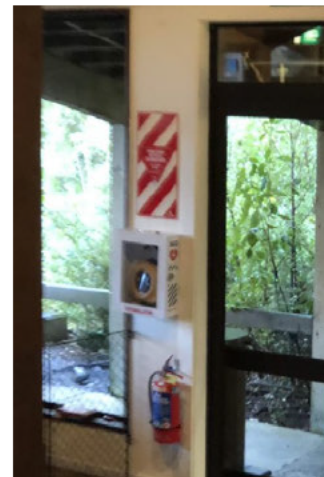
ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
						 
3.6	Flood Monitoring – Internal	SAFE	There is a measurement system in the cave at the boat landing where water levels are to be checked before continuing. If the water levels are rising or at flood level the cave is vacated.	Maintain. Consider use of Trigger Action Response Matrix for escalation and de-escalation all cave environmental conditions.	-	

ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
						
3.7	Flood Monitoring	SAFE	A flashing light is provided in the CCTV monitoring area to warn of flooding.	Maintain.	-	

4. EQUIPMENT/TOOLS/PPE

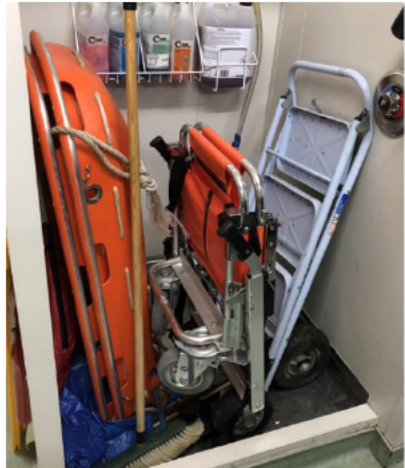
(Tools suitable for job, equipment serviceable/tagged/certified, PPE use and maintenance)

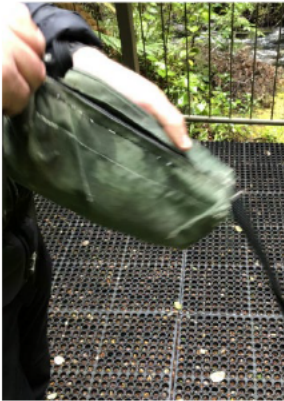
ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
4.1	Test & Tag	SAFE	Test and tag system evident at all sites for electrical equipment and cords.	Ensure all areas maintain in date test and tag, particularly important in the caves.	-	
4.2	Equipment Safety – Guarding	SAFE	Good guarding evident on the hydro power shafts feeding the cave power generator.	Maintain.	-	

ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
4.3	Equipment Maintenance – Cave Equipment Operator Checks	SAFE	Evidence of formal daily weekly operator checks on equipment.	Maintain. Ensure records held for all equipment maintenance.	-	
4.4	First Aid Kit – All Areas	SAFE	First aid kits in place and fully stocked (vessel/terminal/ accommodation). AEDs also available in the caves and terminal operations.	Ensure sufficient personnel are trained in first aid. Routinely check kit for completeness / consumables.	-	
4.5	Firefighting – Extinguisher Testing	SAFE	Fire extinguishers (FEs) were in good condition and in date for inspection and tagging.	Maintain Ensure all fire extinguishers are checked at the required frequency.	-	

ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
4.6	Public Health - Coronavirus Caves and HQ	SAFE	COVID tracking signs displayed and hand sanitiser in place in all public areas.	Maintain.	-	 
4.7	Life Saving Equipment	SAFE	Life ring placed on all wharfs for person falling into water scenarios. Best practice approach for wharfs and near water activities. Bottom photo shows life ring inside the caves for water rescue.	Maintain.	-	

ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
						
4.8	Safety Rails, Gates, and Latches	SAFE	Good use of safety rails, gates, latches, and chains to prevent falls into water and channel access.	Maintain. Ensure the current annual wharf inspection program is maintained.	-	 

ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
4.9	Emergency Equipment – Caves	SAFE	Stretchers and ladders located in the caves building for emergency use. Bespoke rescue wheels have been designed to allow rescue of stretcher patients in the caves similar to LANDSAR equipment. This was a recommendation from LANDSAR on a previous visit. Fire or explosion in underground mines and tunnels WorkSafe	Maintain. Continue to conduct routine drills for emergency evacuation by stretcher.	-	
4.10	Emergency Equipment – Caves	SAFE	There are several waterproof emergency supply kits available in the cave should there be a medical emergency or people become trapped. These are routinely checked for serviceability.	Maintain.	-	

ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
						 
4.11	Guide Equipment – Caves	SAFE	Each guide carries a bum pack with a basic first aid kit and survival equipment for emergency use.	Maintain. Ensure these are routinely checked and that this is recorded.	-	

ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
4.12	Fuel Tank	OBSERVATION	Fuel tank by the hydro shed. No evidence of leaks and in good condition with fire extinguisher nearby. No safety signage in place and no bunding apparent, although no spills detected.	Place signage on tanks and consider installing bunding if tank is to be used and provide routine inspection program.	MEDIUM	 

ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
4.13	Generator	SAFE	Backup power is provided for the caves site by a generator when the hydro power plant is not working. The generator has SOPs, maintains fire extinguishment and all cave guides are trained in its use.	Maintain. Ensure the generator is maintained according to manufacturer's specifications.		
4.14	Walkways – Cave	SAFE	The cave walkways are subject to an annual inspection by an engineer to ensure the structure remains sound.	Maintain.	-	

ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
4.15	Punts – Caves	SAFE	Punts in the mid cave section, near the glow worm section. Good anti-slip features have been designed on the walkway and the punts have been stability tested. A safety chain is available to block the entrance. Note: The water level panel is located at this point and allows guides to view the safe water levels. If water is at the indicated threshold for high or flooded water the caves are vacated.	Maintain.	-	 

ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
4.16	Safety Ladder	SAFE	This ladder was placed by the punt area when observations were made concerning responses to people falling into the water and the ability to recover them to the punt launching platform.	Maintain. Routinely check the condition of the ladder and ensure this is recorded.	-	

5. REACTIONS

(Changed position when observed, stopped job, adjusted PPE, behaviours safe/at risk etc)

ITEM	RISK STATEMENT	RATING	FINDINGS	RECOMMENDATION	PRIORITY	COMMENTS/PHOTOS
5.1	Safety Awareness	SAFE	The Te Anau Manager, Neil has significant experience in the operation and has shaped the cave safety systems which are very good. He displays a system-based approach to the operation and is familiar with the critical risks at the site 😊.	Maintain.	-	
5.2	Safety Awareness	SAFE	Noted a number of guides actively helping elderly members of the tour group, particularly for slips, trips and falls prevention – good work by them.	Maintain.	-	

END OF REPORT