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HSE-E-104-SUM	2	06 JULY 2016

Dongara Water Disposal Well

Acid Wash

Environmental Summary Document

Permit: L1

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1.0 CONTACT DETAILS

Regulatory and Community Affairs Manager
AWE Limited
Level 3, 1101 Hay Street
WEST PERTH WA 6005
Phone: 08 9480 1300

2.0 PURPOSE

The objective of the proposed well intervention activity (WIA) is to conduct an acid wash on the Dongara Water Disposal Well (WDW) to improve injectivity by removing scale build-up.

The Dongara Water Disposal Well operates under the Dongara Gas Field Environment Plan [21/HSEQ/ENV/PL03] Rev 0 approved by the Department of Mines and Petroleum (DMP) on 21 March 2014.

3.0 ACTIVITY LOCATION

The Dongara WDW wellhead is located in Permit L1 in the northern Perth Basin.

Surface location: X-coordinate 306592; Y-coordinate 6761443

Dongara WDW is located inside the Dongara Production Facility (DPF). The DPF and Associated Gas Field are located in Petroleum Production Licences L1 and L2 (refer to Figure 1 below). The DPF is located on the corner of Brand Highway and the Midlands Road near the Irwin River. The DPF is 7km east of the Dongara town ship and approximately 350km north of Perth.

Figure 1 DPF (Dongara WDW) local sensitivities

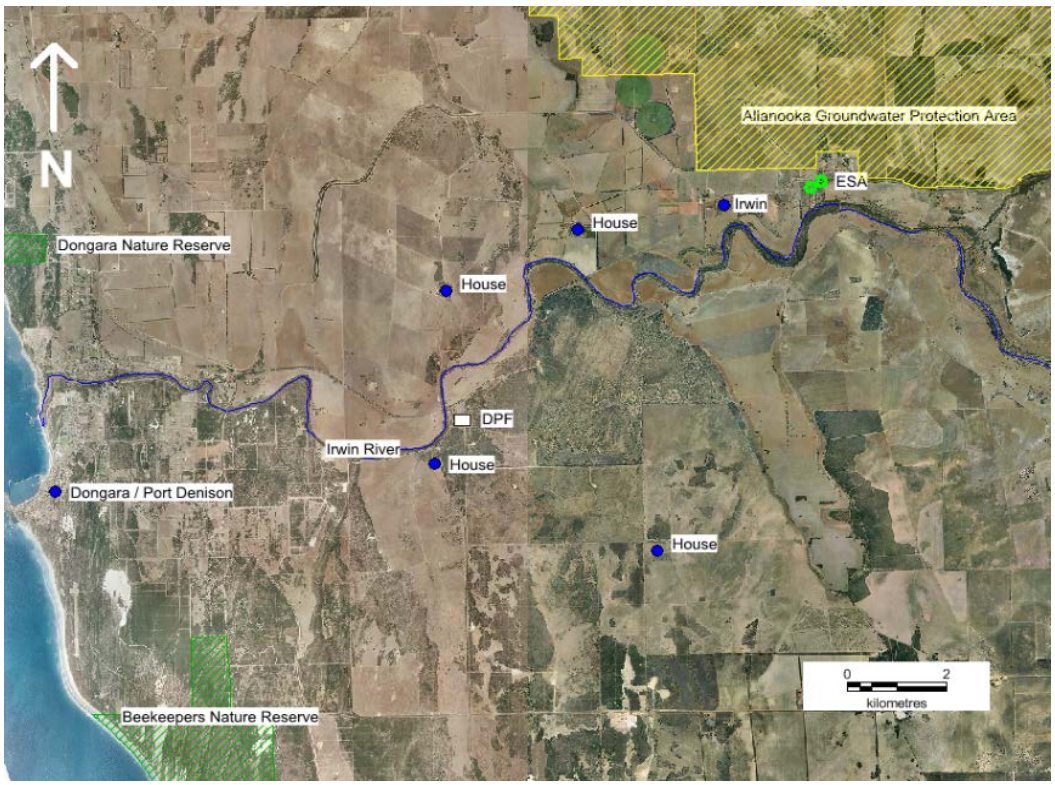
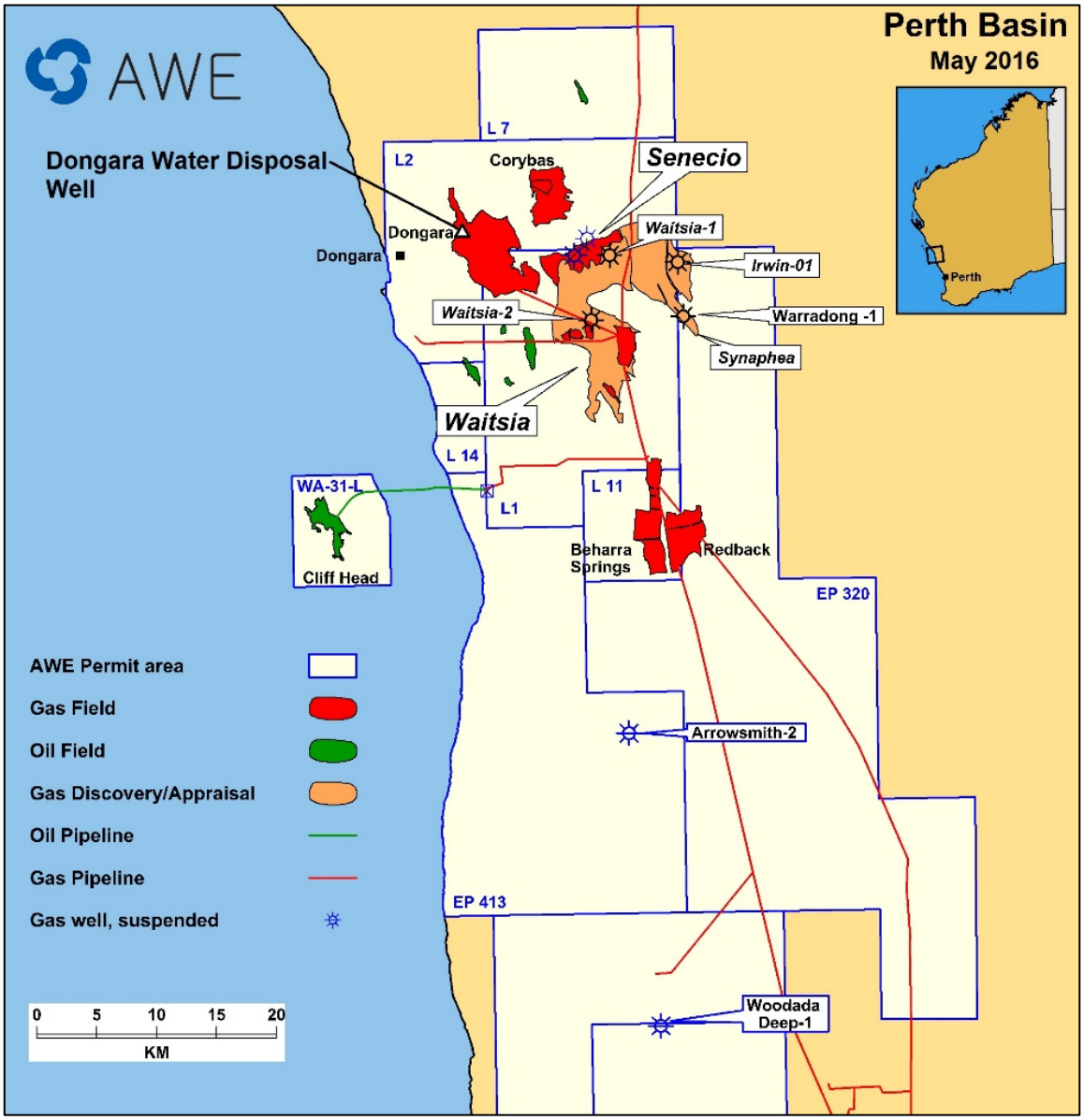


Figure 2 DPF (Dongara WDW) Location Perth Basin



4.0 GENERAL DESCRIPTION OF EXISTING ENVIRONMENT

4.1 Natural environment

A summary of the environment surrounding DPF is included in Table 1. Figure 1 indicates sensitive receptors with respect to DPF.

Table 1 Description of the Environment

Aspect	Detail
Climate	Mediterranean climate characterised by seasonal patterns of hot, dry summers and mild, wet winters
Soils	Sandy, well drained soils consisting of calcareous and siliceous sand underlain by aeolianite, which is often exposed
Surface water	Irwin River (200 m west)
Groundwater	Groundwater level is approximately 10 m below ground surface The nearest Groundwater Dependent Ecosystem (GDE) is located >10km SE of DPF
Conservation Areas	DPF is not located in the vicinity of conservation estate (Redbook Area, Environmental Sensitive Area (ESA) or Nature Reserve)
Vegetation	Vegetation at DPF is cleared around process equipment with firebreaks surrounding the facility. Vegetated bushland lies within 100m of Dongara WDW. No ecological communities of national or state significance are known to occur within the area
Fauna	Dongara-WDW/DPF is fenced to prevent fauna access Invertebrates known to occur within DPF and reptiles have been observed Acid wash operations will not impact on significant fauna habitat
Aboriginal Heritage	No areas of cultural heritage significance within 5 km of DPF
European Heritage	No areas of European heritage significance within 5 km of DPF
Socio-economic	Dongara, which is 7 km west, is the centre of a long standing, regional oil and gas industry Land use surrounding DPF is cattle grazing Nearest residence 1 km southwest of DPF

5.0 DESCRIPTION OF THE ACTIVITY

The Dongara WDW is unable to have disposal water injected due a build-up of scale. Hence, the goal of this work program is to:

- To restore and improve injectivity by removing scale. The main treatment on the Dongara-WDWwill be to conduct an acid wash using 2 m^3 (2000 L) of 15% HCl as a pre-flush and 2 m^3 (2000 L) of 15% HCl.

The proposed acid wash is scheduled to occur as soon as possible subject to regulatory approvals. The program is expected to be of 2-3 days duration. A total of 4,000 litres of 15% HCl acid will be pumped downhole to remove near wellbore scale build up. This will be followed by approximately 3.18 m^3 (20 bbls) of water to perform an injectivity test and a further 4.77 m^3 (30 bbl) of water for the pressure test. Similar acid wash techniques performed previously have successfully restored the well injection rates.

AWE anticipates that this activity will be conducted on a routine basis (possibly every six months), should the volumes of acid required exceed what is proposed within this document for a single acid wash event AWE would seek further approval from the DMP. This is an interim measure and AWE request this approach is adopted for a period of 24 months whilst a permanent measure is evaluated.

The use of a low concentration acid (15% HCL) has proven to be the most effective means of dissolving scale within the disposal well. The acid wash program allows for the pre wash which essentially dissolves the scale within the well bore, the chemistry of the acid and scale reaction means that once the scale is dissolved, the freshwater post wash treatment further dilutes the now neutralised fluid improving injectivity into the formation.

In terms of cumulative risks, as the acid dissolves the scale it effectively renders itself neutralised, there is very little chance of cumulative risks as a result of treatments six months apart. The disposal well is currently used for PFW and stormwater in line with the Dongara Gas Field Environment Plan [21/HSEQ/ENV/PL03] Rev 0, keeping the disposal well operational is cirtical in the continued operation and maintenance of the Dongara Production Facility.

5.1 Products, additives, chemicals and other substances disclosure

The objective of this Bridging Document is to disclose products, additives, chemicals and other substances required under the Petroleum and Geothermal Energy Resources (Environment) Regulations 2012.

AWE Limited confirms that all chemicals and substances have been accurately disclosed in Table 3 (A-C) for its Dongara WDW acid wash technical program.

5.2 Site rehabilitation

The Dongara Gas Field is currently in a “normal operation” mode. It is temporarily shut-in and undergoing some scheduled maintenance. No site rehabilitation work is planned while the DPF is operating.

5.3 Site preparation and earthwork

Site preparation and earthworks are not required.

5.4 Impacts and risks of activity

The risks and impacts associated with by the activity are assessed in the accepted EP.

The major risks associated with this activity are:

- Fuel, oil or chemical spills (risk analysis ranked this risk as low)
- Disposal of waste (risk analysis ranked this risk as low)
- Groundwater contamination (risk analysis ranked this risk as low)

6.0 MANAGEMENT APPROACH

The implementation strategy outlined in the accepted EP is applicable to the proposed activity. The aspects include:

- Systems, practices and procedures
- Roles and responsibilities of personnel
- Training and competencies
- Monitoring, auditing, management of non-conformance and review
- Emergency response (including oil spill contingency plan)
- Record keeping
- Reporting

The WIA program will be managed in accordance with the commitments outlined in the AWE Onshore North Perth Basin Well Intervention Activities Environment Plan (EP) [HSE-E-75] Rev E. For the purposed WIA; there are no additional risks or impacts above or beyond the accepted EP [HSE-E-75] Rev E approved December 16 2013.

The WIA will be managed in accordance with the Perth Basin Oil Spill Contingency Plan for Drilling and WIA [HSE-OP-030] Rev 10 approved by DMP 05 May 2014, the plan provides adequate spill response measures for the proposed activity.

7.0 CONSULTATION

Consultation for the WIA is listed in Table 2 AWE commits to ongoing consultation during the WIA.

Table 2 Consultation Record

Stakeholders	Issues and resolution
DMP (Resources Branch)	Technical program being developed for submission to DMP.
DMP (Environmental Branch)	16-December-2013: DMP's Acceptance of the AWE Onshore North Perth Basin Well Intervention Activities Environment Plan (EP) [HSE-E-075] 31-March-2014: Dongara Water Disposal Well-01 Acid Wash Environmental Bridging Document (W-WDW1-004, Revision 0) accepted by DMP. 3-October 2014: Dongara-WDW Acid Wash Bridging Document Rev 0 submitted to DMP [W-WDW1-004] - this document.
Landowner	AWE Limited is the landowner of the Dongara Production Facility site.
Department of Water	AWE provided a written summary of the proposed acid wash treatment to Department of Water for comment (13/06/16) requesting feedback.

The AWE Mid -West website (www.awemidwest.com.au) covering its Perth Basin activities is an additional method for AWE to communicate with stakeholders on a continuing basis. The website includes project specific pages as well as blogs highlighting updates and responding to particular topics of interest to our stakeholders. It also includes an option to subscribe to news feeds and to contact AWE for additional information.

8.0 CHEMICAL DISCLOSURE

Table 3 Products, additives, chemicals and other substances

Table 3.A System Details

Operator	AWE Perth Pty Ltd
Project/Well	Dongara Water Disposal Well
System	Acid Wash
Total Volume of System	15000L* (includes 25% contingency)

Table 3.B Product List

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data	% Product in system fluid	SDS Attached
Water	Town or bore water	Base fluid	N/A- Natural product.	53.10%	N/A
HCL_15%	Telford Industries	Acid to remove (scale pre-flush and post flush)	Acute/Chronic toxicity *HCL as an ingredient*: 15% LD50 (Oral): >900mg/Kg (rat) LC50 (Inhalation): 300 ppm/hr (rat) Biodegradation/Bioaccumulation: When released into the soil, this material is not expected to biodegrade. When released into the soil, this material may leach into groundwater. Water: 85% Natural product	46.90%	Yes

Table 3.C Chemical List

Chemicals Name	CAS number	Mass fraction (%)
Water	7732-18-5	93%
Hydrochloric acid	7647-01-0	7%
		Total:100%

Attachment 1
SDSs

7 Valentine Street
Kewdale WA 6105
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Western Australia 6986
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TELFORD INDUSTRIES

Chemicals & Equipment
Industrial
Swimming Pool
Mining
Water Treatment

Cromag Pty Ltd ABN 13 008 935 760
ACN 008 935 760 trading as Telford Industries

MATERIAL SAFETY DATA SHEET

HAZARDOUS SUBSTANCE ACCORDING TO WORKSAFE AUSTRALIA

1. IDENTIFICATION

Product Name: **Telchem Hydrochloric Acid 15%** (+/- 1%)

Other Names: Muriatic Acid, Spirits of Salts, HCl

Recommended Uses: Acidising of petroleum wells, boiler scale removal, chemical intermediate, ore reduction, food processing, pickling and metal cleaning, alcohol denaturant, pH adjusting of swimming pool water.

Supplier Name: Telford Industries
Street Address: 7 Valentine Street, Kewdale WA 6105
Telephone: 1800 835 115
Facsimile: 1800 835 222

Emergency Telephone Number: 0409 313 441

2. HAZARDS IDENTIFICATION

This material is hazardous according to health criteria of NOHSC Australia.

Hazard Category:
C Corrosive
T Toxic

Risk Phrase(s):
R23 Toxic by inhalation.
R35 Causes severe burns.

Safety Phrase(s):
S1/2 Keep locked up and out of the reach of children.
S9 Keep container in a well ventilated place.
S26 In case of contact with eyes, rinse immediately with plenty of water & seek medical advice.
S36/37/39 Wear suitable protective clothing, gloves & eye/face protection.
S45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

3. COMPOSITION / INGREDIENTS INFORMATION

CHEMICAL NAME	CAS NUMBER	PROPORTION
Hydrochloric Acid	7647-01-0	15% (+/- 1%)
Water	7732-18-5	balance
		100%

4. FIRST AID MEASURES

If poisoning occurs, contact a doctor or Poisons Information Centre (Phone 131 126)

Inhalation: Remove from exposure, keep warm and rest. If not breathing, give artificial respiration. If breathing is difficult, administer oxygen. Seek immediate medical attention.

Skin Contact: Avoid contact with this chemical. Remove affected clothing including footwear and wash affected area thoroughly copious quantities of water immediately. If irritation occurs, seek medical advice.

Eye Contact: Flush eyes with water immediately for at least 15 minutes. Forcibly hold eyelids apart to ensure complete irrigation of all eye and lid tissue. Seek immediate medical attention.

Ingestion: Wash out mouth with water and give large quantities of water to drink. DO NOT induce vomiting. Transport to hospital immediately.

Notes to physician: Treat symptomatically. Inhalation of high concentration of vapour may cause pulmonary oedema.

5. FIRE-FIGHTING MEASURES

Specific Hazards: Non-combustible material. If involved in fire, this product will release large quantities of hydrogen chloride gas which is very corrosive.

Fire-fighting further advice: Non-combustible liquid. However, will support combustion of other products. Incompatible with oxidizing agents, alkalis, metals, organic halogen compounds, nitro and chloro organic compounds and sources of ignition. Corrosive to steel, aluminium, tin, zinc and most metals generating flammable/explosive hydrogen gas. Will emit toxic fumes in a fire including hydrogen chloride. Fire fighters to wear self-contained breathing apparatus and full protective clothing. If available, spray water on containers to keep cool.

Suitable extinguishing media: Not combustible, however if material is involved in a fire use water fog (or if unavailable fine water spray), foam, dry agent (carbon dioxide, dry chemical powder).

Hazchem Code: 2R

6. ACCIDENTAL RELEASE MEASURES

Spills & Disposal: Hydrochloric Acid is completely soluble in water.

Small Spills: Dilute with a lot of water and wash away. Work from up-wind.
Large Spills: Only persons wearing full protective gear, including forced air breathing equipment, should attempt to deal with either a major leak or a major spill. Contain spill, if at all possible, using solid absorbents such as soil, clay or others eg vermiculite. Make every effort to prevent a major discharge of the product into waterways or sewers. Note: a vapour cloud of acid fumes can be (partially) knocked down with water spray or fog. Larger spills or acid soils can be treated (neutralised) with lime or soda ash.
WARNING: concentrated acid can react violently with these materials, thus neutralising agents

must be added cautiously. Some dilution with water will help, provided the additional volume of liquid can be contained. Once neutralised the liquid or solid absorbent is highly concentrated in chloride salts. Disposal should be decided together with local authorities.

Dangerous Goods - Initial Emergency Response Guide No: 40

7. HANDLING AND STORAGE

Handling: Avoid skin and eye contact and inhalation of vapour. Ensure an eye bath and safety shower are available and ready for use. Observe good personal hygiene practices and recommended procedures. Wash thoroughly after handling.

Storage: Store in a cool, dry, well-ventilated area. Keep containers tightly closed when not in use. Inspect regularly for deficiencies such as damage or leaks. Protect against physical damage. Store away from incompatible materials including oxidizing agents, acids, alkalis, metals, organic halogen compounds, nitro and chloro organic compounds and sources of ignition. Use corrosion resistant structural materials and lighting and ventilation systems in the storage area. Protect from direct sunlight, moisture and static discharges.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

National Exposure Standards: The following exposure standard has been established for this product by The Australian Safety and Compensation Council (ASCC) formerly known as NOHSC; Hydrochloric Acid cas no: 7647-01-0 TWA = 5ppm 7.5mg/m3 Peak limitation

Biological Limit Values: No information available on biological limits for this product.

Engineering Controls: A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area.

Personal Protective Equipment: RESPIRATOR: Wear an approved respirator where dusts/vapours are generated and engineering controls are inadequate (EN149). EYES: Chemical eye goggles and face shield (EN166). HANDS: Protective PVC gloves (EN374). CLOTHING: Corrosion-resistant coveralls and safety footwear (EN465).

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance & Odour: Colourless to slightly yellow corrosive liquid with pungent acidic odour.
pH: <1
Vapour Pressure: Not available
Vapour Density: 1.3 (air = 1)
Boiling Point/Range ^{o}C: 109^{o}C
Melting Point/Range ^{o}C: <-20^{o}C
Solubility in Water: 100% soluble in water.
Specific Gravity: 1.07-1.08 at 20^{o}C
Flash Point (^{o}C): Not flammable.
Flammability Limits (%): Not flammable.
Ignition Temperature (^{o}C): Not available
Molecular Formula: HCl
Additional Information:
(Typical values only – consult specification sheet)

10. STABILITY AND REACTIVITY

Chemical Stability: Product is stable under normal conditions of use, storage and temperature.

Conditions to Avoid: Avoid excessive heat, direct sunlight, moisture, static discharges, freezing and high temperatures.

Incompatible Materials: Incompatible with oxidizing agents, acids, alkalis, metals, organic halogen compounds, nitro and chloro organic compounds and sources of ignition.

Hazardous Decomposition Products: Will emit toxic fumes in a fire including hydrogen chloride. Contact with oxidizing agents liberates toxic chlorine gas. Corrosive to metals generating flammable/explosive hydrogen gas.

Hazardous Reactions: Hazardous polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

Acute Effects

Inhalation: Toxic by inhalation! Effects of inhaling vapour and mists have not been clearly established. Most references indicate that irritation of the nose, throat and lungs would occur due to the corrosive nature of the product.

Skin Contact: Extremely corrosive! Capable of causing severe skin burns with deep ulceration. Can penetrate to deeper layers of skin. Corrosion will continue until removed. Severity depends on concentration and duration of exposure. Repeated/prolonged contact with dilute solutions may lead to irritant contact dermatitis.

Eye Contact: Extremely corrosive! Can penetrate deeply causing irritation or severe burns depending on the concentration and duration of exposure. In severe cases, ulceration and permanent damage may occur.

Ingestion: Corrosive! Causes burning of the mouth, throat and oesophagus, vomiting, diarrhoea, collapse and possible death may result.

Long Term Effects: No data available.

Acute Toxicity / Chronic Toxicity: Oral LD50 Rat: >900mg/Kg Inhale LC50 Rat: 300ppm/1hr

12. ECOLOGICAL INFORMATION

Ecotoxicity: No information available.

Persistence & Degradability: No information available.

Mobility: No information available.

13. DISPOSAL CONSIDERATIONS

Refer to State/Territory Land Waste Management Authority.

14. TRANSPORT INFORMATION

Classified as Dangerous Goods by the criteria of the Australian Dangerous Goods Code (ADG code) for transport by road and rail.

UN No: 1789

Dangerous goods Class:	8
Packing Group:	II
Hazchem Code:	2R
Proper Shipping Name:	HYDROCHLORIC ACID

15. REGULATORY INFORMATION

Poisons Schedule (Aust): S6

16. OTHER INFORMATION

Telford Industries reserves the right to change the chemical specifications without notice.

Material Safety Data Sheets are updated frequently. Please ensure that you have a current copy.

This MSDS summarises Telford Industries best knowledge of the health and safety hazard information of the selected substance and how to safely handle the selected substance in the workplace however Telford Industries expressly disclaims that the MSDS is a representation or guarantee of the chemical specifications for the substance.
Each user should read the MSDS and consider the information in the context of how the selected substance will be handled and used in the workplace including its use in conjunction with other substances.

END OF MSDS

TELFORD INDUSTRIES

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