



Hazardous Materials and Chemical Substances Environmental Material Risk Plan

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Area:	Underground/Surface
Site:	Waihi

	Position/Title	Name	Date
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1 PURPOSE

This plan is a roadmap document detailing how OceanaGold Waihi addresses one of its key Environmental Material Risks (EMR). Hazardous Materials and Chemical Substances is one of seven Waihi risks identified that are at higher risk of causing environmental harm, in particular Cyanide. OceanaGold acknowledge that without appropriate management cyanide can have significant impacts on worker health, the environment and communities. The company is committed to minimising these potential impacts through effective product stewardship, optimising use, and a strong focus on operational control and performance.

There are five existing plans which address the Hazardous Materials and Chemical Substances risk:

WAI-200-PLN-004 Waste Management Plan

WAI-200-PLN-005 Hydrocarbon Management Plan

WAI-200-PLN-018 Hazardous Substances Use and Management Plan - Underground Depot, Waihi

WAI-250-PLN-003 Hazardous Substances Principal Hazard Management Plan

WAI-451-PLN-002 Cyanide Management Plan

2 BACKGROUND

In 2021 OceanaGold Corporate introduced EMR's. Each site requires a plan which specifically addresses the risk. Requirements of the plan are in Appendix 7.1.

3 RISK ASSESSMENT

Hazardous materials and chemicals are identified in the site risk register. A summary of identified risks and controls can be found in Appendix 7.3.

4 ROLES AND RESPONSIBILITIES

ROLE	RESPONSIBILITY
General Manager	<ul style="list-style-type: none"> Review of Hazardous Substances Principal Hazard Management Plan Provide appropriate management and financial support for the implementation of this plan
Superintendent - Environment	<ul style="list-style-type: none"> Review of the Waste, Hydrocarbon and Hazardous Substances Use and Management Plan - Underground Depot, Waihi Management Plans Informing the General Manager and Manager – Mining (UG) of any high-level hazardous substance incidents Staff environmental awareness and training
Manager – Health and Safety	<ul style="list-style-type: none"> Review of the Hazardous Substances Principal Hazard Management Plan Lead review of the site risk register Responsible for Chem Alert system Maintain hazardous substance training records
Manager – All Departments	<ul style="list-style-type: none"> Ensuring appropriate storage compliant to HSNO regulations Reporting of incidents
All applicable personnel	<ul style="list-style-type: none"> Be aware of, and comply with, the procedures contained within or referred to in this Management Plan

5 CONTROL MEASURES

Section 8 of the Hazardous Substances Management Plan lists critical controls. These are:

- Standard operating procedures for working with high risk chemicals, including emergency response
- Staff training in use the chemicals
- Safe work practices, including good housekeeping and regular cleaning of work areas
- Inventory checking and prompt disposal of hazardous chemicals that are no longer required
- Keeping containers of hazardous chemicals appropriately banded and segregated
- Spill kits are available to clean up spills immediately
- Provision of washing facilities for rinsing off chemicals (e.g., hand washing, eye-washes safety showers)
- Appropriate chemical-resistant gloves must be selected in relation to the chemical being handled

Some gloves may be resistant to certain substances but may break down or even react with others

- Using full-face respirators rather than a half-face respirator, and chemical splash suits during any high-risk chemical mixing operations which can cause skin and respiratory allergic reactions

6 STANDARD REQUIREMENTS

OceanaGold standard 6.0 Hazardous Materials and Chemical substances applies to the Waihi site. Its purpose is to “ensure the effective selection, purchase, transportation, handling, and storage of hazardous substances, compliant with all legislative and licence requirements and to minimise their potential adverse impacts of hazardous materials and chemical substances on workers and the environment.” How the standard is addressed is detailed in Appendix 7.2.

OceanaGold standards are audited internally by site audit team members and externally by OceanaGold Corporate every 3 years. Any non-compliances or opportunities for improvement are entered and actioned in INX InControl.

Additionally, sites must review compliance against the Cyanide Management Plan annually with corrective actions developed for issues and opportunities identified during the audit process. An independent third-party audit of compliance against the Cyanide Management Plan every three years is required and corrective actions for issues and opportunities identified during the audit process.

7 APPENDIX

7.1 Environmental Material Risk

Environmental Material Risk Management Plan minimum requirements	Compliance
Use of the Corporate document control system and templates	Throughout; document controlled as per OGC-450-PRO-004
Statement as to the nature of the Material Risk Area, as addressed by the EMRMP	Section 1
The results of any risk assessment completed in respect to the Material Risk Area	Appendix 7.3
A description of the control measures using the hierarchy of controls required to be implemented to manage the Material Risk Area;	Appendix 7.3
A description of how permit conditions and OGC standards and framework requirements apply to the Material Risk Area, and how they shall be complied with;	Section 6, Appendix 7.2
Identification of where emergency preparedness for the Environmental Risk Area is documented	Section 9 of the Hazardous Substances Management Plan
A description of the roles and their corresponding responsibilities under the EMRMP, including the competencies required to carry out such roles and responsibilities	Section 4
Any other matter required by host country legislation or OGC standards particularly relating to a Material Risk Area.	Section 3 of the Hazardous Substances Management Plan

7.2 OceanaGold Corporate Standards

Standard Requirements	Compliance
Comply with host countries legislative requirements regarding the safe transport, storage, use, handling and disposal of hazardous material	

A risk assessment shall be conducted to identify the risks associated with the security, transportation, storage, compliance and handling of hazardous materials generated and used by the Business Unit	Site risk register
A plan describing all systems, processes, procedures, controls and safeguards undertaken to manage risks identified in the risk assessment shall be developed, implemented, communicated and maintained	Multiple plans
Where cyanide is used at the Business Unit, a Cyanide Management Plan shall be developed, implemented and communicated in accordance with the OceanaGold Statement of Position on Cyanide use. This plan shall describe how;	Plan implemented
· Cyanide use is minimised;	CN Management Plan
· Monitoring, validation and reporting of compliance with all regulatory requirements relating to cyanide is undertaken;	CN Management Plan
· Transparent communication and collaboration with stakeholders in relation to cyanide management is achieved;	CN Management Plan
· Host country regulatory requirements and the principles and standards of the International Cyanide Management Institute (ICMI) are achieved;	CN Management Plan
· Conformance against the Cyanide Management Plan is reviewed annually with corrective actions developed for issues and opportunities identified during the audit process; and	CN Management Plan
· Independent third-party audits of compliance against the Cyanide Management Plan are undertaken every three years and ensure corrective actions for issues and opportunities identified during the audit process are developed.	CN Management Plan
The General Manager of the relevant Business Unit shall review and authorise any plan's and shall be accountable for their implementation and ongoing effectiveness	CN Management Plan
A process shall be implemented to assess and approve all substances prior to being allowed on-site.	ChemAlert
All substances shall have a current Safety Data Sheet (SDS) readily available	ChemAlert
Each Business Unit shall maintain a Hazardous Substances Register providing details of the following:	ChemAlert
• Quality and certification requirements for tyre, rim, and wheel assemblies;	ChemAlert
• The product name;	ChemAlert
• The United Nations identification code;	ChemAlert
• Storage locations, requirements and precautions;	ChemAlert
• Summary of maximum inventories;	ChemAlert
• Estimation of current inventories;	ChemAlert
• Approved disposal methods; and	ChemAlert
• Hazardous substance identification as identified by any statutory approval requirement.	ChemAlert
All personnel handling hazardous substances as part of their work activities shall be trained and competent in the safe use, handling and storage of these substances.	InHealth Training records
Signage shall be placed on all storage vessels, containers and tanks that complies with host country legislation or SDS requirements.	Hazardous Substances Principal Hazard Management Plan
Where the type or volume of chemicals used or stored changes materially, the Business Unit shall determine the need for any required licence and permit changes. Processes shall be in place to ensure this occurs prior to any modifications being made.	Management of Change Process
Storage tanks and piping shall be certified, regularly inspected and approved for the conditions of use, and be made of a suitable material to be impervious	Hazardous Substances Principal Hazard Management Plan

to the chemicals stored in them. They are to be routinely inspected and maintained and situated above ground.	
Piping and flow lines shall be colour-coded and marked to indicate the contents and direction of flow.	Hazardous Substances Principal Hazard Management Plan
Plant control systems shall be in place wherever practicable to eliminate the need for operator intervention. Such controls shall incorporate fail safe systems in the event of emergencies. Where automatic control is not practicable, risk assessments shall be used to identify and implement operational processes, that reduce the risk to As Low as Reasonably Practicable (ALARP) and include;	Hazardous Substances Principal Hazard Management Plan
<ul style="list-style-type: none"> • Training and competency; 	As above
<ul style="list-style-type: none"> • Storage and handling; 	As above
<ul style="list-style-type: none"> • Signage, demarcation and restricted access; and 	As above
<ul style="list-style-type: none"> • Monitoring and alarms. (Site) 	As above
Adequately segregated stored hazardous substances, based on:	As above
<ul style="list-style-type: none"> • Quantity of materials stored; 	As above
<ul style="list-style-type: none"> • Physical state of the chemicals (solid, liquid or gas); 	As above
<ul style="list-style-type: none"> • Degree of incompatibility; 	As above
<ul style="list-style-type: none"> • Manufacturer's instructions; and 	As above
<ul style="list-style-type: none"> • Known behaviour of the materials. 	As above
Store all new installations and environmentally hazardous chemicals within low permeability bunded compounds designed in compliance with AS 1940 –2017 The Storage and Handling of Flammable and Combustible Liquids.	Hazardous Substances Principal Hazard Management Plan
All bunded compounds shall be maintained to provide:	
<ul style="list-style-type: none"> • Capability to allow recovery of liquid; 	As above
<ul style="list-style-type: none"> • Chemical resistant to the substances stored; 	As above
<ul style="list-style-type: none"> • Valves, pumps and metres associated with the transfer are operable as required; 	As above
<ul style="list-style-type: none"> • Adequately protected and contained equipment; 	As above
<ul style="list-style-type: none"> • Any potential jetting from any storage vessel or fitting is captured within the bunded area; 	As above
<ul style="list-style-type: none"> • Incompatible chemicals are physically segregated and do not come into contact with each other; and 	As above
<ul style="list-style-type: none"> • Capable of holding 110% of the largest vessel in that area. Where this requirement is not able to be met the Business Unit shall detail additional controls in their plan to provide appropriate protection for workers and the environment. 	As above
Make available spill response kits and place them in work areas where hydrocarbons and other substances may require containment and clean-up.	Hazardous Substances Principal Hazard Management Plan
Conduct spill recovery and clean-up.	InHealth
Document emergency response to chemical events in the Business Units Emergency Management Plan.	Emergency Management Plan
Radiation	
Where radiation sources are used by a Business Unit, a Radiation Safety Officer shall be appointed.	Radiation Safety Plan
A register of all radiation sources shall be maintained and reviewed annually.	Radiation Safety Plan
Sign post all radiation sources, and all unused and expired sources shall be securely held in a locked storage facility that meets the host country legislation. These disused radiation gauges shall be removed off-site by an approved contractor, at intervals not exceeding 10 years.	Radiation Safety Plan
Radiation sources shall be tested for the presence of leaks on a regular basis using an approved radiation leak detection device.	Radiation Safety Plan



7.3 Risk Assessment

Risk #	Department (Site wide available)	Risk Description (What can happen)	Potential Cause(s) (How / why might it happen?)	Principal Hazard Impacts	Inherent Risk (Absent or failed controls/defences)			Critical Controls	Current Controls	Impacted Areas (Maximum reasonable consequence)						Residual/Current Risk (controls present and applied)						
					Consequence (Credible Worst Case)	Likelihood	Risk Level			Health and Safety	Environmental	Social	Financial	Reputation	Compliance	OceanaGold Standard	Consequence (Maximum reasonable)	Likelihood	Risk Level			
WRR-0142	Processing	Chemical Exposure	Pipeline failure Spillage Delivery errors System failure Lack of knowledge / training Failure to wear appropriate PPE Failure to follow procedures Overflow Tank failure	Lost time Injury Equipment damage Business interruption	4	C	18	High	SOP's Approved handlers Hazchem Awareness training Supervision PPE Engineering controls Secondary containment Bunding External audits Equipment inspections and maintenance Safety showers Eye wash Signage HSNO certification Mines Rescue team First aid training Chemical specific training Induction / assessment training of delivery drivers Liaison with chemical suppliers Specialised cleaning contractor Closure plan Cyanide decontamination plan Audit of structure - concrete Cyanide code compliance Diphoterine Planned maintenance Fixed and personal gas monitors Permit to work systems	SDS	3	3						8.9 Hazardous Materials and Chemical Substances	3	D	9	Medium
WRR-0242	Processing	Radiation exposure	Fire Dropped/damaged device	Uncontrolled release of radioactive material Personnel exposure to radiation	1	E	1	Low	Radiation Management Plan Minor quantities of radioactive material kept on site for density gauges Internal Auditing Signage Radiation Safety Officer & Principal Licensee Inspections & monitoring Protective housing (engineered to withstand fire, falls, and explosions) Training	National Radiation Laboratory Audits & Licensing	1						8.9 Hazardous Materials and Chemical Substances	1	E	1	Low	
WRR-0476	Processing	Hydrochloric Acid - Delivery, Storage and Use	Spillage, contact with personnel	Personal injury or health effects	3	E	6	Medium	Isolation - Bunded Storage, Splash guards for pumps, pipes Engineering - Scrubber, Tank Certification. Process automation & instrumentation, bunging, drainage and sump pumping, Automated re-order to prevent overflowing, Materials of construction, Locked delivery point with unique key, Preventative Maintenance PPE - Splash proof goggles, rubber gloves (full length) Rubber boots,	Administrative -Delivery drivers training, delivery checklist, inductions, manuals, SOP's audits, HSNO compliance, Diphoterine, Emergency PPE boxes located near reagent filling points.	3						8.9 Hazardous Materials and Chemical Substances	3	E	6	Medium	

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					Consequence (Credible Worst Case)	Likelihood	Risk Level			Health and Safety	Environmental	Social	Financial	Reputation	Compliance	OceanaGold Standard	Consequence (Maximum reasonable)	Likelihood	Risk Level	
WRR-0477	Processing	Hyprox 600 - Delivery, Storage and Use	Spillage, contact with personnel	Personal injury or health effects	4	E	10	Medium	Automated process control system Automated re-order to prevent overfilling Bunding & drainage Preventative maintenance Tank Certification PPE HSNO Compliance Task SOP's	Delivery Drivers trained by supplier Delivery checklist Inductions (general & Specific) Area Manuals Audits (Internal & External)	4					8.9 Hazardous Materials and Chemical Substances	4	E	10	Medium
WRR-0478	Processing	Sodium Cyanide - Delivery, Storage and Use	Spillage, contact with personnel	Personal injury or health effects	5	E	15	High	Cyanide storage area inside bunded shed. Bunded containment to prevent spill escaping to the workplace or environment. Cyanide facility and pipework away from acids, no possible way for acids and cyanide to interact Scrubber on solids mixing tank, automated control systems, interlock control systems to prevent tank overflows, overflows pipework to bund to catch any possible overflow, bund has sump pump rain fall re-directed away from cyanide storage bund to maintain bund storage volume. Fixed HSN monitoring, Materials construction, PPE	Waihi Cyanide management Plan HSNO compliance Delivery checklists, area manuals, task SOP's, cyanide awareness training, audit, inductions, security checks 24/7,	5					8.9 Hazardous Materials and Chemical Substances	5	E	15	High
WRR-0479	Processing	Sodium Cyanide Solution (30%) - Storage and Use	Spillage, contact with personnel	Personal injury or health effects	5	E	15	High	Bunded area, splash guards around pipes, flanges, pumps. Cyanide facility and pipework away from acids with no possibility of acids and cyanides interacting. Cyanide storage and mixing area pipework completely dedicated. Pipework isolated completely from water network. Automatic mixing, transfer dozing, automatic control systems, interlocked control systems to prevent tank overflows, bunded areas with sump pumps, rainfall directed away from cyanide storage bund to maintain bund storage volume, contingency ponds engineered and designed to hold cyanide spill. Fixed HCN monitoring, materials construction	Waihi Cyanide Management Plan, Cyanide 33% liquid colour with red dye for identification, mixing checklists, area manuals, task SOPs, cyanide training awareness, security checks 24/7 on area, cyanide poisoning antidote held onsite	5					8.9 Hazardous Materials and Chemical Substances	5	E	15	High
WRR-0480	Processing	Caustic Soda - Delivery, Storage and Use	Spillage, contact with personnel	Personal injury or health effects	3	E	6	Medium	Stored in bunded area, splash guards in place around pipes, tanks and pumps, HSNO segregation/ compatibility requirements, automated re-order to prevent overfilling, bunding, drainage and sump pump, materials of construction, tank certification, process automation & instrumentation, preventative maintenance program, delivery point locked with unique key	delivery drivers trained, delivery checklist, area manuals, task SOP's, PPE	3					8.9 Hazardous Materials and Chemical Substances	3	E	6	Medium

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					Consequence (Credible Worst Case)	Likelihood	Risk Level			Health and Safety	Environmental	Social	Financial	Reputation	Compliance	OceanaGold Standard	Consequence (Maximum reasonable)	Likelihood	Risk Level		
WRR-0544	Processing	Health Exposure to Ionising Radiation	Equipment failure, Failure to follow procedures, Equipment housing damage	Medically treated Injury Lost time Injury Permanent Disabling Injury Nervous system illness	4	C	18	High	Radiation seals / enclosed shielding. Low quantities of radioactive material kept on site for density gauges. Warning signage. Restricted work zones & distance. Radiation Inspections & monitoring Protective housing (engineered to withstand fire, falls, and explosions) WAI-253-FOR-003 Radiation Safety Plan for Industrial Gauging WAI-470-PRO-003 Radiation Permit and Work procedure. WAI-470-FOR-003 Radiation Permit WAI-457-PRO-001 Wipe test on fixed Radiation Gauges WAI-250-PLN-002 Worker Health Principle Control Plan	Radiation Safety Officer & Principal License Holder. Site Induction Information. Process Mill Induction & area familiarisation. Stop & Think and JHA process. Toolbox Meetings. Work Area inspections. Task Observations.	4						8.9 Hazardous Materials & Chemical Substances	4	E	10	Medium
WRR-0250	Mining - Surface	Radiation sources	Fire Damage by heavy construction equipment	Uncontrolled release of radioactive material due to housing damage Personnel exposure to radiation	1	E	1	Low	Radiation Management Plan Minor quantities of radioactive material kept on site for density gauges National Radiation Laboratory Audits & Licensing Internal Auditing Signage Site has appointed Radiation Safety Officer & Principal Licensee Inspections & monitoring Protective housing (engineered to withstand fire, falls, crushing, and explosions) Training		1						8.9 Hazardous Materials and Chemical Substances	1	E	1	Low
WSW-11	Site Wide	Health Radiation - ionising (alpha, beta, neutrons, gamma, x-ray)	Skin damage Blood Changes Sterility Genetic Defects Cancer	Long term illness, carcinogenic	5	E	15	High	Restricted area / access Sealed gauges	Radiation training and induction Radiation Permit before commencing work Radiation Register Radiation sources sign-posted Wipe test External Audits Radiation officer Regular Maintenance Program	2						8.9 Hazardous Materials and Chemical Substances	4	E	10	Medium

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					Consequence (Credible Worst Case)	Likelihood				Health and Safety	Environmental	Social	Financial	Reputation	Compliance	OceanaGold Standard	Consequence (Maximum reasonable)	Likelihood	Risk Level		
WRR-0043	Site Wide	Onsite spill during delivery of reagents - spill not contained on site causing community outrage.	Vehicle collision - accident Tank failure Packaging failure Driver / delivery procedure error	negative community reaction	4	E	10	Medium	Contractor management Contractor audits / inspections Certified Suppliers Designed fit for purpose transport & storage vessels Ponds and Bunding MSDS on site MRT trained in chemical spill events Comms integral to CIMS Regular site visits by emergency services Comms to address inaccurate perceptions of possible event HSNO Act Compliance Audit internal/external findings Management inspections Community perception of site		4	4	4	4	4	4	8.9 Hazardous Materials and Chemical Substances	4	E	10	Medium
WRR-0105	Site Wide	Gas storage explosion in stores area / cylinder valve damaged leading to projectile.	Impact damage, Equipment failure, Incorrect storage and handling, Deterioration	Personal injury Equipment damage Business interruption	4	E	10	Medium	Reorder points in PRONTO have been modified downwards Tag out and isolation On the job training Signage Supplier refills and integrity check Preventive maintenance Statutory inspection regimes Competency based training Visual inspection Restricted access Inspection of goods on arrival Appropriate lifting gear (certified) Inspection of gas storage area on weekly sheet Appropriate storage location Bollards Bottle trolleys to move cylinders Certified storage areas Audits/inspections (external /internal) Restricted Access		4						8.9 Hazardous Materials and Chemical Substances	4	E	10	Medium
WRR-0157	Site Wide	Onsite spill during delivery of reagents not contained on site	Vehicle collision - accident Tank failure Packaging failure Driver / delivery procedure error	Environmental damage Injury - chemical burns	3	D	9	Medium	Contractor management Contractor audits / inspections Certified Suppliers Designed fit for purpose transport storage vessels Ponds and Bunding MSDS on site MRT trained in chemical spill events CIMS training		3	3		3			8.9 Hazardous Materials and Chemical Substances	3	E	6	Medium

Risk #	Department (Site wide available)	Risk Description (What can happen)	Potential Cause(s) (How / why might it happen?)	Principal Hazard Impacts	Inherent Risk (Absent or failed controls/defences)			Critical Controls	Current Controls	Impacted Areas (Maximum reasonable consequence)						Residual/Current Risk (controls present and applied)					
					Consequence (Credible Worst Case)	Likelihood	Risk Level			Health and Safety	Environmental	Social	Financial	Reputation	Compliance	OceanaGold Standard	Consequence (Maximum reasonable)	Likelihood	Risk Level		
WRR-0174	Site Wide	Oil / grease spills from heavy machinery / maintenance / contaminated ore causing environmental effect	Spills on floor of workshop (or underground) - runoff to truck wash, oil spillage during maintenance activities Mobile plant hydraulic hose failure. Refuelling spills. Component fatigue	Generally small spills that are contained on site but are frequent (30 per month). Cost of clean-up and disposal. Large oil slick in settling ponds (e.g. in Oct 08). Bund and interceptor management issues identified Oct 08. Potential decrease in mill recovery rates. Contaminated soil / water / waste / ore. Environmental impact	1	A	11	Medium	Hydrocarbon Management Plan, Emergency Plan, Spill kits. Inspection programme. Weekly maintenance checks and inspections. Little or no hydrocarbons in dewatering water, small spill register, large spill incidents. Awareness Training, audits Bunding around storage areas Spill response procedure Pre-start checks. Inspections and preventative maintenance programs Site runoff contingency ponds Upgrade of Favona refuelling & wash bay facilities. Mill refuelling pad bunding.		1						9.3 Used Hydrocarbons	1	B	7	Medium