# Public Report

Q-4120-15-RP-017

# Talinga Water Treatment Facility Quarter 1 2013 Discharge Water Quality Report

**(1 Janurary to 31 March 2013)**

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## Contents

# 1. Summary

Australia Pacific LNG is a joint venture between Origin, ConocoPhillips and Sinopec, to deliver a coal seam gas (CSG) to Liquefied Natural Gas (LNG) project which will deliver gas to domestic and overseas markets.

Australia Pacific LNG is the leading CSG producer in Queensland, supplying more than 40% of the State's domestic gas requirements.

The Talinga Water Treatment Facility (TWTF) has been designed using the best available technology to treat water produced as part of the gas extraction process so that it can be put to a number of beneficial uses. CSG water is treated to a quality consistent with potable water. Treated CSG water is also discharged to the Condamine River, which is a source of public drinking water.

This report presents a summary of the water quality monitoring results obtained during the first quarter of Year 2013. During the quarter there has been *no exceedances in quality criteria*, demonstrating that the TWTF consistently and reliably treats CSG water to a standard which is safe for discharge into a source of public drinking water. This Report has been produced in accordance with the Queensland Government's *Public Reporting Guideline for Recycled Water Schemes* (DERM, 2011) and the *Water Supply (Safety and Reliability) Act 2008* (the Act).

# 2. Introduction

CSG production relies on the removal of water from the coal seams allowing gas to be readily extracted. The removed water is referred to as CSG water.

CSG water is generally of low quality with very few applications for direct use. Users of water from coal seams are generally restricted to a small numbers of agricultural and industrial operations. To maximise the potential future value of CSG water, Australia Pacific LNG has chosen to utilise an advanced desalination process to treat the water to a quality consistent with domestic potable water supplies.

The TWTF is one of Australia Pacific LNG's major installations where CSG water is treated. The TWTF uses the best available technologies to treat the water to a quality consistent with domestic potable supply.

Once treated, the CSG water is used onsite for Australia Pacific LNG's business activities including for drinking and domestic purposes, operations service water and construction activities. This reduces Australia Pacific LNG's reliance on other water resources.

The treated CSG water is also discharged to the Condamine River where it contributes to the base flows. The Condamine River is an essential resource to local communities and landowners in the region. It is the principal drinking water supply for the Condamine Township (located approximately forty seven kilometres downstream of the TWTF discharge location) as well being used for agricultural irrigation and to support local industries. Protecting its existing quality and condition is therefore vital to ensure its long term sustainable use.

**Figure 1 - TWTF Discharge Location**

To ensure the safety and reliability of the treated CSG water entering the river, Australia Pacific LNG is engaged in a comprehensive ongoing monitoring program of water quality sampling, testing and reporting. This report summarises the results of that monitoring conducted during the first quarter (i.e. from 1 Janurary to 31 March) of 2013.

In presenting this information Australia Pacific LNG honours its commitment to providing transparency and ensuring the community, landowners and other key stakeholders have confidence that the treated CSG water can be safely discharged into a source of drinking water.

All the reporting is publicly available and can be viewed and downloaded from the Australia Pacific LNG website at www.aplng.com.au. Any enquiries relating to this report should be made to toll free number 1800 526 369.

Alternatively, general enquires can be made by email (contact@aplng.com.au) or mail to Australia Pacific LNG Pty Limited, GPO Box 148, Brisbane, QLD, 4001.

# 3. Talinga Water Treatment Facility Scheme Description

The TWTF uses a series of water screening, filtration and reverse osmosis processes to remove impurities from the CSG water to ensure its safety and reliability for supply into a drinking water source and beneficial uses. The key treatment processes include:

- Feed pond;
- Filtration;
- Reverse osmosis; and
- Treated CSG water conditioning.

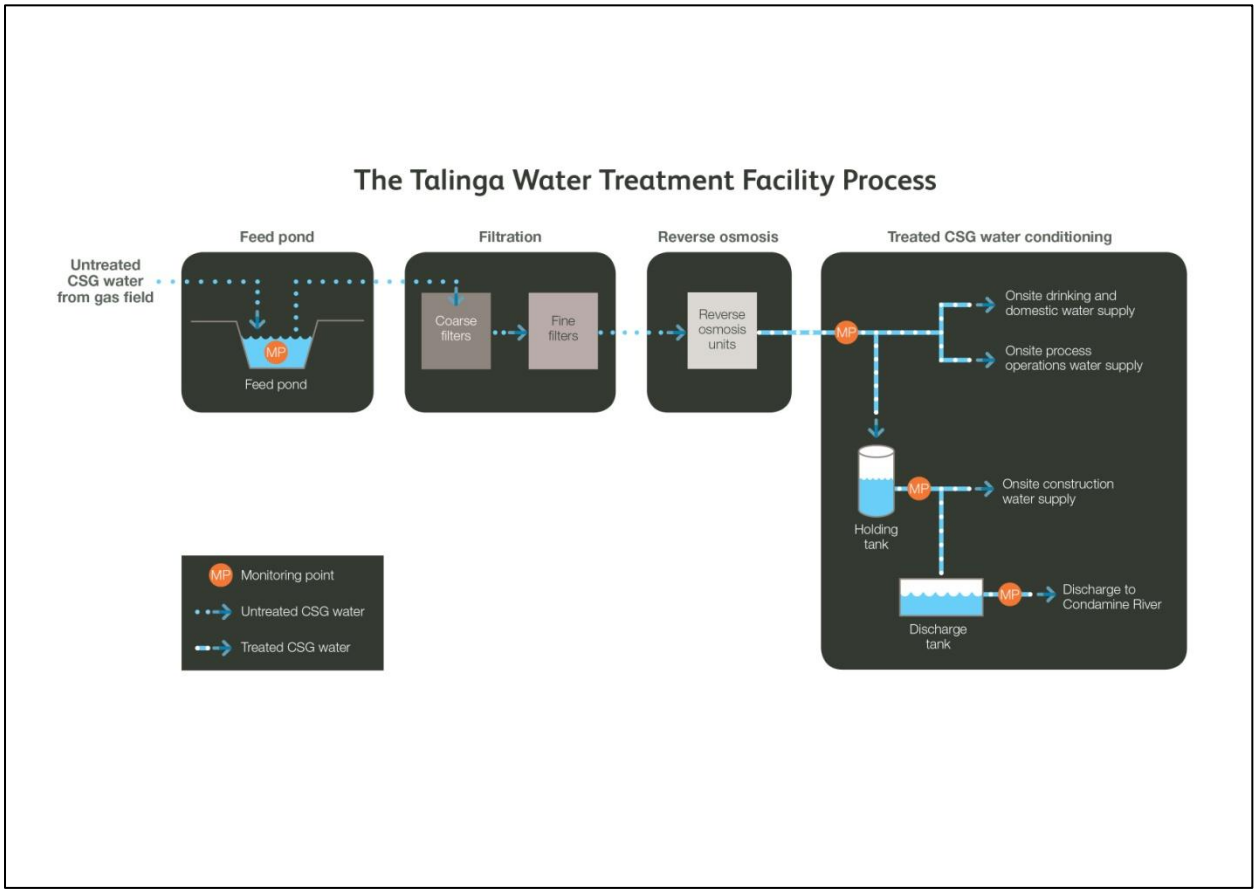


**Figure 2 - TWTF Process Schematic**

## 3.1. Feed Pond

Untreated CSG water gathered from the gas field is temporarily stored in a feed pond prior to its treatment by the TWTF. The feed pond holds the CSG water for approximately one to two weeks. This allows the settlement of coarse suspended sediments and provides opportunity for the CSG water to aerate and oxygenate.

## 3.2. Filtration

The CSG water is then passed through a coarse filter and then a fine filter to remove any particles or suspended sediments that have not settled within the feed pond. A disinfectant commonly used in domestic water treatment facilities is also added prior to the filtration process to protect the treatment system.

### 3.3. Reverse Osmosis

Prior to reverse osmosis, the disinfectant added during the filtration process is removed to protect the membranes from oxidation.

Reverse osmosis involves passing the CSG water through fine membranes at high pressure. This removes most of the dissolved salts and other trace elements.

At this point the water is either transferred to a holding tank, where it is held prior to discharge or piped for use onsite.

### 3.4. Treated CSG Water Conditioning

Prior to entering the holding tank the pH of the treated CSG water is adjusted to ensure its suitability for use, and any existing disinfectant in the system is removed.

When the treated CSG water is discharged to the Condamine River, calcium and magnesium are added. This conditioning is undertaken to ensure a minimum level of these elements are present in the Condamine River to protect the environment.

## 4. Approvals, Monitoring and Results

In order to discharge to the Condamine River, Australia Pacific LNG gained approval from the Queensland Government's Department of Environment and Heritage Protection (EHP), formerly known as the Department of Environment and Resource Management (DERM). The approval was granted under two separate pieces of the Queensland legislation; the *Environmental Protection* Act 1994 and the *Water Supply (Safety and Reliability) Act 2008*.

On 2 March 2012, Australia Pacific LNG received approval from the Queensland Water Supply Regulator (QWSR), formerly known as the Office of Water Supply Regulator (OWSR) for the proposed Recycled Water Management Plan (RWMP) submitted for the Talinga recycled water scheme. Australia Pacific LNG is the first CSG Company to be granted such an approval. The TWTF RWMP replaces the interim RWMP that was prescribed in the *Water Supply (Safety and Reliability) Regulation 2011*.

The content of this quarterly report reflects the reporting requirements outlined within this information notice of approval, and the reporting frequency aligns with that outlined in section 274 of the Act.

### 4.1. Regular External Laboratory Monitoring

The treated CSG water is sampled on a weekly basis for a standard set of parameters and a quarterly basis for a specific set of parameters (refer to Tables 2 and 3 in Attachment 1 respectively) and sent to an independent laboratory for testing. The sampling takes place at the discharge tank prior to the release of the treated CSG water to the Condamine River.

The samples are tested for a comprehensive range of parameters. A summary of the full water quality monitoring results for the TWTF is shown in Attachment 1 at the end of this report.

The water quality monitoring is undertaken using an industry-wide protocol developed by Standards Australia and EHP. Following these standards ensures the water samples are correctly obtained, stored and transported to allow accurate and representative testing in the laboratory.

The water is tested at a variety of laboratories that are independent of Australia Pacific LNG's operations. Each laboratory is accredited by the National Association of Testing Authorities (NATA) for each parameter monitored for in this program.

*"NATA is the authority that provides independent assurance of technical competence through a proven network of best practice industry experts for customers who require confidence in the delivery of their products and services"* – NATA website.

The monitoring of treated CSG water from the TWTF are summarised in Table 1. The results of the monitoring show that all parameters were below the water quality limits for the reporting period. This confirms the TWTF processes are both safe and reliable at treating CSG water prior to its discharge into a source of drinking water.

## 4.2. TWTF Online Indicator Monitoring

Water quality indicators, such as pH, turbidity, conductivity, dissolved oxygen and total chlorine are monitored by an online monitoring system to provide a real time overview of the performance and integrity of the treatment process within the facility.

Should any of these indicators vary from their expected ranges, discharge of water to the Condamine River is suspended immediately. No discharge occurs until further investigation, monitoring and corrections are made to ensure the final water quality is safe. This process ensures the quality of water from the TWTF is maintained at the highest level possible.

## 4.3. Discharged Treated CSG Water Quality

During the first quarter of 2013, no water quality values outside the specified limits were recorded.

The summary table below presents parameters that were detected in the first quarter of 2013. All parameters that were detected are notably less than the discharge water quality limits, indicating the discharge from the TWTF complied with its discharge limits during the reporting period.

**Table 1 - Summary of Maximum Detected Monitoring Results for Treated CSG Water during the first Quarter of 2013**

| Parameter | | Compliance with Water Quality Limit | Water Quality Limit | Unit | Maximum Detected Concentration for Treated CSG Water |
|---|---|---|---|---|---|
| **BTEX** | All Tested Parameters | 100% | Various | µg/L | ND |
| **Disinfection By-products** | All Tested Parameters | 100% | Various | µg/L | ND |
| **Endocrine-Disrupting Chemicals and Hormones** | Bisphenol A | 100% | 200 | µg/L | ND |
| | Nonylphenol | | 500 | µg/L | ND |
| **Inorganic Compounds** | Ammonia as N | 100% | 500 | µg/L | 313 |
| | Bromide | | 7000 | µg/L | 117 |
| | Chlorine | | 5000 | µg/L | 90* |
| | Fluoride | | 1500 | µg/L | 310 |
| | Iodide | | 100 | µg/L | 12 |
| | Sulphate | | 500000 | µg/L | 16100 |
| **Metals** | Aluminium | 100% | 200 | µg/L | 18.4* |
| | Barium | | 700 | µg/L | 9.4 |
| | Boron | | 4000 | µg/L | 470 |
| | Copper | | 2000 | µg/L | 0.9 |
| | Iron | | 300 | µg/L | 60 |
| | Lead | | 10 | µg/L | 0.1* |
| | Mercury | | 1 | µg/L | 0.3* |
| | Strontium | | 4000 | µg/L | 22.4 |
| | Vanadium | | 50 | µg/L | 0.4* |
| | Zinc | | 3000 | µg/L | 4.4 |
| **Nitrosamines** | N-Nitrosodimethylamine (NDMA) | 100% | 0.1 | µg/L | ND |
| **Poly Aromatic Hydrocarbons** | PAH (as B(a)P TEF) | 100% | 0.01 | µg/L | ND |
| **Total Petroleum Hydrocarbons** | Total Petroleum Hydrocarbons | 100% | 200 | µg/L | ND |
| **Trihalomethanes** | Bromodichloromethane | 100% | 6 | µg/L | ND |
| | Bromoform | | 100 | µg/L | ND |
| | Dibromochloromethane | | 100 | µg/L | ND |
| | Chloroform | | 200 | µg/L | 2* |
| **Radiological Products** | Alpha Emitters | 100% | 0.5 | Bql-1 | ND |
| | Beta Emitters | 100% | 0.5 | Bql-1 | 0.1* |

**Notes:**

ND - Not Detected by laboratory

* Detected on one occasion during the fourth quarter of Year 2013.

# Attachment 1: Summary of Weekly and Quarterly Treated CSG Water Quality Monitoring

The following section presents a full summary of the weekly and quarterly monitoring undertaken on the treated CSG water discharged to the Condamine River. The results cover the first quarter of 2013, from 1 Janurary 2013 to 31 March 2013. The monitoring results have been summarised to show the following:

**Parameter** – This lists the public health water quality parameters tested at the point of discharge. An explanation of the parameters is provided in the Glossary.

**Water Quality Limit** – This shows the limits set by OWSR.

**Unit** –This shows the corresponding parameter unit of measurement. It is presented in micro-grams (µg) per litre (L) unless otherwise stated. This unit can also be represented as 'parts per billion' (ppb). Exceptions to this are listed in the reporting tables.

**Monitoring Results** – For any sample where the laboratory detected the presence of one of the test parameters on one or more occasion, the minimum, maximum and average (mean) concentration is reported. Also shown is the concentration below which 95% of the monitoring results fall. This is represented as the 95$^{th}$ percentile and allows any anomalies and outlying high results to be removed.

**Sampling Results** – For reasons explained below the results table, there are instances where sampling was not conducted on several of the weeks within the reporting period. For this reason, the total number of reporting weeks is shown, along with the number of samples taken, the number of samples analysed and the number of sample results pending.

**Table 2 Weekly water quality monitoring results**

| Parameter | | Disinfectant product | Water Quality Limit | Units | Monitoring Results for the Reporting Period | | | | Sampling Results for the Reporting Period | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Minimum Detected Concentration | Maximum Detected Concentration | Mean Detected Concentration | 95th Percentile | Number of Times Parameter Detected | Total Number Weeks | Total Number of Samples Taken | Total Number of Samples Analysed and Reported | Sample Results Pending |
| **BTEX** | Benzene | | 1 | µg/L | ND | | | | 0 | 13 | 4 | 4 | 0 |
| | Toluene | | 800 | µg/L | ND | | | | 0 | 13 | 4 | 4 | 0 |
| | Ethylbenzene | | 300 | µg/L | ND | | | | 0 | 13 | 4 | 4 | 0 |
| | Xylene Total | | 600 | µg/L | ND | | | | 0 | 13 | 4 | 4 | 0 |
| **Inorganic Compounds** | Ammonia as N | | 500 | µg/L | 271 | 313 | 300 | 311 | 4 | 13 | 4 | 4 | 0 |
| | Bromide | | 7000 | µg/L | 12 | 117 | 87 | 117 | 4 | 13 | 4 | 4 | 0 |
| | Chlorine | * | 5000 | µg/L | 90 | 90 | 90 | 90 | 1 | 13 | 4 | 4 | 0 |
| | Cyanide Total | | 80 | µg/L | ND | | | | 0 | 13 | 4 | 4 | 0 |
| | Fluoride | | 1500 | µg/L | 240 | 310 | 150 | 307 | 2 | 13 | 4 | 4 | 0 |
| | Iodide | | 100 | µg/L | 11 | 12 | 12 | 12 | 4 | 13 | 4 | 4 | 0 |
| | Monochloramine | * | 3000 | µg/L | ND | | | | 0 | 13 | 4 | 4 | 0 |
| | Sulphate | | 500000 | µg/L | 2400 | 16100 | 12000 | 16085 | 4 | 13 | 4 | 4 | 0 |
| **Metals** | Aluminium | | 200 | µg/L | 18.4 | 18.4 | 18.4 | 18.4 | 1 | 13 | 4 | 4 | 0 |
| | Arsenic | | 7 | µg/L | ND | | | | 0 | 13 | 4 | 4 | 0 |
| | Barium | | 700 | µg/L | 1.4 | 9.4 | 4 | 8.4 | 4 | 13 | 4 | 4 | 0 |
| | Boron | | 4000 | µg/L | 440 | 470 | 460 | 468.5 | 4 | 13 | 4 | 4 | 0 |

| Parameter | | Disinfectant product | Water Quality Limit | Units | Monitoring Results for the Reporting Period | | | | Sampling Results for the Reporting Period | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Minimum Detected Concentration | Maximum Detected Concentration | Mean Detected Concentration | 95th Percentile | Number of Times Parameter Detected | Total Number Weeks | Total Number of Samples Taken | Total Number of Samples Analysed and Reported | Sample Results Pending |
| | Cadmium | | 2 | µg/L | ND | | | | 0 | 13 | 4 | 4 | 0 |
| | Chromium | | 50 | µg/L | ND | | | | 0 | 13 | 4 | 4 | 0 |
| | Copper | | 2000 | µg/L | 0.6 | 0.9 | 0.6 | 0.9 | 3 | 13 | 4 | 4 | 0 |
| | Iron | | 300 | µg/L | 30 | 60 | 34 | 58 | 3 | 13 | 4 | 4 | 0 |
| | Lead | | 10 | µg/L | 0.1 | 0.1 | 0.1 | 0.1 | 1 | 13 | 4 | 4 | 0 |
| | Manganese | | 500 | µg/L | ND | | | | 0 | 13 | 4 | 4 | 0 |
| | Mercury | | 1 | µg/L | 0.3 | 0.3 | 0.3 | 0.3 | 1 | 13 | 4 | 4 | 0 |
| | Molybdenum | | 50 | µg/L | ND | | | | 0 | 13 | 4 | 4 | 0 |
| | Nickel | | 20 | µg/L | ND | | | | 0 | 13 | 4 | 4 | 0 |
| | Strontium | | 4000 | µg/L | 3.9 | 22.4 | 8.9 | 19.8 | 4 | 13 | 4 | 4 | 0 |
| | Zinc | | 3000 | µg/L | 0.9 | 4.4 | 2.4 | 4.2 | 4 | 13 | 4 | 4 | 0 |
| **Nitrosamines** | N-Nitrosodimethylamine (NDMA) | * | 0.1 | µg/L | ND | | | | 0 | 13 | 4 | 4 | 0 |
| **Poly Aromatic Hydrocarbons** | PAH (as B(a)P TEF) | | 0.01 | µg/L | ND | | | | 0 | 13 | 4 | 4 | 0 |
| **Total Petroleum Hydrocarbons** | Total Petroleum Hydrocarbons | | 200 | µg/L | ND | | | | 0 | 13 | 4 | 4 | 0 |

## Data Summary

Whilst every effort has been made to assess and analyse all the parameters over the first quarter of 2013 there were certain instances (which are discussed below) where this was not possible or not necessary.

**No discharge -** Discharge only occured for the weeks beginning 28/1/13, 4/2/13, 11/2/13, 18/2/13, 25/3/13, 4/3/13 and 11/3/13.

**Flooding -** Samples were unable to be taken for the weeks beginning 28/1/13, 4/2/13 and 4/3/13 as flooding had made the site inaccesable. For the week beginning 11/3/13 the site was accessable but there was no access to the discharge tank structure. On this occasion a sample was taken from the export tank at the plant as this was the next best available option. These results are included above.

**Table 3 Quarterly Water Quality Monitoring Results**

| Parameter | | Disinfectant product | Water Quality Limit | Units | Monitoring Results for the Reporting Period | | | | Sampling Results for the Reporting Period | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Minimum Detected Concentration | Maximum Detected Concentration | Mean Detected Concentration | 95th Percentile | Number of Times Parameter Detected | Total Number Weeks | Total Number of Samples Taken | Total Number of Samples Analysed and Reported | Sample Results Pending |
| **Disinfection By-products** | Bromochloroacetonitrile | * | 0.7 | µg/L | ND | | | | 0 | 13 | 1 | 1 | 0 |
| | Dichloroacetonitrile | * | 2 | µg/L | ND | | | | 0 | 13 | 1 | 1 | 0 |
| **Endocrine-Disrupting Chemicals and Hormones** | Bisphenol A | | 200 | µg/L | ND | | | | 0 | 13 | 1 | 1 | 0 |
| | Nonylphenol | | 500 | µg/L | ND | | | | 0 | 13 | 1 | 1 | 0 |
| **Metals** | Antimony | | 3 | µg/L | ND | | | | 0 | 13 | 1 | 1 | 0 |
| | Selenium | | 10 | µg/L | ND | | | | 0 | 13 | 1 | 1 | 0 |
| | Silver | | 100 | µg/L | ND | | | | 0 | 13 | 1 | 1 | 0 |
| | Vanadium | | 50 | µg/L | 0.4 | 0.4 | 0.4 | 0.4 | 1 | 13 | 1 | 1 | 0 |
| **Trihalomethanes** | Bromodichloromethane | * | 6 | µg/L | ND | | | | 0 | 13 | 1 | 1 | 0 |
| | Bromoform | * | 100 | µg/L | ND | | | | 0 | 13 | 1 | 1 | 0 |
| | Chloroform | * | 200 | µg/L | 2 | 2 | 2 | 2 | 1 | 13 | 1 | 1 | 0 |
| | Dibromochloromethane | | 100 | µg/L | ND | | | | 0 | 13 | 1 | 1 | 0 |
| **Radiological Products** | Alpha Emitters | | 0.5 | Bq/L | ND | | | | 0 | 13 | 1 | 1 | 0 |
| | Beta Emitters | | 0.5 | Bq/L | 0.1 | 0.1 | 0.1 | 0.1 | 1 | 13 | 1 | 1 | 0 |

Note that the detection limit of Bromochloroacetonitrile and Dichloroacetonitrile was 5 ug/L.

# Glossary

The parameters required to be monitored by Australia Pacific LNG by DEHP are in many cases not found within treated CSG water or the water treatment industry. The monitoring undertaken by Australia Pacific LNG is designed to provide a conservative level of assurance to ensure the protection of public health. A brief definition of the sets of parameters contained within the reported information is provided below.

**BTEX** – BTEX is an acronym representing benzene, toluene, ethylbenzene, and xylenes. These are compounds that may be associated with oil and gas production. BTEX are generally not associated with CSG production, although may occur at trace levels.

**Chlorinated Hydrocarbons** – These are organic compounds that may be generated as a by-product of chlorination. They are considered commonplace in everyday life and can occur naturally, in some animals or as the by-product of fires.

**Disinfection By-products** – Disinfectants are routinely used in water treatment facilities to remove biological contaminants (predominantly algae and bacteria) that may decrease the efficiency and integrity of the water treatment process. Disinfectants may react with naturally-occurring matter to form by-products.

**Endocrine-Disrupting Chemicals (EDCs) and Hormones** – The two relevant compounds include Bisphenol A (BPA) and Nonylphenol. BPA is often associated with moulded plastic. Nonylphenol can be found in commercial detergents.

**Haloacetic acids** – These can be a by-product of drinking water chlorination or chloramination (that is the use of disinfectant). These are routine methods used for disinfection of drinking water to remove bacteria and other microbiological organisms.

**Inorganic Compounds** – These compounds are non-carbon based elements. In terms of drinking water chemistry they include compounds such as ammonia, bromide and fluoride.

**Metals** – These naturally occur in drinking water due to the water passing through metal-enriched rock. Certain metals are essential for life. Also specific metal-based salts, namely calcium and magnesium, are added to the treated CSG water prior to discharge to the River to ensure a minimum level is present to protect the environment.

**Nitrosomines** – These compounds are commonly associated with water treatment facilities that utilise chloramines for disinfection and include N-Nitrosodiethylamine (NDEA) and N-Nitrosodimethylamine (NDMA).

**Polycyclic Aromatic Hydrocarbons (PAH)** – PAH occur in oil, coal and tar products and may be associated with water extracted from coal seams at low levels. They are naturally occurring and do not readily dissolve in water.

**Total Petroleum Hydrocarbons (TPH)** – TPH is the term given to a mixture of hydrocarbons (compounds that contain hydrogen and carbon) that occur naturally and in oil, coal and tar products. TPH may be associated with CSG water at low levels.

**Trihalomethanes** – These include the branch of chemical compounds that may be formed as a by-product of disinfecting drinking water with chorine or monochloramine.

**Radiological Products** – These occur naturally in drinking water at extremely low concentrations *via* contact with certain rocks such as granite.

## ABBREVIATIONS & ACRONYMS

| Term/Abbreviation/Acronym | Definition |
|---|---|
| µg | Micrograms (1 x $10^{-6}$ grams) |
| Australia Pacific LNG | Australia Pacific LNG Pty Limited |
| Bq | Becquerel(s) |
| CSG | Coal seam gas |
| DERM | Department of Environment and Resource Management |
| DERM/EHP | Department of Environment and Heritage Protection formerly known as the Department of Environment and Resource Management |
| L | Litre(s) |
| LNG | Liquefied natural gas |
| NATA | National Association of Testing Authorities |
| ND | Not detected |
| OWSR/QWSR | Queensland Water Supply Regulator formerly known as Office of the Water Supply Regulator |
| QLD | Queensland |
| RWMP | Recycled Water Management Plan |
| the Act | *Water Supply (Safety and Reliability) Act 2008* |
| TWTF | Talinga Water Treatment Facility |

This Report has been produced in accordance with the Queensland Government's *Public Reporting Guideline for Recycled Water Schemes* (DERM, 2011) and the *Water Supply (Safety and Reliability) Act 2008* (the Act).

AUSTRALIA PACIFIC LNG

## Document control

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