Port of Townsville and Air Quality in Townsville

Frequently Asked Questions – Created by the Townsville Port Stakeholder Working Group

	Question	Answer
1	Why was the Port Stakeholder Working Group (PSWG) formed?	The Port Stakeholder Working Group was established following the release of a report in December 2014 titled *"Atmospherically Deposited Metal and Metalloid Contaminated Dust in Inner Townsville, Queensland"* by Professor Mark Taylor, commissioned by North Queensland Conservation Council. The PSWG provided a forum for ongoing engagement between Port of Townsville Limited (POTL), port operators and key stakeholders including community representatives, North Queensland Conservation Council (NQCC), relevant Government agencies and Townsville City Council, relating to air quality, dust deposition and environmental management practices at the Port of Townsville. The objectives of the PSWG were: • Maintain good working relationships between the port community, key stakeholders and the community, fostering open, transparent and constructive dialogue; • Provide a forum to discuss potential issues and concerns relating to air quality; dust deposition and environmental management activities at the Port of Townsville; • Ensure that the Townsville community receives comprehensive, accurate, appropriate and timely information on air quality, dust deposition and environmental management at the Port of Townsville; • Improve knowledge and understanding of air quality, dust deposition, and environmental management related to port operations and broader ambient air quality in Townsville; • Provide a forum for continuous improvement suggestions to be raised and discussed and; • Consider and identify cumulative aspects or local pressures related to air quality, dust deposition and environmental management at the Port of Townsville.
2	What type of cargo is handled in Townsville and are loads covered at the port?	Townsville's eight berths handle more than 30 different commodity types valued at almost $10 billion during 2015/2016. These commodities include motor vehicles, general cargo, cement, sulphur, sulphuric acid, fertiliser, copper, silver, magnetite, lead, zinc, coke, copper anode, petroleum products, gas, shipping containers, project cargo, tyres, sugar, molasses, timber, live cattle, refrigerated meat, sand and gravel. All bulk cargo is stored in sheds (not left out on the open) and is transported to the ship in enclosed conveyor belts. All bulk cargo transported into the Townsville Port is transported in covered wagons on trains, or by truck.
3	Who approves an operator to handle bulk material at the port?	There are certain activities at the Port (such as the handling of bulk materials) that are classified as Environmentally Relevant Activities (ERAs) under the Environmental Protection Act 1994. In simple terms, ERAs are defined because of their potential to result in the release of contaminants that may be harmful to the environment. They are regulated by the Department of Environment and Heritage protection (EHP). In addition, there are other approval requirements that may be required through other regulators.

	Question	Answer
4	What types of lead are handled in Townsville?	Lead is present in three key products handled through the Townsville Port; lead concentrate, zinc concentrate and lead anodes. • **Lead anodes** are in solid metal form, created by pouring molten metal into a cast. There are no emissions associated with the handling or storage of lead anodes. • **Lead concentrate**, and to a significantly lesser degree **zinc concentrate**, contain lead in the form of lead sulphides. This product is in a 'coarse powder' form. Different forms of lead have different bio-availabilities, meaning that the potential for the lead to be absorbed into the human body and impact health is different for different types of lead. Lead sulphides, as present in the products at the Port, have a relatively low bioavailability, and there is a much lower risk of impact to human health than from some other types of lead such as lead carbonates.
5	Is the air in Townsville considered safe? How do we know?	Many human activities have the potential to negatively impact on air quality. It is important to understand the potential for this to occur and to monitor air quality, to ensure that air quality remains at a safe level, and action can be taken to mitigate impacts if necessary. Air quality may vary greatly over time, location and distance. Sometimes impacts may be localised (e.g. odour from a particular source, port activities) or regional (e.g. smoke from a bushfire). There are activities at the Port of Townsville that have the potential to impact on air quality. Consequently, a robust air quality monitoring program is in place to monitor the impact of port activities, ensuring that activities are managed in a way that ensures safe air quality. Individual port operators, Port of Townsville Limited (POTL) and the Queensland Government all participate in the air quality monitoring at the Port. The monitoring around the Port boundary shows that air quality complies with the EPP Air and Air NEPM objectives and standards and has done so since this monitoring began in 2008. The air quality monitoring program confirms that air quality around the Port is safe. The monitoring data also shows that, within the objectives and standards, concentrations of pollutants in air are sometimes elevated as a result of Port activities. Notably, levels of some contaminants (such as lead) that were previously trending upwards from early 2013 until late 2015, have been falling since this time. As such, it is important that air quality monitoring around the Port continues to be carried out and environmental management practices at the Port continue to be enhanced, to ensure that air quality remains at safe levels and that emissions are reduced as much as possible.
6	What does the standard of air quality in Townsville mean for human health?	The air quality in Townsville generally meets the National Environment and Protection Measure for Ambient Air Quality. The Measure was developed by governments in consultation with health professionals, environmental groups and the community. It aims to improve the health of Australians through improved air quality.

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		The standards were set on the basis of scientific studies of air quality and human health from all over the world, as well as the standards set by other organisations, such as the World Health Organization. Levels of ozone, nitrogen dioxide, sulphur dioxide and lead at air quality monitoring sites in Townsville have never exceeded the National Environment Protection (Ambient Air Quality) Measure standards for protection of human health since monitoring began in 2004. Occasional exceedances of the PM_{10} (particles less than 10 micrometres in diameter) standard have been measured as a result of natural events such as dust storms, however no exceedances have been measured during the last five years.
7	Why don't we do blood lead testing in Townsville?	Queensland Health has reviewed the data available to determine if there is justification for blood lead testing twice, first in 2008/09 and again in 2014. In each instance Queensland Health has concluded that community blood lead level monitoring is not warranted due to the very low risk to public health. If an individual is concerned about their own blood lead level they should ask their doctor for a blood lead test Commercial operators undertaking lead related activities at the Townsville Port carry out occupational blood lead level testing for their workers in line with legislated requirements.
8	Who regulates air quality from activities at the Townsville Port?	There are certain activities at the Port (such as the handling of bulk materials) that are classified as Environmentally Relevant Activities (ERAs) under the *Environmental Protection Act 1994*. In simple terms, ERAs are defined because of their potential to result in the release of contaminants that may be harmful to the environment. They are regulated by the Department of Environment and Heritage protection (EHP). Anyone wanting to undertake one of these ERAs at the Port must apply for an approval called an Environmental Authority. If approved, this document authorises the activity and will generally specify a range of conditions about how the activity must be carried out or what outcomes must be achieved. The conditions are included to ensure that the activity does not result in unacceptable impacts to the surrounding environmental values. There are also activities at the Port that have an impact on air quality but are not defined as an ERA. For example, construction and demolition projects that generate dust, or live cattle export where odour is caused. These activities are not regulated by EHP but may require a permit from POTL and must comply with the General Environmental Duty under the Queensland Environmental Protection Act 1994.
9	What different types of monitoring equipment are used in Townsville, where are they located and why?	Air quality monitoring is conducted separately by Port of Townsville Limited (POTL), the Queensland Government and port operators. POTL and DEHP use three types of equipment to monitor air emissions: • High Volume Air Samplers: • Tapered Element Oscillating Microbalance (TEOM): • Dust deposition jars:

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		The Queensland Government also uses an XACT Metal Monitor, which provides near real-time data about the level of metals in the air. The results are publicly available through the DEHP website. Monitoring equipment is located at: • Coast Guard • Enviro Park South Townsville • Lennon Drive Detailed information about the three different types of monitors can be found on POTL's website here: http://www.townsvilleport.com.au/about-the-port/environment/air-quality-monitoring In addition to these, port operators maintain their own monitoring equipment. In May 2014 the Townsville Coast Guard station operated by the Queensland Government and the Townsville Port monitoring station operated by Port of Townsville Limited were amalgamated into one joint monitoring station at the Townsville Coast Guard. Port of Townsville Limited partially funds the operation of this station.
10	Why are there different types of air quality monitoring and why is the resultant data not necessarily comparable? (ie. hi-vol versus dust deposition etc).	Different types of air quality monitoring are necessary, depending upon the pollutant being targeted and the impact being assessed (health or nuisance). For example, to determine if the air is safe to breathe, a measure of the concentration of particles suspended in a known volume of air is needed. On the other hand, dust nuisance caused by dust settling the use of the word out seems redundant on surfaces requires a measurement of the mass of dust depositing on a known surface area over time. Particle size is also an important consideration. Health impacts are primarily associated with particles less than 10 micrometres in diameter (PM10), while larger particle fractions (e.g. total suspended particles (TSP), dustfall) tend to give rise to nuisance impacts. Monitoring of dust around the Port of Townsville encompasses measurement of both fine (less than PM10) particles associated with health impacts and coarse particles that can lead to dust nuisance. Continuous monitoring techniques –TEOM (tapered element oscillating microbalance) and Xact metals monitor – provide information on changes in PM10 and TSP particles and TSP metal concentrations respectively on an hourly basis. This short-term information delivery assists in identifying potential sources when elevated levels occur. High volume air samplers are used to determine compliance of PM10 and TSP metal concentrations with regulatory limits. These samplers collect particles suspended in the air by drawing a large volume of air across a filter. The samplers run for a period of 24 hours at a frequency of one in six days. The particle sample collected on the filter paper is analysed in a laboratory to give the mass concentration (in units of micrograms per cubic metre, µg/m3) of different metals. Dustfall sampling is conducted using a dust deposition gauge to collect dust particles settling out under the influence of gravity over a period of one month. The rate of dust deposition is then calculated based on the mass of dust collected over

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		this period and the collection surface area. The deposition rate is expressed as the average mass deposited per unit area and time (e.g. mg/m2/day) over the collection period. Analysis of the collected dust for metals provides a measure of the deposition rate for selected metals, including lead, in units of micrograms per square metre per day (µg/m2/day). Having a range of dust monitoring at the same location provides a comprehensive picture of the different dust types and what dust-related issues might be occurring. However, because the different monitoring methods are designed to evaluate different dust impacts, the resultant datasets will often not be directly comparable.
11	What are particles, how are they formed, how do they move and how do they affect people?	Particles in the air at elevated levels can be hazardous to human health or cause a nuisance. Potential health effects of airborne particles are closely related to particle size. Common particle size distributions monitored include: • PM10 (particles less than 10 micrometres in diameter) – for assessment against health-based criteria • TSP (total suspended particles, generally up to 100 micrometres in diameter) – for assessment against predominantly nuisance-based criteria • deposited dust particles – for assessment of dust nuisance PM10 particles are invisible to the naked eye. By way of comparison, a human hair is about 60 micrometres in diameter. Airborne particles can come from: • combustion processes, such as engines, power stations, wood heaters, bushfires and hazard reduction burning • non-combustion activities, such as earthworks, unpaved roads, bulk material handling and windblown dust. **PM10** PM10 refers to airborne particles less than 10 micrometres in diameter. These particles are generated by both combustion and non-combustion processes, including windblown dust, sea salt, industrial processes, motor vehicle engines and fires. PM10 particles are capable of penetrating the lower airways of humans and can cause negative health effects. The recommended air quality standards for PM10 are: • 50 micrograms per cubic metre (µg/m3) for a 24-hour exposure period • 25 µg/m3 for an annual exposure period. These standards are designed to protect sensitive members of the community, such as children and asthmatics. **TSP** Airborne particles up to about 100 micrometres in diameter are referred to as TSP (total suspended particles). These particles are generated by both combustion and non-combustion processes, including windblown dust, sea salt, earthworks, mining activities, industrial processes, motor vehicle engines and fires. Health effects associated with TSP mainly arise from the fraction of particles less than 10 micrometres in diameter, which are capable of penetrating the lower airways of humans. Particles larger than 10 micrometres in diameter are not generally associated with human health effects. However,

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		these particles can cause nuisance problems through soiling of property and materials. The recommended air quality goal for TSP for protection of human health is 90 µg/m3 for an annual exposure period. The New Zealand Ministry for the Environment recommends that 24-hour average TSP levels be below 80 µg/m3 in residential areas to avoid dust nuisance impacts. **Deposited dust** Deposited dust (dustfall) refers to air particles that settle out over a given area and time under the influence of gravity. Deposited dust can include particles of any size, but it generally comprises particles larger than 20 micrometres in diameter that rapidly settle out of the air near the point of emission. Deposited dust is measured to assess if an emission source is causing a nuisance, such as soiling of property and materials. Deposited dust is associated with nuisance effects. The Environmental Protection (Air) Policy 2008 does not specify an objective for deposited dust, but a level of 120 milligrams per square metre per day (mg/m2/day), averaged over one month, is commonly used to assess dust nuisance.
12	Why do the monitoring stations go offline sometimes?	Monitoring stations can go offline for short periods due to power failure, calibration exercise, equipment fault, routine maintenance, vandalism or inclement weather.
13	Is the air quality monitoring results from the Townsville Coastguard Coast Guard (TCG) monitoring site representative of air quality across all of Townsville?	No. The Townsville Coast Guard (TCG) station was selected to provide a measure of maximum air pollutant impacts from the Port of Townsville because of its close proximity. Previous studies between 2008 and 2009 showed an impact from activities at the Port of Townsville at the TCG location, but as you move further away from the Port this contribution disappeared. As such, the monitoring results for other locations (such as North Ward and previously at Pimlico) can be quite different from TCG. It is also important to note that the Port operations are not the only source of air contaminants in the Townsville area. Various other industries and activities result in air emissions that can impact at local or regional levels. There are also natural influences on air quality such as dust storms and bushfires that can have significant impact from time to time.
14	What caused the increasing trend in the levels of lead in deposited dust and lead in air between 2013 and 2015 at the Townsville Coastguard monitoring location?	Activities carried out at the Port of Townsville involving mineral concentrate handling can contribute to elevated levels of metals (including lead) being measured in close proximity to the Port. This is the reason that an air quality monitoring station has been established at the Townsville Coastguard Coast Guard(TCG), adjacent to the Port. It is also the reason that these activities are tightly regulated and that significant investments in emission controls have been made by the operators at the Port. The specific reason for the increasing trend in lead in deposited dust and lead in air observed between 2013 and 2015 is less clear. What we do know is that during this period a higher frequency of elevated lead results occurred. The scale of these elevated results was also higher than those observed previously, resulting in the rolling annual average lead levels trending upwards.

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		Whilst it is extremely difficult to isolate a particular source or cause of the elevated results due to the complexity of port operations, it is clear that port activities involving loading or unloading bulk mineral concentrate products can contribute to elevated levels of lead measured at the TCG monitoring site. Activities other than ship loading or unloading (such as transport and storage)and resuspension of surface dust during windy conditions may also contribute to lead entering the air environment, so it is possible that the increasing trends that were observed were a product of a combination of different sources. *Whilst the increasing trend in the lead levels was concerning, it is important to note that air quality was still compliant with the EPP Air and Air NEPM objectives and standards, which are based around the protection of human health and safety.* *It is also important to note that the trend has now reversed and levels are coming back to levels that existed pre-2013. Considerable work has been undertaken to enhance environmental monitoring around the Port and to strengthen emission controls. This should help to ensure that the increasing lead trend that was observed doesn't happen again.*
15	What is data validation?	Data validation involves reviewing the monitoring data using relevant data screening criteria to identify possible incorrect values, with these values either being corrected or removed from the dataset to ensure it's accurate.
16	What Australian standards, guidelines or objectives are there for measuring deposited dust and metals in deposited dust?	Deposited dust impacts are predominately associated with dust nuisance, but can have health impacts depending on the nature of the dust deposited. Criteria for deposited dust relate to dust nuisance rather than health effects. There are currently no national air quality guidelines or objectives for nuisance effects resulting from dust that settles still think this is redundant on surfaces in Australia. However, regulatory agencies in Australia often use criteria that have been derived from direct observations and investigation of dust levels and nuisance effects to assess if deposited dust levels constitute a nuisance. In Queensland, a dust deposition rate of 120 milligrams per square metre per day, averaged over a 1 month period is frequently used to categorise nuisance dust. There is a standard for the sampling and analysis methods used for measurement of deposited dust. Australian/New Zealand Standard AS/NZS 3580.10.1 covers the sampling method for deposited dust (dustfall). The method involves using a dust deposition gauge (essentially a glass funnel supported in the neck of a large glass bottle) to capture dust over a defined period (usually a month). The Standard includes the analytical process (laboratory method) for determining the deposition rate of material sampled using the dust deposition gauge. It is also possible, through further chemical analysis of the material collected with a dust deposition gauge, to identify the amount of metals present in the dust. Until recently there was no standard method for doing this. However, in October 2016 the above Australian/New Zealand Standard was updated to include a method for determining metals present in the deposited dust. This will help to ensure that metals in dustfall results reported by different laboratories are comparable.

	Question	Answer
		Limits for these exist for overseas countries and for other locations in Australia (eg. Mt Isa), but not for Townsville.
17	How often are surfaces available to children cleaned on The Strand?	It is inevitable that dust accumulates on surfaces over time. Good personal hygiene practices are the responsibility of all in the community, particularly when using shared or public facilities. Doing its part to keep public equipment clean, Townsville City Council maintains a rigorous program of cleaning on The Strand: • Barbeque facilities are cleaned every morning; • Every day, tables are dusted and, if wet or visibly dirty, they are also wiped down; • Playground equipment is cleaned once a week by maintenance staff to remove any dust; • Council engages a specialist contractor at least twice each year to use high pressure cleaners to even more thoroughly clean all playground facilities. People, and particularly parents of young children, should be aware of the environment around them and take reasonable precautions. There are a number of toilet facilities along The Strand, all of which have hand basins to facilitate the washing of hands.
18	What are the likely sources of lead in dust for Townsville?	Multiple sources of lead in dust have been identified in Townsville. Loading bulk metal products containing lead at the Port of Townsville does contribute to lead in the air and lead in dust;. Monitoring shows that these activities are occurring well within statutory guidelines (see the POTL Operations Dashboard) and these activities are tightly regulated by DEHP. Additionally, lead is found in soil throughout the city from historical sources, particularly leaded petrol, lead batteries and lead paints. When disturbed, this contributes to lead in dust. People renovating homes routinely disturb and liberate lead particularly from lead paint.
19	What is the “black dust” and what is in it?	Some Townsville residents have raised concerns about a greasy dark coloured substance, often referred to as “black dust”, sometimes found on outside surfaces. “Queensland Government testing has shown that the black dust commonly comprises of a mixture of different particle types, including mould spores, silica and silicate mineral grains, clay (soil) particles, soot (from combustion processes such as motor vehicle exhaust, in particular diesel exhaust) and smoke residue (from bushfire events). The mould spores, along with the soot particles, are likely to be responsible for the blackness of the dust deposits (and their greasy appearance). While traces of both lead and zinc were found in some samples, there was no evidence of mineral concentrates being a significant component of the black dust. The black dust does not appear to pose a danger to human health. However, some residents regard the material as a dust nuisance. The dust is easily managed through cleaning outdoor surfaces – it is recommended that residents everywhere keep their outdoor areas cleaned.” Townsville is a dry and often windy place (especially in the second half of the year before the wet season) and nuisance dust

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		is an issue.

Port Stakeholder Working Group (PSWG) Objectives and Achievements

	Objective	Achievements
1	Maintain good working relationships between the port community, key stakeholders and the community, fostering open, transparent and constructive dialogue	• 21 PSWG meetings were held between April 2015 and January 2017, bringing together up to 25 representatives from 12 organisations including four community representatives. • A port tour provided to all PSWG members prior to commencement of the PSWG • Specific port facility tours and briefings on lead loading and environmental protection were provided to interested community members in response to queries. • Using a structured agenda, the monthly PSWG meetings worked through updates from Port of Townsville and port users on performance and improvements, compliance and monitoring from regulators as well as addressing issues or queries raised by members. • Minutes of PSWG meetings and all formally tabled papers, reports and presentations are publicly available on the Port of Townsville and NQCC website. • The PSWG put the often complex scientific data and terminology that accompanies monitoring practices, into more laymen's terms for the Community Representatives (and therefore the community).
2	Provide a forum to discuss potential issues and concerns relating to air quality, dust deposition and environmental management activities at the Port of Townsville	
3	Ensure that the Townsville community receives comprehensive, accurate, appropriate and timely information on air quality, dust deposition and environmental management at the Port of Townsville	• Department of Science, Information Technology and Innovation and Department of Environment and Heritage Protection installed an Xact metal monitoring device at the Coast Guard location in December 2015. The new monitor provides real-time data (which was previously only one in six days) on air quality around the port and results can be viewed at any time by the public on the EHP website, • DEHP produced a one page flyer detailing monitoring results for the PSWG group • Port of Townsville launched the quarterly "Townsville Port Community e-Newsletter" in January 2016, distributed an email subscriber database (opt in). The newsletter provides the community with updates on trade performance, environmental news and monitoring results, project status reports at the port and engagement initiatives. POTL carried out a letterbox drop of residents North Ward, Magnetic Island and South Townsville to build its initial subscriber base. • The Townsville Port Operations Data Dashboard was launched in September (with June 2016). The Dashboard is a tool for the community to be able to view up-to-date air quality information in one place and is now published monthly. • Queensland Health produced an "Advice on blood lead levels in Townsville" statement to clarify safety of air quality in Townsville • All port operators have presented twice to the PSWG, providing information on operations, environmental standards and ongoing environmental improvement initiatives.
4	Improve knowledge and understanding of air quality, dust deposition and environmental management related to port operations and broader ambient air quality in Townsville	

	Objective	Achievements
5	Provide a forum for continuous improvement suggestions to be raised and discussed	• **Glencore** invested into air control improvements during 2015/16 - Upgrades included: o shed sheeting replacement and roof vent purchase o workshop wall replacements o truck bay extension and enclosure o replacement of the north east wall of Shed One o Installation of C1 conveyer gallery dust covers o shiploader wash down splash curtain installed o conveyer water sprays installed on out-loading system o fogging system trialled for transfer point to the ship hold o Resurfacing of the site with asphalt o Installation of fast acting doors on all entrance and exists to ensure sealing. • **South32** invested $2.5 million into dust control improvement works during 2015-16. These works included: removal of the ridge vent, installation of a wagon air-wash system, and addition of brush seal doors to the rail wagon tippler building; installation of automated moisture measurement and water addition during concentrate in-loading; construction of an improved-technology delivery-conveyor for the Berth 11 shiploader; introduced an accelerated program to identify and replace corroded or damaged sheeting and cladding for the concentrate shed, conveyor galleries, and towers; and rebuilt and replaced dust collectors. South32 also bedded down on-line real-time stack monitoring and undertook operational dust monitoring trials. • **Townsville Bulk Storage and Handling** appoint dedicated Environmental Officer and invested in new monitoring and dust mitigation equipment during 2015/16. TBSH invested in additional air quality monitoring equipment including two high-volume samplers (TSP and PM10) and two continuous real time samplers and have developed and implemented an air quality monitoring plan for near field air quality monitoring of Port operations. TBSH also acquired a mobile dust collector to mitigate dust emissions during operations. TBSH also implemented an Environmental Management System in accordance with ISO-14001. • **Northern Stevedoring Services** operates a state-of-the art bulk handling facility valued at $15 million. The negative-pressure bulk handling facility is a ground breaker in terms of environmental standards in Queensland. In addition NSS have also invested in a custom designed fogging & misting system which is based on leading technology in dust suppression; installation of a closed conveyor system and dust extraction unit on the hopper; purchased a range of dust monitoring devices to meet regulatory compliance with air quality; and the addition of two new street sweepers & an industrial vacuum system. Further improvements to the Container Storage Yard consisted of the

	Objective	Achievements
		installation of shaker grids, sealing of roadways and trialling dust suppression additives. NSS have also recently achieved ISO 14001 accreditation for its Environmental Management System. • **Townsville City Council** published its cleaning protocols of cleaning equipment located on the Strand. o BBQ are cleaned every day (morning); o Tables are either wiped down if they are wet or visibly dirty or if they are dusty the dust is removed by blower; o Playgrounds – On a weekly basis the equipment is cleaned by maintenance staff to remove any dust. Council also engages a contractor 2-3 times per year to fully clean the playgrounds through the use of high pressure cleaners. • Good hygiene practices are the responsibility of all Strand uses. There are a number of toilet facilities along the Strand that all have wash hand basins to facilitate the correct washing of hands. • **Landscaping in Hubert Street** - Several port customers carried out landscaping works on Hubert Street during 2015/16 including Northern Stevedoring Services, Puma and SIMS Metal.
6	Consider and identify cumulative impacts or local pressures related to air quality, dust deposition and environmental management at the Port of Townsville	• The new DISITI and EHP **Xact metal monitoring device** at the CoastGuard location shows the cumulative air quality results from the Port of Townsville. The monitor provides real-time data (which was previously only one in six days) on air quality around the port and results can be viewed at any time by the public on the EHP website. • A Port Operations Dashboard developed by the PSWG brings together all key information and presents this cumulative port air quality information, coupled with shipping information, in a form that is readily usable by the community.