

Modification Notice - Regulation 22

Interest Holder	Imperial Oil and Gas Pty Ltd	EMP Title	2021-2025 EP 187 Work Program	Unique EMP ID No.	IMP 4-3	Mod No.	9	Date	October 2024
Brief Description	<p>Imperial proposes to modify the Regulated Activity in IMP 4-3 in relation to the filtration of flowback fluid and drill water. Specifically, this modification proposes to filter flowback fluid and drill water from the Carpentaria-2H and the Carpentaria-3H wells on the Carpentaria 2H/3H/5H well pad.</p> <p>A technical memorandum outlining the proposed filtration process is supplied in Attachment 1.</p>								
Geospatial Files Included?	N/A								

Does the proposed change result in a new, or increased, potential or actual environmental impact or risk?	If an INCREASE in an existing potential or actual environmental impact or risk is it provided for in the approved EMP?	Does the proposed change require additional mitigation measures to be included?	Has additional stakeholder engagement been conducted?	Does it require additional environmental performance standards and measurement criteria?	Does it affect compliance with Sacred Site Authority Certificates?	Does it affect current rehabilitation, weed, fire, wastewater, erosion and sediment control, spill or emergency response plans?	Will the environmental outcome continue to be achieved and will the impacts and risks be managed to ALARP and acceptable?
No. See Section C.	N/A	No. Existing mitigation measures are in place covering hydraulic stimulation operations, spill management, and wastewater management.	No. Previous Stakeholder engagement has included fluid storage.	No. Current EPS, measurement criteria, and monitoring in the existing approved EMP remain applicable.	No. The proposed modification is within the area covered by the current AAPA certificate.	Yes. <ul style="list-style-type: none"> • IMP 4-3 Appendix 06 (Wastewater Management Plan) • IMP 4-3 Appendix 07 (Spill Management Plan) The above plans have been updated to align with this Reg 22 submission. All other plans remain valid and appropriate.	Yes. See Section D.

Current EMP Text	Amended EMP Text												
<p>IMP 4-3</p> <p>Table 27: Monitoring Plan</p> <p><i>In accordance with original EMP text.</i></p>	<p>IMP 4-3</p> <p>Table 27: Monitoring Plan</p> <p><i>Amend to include an additional row:</i></p> <table border="1" data-bbox="1048 480 2029 1129"> <thead> <tr> <th data-bbox="1048 480 1290 612" rowspan="2">Monitoring program</th> <th data-bbox="1290 480 1529 612" rowspan="2">Location</th> <th colspan="2" data-bbox="1529 480 1789 560">Factors Assessed/ Actions</th> <th data-bbox="1789 480 2029 612" rowspan="2">Frequency</th> </tr> <tr> <th data-bbox="1529 560 1664 612">Quality</th> <th data-bbox="1664 560 1789 612">Quantity</th> </tr> </thead> <tbody> <tr> <td data-bbox="1048 612 1290 1129">Water filtration</td> <td data-bbox="1290 612 1529 1129">Monitoring onsite.</td> <td data-bbox="1529 612 1664 1129">Analytes, listed in Section C.8 of The Code</td> <td data-bbox="1664 612 1789 1129">Filtered fluid.</td> <td data-bbox="1789 612 2029 1129"> <p>Monitoring</p> <ul style="list-style-type: none"> • Daily inspections during filtration of freeboard availability, tank integrity, pipe, pump and filtration unit integrity. • Six monthly sampling to commence after fluid has been filtered. </td> </tr> </tbody> </table>	Monitoring program	Location	Factors Assessed/ Actions		Frequency	Quality	Quantity	Water filtration	Monitoring onsite.	Analytes, listed in Section C.8 of The Code	Filtered fluid.	<p>Monitoring</p> <ul style="list-style-type: none"> • Daily inspections during filtration of freeboard availability, tank integrity, pipe, pump and filtration unit integrity. • Six monthly sampling to commence after fluid has been filtered.
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Current EMP Text	Amended EMP Text						
<p>IMP 4-3 Appendix 06 Waste and Wastewater Management Plan</p> <p>Table 1. Waste Types</p> <p><i>In accordance with original EMP text.</i></p>	<p>IMP 4-3 Appendix 06 Waste and Wastewater Management Plan</p> <p>Table 1. Waste Types</p> <p><i>Amend to include an additional row:</i></p> <table border="1" data-bbox="1048 440 2029 596"> <thead> <tr> <th data-bbox="1048 440 1541 520">Waste Source</th> <th data-bbox="1541 440 2029 520">Waste Type</th> </tr> </thead> <tbody> <tr> <td data-bbox="1048 520 1541 596">Water filtration</td> <td data-bbox="1541 520 2029 596"> <ul style="list-style-type: none"> Residual solids </td> </tr> </tbody> </table>	Waste Source	Waste Type	Water filtration	<ul style="list-style-type: none"> Residual solids 		
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<p>IMP 4-3 Appendix 06 Waste and Wastewater Management Plan</p> <p>Table 2. Waste Volumes and Characteristics</p> <p><i>In accordance with original EMP text.</i></p>	<p>IMP 4-3 Appendix 06 Waste and Wastewater Management Plan</p> <p>Table 2. Waste Volumes and Characteristics</p> <p><i>Amend to include an additional row:</i></p> <table border="1" data-bbox="1048 873 2029 1067"> <thead> <tr> <th data-bbox="1048 873 1258 952">Waste Source</th> <th data-bbox="1258 873 1749 952">Volume per Well</th> <th data-bbox="1749 873 2029 952">Characteristics</th> </tr> </thead> <tbody> <tr> <td data-bbox="1048 952 1258 1067">Residual solids</td> <td data-bbox="1258 952 1749 1067">Approximately 1 tonne when filtering 7.6 ML of fluid.</td> <td data-bbox="1749 952 2029 1067">Non-hazardous to Potentially hazardous.</td> </tr> </tbody> </table>	Waste Source	Volume per Well	Characteristics	Residual solids	Approximately 1 tonne when filtering 7.6 ML of fluid.	Non-hazardous to Potentially hazardous.
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Current EMP Text	Amended EMP Text														
<p>IMP 4-3 Appendix 06 Waste and Wastewater Management Plan</p> <p>Table 5. Waste Storage and Treatment <i>In accordance with original EMP text.</i></p>	<p>IMP 4-3 Appendix 06 Waste and Wastewater Management Plan</p> <p>Table 5. Waste Storage and Treatment <i>Amend to include an additional row:</i></p> <table border="1" data-bbox="1048 440 2033 595"> <thead> <tr> <th data-bbox="1048 440 1267 515">Waste</th> <th data-bbox="1267 440 2033 515">Storage Method</th> </tr> </thead> <tbody> <tr> <td data-bbox="1048 515 1267 595">Residual solids</td> <td data-bbox="1267 515 2033 595"> <ul style="list-style-type: none"> • Stored in a backwash/residual solid tank with bunding. </td> </tr> </tbody> </table>	Waste	Storage Method	Residual solids	<ul style="list-style-type: none"> • Stored in a backwash/residual solid tank with bunding. 										
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<p>IMP 4-3 Appendix 07 Spill Management Plan</p> <p>Table 1. Estimated volumes of chemicals and wastewater associated with the activity, per well pad <i>In accordance with original EMP text.</i></p>	<p>IMP 4-3 Appendix 07 Spill Management Plan</p> <p>Table 1. Estimated Volumes of Chemicals and Wastewater Associated with the Activity, per Well Pad <i>Amend to include an additional row:</i></p> <table border="1"> <thead> <tr> <th>Item</th> <th>Maximum Volumes on Site</th> <th>Storage Location</th> <th>Containment</th> </tr> </thead> <tbody> <tr> <td>Residual solids</td> <td>1 tonne</td> <td>Stored in a backwash/ residual solid tank during water filtration prior to disposal offsite.</td> <td>Secondary containment.</td> </tr> </tbody> </table>	Item	Maximum Volumes on Site	Storage Location	Containment	Residual solids	1 tonne	Stored in a backwash/ residual solid tank during water filtration prior to disposal offsite.	Secondary containment.
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Section A - Code of Practice: Onshore Petroleum Activities (the Code) in the NT 2019

The proposed modification is consistent with the requirements of the *Code of Practice: Onshore Petroleum Activities in the NT 2019 (the Code)*.

The proposed modification is consistent with the requirements of section A.3.8 (a) of the *Code*:

“Activities that involve wastewater or chemical storage must be carried out according to the wastewater management plan which are part of the EMP”.

- The wastewater management plan has been updated in this Reg 22 submission.

The proposed modification is consistent with the requirements of section C.3.1 of the *Code* waste management hierarchy. The proposed modification will:

“Reuse: use of wastewater for the same or alternative petroleum activity without treatment or minimal treatment”.

The proposed modification aligns with section C.4.2.3 of the *Code*:

“Recycling and re-use of all fluids should be maximised and the off-site transport and disposal of fluids should be minimised”

The proposed modification will not impact adherence to section C.5 of the *Code*, monitoring mandatory requirements. A sample from all produced water and flowback fluid storages will be taken at least once every 6 months and tested for analytes listed in section C.8 in accordance with. This sampling regime will commence after the water has been filtered for re-use.

Section B - Petroleum (Environment) Regulations 2016 (the Regs)

The proposed modification is consistent with the requirements of the *Petroleum (Environment) Regulations 2016*.

It is Imperial’s intention to provide a modification which changes the details of the original IMP 4-3 submission and subsequent Reg 22 modifications as they relate to the treatment of flowback fluid and drilling water in HF activities. The modification is proposed to reduce the volume of groundwater needed for future HF activities and reduce the generation of waste. Attachment 1 describes in detail how fluid filtering will occur. This fulfills the requirement of schedule 1, part 1 (1) of the *Regs*, in providing a description of Regulated Activity.

Section C – Risk Profile

The proposed modification does not inadvertently change the risk profile as the storage and transfer of flowback fluids and drilling water before and after HF is already controlled and mitigated for in IMP 4-3 Appendix 04.

Applicable risks listed in IMP 4-3 Appendix 04 which relate to storage, treatment, and transfer of flowback fluid and drilling water are:

Risk #30, #31, #32, #33, #34, #35, #36, #45, #46, #49, #57, and #63.

Section D – ALARP Demonstration

The proposed modification maintains that impacts and risks remain at ALARP and acceptable levels.

ALARP is maintained through meeting requirements of *the Code* and implementing all reasonably practicable site-specific controls. Imperial deems the environmental impacts and risks associated with the filtering of flowback fluid and drill water As Low As Reasonably Practicable (ALARP) based on:

- Good Practice Control Measures:
 - The proposed modification complies with *the Code* as demonstrated in Section A of this Reg 22 submission.
 - The water filtration is planned to commence early November 2024 and will take approximately 30 days.
 - Daily inspections of tank integrity, pipe, pump, and filtration unit integrity by competent and experienced personnel.
- Good Industry Practice: Engineering control standards include:
 - Above ground wastewater storage tanks are designed and constructed following the relevant Australian Standards (including AS1554.1 and AS3990) and are fitted with secondary liners, level monitoring and leak detection.
 - The filtration plant area will be bunded to catch any spills and to hold 110% of the largest tank.
 - Inflow pumps will be controlled by level switches in tanks.
 - All hoses and closed vessels will be pressure rated greater than the dead head pressure of supply pumps.
- Risk-based:
 - A chemical risk assessment of the flowback and drill fluids will be undertaken prior to fluid reuse under IMP 4-3.

Section D – ALARP Demonstration

- Current IMP 4-3 Appendix 04 risk assessments addressed the storage and transfer of fluids, the storage and transfer of chemicals, and the management of spills.
- Precautionary approach:
 - The filtration of fluid already onsite will help maintain capacity in existing well pad fluid storage facilities and contribute to the maintenance of minimum freeboard levels over the 2024-2025 Wet Season.

Section E – Environmental Outcomes

The proposed modification maintains that the environmental outcomes as stated in the EMP remain achievable.

The following environmental outcomes from IMP 4-3 Table 30 remain achievable with the proposed modification:

- Conduct of the Regulated Activity does not create safety risks for the public or landholders.
- Sensitive receptors, significant conservation areas, or listed species or their habitat is not permanently affected by the conduct of the Regulated Activity.
- Terrestrial environmental quality, including surface waters, is not permanently affected by the Regulated Activity's conduct.
- The conduct of the Regulated Activity does not result in the over-extraction or contamination of groundwater resources.
- Local inland water quality is not permanently affected by the conduct of the Regulated Activity.
- Minimise emissions, including greenhouse gases, created by the conduct of the Regulated Activity.

Section F – Environmental Performance Standards

The proposed modification aligns with IMP 4-3 existing environmental performance standards and measurement criteria.

IMP 4-3 Table 30 of the EMP (copied below) has the below Environmental Performance Standards and Measurement Criteria that are applicable to the filtration and storage of HF fluids, and how this Reg 22 submission meets the EPS.

IMP 4-3 Table 30

Current Environmental Performance Standards	Current Measurement Criteria	How the Proposed Fluid Water Filtration Meets the Current EPS
	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> •
Waste transported appropriately.	<ul style="list-style-type: none"> • All listed waste transported by licensed waste contractors. • Listed waste transfer records show Environment Protection Licence (EPL) number of waste contractor. • Waste records show the volume of wastewater removed from the well site for off-site disposal by a licensed waste contractor. • Waste records show removal of all putrescible waste from site. 	<ul style="list-style-type: none"> • At the end of the filtration process, the generated residual solids will be removed from the site by a licenced waste contractor using a vacuum truck and disposed of at a licenced waste facility. • Flowback and produced water from the Carpentaria 5H HF will be stored in above ground tanks to be re-used on subsequent HF operations or evaporated and eventually removed from site by a licenced waste contractor using a vacuum truck and disposed of at a licenced waste facility. • Appropriate records will be maintained.
All hazardous chemicals or those that may cause environmental harm to be stored in secondary containment, which has sufficient capacity to hold 100% of the	<ul style="list-style-type: none"> • Site induction records show all personnel inducted and induction materials include requirements related to the use and storage of hazardous chemicals. 	<ul style="list-style-type: none"> • The flowback fluid and drilling water that is intended to be filtered is currently stored in an above ground double lined bunded tank. • The chemicals that will be used in the filtration process will be stored in accordance

Section F – Environmental Performance Standards

<p>volume of the largest container stored unless the container has its own secondary containment.</p>	<ul style="list-style-type: none"> • Weekly inspection records confirm all hazardous materials stored in compliance with relevant SDS. • Inspection records confirm that all hazardous chemicals are stored in secondary containment, which can hold 100% of the largest container, weekly during the Dry Season and daily during the Dry Season. • Weekly inspection records confirm tanks and storage vessels intact and free from defects or tears. • Incident management system includes records. 	<p>with the SDS and be banded or within secondary containment.</p> <ul style="list-style-type: none"> • The filtration system will be appropriately banded. • Daily inspections of the filtration system will during the filtration process. • Records will be maintained.
<p>All spills remediated immediately on discovery.</p>	<ul style="list-style-type: none"> • Site induction records show all personnel inducted, and induction materials include requirements to remediate all spills to the ground immediately. • Daily inspections show no evidence of soil contamination from spills/leaks not immediately rectified. • Weekly inspections show the hazardous materials and storage area is clean and free from spills and leaks. • Daily inspections show bunds inspected and contents removed daily during Wet Season. • Hazardous materials register to be maintained during site operations • Records of spill remediation to confirm immediate response. • SDS register compliant with NT WorkSafe requirements and kept at location of chemicals at all times. • Daily inspections show spill kits appropriate to the chemical in use are available at the location of use. 	<ul style="list-style-type: none"> • All spill control measures will be maintained.

Section F – Environmental Performance Standards

<p>No instances of loss of containment of wastewater.</p>	<ul style="list-style-type: none"> • Incident management system includes records of loss of containment of wastewater. • Site induction records show all personnel inducted, and induction materials include requirements related to wastewater storage. • All tanks marked with freeboard levels as per seasonal requirements. • Daily inspections confirm wastewater levels do not exceed freeboard. • Records of exceedance of the freeboard are included in the incident management system and evidence of corrective actions and preventative measures implemented. • A minimum of 1.1 m freeboard will be maintained in all tanks/pits that contain Flowback Fluid and Produced Water throughout the Wet Season. 	<ul style="list-style-type: none"> • The filtration process will incorporate monitoring freeboard levels when transferring fluid between the two tanks. • All inductions and inspections will be conducted in accordance with IMP 4-3 commitments. • Records will be maintained.
<p>All storage vessels for wastewater and hazardous substance are maintained at 100% integrity.</p>	<ul style="list-style-type: none"> • Daily inspection records confirm tanks and storage vessels intact and free from defects or tears. • Incident management system includes records of failures of integrity of storage vessels. 	<ul style="list-style-type: none"> • Inspections of above ground tanks, pipes and the filtration system will be conducted daily during filtration. • Records will be maintained.

Title:	C5H Water Filtration Process Description – Attachment 1	
Doc No.:	ING-CPP-WHS-MEM-001	
By:	Luke Jordan, Jon Bennett	Date: 04-Oct-24

1 Summary

This technical memorandum provides an overview of the design and process objectives of the C5H water filtration process.

2 Water Treatment Objectives

The primary objective of the C5H water filtration is to enable the stored flowback water from C3H to be recycled and used in the water supply for the C5H fracture stimulation. [REDACTED]

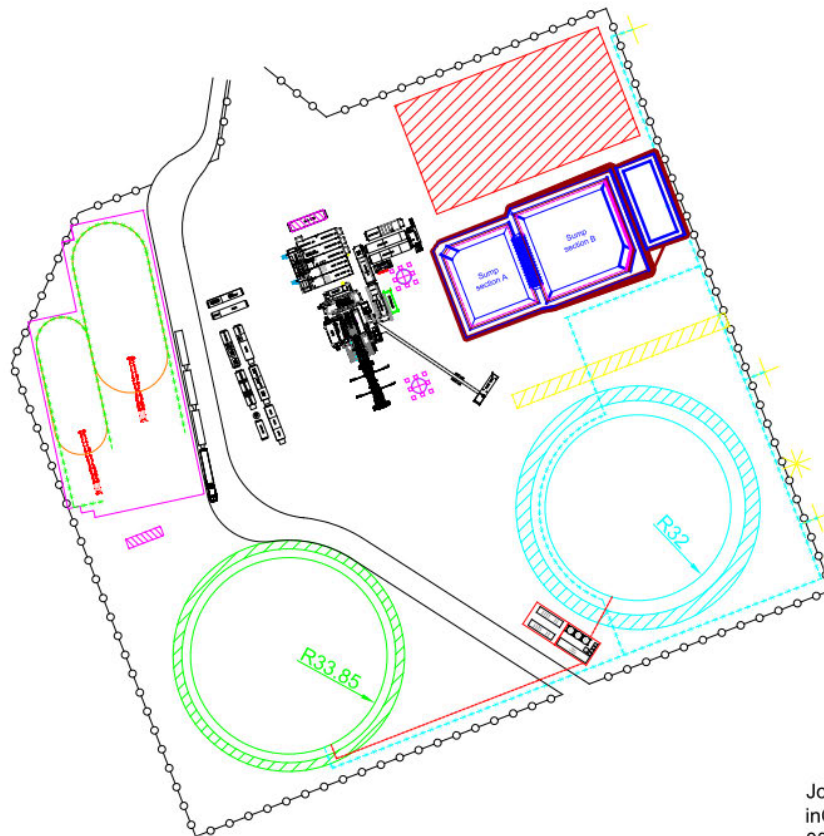
[REDACTED] EMP IMP 4-3 states the following objectives, which cannot be achieved without operating the C5H water treatment plant.

Table 1 Wastewater Objectives and Filtration Benefits

EMP IMP 4-3 Wastewater Related Objectives	C5H Water Filtration Process Benefits
Provide the capability for recycling and reuse of fluids.	Without the C5H water filtration process, flowback water would not be technically feasible to reuse.
Reduce the amount of groundwater taken.	Reuse and filtration of C3H flowback fluid, via the proposed C5H filtration process, will reduce the quantity of groundwater extracted for use in the HF of C5H by ~5 ML.
Reduce the amount of wastewater for final disposal.	The C5H water filtration process enables the C3H flowback to be reused for the C5H HF, which in turn can be treated and reused as part of the water supply for fracture stimulation of subsequent wells.

3 Indicative Layout of Water Filtration on the C2/3/5 Well Pad

Carpentaria 5 drilling, sand load in and water filtration layout



- Legend
- Drilling chemical storage area
 - Fuel Storage
 - Sand bunkers
 - Water filtration (including chemical storage)
 - Tank 1 (no lid, 1.1m freeboard)
 - Tank 2 (with lid, 0.5m freeboard)
 - Sump (1.1m freeboard)
 - Turkey nest
 - Freshwater lines
 - Water filtration lines
 - Carpentaria 2 & 3 wellheads (bollarded)
 - Water bore
 - Fence (stock)

Jon Bennett
inGauge Energy
03/10/2024



Figure 1 Indicative Well Pad Layout of Water Filtration

4 Water Filtration Process Description

The water filtration throughput [REDACTED].

Supervised operation of the plant will be continuous 24 hrs/7 days, with the treatment of the [REDACTED].

[REDACTED]

[REDACTED]

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5 Dosing Chemicals Impact on Filtrate Composition

[REDACTED]

