Pre-Start Up Compliance Report

Phase 7: Operation of new Nitrates Effluent Tank

March 2023

Rev	Date	Description	Prepared By	Approved By
0	10/3/2023	Phase 7 Pre-Start Up Compliance Report	N Robinson	P Cunsolo

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1 INTRODUCTION

Orica Australia Pty Ltd (Orica) operates a manufacturing facility at Kooragang Island, Newcastle, NSW, which produces ammonia, nitric acid and ammonium nitrate. The facility commenced operations in 1969 and there have been several increases to production capacity at the site. The current operation includes an Ammonia Plant, three Nitric Acid Plants, two Ammonium Nitrate Plants and associated dispatch and support infrastructure.

In December 2009 Approval was granted by the NSW Department of Planning and Infrastructure for the expansion project (the Project) to enable the production of ammonium nitrate to increase from the 500 kilo tonnes per annum (ktpa) to 750ktpa. The Project Approval was successfully modified on 17 December 2014, to allow the construction of three ammonia flares (Phase 4) and the relocation and increase in storage capacity of a previously approved nitric acid storage tank (Phase 5). A copy of the current staging plan is provided in Table 1.

Table 1 – Orica Kooragang Island Expansion Project Staging Plan (relevant phase highlighted in green)

Phase	Stage	Description of Work	Sub-Stage	Approval Status	Estimated Construction Timing
Ammonia Plant Uprate					
1	1a	**Ammonia Plant Expansion – Plant Air Compressor Building** Construction of Plant Air Compressor building shell (compressor installed in Stage 1(b)).	Completed	Construction Complete and Operational	Completed
	1b	**Ammonia Plant Expansion - Installation/Modification of Plant** Installation of new equipment including new compressor, process vessels pipework and instruments in the Ammonia Plant.	Completed		
Proposed Trident Nitrates Expansion Project Construction Scheduling					
2	2a	**OBL 1(a) – Nitrates Infrastructure & ANS Loadout** Installation of new site infrastructure including the new site entrances, internal access roads, security and weighbridge facilities, ANS product storage and despatch facilities.	1. Internal access roads and minor civil works. 2. Site entrances, security offices and weighbridges. 3. Major civil works including piling and foundations. 4. New ANS storage vessel loading equipment	Approval for Construction granted / construction yet to commence.	Yet to be determined
	2b	**OBL 1(b) – Nitrates Despatch & Support Infrastructure** Construction of new AN Bag store, AN Despatch facilities and amenities, demolition of existing AN Bag store and despatch, construction of new AN Bulk Store, modification to existing AN bulk store, construction of WANS, construction of new control room and electrical infrastructure.		Approval to commence construction not yet granted by DoPI.	Yet to be determined
3	3a	**NAP4 – Nitric Acid & AN Solution plants and Support Infrastructure** Construction of the NAP4/ ANS Plant and tie-ins Construction of Nitrates support infrastructure including new Nitric Acid Storage, Ammonia Storage, Boiler, Cooling Tower, Demin Plant expansion Instrument Air upgrades, new Ammonia pumps, pipebridges & transfer lines.		Approval to commence construction not yet granted by DoPI.	Yet to be determined
	3b	**AN3 – AN Prill Plant** Construction of ANP3 Dry Section plant and tie-ins		Approval to commence construction not yet granted by DoPI.	Yet to be determined
Ammonia Management Improvement Program					
4	4	**Ammonia Flares** Construction and operation of three ammonia flares.	1. Nitrates Plant Flare 2. Ammonia Storage Flare 3. Ammonia Plant Flare	Approval to commence construction of the flares was granted on 23 June 2015. **Ammonia Flares** The nitrates flare became operational during February 2016 The ammonia storage flare became operational during April 2016. The ammonia plant flare was commissioned during April 2017.	Completed

Phase	Stage	Description of Work	Sub-Stage	Approval Status	Estimated Construction Timing
Nitric Acid Tank					
5	5	**Nitric Acid Tank** Construction and Operation of a nitric acid tank and associated scrubber, capable of exporting and importing nitric acid via the site's nitric acid wharf pipeline.		Approval to commence construction not yet granted by DoPI.	Yet to be determined
Boiler					
6	6	**Construction and operation of new Site Boiler** Construction and Operation of a new site boiler (to replace the decommissioned original site boiler)		Approval to commence construction granted on 27 July 2015	Construction completed 12 December 2019
Nitrates Effluent Tank					
7	7	**Construction and operation of new Nitrates Effluent Tank (MOD4)** Construction and Operation of a new Nitrate Effluent Tank (to replace the Nitrates Effluent Pond)		Approval to commence construction granted on 13 May 2021	Commenced with handover scheduled for 15 April 2023
Prill Tower Scrubber					
8	8	**Construction and operation of new Prill Tower Scrubber (MOD5)** Construction and Operation of a prill tower scrubber to remove particulate associated with the existing ANP1 Prill Tower		Approval to commence construction granted on 29 Oct 2021	Estimated to commence late CY 2022

The Project Approval (08_0129) requires that a Pre-Start Up Compliance Report be prepared to detail compliance with the Pre-Start Up activities, as noted below:

Pre-Start Up	
16	One month prior to the commencement of operation of each Project stage, the Proponent shall submit to the Secretary, a Pre-Start Up Compliance report detailing compliance with conditions 14 and 15, including; a) dates of study/plan/system submission, approval, commencement of construction and commissioning; b) actions taken or proposed to implement recommendation made in the studies/plans/systems; and c) response to any requirement as imposed by the Secretary under Condition 4.

This report has been prepared to document the "Pre-Start Up" Compliance activities prior to the commencement of operation of the new nitrates effluent tank associated with Phase 7 of the Project.

2 SUMMARY OF COMPLIANCE TIMING

The dates of the commencement of the different construction stages associated with Phase 7 of the project are detailed in Table 2.

Table 2: Key Construction, Commissioning and Approval Dates

Stage	Dates
Approval of MOD4 (Effluent Tank)	13/5/2021
Commencement of Construction	03/6/2022
Commencement of Phase 6 Commissioning	Expected 20/3/2023
Commencement of Phase 6 Operation	Expected 15/4/2023

Condition 16 requires the confirmation of compliance with the studies, plans and systems submitted to the Department of Planning, Industry and Environment (DPIE) under Conditions 14 and 15. The dates of submission and approval of these documents are detailed in Table 3.

Table 3: Study, Plan, System Submission and Approval Dates

Condition	Requirement	Initial Submission Date	Most recent submission
Condition 14 (a)	Fire Safety Study	16/7/2013	Current version of FSS supplied in 2019 No further Phase 7 updates.
Condition 14 (b)	Hazard and Operability Study	30 October 2012 (Supplementary HAZOP 22 June 2015)	10/3/2023 (Phase 7)
Condition 14 (c)	Final Hazard Analysis	1/5/2015	No further Phase 7 updates
Condition 14 (d)	Construction Safety Study	15/06/2015	10/3/2023 (Phase 7)

Condition	Requirement	Initial Submission Date	Most recent submission
			No further Phase 7 updates.
Condition 15 (a)	Transport of Hazardous Materials	16/7/2013	No Phase 7 updates
Condition 15 (b)	Emergency Plan	21/12/2010	Phase 6 Updates supplied on 02/08/2019. No Phase 7 updates but latest version supplied following general update.
Condition 15 (c)	Safety Management System	23/12/2010	02/09/2015 (Phase 4) No Phase 7 updates but latest version supplied following general update.

A number of these reports included recommendations, which are detailed in Section 3.

3 PROJECT APPROVAL CONDITIONS

3.1 PRE-CONSTRUCTION STUDIES

3.1.1 Condition 14 (a): Fire Safety Study

A fire safety study (FSS) which incorporated the Expansion Project Boiler, although in its originally proposed location located adjacent to the proposed Nitric Acid Plant 4, was submitted to the Department of Planning and infrastructure on 16 July 2013, titled Nitric Acid Plant 4 and Ammonium Nitrate Plant 3 Fire Safety Study. A review of the hazardous scenarios identified in this study associated with the Phase 7 tank were compared against the hazardous scenarios considered in the site's approved Site FSS and found to be consistent. A review of the Effluent Tank Construction Safety Study (CSS) and Hazard and Operability Study (HAZOP) did not identify any further scenarios that would be required to be included in a FSS and therefore the analysis detailed in the Department of Planning and Infrastructure and NSW Fire and Rescue approved site FSS remains valid.

3.1.2 Condition 14 (b): Hazard and Operability Study

HAZOP analysis has been completed, resulting in 53 actions being identified across the design, construction and commissioning phases that are detailed in Attachment 1 and summarized in Table 4. Of the 53 actions identified in the Effluent Tank HAZOP, 2 actions remain open. The HAZOP action status is tracked using the Orica Kooragang Island Risk Register action reporting system.

All actions relating to the effluent tank, except those which are related specifically with the commissioning period and early operation of the system, have been completed. HAZOP actions that remain open will be completed prior to the commencement of “Start Up” or operation of the Effluent Tank, or within 3 months (for calibration purposes).

Table 4: HAZOP action summary

	Total Number of HAZOP Actions relating specifically to the effluent tank	Open Actions
Phase 7 HAZOP/CHAZOP	53	2

3.1.3 Condition 14 (d): Construction Safety Study

Of the 22 actions identified in the initial Construction Safety (CSS) Study for the Effluent Tank (Phase 7), 0 remain open, which included items for implementation during the construction phase. The CSS action status is tracked using the Orica Kooragang Island Risk Register action reporting system and details are provided in Attachment 2. A summary of the action closure status is provided in Table 5 below.

Table 5: Construction Safety Study action summary

	Total Number of CSS Actions relating specifically to the Effluent Tank	Open Actions
Phase 6 CSS	22	0

3.1.4 Condition 15 (a): Transport of Hazardous Materials

A Transport of Hazardous Materials Report was developed and submitted to the Department on 16 July 2013. No revision to this report was necessary as Phase 7 activities do not relate to the transport or storage of ammonium nitrate.

3.1.5 Condition 15 (b): Emergency Response Plan

The Emergency Response Plan (ERP), which was prepared in accordance with the Department of Planning's *Hazardous Industry Planning Advisor Paper No. 1: Industry Emergency Planning Guidelines*, was submitted to Fire and Rescue NSW (FRNSW) (formerly the NSW Fire Brigade) on the 21 December 2010 and approved by both DPIE and NSWFR on 18 July 2011 and 19 July 2011 respectively. The EMP was recently revised to incorporate the operation of the new Effluent Tank including:

- Updating drawings contained in the appendices of the ERP to detail the location of the boiler and associated supporting infrastructure;
- A review of the ERP's hazardous material register, with a new depot included for boiler chemicals;
- Updated safety data sheets;
- An updated version of the community emergency response information;
- Updated drawings of the fixed gas detector locations; and
- A review of the site's existing hazardous scenarios associated with a flammable gas loss of containment was undertaken and found to adequately capture an event associated with the operation of the project's Boiler.

Updates to the ERP were included in correspondence to DPIE in relation to pre commissioning approval on 2 August 2019. In addition, applications to register the boiler were submitted to NSW WorkCover, as required by Schedule 11 Work Health and Safety Regulation 2011 and are enclosed in Attachments 3A-3D.

While no change to the ERP is required as a consequence of the Phase 7 activities, a further general update of the Emergency Response Plan has been completed and has been supplied as as noted in Attachment 3.

3.1.6 Condition 15 (c): Safety Management System

A Safety Management System (SMS) report was prepared in accordance with the Department of Planning's *Hazardous Industry Planning Advisor Paper No. 9: Safety Management* and submitted to the Department on 23 December 2010. There were no recommendations identified in the SMS, although the report identified the key aspects of Orica's SH&E Management System to be utilised during the operation of the new boiler. These systems are an integral part of Orica's SH&E Management system and have been implemented for the boiler project and the existing operations at the site.

An updated Safety Management System report was submitted to DPIE associated with Phase 4 projects activities relating to the construction and operation of three ammonia flares, dated 10 August 2015 and approved by DPIE on 2 September 2015.

Specifically to Phase 7, a review of the Safety Management Plan found that all safety related procedures, responsibilities and policies, along with details of mechanisms for ensuring adherence to the procedures associated detailed in the Report are compatible to Phase 6 activities. However, a general update of the Safety Management System has been completed and the current version has been supplied as noted in Attachment 4.

4 RESPONSES TO DIRECTOR GENERAL'S REQUIREMENTS

Condition 16(c) of the Project Approval requires that Orica comply with any requirement imposed by the Director-General of Planning in relation to the plans or studies.

The Department of Planning included a number of requirements in the approval of the studies required under Conditions 14 and 15. A summary of the status is supplied in Table 6 below.

Table 6: Summary of status of Director General's (Secretary's) requirements

Department of Planning Requirement	Action	Status
Fire Safety Study	Although a Fire Safety Study is not required for the tank, an updated FSS has been included for completeness.	Closed

Department of Planning Requirement	Action	Status
HAZOP: Approved subject to the implementation of all actions identified in the HAZOP minutes.	Of the 52 actions relating to the boiler identified in the project HAZOP reports 2 remain open (as outlined in Attachment 2) and are scheduled for completion prior to operation. An update on open actions will be provided as part of the Post Startup Compliance Report.	Open
CSS: Approved subject to the implementation of all actions identified in the CSS minutes.	All 22 actions relating to the effluent tank identified in the CSS report have been closed.	Closed
Safety Management Study	Although no project specific updates were required is not required for the project, an updated SMS has been included for completeness.	Closed

Attachment 1 – HAZOP Action Status

PINNACLE RISK MANAGEMENT – HAZARD IDENTIFICATION RECORD SHEET

PROJECT:	**C.006820 Nitrates Effluent Tank (Nitrates Effluent Tank)**	**TEAM MEMBERS:**	**Colin Gabriel, Men Van Chau, Justin Ford, Laxmikant Jahagirdar, Darren Brotherton, Jarrad Bird, Richard Burwood, Craig Tischler, Nathan Robinson**
SYSTEM:	**Effluent Tank**	**LEADER:**	**Dean Shewring**
DRAWING:	**Effluent Tank ELD set**	**MINUTES BY:**	**Colin Gabriel**
			DATE: 28/01/2021 5/02/2021 9/02/2021 1/10/2021

No.	Guide Word	POSSIBLE CAUSE	POSSIBLE CONSEQUENCES	PREVENTED OR CORRECTED BY	ACTIONS RECOMMENDED	BY	Completion Date / Forecast
1	Plant items				Review the need to install a low point drain on line 80-EFF-2591 (ELD 15- 01666 Grid Ref F6) given that this line is now piped to a higher elevation to enter the nitrates effluent tank, i.e. to allow pipe draining to maintain HV394	Travers Searle	~~26/04/2022~~ CLOSED
2	Plant items	There is potentially a greater likelihood of fudging in line 80-ANS-2633 (outlet of HV375) as this will be a longer line to the effluent tank with more bends. Note that the AN strength can be up to approximately 80%	The line needs to be unblocked using hot condensate hoses which may not be adequate using the existing point of entry		Review the piping layout to determine if and where additional washout points are required in this line, e.g. at elbows	Travers Searle	~~27/11/2021~~ CLOSED

3	Plant items	It is known that ANP1 Washout Sump Pump does not meet the existing washdown capacity requirements and hence overflow occurs within the AN1 Dry Section bunded area	As the additional line length for 80-ANS-2633 and elevation rise into the nitrates effluent tank will increase the pump discharge head, then the flooding issue will be worse than existing. The flooding can result in ANS overflowing to the building floor.		Ensure that the project changes do not reduce the pump capacity below its current value. Orica business to review if the design for the ANP1 Washout Sump Pump should be improved as a separate project to prevent overflow.	Courtney Chin	~~May 2023~~ CLOSED FOR THE PURPOSES OF THIS PROJECT
	Separate project by Orica in progress to review requirement for upgrading Sump Pumps Pumps have been assessed with minimal tangible impacts due to Effluent Tank Project For purposes of Project – Action Closed						
4	Instruments				Review the fail position for HV375 as previous project changes and how the plant is operated shows a preference for directing the flow to the AN Washout Tank rather than the pond (i.e. the proposed Nitrates Effluent tank)	Colin Gabriel	~~24/05/2021~~ CLOSED
5	Design / Project Issue	The current and future philosophy is to locally start and stop all sump pumps only. This allows the operators to detect and manage any significant losses of containment of AN streams and hence determine the appropriate actions			Update the functional description to ensure all new sump pumps in this project are only started and stopped locally. The 3-way actuated valve on the suction to pump 15-74J27 is to remain as an actuated valve with a position switch. The valve and its start / stop controls are to be located outside the bunded areas or within reach from outside the bunded area	Justin Ford	~~30/08/2022~~ CLOSED
6	Plant items				Preference is to relocate pump 15-74J27 to the concentrator sump as this bunded area has lower walls and therefore access for operation and maintenance is improved	Travers Searle	~~27/11/2021~~ CLOSED

7	Instruments				Mark-up the ELDs to show the fail position for all 3-way valves associated with this project, e.g. the 3-way valve on the suction of pump 15-74J27 fails to the Washout Tank and the 3-way valve on the pump discharge line 50-EF-9860 (dwg 15-01388 Grid Ref B11) is to fail to the nitrates effluent tank (to lower the risk of high strength AN strengths flow to the River Pit)	Colin Gabriel	~~24/05/2021~~ CLOSED
8	High Flow / High Level	Failure of pump 15-74J27 or blocked suction strainer	Potential to overfill the concentrator bund. This will lead to environmental impact as up to 40% AN will flow to ground	Operator response to high level, e.g. use of a temporary diaphragm pump connected to valve V10460 or a vacuum truck. Note the approximate volume of the concentrator bunded area is 38 m3 (allows time for operator response before an overflow event occurs)	No further action required	-	CLOSED
9	Plant items				Include a flanged connection prior to valve V10460 (dwg 15-01388 Grid Ref G8) to allow the concentrator bund sump strainer to be cleaned, i.e. the spool can be disconnected at the flange and removed	Colin Gabriel	~~24/05/2021~~ CLOSED
10	High Flow / High Level	The 3-way actuated valve on line 50-EF-9860 (dwg 15-01388 Grid Ref B11) stuck open to the River Pit	Potential for exceeding the site nitrogen limits	Operator response to high conductivity alarm AI301	Install feedback on the 3-way valve to confirm valve position and for ease of fault finding high nitrogen levels to the River Pit	Colin Gabriel (Justin Ford)	~~24/05/2021~~ CLOSED

11	Plant items				Install a drain valve between pump 15-74J27 and isolation valve V10461 to allow the pump discharge line to be drained for maintenance. Relocate check valve V10462 to immediately upstream of this drain valve. This will allow draining of the pump discharge pipe to valve V10461 (i.e. through the NRV) to allow maintenance on the pump, the conductivity meter and/or the non-return valve	Colin Gabriel	~~24/05/2021~~ CLOSED
12	Low Flow / Low Level	Pump 15-74J27 continuing to run when the concentrator sump is empty			To be consistent with other sump pump designs, mark-up the ELD to show the low level cut-out from LI383	Colin Gabriel	~~24/05/2021~~ CLOSED
13	Plant items	Draining of low points in the piping			Include in the mechanical piping drawings the required low point drains and high point vents for commissioning and maintenance purposes	Travers Searle	~~15/04/2022~~ CLOSED
14	Reverse Flow	V10452 left open and NRV V10451 passing (dwg 15- 01334 Grid Ref A10)	Potential to exceed the site nitrogen licence limit due to reverse flow through V10451 to the River Pit	Procedural control to ensure manual valves are in the correct position. Operator response to high conductivity in River Pit discharge	Review the need to lock closed V10452. Include NRV V10451 in the preventative maintenance system (PMs) for routine inspection and maintenance. Relocate NRV V10451 to upstream of V10450 and include low point drains (as appropriate) to allow maintenance of the NRV	Travers Searle	~~10/3/2023~~ CLOSED
15	Plant items				Install an isolation valve between pump 15-74J27 and the upstream suction 3-way valve and also a low point drain to comply with the site standard for pump maintenance	Colin Gabriel	~~24/05/2021~~ CLOSED

16	Instruments	Failure of the conductivity meter on the discharge of pump 15-74J27	Potential to exceed the site's nitrogen licence limit if the 3-way valve on line 50-EF-9860 (dwg 15-01388 Grid Ref B11) remains open to the River Pit	Preventative Maintenance. Operator response to the high conductivity alarm in the effluent from the River Pit	Include in the PMs the conductivity meter on the discharge of 15-74J27 to lower the likelihood of failure on demand	Travers Searle	~~10/3/2023~~ CLOSED
17	High Flow / High Level	Significant loss of containment from the AN Washout Tank, e.g. tank or large pipe failure	Potential to overfill the existing bunded area and hence loss of containment of AN liquid to soil, i.e. environmental impact	Equipment design and maintenance standards	Check the capacity of the existing AN Washout Bund to ensure it is adequate for the AN Washout Tank. Review the relevant Australian Standards / Codes of Practice to ensure the bund capacity meets compliance requirement. If the bund capacity is insufficient, then Orica business is to separately review the need to improve the bund capacity outside of this project	Nathan Robinson	~~30/12/2021~~ CLOSED
18	Impurities	Potential for coating agent and oils (from the oily water junction) to enter the Nitrates Transfer Pit and then the Nitrates Effluent Tank	Potential for the hydrocarbons to layer on the surface of the Nitrates Effluent Tank liquid. Ultimate consequential impacts unknown?		Further review this scenario to determine if hydrocarbon layering in the Nitrates Effluent Tank is possible and if so, what are the hazards, e.g. decomposition	Jarrad Bird	~~1/11/2021~~ CLOSED
19	Plant items				As the extended pipe 100-EFF-2504 goes to a higher elevation than the existing pipe and will also contain more liquid, review the need for a low point drain to allow maintenance on NRVs V2050 and V2049 (dwg 15- 02888 Grid Ref E10)	Travers Searle	~~30/11/2021~~ CLOSED
20	Design / Project Issue				Field check the material of construction for pipe 80-EFF-2405 and update the spec breaks on the ELDs as appropriate. Also, confirm that the existing PVC pipe is adequately rated for the new dead-head pressure of 28 m.	Colin Gabriel	~~17/09/2021~~ CLOSED

21	Zero Flow / Empty	Potential to block the pump discharge RO's.	Loss of recirculation flow line with the potential for pump dead- head and overheating. Potential AN decomposition	High pump bowl temperature trips and low pump discharge flow trips. Coarse strainer on the pump inlet.	Confirm the sizing case for the RO's to meet Orica sizing standards, e.g. to avoid the orifice being too small and hence the increased probability of blockages.	Colin Gabriel	~~27/10/2021~~ CLOSED
22	High Pressure	Increased potential for liquid hammer, given the higher head pumps.	Increased potential for failure of the PVC pipes leading to a loss of containment of effluent containing AN, e.g. impact to people and/or the environment.		Check during commissioning if hammer occurs when HV383A or B closes and if so, provide means to avoid hammer, e.g. slowing the valves' closing speeds.	Colin Gabriel	April 2023
	Commissioning Action included in Commissioning Plan						
23	Instruments				Review the set points for the 3 supply sumps low level switches on ELD 15-00957 to ensure the new pumps are stopped prior to losing prime. (Pump upgrades no longer required)	Justin Ford	~~28/09/2021~~ CLOSED
24	Instruments				Confirm the setpoint for the low flow switches on the discharge of the three sump pumps on ELD 15-00957 and that they work on demand (non- project issue). (Pump upgrades no longer required)	Justin Ford	~~30/08/2022~~ CLOSED
25	Design / Project Issue				No actions recorded for this system.	-	-
26	Plant Items				Confirm there will be means to drain line 50-EF-0057 downstream of HV356B to allow maintenance of this valve (Dwg 15-02888 Grid Ref C4). This is required as the new line to the Nitrates Effluent Tank rises in elevation and hence effluent containing AN will rest in this line.	Travers Searle	~~26/04/2022~~ CLOSED

27	Design / Project Issue				Agreed design basis for tank level and sump pump conductivity control as follows: If 15-74J25 is pumping low conductivity liquid then the flow through the 3-way HV (on the pump discharge) will be direct to River Pit. If level is low within 15-74F66 and the conductivity is high within the sump effluent then 15-74J25 will pump back to the tank. If 15-74F66 level is high then 15-74J25 will pump direct to River Pit irrespective of conductivity. This is to avoid effluent building up in the sump and overflowing the bund weir and hence introducing impurities, e.g. chlorides, into the Reclaim System. If high conductivity liquid is pumped direct to the River Pit then River Pit diversions are to be put in place as per existing procedures. Include a high priority alarm when the conductivity is high and the 3-way HV is directed to the River Pit, i.e. to alert the operators that the River Pit diversions may be required	Justin Ford	~~28/11/2022~~ CLOSED
28	High Flow / High Level	Large loss of containment from the nitrates effluent tank system, e.g. tank or pipe failure	Potential to overflow the bund internal weir and hence introduce impurities, e.g. chlorides, into the reclaim system. This can lead to AN decomposition within the plant	High level inhibit from the nitrates effluent bund sump pump 15-74J25 to the AN reclaim bund sump pump 15-95J02. Equipment designed and maintained as per Orica and Australian Standards, i.e. to lower the likelihood of large leaks occurring.	Develop a procedure for disposing of any effluent that has entered the reclaim bund area, i.e. prevent it from entering the plant and introducing impurities. i.e. prevent it from entering the plant and introducing impurities.	Clare Keogh	~~27/09/2021~~ CLOSED

29	Reverse Flow	The flow from AN2 wet / ANS loadout HV356B enters nozzle J on the Nitrates Effluent Tank which currently has a dip pipe without the siphon breaker.	Potential for reverse flow, i.e. siphoning from the tank to the River Pit (potential licence breach) or the AN Washout Tank (impurities to the process).	River Pit diversion as per the existing procedures.	Remove the dip pipe in the Nitrates Effluent Tank to prevent reverse flow through nozzle J (or Drill Syphone holes close to tank ceiling – above overflow pipe)	Travers Searle	~~26/04/2022~~ CLOSED
30	High Temperature	Dumping the 92% Tank or misdirected flow from the 83% Tank to the effluent system.	Up to 120oC ANS entering the Nitrates Effluent Tank with the potential to exceed the site effluent temperature limit.	High temperature trip on the Nitrates Effluent Tank Pump at 80oC. Further cooling through dilution in the site effluent system. Temperature measurement and diversion into the Demin Tanks and then into the Diversion Pond if the site effluent temperature is too high.	No further action required	-	CLOSED
31	Impurities	Pump 15-74J26 fails and flow continues into the Nitrates Effluent Tank.	When the pump is restarted there is potential for suspended solids to flow to the River Pit, i.e. licence breach. This may be due to the tank inlet streams having high levels of suspended solids which could accumulate at the pump inlet nozzles' level and hence higher suspended solids being drawn into the pump when it is restarted	No known events are likely to generate short term high sludge flows into the nitrates effluent tank. Note: If this scenario proves to generate unacceptable suspended solids in the site effluent then further filtration or similar will be required.	No further action required	-	CLOSED

32	Impurities	Residual dosing chemical left in line 15-EF-9865 (the chemical dosing line to the Nitrates Effluent Tank).	Potential for adverse reaction when dosing chemicals are changed, e.g. caustic mixing with acid.	Dosing chemicals will be transferred under a temporary modification which will include the need for water flushing after each transfer.	Include a note on the ELD and also within the process description that states the chemical dosing transfer line should be flushed with water after each use.	Colin Gabriel	~~24/05/2021~~ CLOSED
33	Change in Composition or Concentration / Two-Phase Flow / Reactions	Potential to increase suspended solids in the effluent to the River Pit due to mixing when effluent splash fills into the tank.	Potential license breach.		Review during early operation the TSS in the effluent from the tank and whether the tank liquid level needs to be raised to avoid disturbing the sludge layer at the bottom of the tank and hence unacceptable discharges. Note: If suspended solids in the discharge is problematic and regular tank cleaning is required then filtration will need to be installed on the discharge of 15-74J26.	Clare Keogh	Jun-22
	Action requires calibration during operation. No influence on Startup						
34	Plant Items				Check that the tank vent and overflow sizes are adequate for the proposed tank inlet and outlet flowrates.	Colin Gabriel	~~27/10/2021~~ CLOSED

35	Plant Items				Tank cleaning queries: 1. Review if an 80mm drain valve will be adequate (large enough) for removing the type of sludge that will enter the tank. Note that the existing pond and similar tanks are vacuumed out with approximately 100mm diameter hoses (concern is blocking the 80mm valve). 2. Depending on the response to the above action, review if draining should also be done via nozzle N (note that this is elevated above floor level though) and if so, whether a valve is required on the nozzle. 3. Note the tank has internal baffles with drain slots and these are not required to be v	Travers Searle	~~26/04/2022~~ CLOSED
36	Plant Items				Confirm that there will be a suitable area for an IBC to be temporarily stored for dosing the nitrates effluent tank. Suitable access by appropriate vehicles lifting the IBC will be required. (IBC to be installed outside of tank bund and on a sealed pavement)	Travers Searle	~~27/11/2021~~ CLOSED
37	Plant Items				Relocate the NRV V10420 to upstream of drain valve V10422 to allow ease of draining for NRV maintenance. Note that this drain is also required for draining any liquid in the dosing chemical transfer hose, therefore, the hose connection to the drain valve V10422 should be free-draining.	Colin Gabriel	~~24/05/2021~~ CLOSED
38	Plant Items	Dosing chemicals to the Nitrates Effluent Tank will include 50% caustic soda and 50% nitric acid.	These are corrosive liquids.	Dosing system materials of construction to be compliant with Orica design standards for these dosing chemicals.	No further action required	-	CLOSED

39	Plant Items	Potential for low pH liquid (<1) to enter the effluent tank during startup.	Potential adverse corrosion impacts on the pumping systems (e.g. the sump pump as well as effluent pump).		Confirm that the pumping systems are suitably rated for low pH effluent.	Colin Gabriel	~~27/11/2021~~ CLOSED
40	Plant Items	Losses of containment of effluent into the bunded area.	Potential to corrode the concrete.	Project scope is to deliver a concrete bund without any further protection.	No further action required	-	CLOSED
41	Plant Items				Provide a suitable power supply outlet to run the chemical dosing pumps.	Justin Ford	~~30/08/2022~~ CLOSED
42	Instruments	Historically, the AN strength in the pond is 2-4%, however, there are upset conditions where the strength increases to approximately 20% or more, e.g. washdown from spills in the AN1 plant.			Consult with the AN Expert Panel whether this tank is required to be designed to meet the ANS Tank requirements, e.g. redundant level measurement and temperature measurement (given the range in concentrations noted in the Cause Column). Note that pump 15-74J26 has been designed as an ANS pump and therefore the tank is potentially an ANS tank. Also, refer to Jarrad's email dated October 23 2020 recommending two level instruments.	Jarrad Bird	~~8/11/2021~~ CLOSED
43	High Flow / High Level	FV in line 50-EF-9870 fails open.	Potential for high nitrogen to the river and potential licence breach.	Operator response to high concentration, conductivity and pH alarms with diversion to the Demin tanks.	As per other actions, show the valve fail position on the ELDs (this FV fails closed).	Colin Gabriel	~~24/05/2021~~ CLOSED
44	High Flow / High Level	15-74J26 stops and flow continues to siphon from the Nitrates Effluent Tank to the River Pit.	Potential for high nitrogen to the river and potential licence breach.	Operator response to high concentration, conductivity and pH alarms with diversion to the Demin tanks.	Include in the FD the requirement to shut the FV (Dwg 15-43391 Grid Ref B11) when pump 15-74J26 is not running.	Justin Ford	~~30/08/2022~~ CLOSED

45	Plant Items	Historically, the strainers upstream of the pH meter and Coriolis meter block.	Loss of pH and density measurement.		Provide a drain valve downstream of the pH meter as per existing design and ensure the pH meter remains wet or flooded when the pump stops i.e. the pH meter should not be drained by the new drain valve and hence dry out causing failure. Pipe this drain and drain V10441 to the sump to avoid splashing liquid on the bund floor causing corrosion. The discharge of each drain at the sump must be visible to the operators so that they can check the flow to fault- find blockages.	Travers Searle	~~27/11/2021~~ CLOSED
46	Plant Items				Provide an isolation valve downstream of the FV control valve (Dwg 15-43391 Grid Ref B11) and a drain valve for maintenance purposes. The drain valve could be either before or after the control valve (but inside the two manual isolation valves).	Colin Gabriel	~~24/05/2021~~ CLOSED
47	Plant Items				Mark-up the ELD to show a drain valve on the pH meter strainer S9612 to allow safe drainage for maintenance when the Effluent Pump remains in operation. Note that this drain valve exists on the strainer currently installed in the existing design.	Colin Gabriel	~~24/05/2021~~ CLOSED
48	Instruments				Update the FD to detail how the effluent flow and concentration values are derived and mark-up the ELD accordingly. This will require investigation of the current programming and how this can be incorporated into the new system.	Justin Ford	~~30/08/2022~~ CLOSED
49	Instruments	When 15-74J26 stops, the pipe with the Coriolis meter will drain to sump if drain valve V10441 is open.	Potential for damage to the Coriolis meter if it dries out(?).		Check with the Coriolis meter supplier if repeated drying out will cause a problem.	Justin Ford	~~3/10/2022~~ CLOSED

50	High Flow / High Level	Sump level transmitter reading too high.	Dry run and damage pump.		Check with pump supplier if the pump requires further protection, e.g. run timer to prevent damage.	Travers Searle	~~26/04/2022~~ CLOSED
51	Plant items				Provide a flanged joint upstream of RO-0585 to allow pump removal for maintenance.	Colin Gabriel	~~27/11/2021~~ CLOSED
52	Plant items				Install an isolation valve immediately downstream of V10443 (this is to allow use of a temporary pump to pump out the sump through V10445 to the River Pit). Provide an isolation valve in line 50-EF-9864 downstream of the 3- way HV valve to allow isolation for maintenance of this HV.	Colin Gabriel	~~24/05/2021~~ CLOSED
53	Plant Items				Mark-up the ELD to show the fail position for the 3-way HV on the discharge of 15-74J25 and include limit switches on the 3-way valve to alarm any valve out of position.	Colin Gabriel	~~24/05/2021~~ CLOSED
54	Plant Items	The drain between the concentrator bund and the washout tank bund could leak	Ground contamination if the drain pipe is underground		The drain between the concentrator bund and the washout tank bund needs to be aboveground. Show this on the ELDs	Colin Gabriel	~~29/11/2021~~ CLOSED
55	Plant Items				Provide local concentrator sump pump start / stop controls that can be accessed from outside the bund (or provide a platform to access the existing start / stop controls). Also, ensure that the sump pump discharge hose connection point (operated when a temporary pump is used) is accessible from outside the bund. This is required to ensure that all operations associated with the concentrator sump pump can be performed from outside of the bunded area, i.e. to prevent people from having to wade through a flooded bund to operate a sump pump	Justin Ford	~~30/09/2022~~ CLOSED

56	Reverse Flow	Potential for syphoning from the Nitrates Effluent Tank as the dip pipe has no reverse flow direction, e.g. opening drain valve V10506 (ELD 15- 0288 grid ref C3) or HV356A and B (on ELD 15-02888) open at the same time	Draining of the tank		Install a syphon break in the dip pipe for nozzle J on the Nitrates Effluent Tank (refer item 29 above)	Colin Gabriel	~~29/11/2021~~ CLOSED
57	Plant Items				Mark-up the ELD (or provide a Note) to indicate that the flow is from the Nitrates Effluent Tank bund to the right on the drawing for the internal bund weir (see Note 4)	Colin Gabriel	~~29/11/2021~~ CLOSED
58	Plant Items				Provide a hose connection point (with an isolation valve and camlok connection) in the effluent tank bund to allow the operators to connect a hose for flushing pipes etc. Note that the connections on the hose reels do not allow connection to a pipe for flushing purposes	Craig Tischler	~~29/11/2021~~ CLOSED

Attachment 2 – HAZCON Action Status

PINNACLE RISK MANAGEMENT - HAZARD IDENTIFICATION RECORD SHEET

PROJECT:	**C.006820 Nitrates Effluent Tank (Nitrates Effluent Tank)**	**TEAM MEMBERS:**	**Travers Searle, Keith Robertson, Clare Keogh, David C Brown, Sherree L Woodroffe Daniel Harris (Milleen Constructions)**
SYSTEM:	**Civil Works**	**LEADER:**	**Dean Shewring**
DRAWING:	**DSK-001; 15-43450; 15-43451; 3-D Model**	**MINUTES BY:**	**Sherree Woodroffe**
			DATE: 6/12/2021

No.	Guide Word	POSSIBLE CAUSE	POSSIBLE CONSEQUENCES	PREVENTED OR CORRECTED BY	ACTIONS RECOMMENDED	BY	Completion Date / Forecast
1.	Structural integrity	Degradation of existing or new bund walls in the future	Repair can only be performed from inside of either bund or from the top of the walls		Review with Structural Engineer to confirm that future repairs from inside bund or top of wall are acceptable	Travers Searle	~~6/12/2021~~ CLOSED
2.	Structural integrity	Installing the timber piles	Potential for ground displacement problems that may cause damage to the adjacent concrete bund	Displacement piles have been assessed and approved by the responsible engineers (D Bailey / A Hoffman)	If it occurs, concrete will need to be repaired. Review with the responsible engineers if this scenario was included in the assessment and subsequent approval of the use of timber piles	Travers Searle	~~28/2/2022~~ CLOSED
3.	Confined space	Deepest excavation is for excavation of the sump. The 800mm excavation is also a confined space	Potential to be a confined space hazard		Document the confined space assessment process for all excavations and determine which ones are to be managed as confined spaces	Travers Searle	~~28/2/2022~~ CLOSED
4.	Sequence				Review with B Galloway the project plans for the boilerhouse pit modifications, as well as the existing pipe from the boilerhouse to the effluent pond, as these may interfere with the planned effluent tank civils installation. For example, the drain from boilerhouse to the pond can be placed underground with protective steel capping	Travers Searle	~~28/2/2022~~ CLOSED

PINNACLE RISK MANAGEMENT - HAZARD IDENTIFICATION RECORD SHEET

PROJECT:	**C.006820 Nitrates Effluent Tank (Nitrates Effluent Tank)**	**TEAM MEMBERS:**	**Travers Searle, Keith Robertson, Clare Keogh, David C Brown, Sherree L Woodroffe Daniel Harris (Milleen Constructions)**
SYSTEM:	**Civil Works**	**LEADER:**	**Dean Shewring**
DRAWING:	**DSK-001; 15-43450; 15-43451; 3-D Model**	**MINUTES BY:**	**Sherree Woodroffe**
			DATE: 6/12/2021

No.	Guide Word	POSSIBLE CAUSE	POSSIBLE CONSEQUENCES	PREVENTED OR CORRECTED BY	ACTIONS RECOMMENDED	BY	Completion Date / Forecast
5.	Commissioning checks	Potential for failure of a water stop	Bund will leak if a loss of containment occurs		Include in the project plan the need to "wet test" the bund, i.e. partially fill with water to confirm bund integrity. Conduct a visual inspection of the existing bund to ensure no cracking or damage has occurred. Photograph the existing bund and wall prior to construction work occurring	Travers Searle	~~28/2/2022~~ CLOSED
6.	Environmental	Potentially need to dewater the excavation for the bund sump pit due to groundwater ingress	Management of potentially contaminated extracted groundwater		Determine the disposal option for the extracted groundwater if dewatering is required	Travers Searle	~~28/2/2022~~ CLOSED
7.	General				Review the need for the existing sign on the eastern side of the bund wall and reposition as appropriate	Travers Searle	~~28/2/2022~~ CLOSED
8.	Structural Integrity	Insufficient space to provide acceptable battering when installing the sump pit, e.g. due to the proximity of the adjacent pond wall	Potential for wall collapse during excavation		Include in the project plan means to secure the sump pit excavation to prevent collapse	Travers Searle	~~28/2/2022~~ CLOSED
9.	Environmental	Potential to overflow from the new effluent tank bund into the existing bunded area	Liquid can flow over the new bund wall and then north/south along the existing bund wall and therefore flow onto the ground rather than be directed into the existing bund		Include in the design means to prevent liquid runoff at the north and south ends of the existing bund wall to ensure all liquid flows into the existing bunded area	Travers Searle	~~28/2/2022~~ CLOSED

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SYSTEM:	**Civil Works**	**LEADER:**	**Dean Shewring**
DRAWING:	**DSK-001; 15-43450; 15-43451; 3-D Model**	**MINUTES BY:**	**Sherree Woodroffe**
			DATE: 6/12/2021

No.	Guide Word	POSSIBLE CAUSE	POSSIBLE CONSEQUENCES	PREVENTED OR CORRECTED BY	ACTIONS RECOMMENDED	BY	Completion Date / Forecast
10.	Access	Potential loss of containment of effluent into the bund during operation (pH from 1 to 10)	Potential corrosive impact to personnel if they are in the bund	As the bund wall is 1.25m in height then a person can escape by using the north west stairs or by sliding over the bund wall	Review the need for two means of escape from the bund	Travers Searle	~~28/2/2022~~ CLOSED
11.	Services				Confirm there is adequate towns water available (e.g. from the boilerhouse) to wet down area to avoid excessive dust emissions	Travers Searle	~~28/2/2022~~ CLOSED
12.	Environmental				Provide a containment area to allow concrete trucks to wash their chutes and therefore contain the resulting slurry	Travers Searle	~~28/2/2022~~ CLOSED
13.	Structural integrity	Potential for AN dust to settle on metal reinforcing prior to concrete pour	Corrosion		Include in the project plan means to protect the reinforcing between installation and concrete pour	Travers Searle	~~28/02/2022~~ CLOSED
14.	Environmental	Potential for rain to wash spoil from work area	Potential contamination of stormwater and build-up of sediment	CEMP include controls for management of sediment	No further action required	-	CLOSED

PINNACLE RISK MANAGEMENT - HAZARD IDENTIFICATION RECORD SHEET

PROJECT:	**C.006820 Nitrates Effluent Tank (Nitrates Effluent Tank)**	**TEAM MEMBERS:**	**Travers Searle, Matthew Anstey, Clare Keogh Adam Gavenlock, Keith Robertson, Sherree L Woodroffe, Colin Gabriel Ben Taylor (Pacific Welding Australia) Grant Davies (Pacific Welding Australia)**		
SYSTEM:	**Structural, Mechanical, Piping (SMP) Construction Works**	**LEADER:**	**Dean Shewring**	**DATE: 03/02/2022**	
DRAWING:	**3-D Model**	**MINUTES BY:**	**Sherree Woodroffe**		

No.	Guide Word	POSSIBLE CAUSE	POSSIBLE CONSEQUENCES	PREVENTED OR CORRECTED BY	ACTIONS RECOMMENDED	BY	Completion Date / Forecast
1.	Hot work	Hot work on any existing pipe that contains residual AN	If the AN is heated and confined then explosive decomposition can occur. This can lead to fatality	All tie-ins to comply with Orica cold cutting techniques (reciprocating saw used to cut piping), Permit to Work and decontamination procedure (flushing prior to break-ins). Isolations to comply with 'Isolation of Plant and Equipment from Hazardous Materials, Electrical and Stored Mechanical Energy Procedure'	Include the hazards of AN decomposition in the project plans with a summary of the required controls. Brief workers on the hazards associated with AN containing equipment and the controls	Travers Searle	~~12-3-2022~~ CLOSED
2.	Access	Work on the concentrator pump maintenance access platform	Potential for a person to slip on the HDPE effluent pond liner and fall into the pond		Include appropriate hard barricading to provide safe access the work area (e.g. scaffold handrail). Apply barricading to the northern section of the effluent pond as well (to comply with Work Health and Safety Regulation regarding working near water)	Travers Searle	~~31-3-2022~~ CLOSED

PINNACLE RISK MANAGEMENT - HAZARD IDENTIFICATION RECORD SHEET

PROJECT:	**C.006820 Nitrates Effluent Tank (Nitrates Effluent Tank)**	**TEAM MEMBERS:**	**Travers Searle, Matthew Anstey, Clare Keogh Adam Gavenlock, Keith Robertson, Sherree L Woodroffe, Colin Gabriel Ben Taylor (Pacific Welding Australia) Grant Davies (Pacific Welding Australia)**		
SYSTEM:	**Structural, Mechanical, Piping (SMP) Construction Works**	**LEADER:**	**Dean Shewring**	**DATE: 03/02/2022**	
DRAWING:	**3-D Model**	**MINUTES BY:**	**Sherree Woodroffe**		

No.	Guide Word	POSSIBLE CAUSE	POSSIBLE CONSEQUENCES	PREVENTED OR CORRECTED BY	ACTIONS RECOMMENDED	BY	Completion Date / Forecast
3.	Piping installation	Installation of new pipes on piperacks containing existing hazardous materials, e.g. ammonia	If the work activities propagate to a pipe carrying a hazardous material then there is the potential for significant impacts to construction personnel	Permit to work requirements for pipe protection, e.g. welding blankets	Include in the project plan identification (e.g. local signage) of pipes containing hazardous materials such as ammonia, concentrated ANS, nitric acid and steam. Aim for longest spools of pipework possible to minimise in-situ welding	Travers Searle	~~12-3-2022~~ CLOSED
4.	Access	Poor valve and equipment access	Difficulty maintaining and operating the equipment		Ensure that all new valves and other equipment are easily accessible to both operations and maintenance personnel, e.g. HV383A needs to be relocated	Travers Searle	~~12-3-2022~~ CLOSED
5.	Access	Heavy vehicle movements could damage in-ground effluent tanks and pits	Loss of effluent to groundwater, i.e. environmental impact		Apply the same controls used in the civils HAZCON to protect the existing structures and equipment in the area to the east of the effluent tank from the proposed truck and crane movements	Travers Searle	~~12-3-2022~~ CLOSED
6.	Electrical	Potential for lightning to strike the tank when in position	Transfer of voltage to workers if the tank is not adequately earthed		Earth tank at the same time as the hold down bolts are secured	Travers Searle	~~12-3-2022~~ CLOSED

PINNACLE RISK MANAGEMENT - HAZARD IDENTIFICATION RECORD SHEET

PROJECT:	**C.006820 Nitrates Effluent Tank (Nitrates Effluent Tank)**	**TEAM MEMBERS:**	**Travers Searle, Matthew Anstey, Clare Keogh Adam Gavenlock, Keith Robertson, Sherree L Woodroffe, Colin Gabriel Ben Taylor (Pacific Welding Australia) Grant Davies (Pacific Welding Australia)**		
SYSTEM:	**Structural, Mechanical, Piping (SMP) Construction Works**	**LEADER:**	**Dean Shewring**	**DATE: 03/02/2022**	
DRAWING:	**3-D Model**	**MINUTES BY:**	**Sherree Woodroffe**		

No.	Guide Word	POSSIBLE CAUSE	POSSIBLE CONSEQUENCES	PREVENTED OR CORRECTED BY	ACTIONS RECOMMENDED	BY	Completion Date / Forecast
7.	Access				Ensure that the existing hose reel within the reclaim/process condensate bund can be accessed from outside the bund for washdown purposes. Final location to be determined in conjunction with operations and maintenance, e.g. a new area for temporary washdown purposes can be immediately to the south of the effluent tank and therefore the hose reel is required along the southern bund wall	Travers Searle	~~31-3-2022~~ CLOSED
8.	Access	Effluent pit 15F51 is to be replaced and will have a solid barricade around it during construction and four bollards post installation	Potential to impede truck and crane access during tank installation		Liaise with the Project Manager for the effluent pit replacement job to obtain details and plan work scope to avoid conflicts	Travers Searle	~~12-3-2022~~ CLOSED
9.	Environmental	Rain water build up in nitrates effluent pond	Overflow of pond if pond level is not managed prior to demolition		Finalise plans for pond decommissioning and management of water levels in the pond until demolition of the pond occurs	Travers Searle	~~31-3-2022~~ CLOSED

Attachment 3 – Orica KI Emergency Plan

Supplied as file "230310 Att 3 KI_ERP 1972391.pdf"

Attachment 4 – Orica KI Safety Management System

Supplied as file "230310 Att 4 KI_SMS 2393671.pdf"