Standard Operating Procedure

NTMO-ES-SOP052

Discharge Management

Environment Department

Revision	Prepared	Reviewed	Approved	Date	Description	Next Revision:
0	S.Barber			29/10/2015	Draft	
1	S.Barber			22/11/2015	Draft	
2	S.Barber			03/12/2015	Final	
3	S.Barber	P.McHugh	P.McHugh	19/01/2016	Final	
4	S.Barber			18/08/2016	Final	
5	S.Barber	L. Kerr/ S.Pearson	P.McHugh	01/12/2016	Final	
6	S. Barber	L. Kerr		06/01/2016	Draft	
7	S. Barber	L. Kerr	P.McHugh	20/01/2017	Final	
8	S. Barber	L. Kerr		20/03/2017	Added new formula	
9	S. Barber	Y. Lim	P McHugh	23/08/2017	Updated Creek 6 Rating Table and Curve	
10	S Yang	P McHugh	P McHugh	07/12/17	Incorporated Pulse Discharge Management Plan	
11	S. Cseh	Y. Lim		29/07/2018	Information update	
12	Henry Brady			30/07/2018	Document Formatting	30/07/2019
13	J.Marr			08/11/2018	Updated_ In Progress	
14	Sam Y	M.Gdak		19/06/2019	Update Operating Procedure	
15	Emg			21/10/2022	AE Formatting	

Context: The key documents relating to water management at the NTMO Cosmo Howley Project Area, active discharge to the Howley Creek System.

Purpose: To ensure active discharge is managed at the Cosmo Howley Project Area to prevent environmental harm and ensure appropriate actions are taken to manage significant rainfall events; maintain compliance; and ensure incidents are identified and reported as soon as practicable

Scope: This procedure covers active discharge management at the CHPA for the receiving Howley Creek.

Glossary:

Analyte	A substance or chemical constituent that is determined in an analytical procedure.	mm	Millimetres
BCPA	Brocks Creek Project Area	MOL	Maximum Operating Level
BoM	Bureau of Meteorology	WDL	Waste Discharge License
CHPA	Cosmo Howley Project Area	WMP	Water Management Plan
DO	Dissolved oxygen	NT EPA	Northern Territory Environmental Protection Authority
DITT	Department of Primary Industry and Resources (Previously Department of Mines and Energy)	SSTV	Site Specific Trigger Values
EC	Electrical conductivity	Treatment Water	Water treated with carbon oxide
Freeboard	The distance of space (m) before overflow.	CHCK06	Downstream Howley Creek (Creek 6)
pH	Measurement of acidity of a liquid.	m^3/s	Cubic meters per second (Cumecs)
MMP	Mine Management Plan		

Role/Title	Responsibilities
Mine Director	Accountable for any communications with Regulators. Review of Incident Notifications and Incident Investigations to be sent to DITT, NTEPA or any other external stakeholders. Determining if the DITT or any other stakeholders should be notified of a negative trend or anomaly, that doesn't constitute a statutory breach. Ensure sufficient resources are available to managers for adequate environmental protection measures.
Environment Manager	The Environment Manager provides effective, practical advice to the management team and to the environment team on Occupational Health and Safety and Environmental requirements including compliance with relevant legislation, standards and guidelines. The Environment Manager is accountable for reporting to the management team on outcomes and improvements required. The Environmental Manager will: • Ensure that all personnel and visitors are inducted and trained in their roles and responsibilities and are competent to perform the duties allocated to them; • Identify the environmental risks associated with certain work practices, assess risks and collaborate with the Mine Director to develop work methods that will minimise, eliminate or control these risks; • Liaise with subcontractors to ensure their activities are compliant with performance indicators that they are aware of the BCPA and CHPA water management process; • Delegate instructions and supervision for control measures to relevant staff members; • Ensure Water Management Plans are developed and valid as per conditions of Environmental Approval; • Coordinate with Project Coordinator on corrective actions taken to protect creeks from pollution and provide updates on managing actions taken within disturbed areas; • Ensure that task-specific environmental training methods (toolbox talks) are developed and delivered prior to environmentally sensitive work; • Review, overseeing and submitting Incident Notifications and Investigations to be sent to DITT, NTEPA or any other external stakeholders;

Role/Title	Responsibilities
	• Meeting the legislated commitments made in the License and Water Management Plan regarding downstream and discharge water quality; • Incident investigation leader for those involving statutory breaches; • Holding discussions with DITT and NT EPA regarding any incidents; • Incident investigation leader for those involving statutory breaches; • Implementation and regular review of the Active Discharge Management Procedure; • Audit the water management action plan; and Evaluate and monitor effectiveness of water treatment measures as well as water quality trigger values throughout the wet season; • Ensure regular site inspections of site activities have been carried out and audits results to recommend improvements and correct dewatering related non-compliances
Project Coordinator	The Project Coordinator is accountable for the efficient and effective coordination of field de-watering operations and upkeep of maintenance on equipment. The Project Coordinator is responsible for project management in preparation for wet season water treatment, movement and preparation for discharges. With regards to water management: • Direct construction works in a planned and regulated manner that avoids or minimises risk of potential issues; • Ensure mine site personnel conduct works in accordance with statutory and approval requirements; • Undertake actions in response to changes in water management objectives; • Ensure that all environmental (and other) incidents are reported to the Environmental Manager as soon as practical; and • Stop work and report to the Environment Manager immediately if situations arise that are outside the scope or not covered by Safe Work Method Statements (SWMS).

Role/Title	Responsibilities
Environmental Dewatering	• Providing early notification to the Environmental Department or Project Coordinator if any water management issues arise; • Informing the Project Coordinator, Environmental Manager and Environmental Department if there have been any overflows, seepage or spills; • Oversee and ensure the timely progress of the field dewatering operations; • Ensure that all activities associated with dewatering are undertaken in accordance with the requirements of this plan and are undertaken with due regard to the approved WMP, WDL and general working practices; and • Responsible for complying with requirements that minimise potential risks due to work activities, and the installation and maintenance of dewatering equipment.
Environmental Officer	• Undertake and adhere to monitoring programs outlined in WDL and WMP. • Daily monitoring and recording of site rainfall data; • Hourly monitor creek gauging station data; • Hourly review and update the active discharge spreadsheet; • Notify Dewatering Department if there are issues with siphons or pumps; • Notify Dewatering Department of required water movement onsite; • Provide support to the Environmental Manager; • Ensure compliance with the approved WMP and WDL; • Identify non-compliance or exceedance; • Act immediately to prevent non-compliance or exceedance; • Write a notification and/ or investigation for all exceedances or non-compliance for Environmental Manager to review and submit; • Write all required reports that are required by regulators for the Environmental Manager to review and submit;

Role/Title	Responsibilities
	• Ensure that appropriate records are kept and maintained; • Recommend additions or changes to the water management based on site experience gained from past and continuous improvement; • Promoting environmental awareness and socialisation related with waste management amongst the workforce; and • Inspect site dewatering infrastructure.
Hydrology Officer	Inclusive to the responsibilities of the Environmental Officer, as well as: • Design the mine site hydrology network and hydraulic structures; • Monitor the dewatering activities; • Supervise the as-built survey of the installed dewatering infrastructures; • Perform hydrology analysis across NTMO sites; • Provide advice to the Dewatering Department, Environmental Officers, and Project Coordinator on proper implementation of water management related measures; • Ensure that water management records are maintained; • Regular monitoring and recording of sites flow meters and discharge/transfer volumes; and • Measure water levels per licence and Management Plans program and discharge plan.

Hazards	Controls:
Sprains and Strains	Appropriate footwear. Watch footing.
Steep bank edges	Take 5. Use stairs where available. Avoid going down steepest areas of banks where possible.
Exposure to climate	Ensure fluids are readily available. Hat and sunscreen.
Animal bite/attack	Be aware of surroundings. Don't leave vehicle if buffalos are nearby. Wear gloves when handling pumps or pipes. Ensure first aid kit is in vehicle as per vehicle prestart requirements. Carry a communication device with you when exiting vehicle.
Working alone	When working at night, notify shift boss of your whereabouts or make sure they check on you regularly. Radio contact. Spot messenger. Satellite phone.
Working at night	When working at night, you will more than not be working alone. Make sure someone knows where you are when leaving the office area and expected time of return. At the very least have the shift boss or another reliable employee check on you regularly throughout the night.
Fatigue Management	When on night shift, prepare yourself for working abnormal hours. Sleep for long as possible during the day when transitioning from day to night work. Maintain a routine once on night shift. Go to bed at a reasonable time, remain active and eat healthy.
Exposure to contaminants	Disposable nitrile, powder free gloves should be worn during sampling activities to protect skin against potential contaminants and QA/QC.

Precautions:

- Crocodile and animal safety required at creek sites and all water storage infrastructure.
- No discharge during dry season.
- Recessional flows are highly variable; apply caution during interpretation of flow rates.
- Avoid discharge during last flows where possible.

Pre task requirements:

Review weather forecasts and telemetry data;

Understand and write down discharge amount before leaving office;

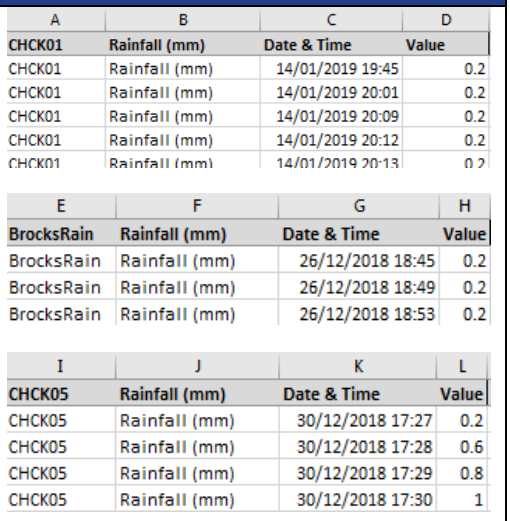
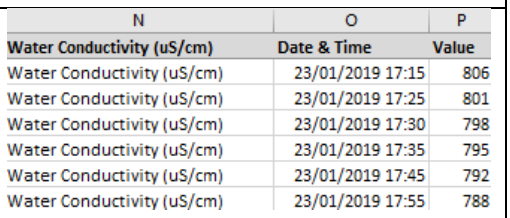
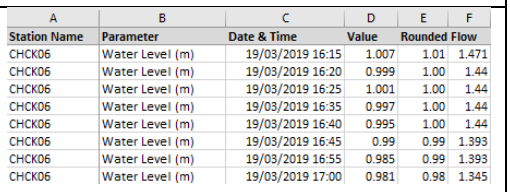
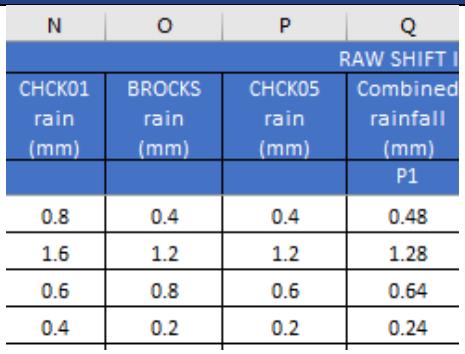
Notify Shift boss of whereabouts; and

Sampling conducted in accordance with WMP prior discharge.

PPE and equipment required:

- Sun protection
- Satellite phone (When working remote)
- Project Area site specific trigger values
- GPS
- First aid kit
- Snake bite kit
- Sample Bottles & Esky with ice block.
- Two Way Radio
- Water quality meter
- Spot messenger
- Leica Viva Survey equipment
- Sample Bottles & Esky with ice block
- Sampling field sheets
- Permanent Maker
- Pen

Working Method

No.	Stage/Task	Comments and photos	
Step 1 Enter Telemetry Data ("*Telemetry" Tap* and "*CHCK06 Level"* Tap)			
1.	Check the rainfall for Brocks Creek, CHCK01 and CHCK05 for the previous hour. Raw data from the telemetry stations are to be entered in each corresponding column in the '*Telemetry'* tab for each site.	Telemetry Website https://data.envirotechmonitoring.com.au/Client/Default.htm The tipping bucket rainfall data (BCPA, CHCK01, CHCK05) can be checked by logging onto the telemetry gauging station for each gauge location (Brocksrain, CHCK01, CHCK05)	
2.	Check CHCK06 EC telemetry logging data.	Raw data from the telemetry stations are to be entered in column P.	
3.	Check CHCK06 Level telemetry logging data.	Raw data from the telemetry stations are to be entered in column D in the "CHCK06 Level" tab. Drag down formula in Column E and F.	
Step 2 Discharge Flow Rate Calculation ("*hourly"* Tap)			
4.	Check Rainfall data on the '*hourly'* tab.	Drag down formula in columns N, O and P. It will automatically update the rainfall within that hour. Combined rainfall data (Column Q) should automatically update.	

Working Method

No.	Stage/Task	Comments and photos	
5.	Check CHCK06 flow rate and EC data.	Column R and column S should update automatically. Pump OFF EC and Pump ON will be updated by column V control.	
6.	Enter Howley West Pit or Dam 3 EC data	Enter discharge EC data in column U. If discharge will be carried out from both sites. EC can be averaged out between Howley West pit and Dam3.	
7.	In column V, enter Start, Stop, On, Off and Reset to depict current status of pumps and siphons. By doing this, the EC values will display in the correct column- either Column S or T.	Reset Rule 1: Select 'Reset' in Status Column V if both: • Hourly combined rainfall >6mm (Column Q); • Current EC <last reset EC or Start EC (Columns S – T). Reset Rule 2: Select 'Reset' in Status Column V if both: • Hourly rainfall <2mm (Column Q); • Current EC >last reset EC OR Start EC (Columns S – T). Reset Rule 3: Select 'Reset' in Status Column V if both: • Hourly combined rainfall <6mm (Column Q); • Current EC is 70% of last reset or start EC	

R	S	T
PUTS		
CHCK06 flow (cumecs)	PUMP OFF EC (us/cm)	PUMP ON EC (us/cm)
Q1	E1OFF	E1ON
8.23	115	0
10.09	115	0
11.03	115	0

S	T	U	V
PUMP OFF EC (us/cm)	PUMP ON EC (us/cm)	Discharge EC (uS/cm	Status
E1OFF	E1ON	HEC	(ON/OFF)
0	874	3555	ON
998	0	3555	RESET
1255	0	3555	STOP
1466	0	3555	OFF
1277	0	3555	OFF
903	0	3449	START
0	742	3449	ON
648	0	3449	RESET

Working Method

No.	Stage/Task	Comments and photos	
8.	Check column I for maximum discharge flow rate	The maximum discharge flow rate is calculated every hour.	
9.	If discharging from Dam 3, go to ***"Discharge Calc"*** **tab** for siphon flow calculation	1)Enter in Location 2)Enter current Dam3 water level 3)Enter the number of siphons to be opened to get optimal discharge	

I	J	K	L
Maximum Pump (L/sec)	Shift Rainfall (mm)	Date number	DateTime (Hour End)
Qm	P6		
1373	0.0	43499.958	3/02/2019 23:00
1325	0.0	43500.000	4/02/2019 0:00
1228	0.0	43500.042	4/02/2019 1:00
809	0.0	43500.083	4/02/2019 2:00
606	0.0	43500.125	4/02/2019 3:00
559	0.0	43500.167	4/02/2019 4:00
313	0.0	43500.208	4/02/2019 5:00
No Discharge	0.0	43500.250	4/02/2019 6:00
No Discharge	0.0	43500.292	4/02/2019 7:00

A	B	C
Siphon Calculation		
1.Select Location	Dam 3	
2.Enter Current Water Level RL	1096.5	
3.Select Numbers of Big Siphon	3	
4.Select Numbers of Small Siphon	2	
Total discharge L/S		
Large	Small	Total
852.90	223.79	1077

Step 3 Record Keeping (*"Shift Log"* Tap)

1.	Date and time	Enter date and time for that hour.	
2.	Discharge record	1. Enter maximum discharge flow rate in column C. 2. Enter total field discharge flow rate in column B. 3. Enter Discharge location in column D. 4. Enter actual discharge flow rate for separate location in column E. 5. Enter discharge duration in column F. 6. Enter Dam 3 and Howley West EC in column G and H accordingly. 7. HW and Dam 3 ML, discharge volumes and missed opportunities will calculate automatically.	

A	B	C	D	E
Date & Time	Total Discharge Rate (L/s) Discharge Calcs F3	Theoretical Max (L/s) Discharge Calcs (hourly)	Discharge Outlet	Actual Discharge Rate (L/s)
9/02/2019 13:00	1611	1504	Dam 3	1011
9/02/2019 13:00			HWP	600
9/02/2019 14:00	1295	1319	Dam 3	695
9/02/2019 14:00			HWP	600
9/02/2019 15:00	1045	1088	Dam 3	445
9/02/2019 15:00			HWP	600
9/02/2019 16:00	0	785	Dam 3	0
9/02/2019 16:00			HWP	0

Working Method			
No.	**Stage/Task**	**Comments and photos**	
8.	Check discharge volume	Discharge volume columns will fill in automatically	
9.	Select Limiting Factor and update the notes	Select the limiting factor in column O and update the notes in column P.	
General			
1.	Daily Notify the Environmental Manager prior to commencement of discharge.	Email notification to be made of commencement or cessation of discharge to Environmental Manager. Advise on commencement and cessation of discharge.	
2.	Maintenance/de-watering department carries out inspections of key water management system infrastructure.	Areas to focus on during inspections: • Are the pumps operational; • Is the pipe work in sound condition; • Are there any leaks/spills observed; • Are the pumps transferring at their design rate; • Are the contingencies in place and ready to operate in case of an emergency? Identified maintenance issues will be entered into Pronto as a work request to be actioned.	