Submission No 119

INQUIRY INTO PERFORMANCE OF THE NSW ENVIRONMENT PROTECTION AUTHORITY

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Legislative Council Inquiry: Regulation of White Bay Shipping Facility

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The approval of the White Bay shipping facility demonstrates the failure of environmental assessment, approval and regulation processes to protect the health and amenity of local residents. This submission details many areas where there was a failure to identify and assess both air and noise emissions from the shipping facility. The facility was approved and it has caused considerable distress to many local residents due to the levels of noise and air pollution discharged. The lack of accepted safe levels for some of the air pollutants was not recognized and acted upon in the approval process. The proponent is yet to take action to reduce the levels of air pollutants and noise discharged. Monitoring of emissions by the proponent has not provided residents with any confidence that emissions will be reduced at some time in the future. This is not satisfactory. Corrective action is urgently required.

The Author

The author was previously employed by the former State Pollution Control Commission and Environment Protection Authority for over 27 years. He is a professional engineer and has qualifications in engineering and public policy. His primary roles encompassed environmental assessment, approval, licensing, review and regulation of many industrial facilities. These included the Botany shipping facilities, Third Runway at Sydney Airport, Parramatta High Speed Ferry and the rail network.

This submission was developed to enhance environmental protection for residents of the Balmain peninsular and to make sure that future projects are both accountable and achieve ecologically sustainable development.

Legislative Council Inquiry: Regulation of White Bay Shipping Facility

1.0 Summary

The White Bay shipping facility imposes the release of a substantial quantity of air pollutants with known health impacts into the atmosphere immediately adjacent to an existing medium-high density residential area. The diesel engines and boilers on passenger vessels using the facility do not incorporate low emission pollution control technology. No effective action was taken by the EPA to reduce the levels of air pollution being discharged. An equivalent approval for the operation of an intermittent stationary diesel power plant in this location would not have been granted in this location. Such a power plant would have required stringent air emissions using currently available technology.

In addition to the approved high levels of air emissions, the facility was also granted high levels of noise emissions where the effect on existing residents was effectively ignored. The approved noise levels are much higher than they should have been using the EPA's Industrial Noise Policy. A proper assessment would have resulted in the facility not being approved. The facility imposed at least a 20dB(A) noise problem on residents and no effective action has been taken to address the magnitude of the offensive noise generated by shipping activities.

Past experience of the relationship between the EPA and Planning NSW shows that Planning NSW consistently issues approvals which give effect to Government policy of the day. The opportunity for the EPA to provide fearless and frank advice counter to that of Planning NSW is not countenanced. The planning approval document for this facility indicates that consent conditions were developed by the proponent and these subsequently became the consent conditions. This is totally unacceptable and displays an example of regulatory failure.

2.0 Objectives of the EPA under Section 6 of the Administration Act:

Under this section of the Act, the EPA is charged with the responsibility to protect, restore and enhance the quality of the environment incorporating ecologically sustainable development (esd) principles. The analysis of both air and noise emissions from this facility provided in this submission reveals that the EPA displayed significant concurrence with the proposal rather than to reduce the level of impact arising from its operation. The risks of exposure to air pollutants and noise from the facility were not reduced. The EPA failed to indicate the presence of more stringent air pollution health standards and highlight the more generous noise limits proposed by the proponent which are not supported by critical analysis. Opportunities to include financial penalties into the planning consent conditions were not developed.

3.0 Regulatory Framework:

The regulation of shipping activities in Sydney Harbour rests with Roads and Maritime Services (RMS). This presents a serious risk of regulatory failure as RMS is both the proponent and regulator of the White Bay Facility. The regulatory framework is also more complicated by the terms of the Protection of the Environment Operations Act which establishes the EPA as the regulator of Government operators. Shipping activities fall under international regulatory framework which effectively over-rides local regulations. It was a

serious failure of the planning documents to explore the regulatory system and address these deficiencies.

The planning instruments rely upon a “statement of commitment” from the proponent and vain hope. The fact that the proponent is also the regulator, the inability of NSW regulatory officials such as, the Police, to act upon complaints reflects a gross omission in the planning documents. Claims by shipping companies that their operations over-ride local regulations should have heightened the need to focus on the details of any conditions of consent. Instead, the planning instruments rely upon the operator to self-regulate its activities and those of ship operators. This is totally unacceptable and illustrates a serious failure of the approval process for this facility. The EPA in its comments on the proposal did not draw out the challenges with the existing legislation and its application to this project.

4.0 Working Harbour Policy:

This policy is bereft of environmental protection. It fails to include any form of commitment to serious environment protection or consideration of environmental impacts arising from shipping activities. It fails to identify that international shipping utilises residual fuel oil (RFO) with up to 3.5% sulphur as its source of power supply. RFO causes known high levels of air emissions. Bunkering of RFO in the harbour should be prohibited. Ship diesel engines have generally not been updated to current emission control technologies. Ringelmann smoke standards are not enforced on ship emissions. The “working harbour” policy with the current lack of effective pollution controls is irresponsible as the health of the many local residents surrounding the harbour need to be protected.

5.0 Financial Incentives for noncompliant shipping:

The approach to addressing the current environmental issues presented by the White Bay shipping facility could be most effectively addressed by the imposition of a financial penalty system to provide an incentive structure to ship operators. A pricing mechanism is consistent with the esd principles. Under the existing arrangements, there is no incentive to reduce noise levels or to apply air emission control technology.

Failure of air emissions regulation - White Bay Shipping Facility

1. Summary

This report will demonstrate that there was a failure of the regulatory authorities to make a significant attempt to effectively regulate and monitor air pollution arising from this shipping terminal. This failure is evident from a failure to identify more stringent relevant health criteria that should have been applied, failure to consider available technologies which would have reduced air pollution levels, failure to specify air monitoring performance standards, failure to undertake odour dispersion modelling and apply quantifiable odour performance criteria; omission of reference to Ringelman smoke emission standards; failure to identify the potential for the port area to be declared an "Emission Control Area" under international shipping regulations; failure to assess and apply controls to bunkering activities and failure to obtain existing local air quality data.

The result of these omissions and defects in the planning approval process is that local residents are subjected to air emissions from shipping movements which can cause significant health effects. The planning approval instrument provides no specific conditions which will result in air emissions being reduced in the future.

2. Failure to describe and assess the regulatory regime applicable to the facility

The environmental assessment documentation does not describe the regulatory framework which applies to the regulation of air emissions from shipping using the facility. The application of the international shipping controls using the "Emission Control Area" provisions to the facility was not identified. This would have provided another means to reduce air emissions from the facility.

The role of the EPA as the environmental regulator relative to the powers possessed by the Roads and Maritime Services (RMS) as the holder of the development consent was not elaborated upon. The result is that regulatory responsibility and potential issues of regulatory effectiveness were not explored and resolved prior to approval being granted.

Due to the deficiencies that are identified in the planning consent document, it is suggested that a "prevention notice" as provided under the Protection of the Environment Operations Act, will need to be issued by the EPA to the proponent that specifies compliance conditions including a new monitoring program that needs to be undertaken.

3. Identification of relevant air quality standards

The proponent proposed that the air quality standards which should be used for assessing this project were those that were current in NSW. The proponent did not consider whether the more stringent air quality standards that were released by the World Health Organisation (WHO) in 2005 should have been applied. The environmental regulator, the EPA also failed to do so. This represents a failure of EPA in its obligations to consider the

need to apply a more stringent assessment criteria as identified in Part 6 of the Administration Act.

Given the intermittency and times of use of the shipping facility, the following WHO criteria are relevant for assessment of air pollution emissions from the White Bay shipping facility:

PM_{10} – 24 hour mean 50µg/m^3

$PM_{2.5}$ – 24 hour mean 25µg/m^3

NO_2 – 1 hour mean 200µg/m^3

SO_2 – 24 hour mean 20µg/m^3

10min mean 500µg/m^3

Instead of using the WHO criteria, the proponent used the following criteria to assess the impact of the project. These are the current Australian and NSW standards. However, it is apparent that the SO_2 is much greater than that issued by WHO particularly for 24 hours.

Pollutant	Averaging time	Concentration limit
PM_{10}	24 hour	50µg/m^3
	Annual	30µg/m^3
SO_2	10 minute	712µg/m^3
	1 hour	570µg/m^3
	24 hour	228µg/m^3
	Annual	60µg/m^3

The use of maximum acceptable health standards as approval conditions for the shipping facility was an exceedingly generous approach to the approval. If the shipping facility pollutants result in the air quality reaching these maximum "acceptable" standards, no other air pollution generating activities would be permitted in the future. For this reason, the shipping facility was given very generous pollution limits – far more generous than would have been granted for a diesel power station for example.

A further deficiency of the environmental assessment of this proposal is that $PM_{2.5}$, NO_2 and air toxics were not considered in the assessment. These pollutants present concern for serious health effects. The failure of EPA to identify the need to include these parameters in its assessment of the proposal raises questions about its fulfilment of obligations under Part 6 of the Administration Act.

4. Failure to assess total quantities of air pollutants discharged relative to existing pollution loads

National Pollutant Inventory (NPI) information could have been obtained and the results compared with existing air pollutant loads being discharged into the atmosphere in the vicinity of the port. This information would have provided the public with comparison information that would have enabled as assessment to be made of the magnitude of

shipping emissions relative to existing sources. Such an assessment would have provided local residents with information that would assist making a comparison of the shipping terminal with other known air pollution sources.

PAE Holmes issued a report for the Office of Environment and Heritage (OEH) on shipping emissions in 2011. This report suggests PM_{10} emissions in Port Jackson are 185.9 tonnes; $PM_{2.5}$ are 171.1 tonnes; SO_2 emissions 1,555.5 tonnes; VOC 40.6 tonnes; CO 114.4 tonnes; NOx 1837.2 tonnes and VOC 40.6 tonnes. No assessment was provided of changes to these values with the approval of the shipping facility and a comparison with other air pollution loads in the local area.

5. Predicted air quality impacts from the SKM report

The following table was developed from the pollutant concentration contours contained in the SKM report. The table shows that this report predicted there were large areas of the Balmain peninsular where WHO air pollutant health criteria would be exceeded if the project were approved.

The WHO criteria applied in this assessment are:

NO_2 – 1 hour mean 200µg/m^3
SO_2 – 24 hour mean 20µg/m^3
10min mean 500µg/m^3

Summary of areas affected:

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
NO_2 – 1 hour mean 200µg/m^3	Large area of Balmain including most of East Balmain. All of Pyrmont west of city west link.	All of central Balmain and west area of Pyrmont	All of Balamin and East Balmain, parts of Rozelle and north parts of Glebe. Area affected goes beyond map	All of Balamin and East Balmain, parts of Rozelle and north parts of Glebe. Area affected goes beyond map
SO_2 – 24 hour mean 20µg/m^3	Large area of Balmain including most of East Balmain. All of Pyrmont west of city west link.	All of central Balmain and west area of Pyrmont	All of Balamin and East Balmain, parts of Rozelle And north parts of Glebe Area affected goes beyond map	All of Balmain and Pyrmont peninsulars extends beyond map boundary.
SO_2 - 10min mean 500µg/m^3	Nil	Nil	Nil	Nil

SKM modelling results were provided in terms of contours for NO_x concentrations. The WHO criterion is given for NO_2 and this means an assessment is required to determine the conversion of NO_x to NO_2. SKM claimed a 9:1 ratio for NO_x to NO_2. Whether this rate is achieved at White Bay was not investigated. There are some reports which claim a lower conversion rate.

The use of the EPA's Rozelle monitoring site for "background" air quality data relies upon the assumption that air quality in Balmain – Pyrmont is similar to that in Rozelle, Callan Park where the EPA's monitoring site is located. This assumption is questioned. The "working port" claims, if realised, suggest that Balmain – Pyrmont air quality coupled with Anzac Bridge motor vehicle emissions is of poorer quality that that at Callan Park.

Given the above analysis, adoption of WHO criteria for air quality assessment should have led to the shipping facility in the approval process being subject to significant pollution controls. This is because the modelling assessment revealed that there would be a large residential area subject to exceedances of the WHO health criteria should the project be approved. The regulatory failure to consider the WHO criteria and their application at the point of planning approval highlights a major deficiency of the approval process.

6. Failure to identify options for new emission controls

The planning documents did not include a discussion of new technologies that were available to reduce air emissions from shipping activities. For example, the use of particulate filters, catalytic converters was not identified.

7. Lack of odour emission assessment

The planning approval process did not include an assessment of potential odours from shipping activities. The potential for offensive odours to be generated could have been assessed by undertaking an odour source strength analysis and modelling of emissions. This was not performed as part of the planning approval process despite the knowledge that air emissions from diesel powered combustion processes results in odorous chemicals being discharged.

8. Failure to identify application of Ringelmann smoke emission standards

The application of Ringelmann smoke standards to exhaust emissions from ships was not identified in the environmental assessment. Ringelmann limits apply for exhausts from non-scheduled premises including shipping. Observations of shipping activities indicate that compliance with this Standard is not being consistently achieved.

9. Lack of meaningful compliance conditions for air emissions in the planning approval

Air emission compliance requirements that were specified in the conditions of consent were grossly deficient. These deficiencies include the following:

- The air quality standards adopted for the project did not include specific criteria for air pollutants emitted by ships using the facility. For example, the PM_{10} 24 hour standard is not relevant for a ship which is in port for just 10 hours.
- No fuel sulphur concentration limits were specified. Motor vehicle diesel fuel is limited to 10ppm (ultra-low sulphur) while fuel sulphur levels of up to 3.5% sulphur (35,000 ppm) apply to ships using the port. Fuel sulphur limits have been applied in other ports for several years. The technology required to apply a lower sulphur standard while ships are in port is not that complex. The failure to include even a timetable for the introduction of lower fuel sulphur limits or other form of sulphur emission control raises an issue of credibility for the regulator.
- No timetable for shore power to be installed on ships using the facility. The former Maritime Services Board had identified this option over 30 years ago (with the author). It would appear that there is no longer a need for further investigation. Shore power should have been specified as a mandatory condition with a timetable for its introduction.
- No timetable for air pollution emission standards for ships using the facility to be introduced. There are existing available technologies which could be applied to ship engines to produce a large reduction in pollutants. These available technologies were not identified by the proponent and the EPA failed to identify these in its comments on the proposal. Had the proposal involved a large diesel stationary power generation facility, these controls would have been required as a condition of consent without question.
- The air quality monitoring and reporting requirements were not clearly specified in the consent – the air quality monitoring program was left to the proponent to define and commit to. The parameters monitored are largely of little interest from a regulatory perspective. For example, the reporting of PM_{10} 24 hour results is not meaningful when those results include unknown emissions from other sources both when the ship is in port and when the ship is not in port.
- The air quality monitoring program used by the proponent does not provide any ability to distinguish ship air pollutants from that caused by other sources, in particular, motor vehicles.
- Requirement for ships to comply with Ringelmann emission limits were not identified.
- Bunkering of ships in port was not assessed and not prohibited.

The above listing of deficiencies in the regulation of the shipping facility indicates the need for major changes to be imposed on the operator of the facility in order to address public concerns.

10. Deficient requirement for monitoring and reporting of air emissions

The purpose of requiring an air quality monitoring is twofold. The first is to assess whether the facility has caused any of the specific air quality criteria to be exceeded at any residential location. The approval documentation assumed that all existing residential areas achieved compliance with the air quality standards. The facility was approved with no existing air quality data (except for that provided by the EPA's monitoring stations). The assumption was made that air quality at the EPA's Rozelle site would be similar to that in the Balmain area. (The second monitoring report with results on days with no ships in port reveals that this assumption is not correct. PM_{10} results with no ships in port were typically higher in Balmain.)

The use of just a single monitoring point to reach any valid conclusion on air quality in all residential areas is problematic. For example, prevailing winds at different times of the year mean that the monitoring program needs to correlate wind direction over the year with measured results and the wind direction and speed at the time those results are obtained. The failure of the monitoring program to include any site specific atmospheric monitoring means that correlation of pollutant concentrations with wind speed and direction is not possible.

Another purpose of the monitoring program is to assess the magnitude of the increase in air pollutants discharged into the atmosphere. Data on the increase in source emissions would provide the public with information on whether the shipping companies using the facility have reduced their emissions to as low as reasonably practical. The monitoring program developed by the proponent did not attempt to satisfy this objective.

Deficiencies in the monitoring and reporting of air emissions include the following:

- Only required to monitor SO_2 and PM_{10}.
- Times when monitoring was required was subject to the choice of the proponent.
- No requirement to monitor other parameters of serious health concern, such as, air toxics – BTEX, NO_2 and $PM_{2.5}$.
- No requirement to monitor atmospheric parameters, eg wind speed and direction.
- No requirement to assess existing local air quality and distinguish between shipping emissions and emissions from other sources.
- No requirement to include a log of ship activities when monitoring was taking place.
- No requirement to provide sulphur concentration data in fuel on board ships when monitoring was occurring.
- No requirement to undertake air quality monitoring over times with and without ships in port so that data is obtained on air quality arising from other sources. This data is required to assess impacts associated with annual air quality criteria and to make an assessment of the actual contribution from ship emissions relative to ambient levels when a ship is in port. Compliance with annual air quality limits cannot be evaluated.
- No requirement in the monitoring program for the air quality results obtained from the monitoring program to be related to those predicted by the model used in the

environmental assessment. This must also be extended to include predicted air quality at the worst affected residence relative to that measured at the monitoring station. The air quality monitoring results released by the proponent has not included the latter evaluation.

- No monitoring program for odours.
- No monitoring of Ringelmann smoke emissions

As each ship movement is typically completed within a 10 hour period, the specification of limits for 24 hour or annual values is of no consequence from a regulatory perspective as proving beyond reasonable doubt shipping source contribution over such periods would be highly questionable. This means that the only regulatory parameter evaluated by the monitoring data is SO_2 emissions over 1 hour – and the results include sulphur emissions from other sources. The table in the Monitoring Reports reporting the measured results for the 1 hour SO_2 concentration is titled "1-hour average SO_2 maximum measured concentration" with the note that the reported value is an average of the 15 minute results. The use of "maximum" in the descriptor appears to be contradictory.

The AQMP does not include any requirement to monitor concurrent atmospheric conditions when air quality monitoring is taking place. Although wind rose data for a remote site is included in the monitoring report, this data does not permit air quality results to be correlated with wind speed and direction. The released first air quality monitoring report indicates that the predominant wind direction on the three days that a ship was present in the berth was from the north, northeast and west sectors ie these directions are likely to give lower concentrations in the residential areas than if southerly winds were present. Hence the air quality results are not able to be used to make any assessment as to pollution levels under a worst case scenario. For example, what are the SO_2 levels under a light southerly wind conditions? Under this scenario, what is the contribution from traffic on Anzac Bridge?

11. Use of the Air Quality Monitoring Reports to assess air emissions from the facility

The proponent has provided two air quality monitoring reports to the public. The content of these reports, as stated above, was developed by the proponent. The monitoring reports do not enable any substantive assessment to be made of the air emissions from shipping in all potentially affected residential areas. The reports contain monitoring results at just one monitoring station. No wind data to correlate air quality results with emissions from ships in port was provided. If the wind direction during each monitoring period was away from the monitoring point, the monitoring results would not be likely to cause elevated ship emissions. It would only be if the monitoring point was downstream relative to the ship location, would elevated emissions be likely or if there was calm atmospheric conditions. The reports do not provide any detailed information on wind speeds and directions with respect to the monitoring location and ship stack location. Hence the monitoring reports are only of very limited use. It is not possible to indicate what pollution levels might be present

at other sites, such as, in the houses in Bradford Street, which are in a different direction from the ship to the monitoring site.

12. Can any conclusions be made relating to PM_{10} results?

The monitoring reports do not provide sufficient information to make any conclusions as to the levels of PM_{10} arising from shipping activities at neighbouring residences (apart from residences adjacent to the monitoring site). A very tentative "possible" indication is that some elevation of the 24 hour PM_{10} occurred on 30 September 2013. The Rozelle results were also higher on this date. Whether this result is due to shipping or other activities is not able to be determined as there is insufficient supporting information in the report to reach any valid conclusions.

The PM_{10} 24 hour average result for 5 October 2013 has no explanation although this date also had an elevated PM_{10} result at Rozelle.

From the second report, a comparison of no ship in port versus ship in port results suggests Shipping "might" cause an increase in the PM_{10} 24 hour concentration of up to 5 $\mu g/m^3$ at the monitoring station. However, without wind speed/direction information, it is not possible to conclude if this change was due to shipping or due to other sources and different atmospheric conditions.

13. Can any conclusions be made relating to SO_2 emissions?

The following selected results are provided in the monitoring reports.

Date	Max SO_2 10 min $\mu g/m^3$	Max SO_2 1 hour $\mu g/m^3$	SO_2 24 hour $\mu g/m^3$
21-9-2013	121.7	64.3	7.5
30-9-2013	93.4	41.1	15.5
7-10-2013	345.7	258.0	57.2
6-12-2013	283.1	142.9	15.0
10-12-2013	188.0	89.9	12.7
20-12-2013	106.0	82.9	24.5
22-12-2013	112.6	99.6	29.9
23-12-2013	127.1	79.0	30.4

There is insufficient atmospheric monitoring data in the reports to determine the wind speed and direction monitoring at the time each of these results were obtained.

The applicable WHO criteria are: SO_2 – 24 hour mean 20$\mu g/m^3$ and 10min mean 500$\mu g/m^3$

Based upon the WHO criteria, there are 4 days when the SO_2 10 minute criterion was exceeded at the monitoring site. The monitoring reports do not provide any indication as to the extent of the residential area where SO_2 emissions from shipping exceed the WHO criteria.

In contrast, the measured SO_2 emissions were less than the criteria specified by the Planning NSW Director General for the shipping terminal at the monitoring site. Whether the SO_2 concentration complies with this higher limit at each residential premise was never assessed in the monitoring reports.

A comparison of the measured SO_2 concentrations with and without shipping present in the second monitoring report suggests that shipping possibly increases SO_2 emissions by 100µg/m^3 in a "downwind" situation but this is very dependent upon atmospheric conditions.

14. Predicted shipping emission concentrations for other pollutants from White Bay Facility

Using the ratios of pollutant concentrations from shipping emissions given in the OEH report, it is possible to make an estimate of pollutant concentrations for other pollutants from shipping activities. An increase in SO_2 concentration of 100µg/m^3 in a "downwind" situation would give an increase in the following pollutant concentrations on a pro rata basis:

Pollutant	Increase in concentration	WHO limit
SO_2	100µg/m^3	24 hour mean 20µg/m^3
PM_{10}	12µg/m^3	24 hour mean 50µg/m^3
$PM_{2.5}$	11µg/m^3	24 hour mean 25µg/m^3
NOx	120µg/m^3	-
NO_2	13µg/m^3 (9:1 ratio)	1 hour mean 200µg/m^3
VOC	2.6µg/m^3	-

Based upon this indicative analysis, SO_2 emissions from shipping would be highly likely to exceed the WHO limit over a 24 hour period in a downwind situation. The fine particles $PM_{2.5}$ loading represents almost half the allowable limit. Existing fine particle emissions from motor vehicles and other sources in the locality are likely to contribute a significant amount of the allowable limit.

15. Should ship berthing be permitted under any atmospheric conditions?

The above analysis indicates that there may be a need for ship berthing to be banned depending upon the atmospheric conditions in order to protect the health and amenity of local residents. The monitoring reports provided by the proponent do not provide a satisfactory basis for reaching any conclusions as to whether the shipping facility will achieve compliance with WHO air quality criteria under all conditions.

16. Conclusions relating to air emissions

The shipping facility was approved without a critical review being completed of the air pollution likely to arise from its operation. There is very little meaningful ambient air quality data available for the residential areas around the shipping terminal. The monitoring reports provided to date do not enable an assessment to be completed of the magnitude of air

pollution impact in the surrounding residential areas. The approval conditions provide no scope for air pollution to be reduced in the future unless the proponent voluntarily initiates pollution reduction measures. For this reason, there is a need for the EPA to issue appropriate notices to the proponent specifying stringent conditions to protect the health and amenity of local residents and provide comprehensive reporting to the public on progress being made by the proponent in that regard. This will include a substantial expansion of the current air quality monitoring program.

17. Recommendations on air emissions regulation

The new requirements for the regulation of air emissions should be issued in the form of a "prevention notice" issued by the EPA to the proponent. These requirements should rectify the deficiencies in the planning approval as described above. The notice should include a revision of the air monitoring and reporting conditions plus include specific time frames for air emission reduction activities to be implemented.

Failure of Noise Regulation - White Bay Shipping Facility

1. Summary

Based upon the results of the monitoring acoustic reports prepared for the White Bay shipping terminal, shipping activities are generating noise levels which exceed acceptable levels by at least 20dB(A). This level of exceedance arises because of the time of day of those activities plus weightings for tonal and impulsive noise as provided for under the EPA's Industrial Noise Policy (INP). Noise of this character and magnitude affects human health through loss of sleep and causes stress and annoyance to residents through loss of amenity in their home. The magnitude and frequency of non-compliances reported in acoustic compliance reports understates the level of annoyance caused by shipping activities.

There are three main reasons why the acoustic assessment used for approving the facility has not reflected the level of annoyance displayed by affected residents. These are: the claim that the shipping facility is bordering an industrial area rather than a residential area; there is a mistake in noise criteria provided for the Dockside Apartments; and modifying factors have not been applied when assessing compliance as required under the INP.

Now that the facility is operational, the "feasible and reasonable" provisions of the INP provide the EPA with limited options to have the necessary noise reduction measures imposed. Although noise reduction measures could be fitted to ships using the facility, there needs to be a shift in the policy of RMS who provides berthing facilities. The imposition of cost penalties would create a market based incentive for shipping companies to implement noise reduction measures. The magnitude of the exceedance being imposed on residents also warrants the imposition of a curfew to restrict shipping movements as this constitutes a reasonable and feasible approach to addressing the current noise pollution.

2. Amenity Noise Level Criteria used for the Shipping Terminal

2.1 Classification of affected residential areas under the Industrial Noise Policy

The Wilkinson Murray (WM) acoustic planning report claims that the proposed terminal should be assessed as falling within the residential bordering industrial zoning under the EPA's INP. WM did not attempt to provide substantive justification of this claim. WM did not attempt to ascertain the point where industrial noise drops by 5dB to determine where the industrial bordering residential zone is limited to as specified in the INP. The classification of the shipping terminal as representing an industrial bordering residential development is a critical issue that deserves much closer scrutiny.

In the noise compliance reports, there are multiple occasions where reference is made to noise arising from traffic on Anzac bridge being a dominant feature of the ambient noise environment. This comment particularly applies for noise monitoring performed at the Oxley Street, Glebe, Refinery Drive, Pyrmont and Dockside Apartments. As the shipping terminal is not operational 24 hours, 7 days of the week, an inspection of each of the residential areas reveals that industrial noise from other shipping facilities is not the major source of noise when the passenger terminal is not operating. Distant traffic is generally the predominant source of noise. Hence, the claim that each of the residential areas should be assessed as

being residential bordering industrial is disputed on the basis of observations when the shipping terminal is not in use and the statements made in the compliance reports which give multiple references to traffic noise as being the dominant source of ambient noise.

Using the descriptions provided in the INP, the shipping facility should be assessed on the basis of each of the existing residential areas as being "urban." This is justified on the basis that the background noise in each of these areas is dominated by "urban hum" from road traffic on Anzac bridge and the associated major roads. The background noise is not dominated by industrial ie shipping noise at each of these residential locations. Therefore, the "urban" classification to determine acceptable noise levels should be used.

Amenity Criteria	Daytime $L_{A,eq,period}$	Evening $L_{A,eq,period}$	Night $L_{A,eq,period}$
Using "industrial interface"	65	55	50
Using "Urban"	60	50	45

As will be shown in the following discussion, the selection of the correct description of the existing residential receivers has an important effect on the selection of the correct noise criteria.

2.2 "Urban" land use noise criteria for amenity

For a residence in an "urban" area, the acceptable noise levels (ANL) from an industrial facility are given in the table below:

Time period	ANL $L_{Aeq,period}$ dB(A)	Maximum $L_{Aeq,period}$ dB(A)
Day	60	65
Evening	50	55
Night	45	50

When the existing measured L_{Aeq} due to noise from existing industry is greater than the ANL minus 6, there is a need to correct the ANL to account for the existing industrial noise. The following table has been produced to illustrate:

Table: Corrected Acceptable Noise Levels for "urban" interface

Site	Existing $L_{Aeq,period}$ dB(A)			Corrected ANL max $L_{Aeq,period}$ dB(A)		
	Day	Evening	Night	Day	Evening	Night
Grafton St, Balmain	56	52	52	58	42	42
Donnelly St, Balmain	56	52	52	58	42	42
Dockside Apartments	55	52	48	58	42	38
Refinery Dr Pyrmont	55	55	50	58	45	40
Oxley St, Glebe	57	53	53	57	43	43
Camerons Cove, Balmain	56	52	52	58	42	42

Note: The Existing L_{Aeq} noise levels were taken from Table 4-2 of WM report with a correction made for the Dockside Apartments.

3. Intrusiveness noise level criterion used for the Shipping Terminal:

Background noise level measurements and selection of rating background noise level (RBL)

The selection of the correct background noise level in a locality is important because the intrusiveness criterion permits just a 5dB increase in the RBL. If an RBL is selected which is much higher than the correct background noise level, this will lead to much higher noise levels being permitted and the noise, when present, will be much more annoying because it stands out so much more against other noises in the locality.

There were numerous ambient noise level measurements completed in the past. The results of these are summarised in Table 4.1 of the WM report. There are clearly several inconsistencies in the rating background noise levels reported. The WM report does not contain a discussion of these values and propose a rationale for selecting the RBL for each receiver location.

Site	RBL WM Report L_{A90}		
	Day	Evening	Night
Grafton St, Balmain	45	43	40
Donnelly St, Balmain	47	47	44
Dockside Apartments	48	48	48
Refinery Dr Pyrmont	50	48	46
Oxley St, Glebe	53	42	42
Camerons Cove, Balmain	45	43	40

There is an error in Table 4.2 of the WM Report. The measured noise levels at the Dockside apartments in Balmain are claimed to have L_{A90} levels which are equal or greater than the L_{Aeq} levels for the day, evening and night periods. This is not physically possible. The L_{A90} levels for Dockside Apartments were interchanged with the L_{Aeq} levels. This change produces a significant effect upon the conclusions reached in the compliance assessment reports as there is now a lower noise limit for the Dockside Apartments. The correction also means that the limits provided in the Planning Approval are incorrect at this location.

There is a further apparent issue with the noise measurements used to determine the claimed background noise levels at the Dockside Apartments in the WM report. This report states that the L_{A90} noise levels are the same day and night. In practice, this is an extremely rare coincidence. It suggests that the noise levels were measured with some localised item of mechanical plant operating in the background. This item of plant appears to have been turned off when the noise compliance reports were developed. For example, Acoustic Report No 2, Table 5 gives a measured $L_{A90,\ 15min}$ for the dockside apartments of 43dB(A) at night with little to no shipping noise. This noise level was again reported in Acoustic Report

No 8 for this location. However, the noise criterion proposed for night-time noise at this location was 53dB(A) - based upon a RBL of 48dB(A).

The conclusion is that it is more likely that a better estimate of the background noise level at night at the Dockside Apartments is 43dB(A). The correct evening background noise level may be in the vicinity of 47dB(A) and not the claimed 53dB(A). In any case, the noise limits included in the planning instrument are incorrect and need to be revised to ensure that the appropriate noise level limits are in place for the Dockside Apartments.

4. Project specific noise levels (PSNLs)

The table below contains a list of both the intrusiveness limits and the amenity limits for each of the residential areas.

Site	RBL + 5dB(A) Intrusiveness Limits $L_{Aeq,15\ min}$			Amenity Noise limits $L_{Aeq,\ period}$ Industrial/Urban		
	Day	Evening	Night	Day	Evening	Night
Grafton St, Balmain	50	48	45	65/58	52/42	42/42
Donnelly St, Balmain	52	52	49	65/58	52/42	42/42
Dockside Apartments	53	53	53	65/58	52/42	46/38
Refinery Dr Pyrmont	55	53	51	65/58	43/45	42/40
Oxley St, Glebe	58	47	47	65/57	51/43	43/43
Camerons Cove, Balmain	50	48	45	65/58	52/42	42/42

Note: (1) Dockside RBL noise limits need to be revised due to error in WM report.

(2) Highlighted values are the lower of the Intrusiveness and Amenity values.

By selecting the lower of the noise levels when assessed for intrusiveness and amenity, the noise levels for the project are determined. As is shown in the following table, changing the land use parameter and using different background and ambient noise levels yields a different set of noise limits. Lower values are highlighted in the above table. This yields a change to generally a lower set of noise limits as set out below.

Table of PSNLs:

Site	Industrial WM Report Limits			**Proposed new Noise Limits**		
	Day	Evening	Night	**Day**	**Evening**	**Night**
Grafton St, Balmain	50	48	45	**50**	**42**	**42**
Donnelly St, Balmain	52	52	49	**52**	**42**	**42**
Dockside Apartments	53	52	46	**53**	**42**	**38**
Refinery Dr Pyrmont	55	47	42	**55**	**45**	**40**
Oxley St, Glebe	58	47	43	**57**	**43**	**43**
Camerons Cove, Balmain	50	48	42	**50**	**42**	**42**

Notes: (1) Dockside Apartments noise levels are corrected from the WM report.

(2) The proposed new day limits are all $L_{A,eq\ (15\ min)}$ while the evening and night limits are all $L_{A,eq,period}$.

The above table illustrates the effect of the choice of "urban" or "industrial interface" has upon the resultant noise level criteria particularly in the evening and night time periods. The error in the WM Report for the Dockside Apartments noise criteria is also shown in the above table. This has particular significance when assessing noise impacts arising from motor vehicle entering and departing the premises.

5. Corrections to noise level limits for the character of emitted noise

Chapter 4 of the INP describes "modifying factor" adjustments that are to be made to determine acceptable noise levels when undertaking noise assessments. There are four aspects which provide "modifying factor" adjustments. These are:

5.1 Adjustments for Tonal Noise (Table 4.1 INP) including low frequency noise

The INP specifies the definition of tonal noise and a 5dB correction applies where this occurs. It is necessary to demonstrate that fan noise, for example, is not broadband. Tonal noise from ship fans has been a known source of annoying noise from experience. Claims that all ships do not emit tonal noise must be supported by third octave band measurements when tonal elements are detected. Similarly, low frequency sounds should also be assessed to determine if a correction factor needs to be applied.

5.2 Adjustments for Impulsive Noise (Table 4.1 INP)

The INP provides a definition of impulsive noise and this will require the use of an "impulse" and "fast" response sound level meter to confirm whether this correction needs to be applied. Instances where "hammering" is detected would call for these measurements to be made.

5.3 Adjustments for intermittent noise (Table 4.1 INP)

Intermittent noise, such as that from passing vehicles, PA systems and alarms, incur a 5dB penalty at night where the noise level varies by more than 5dB. The compliance reports identified multiple occasions when intermittent noise took place however as there was no evidence recorded of a 5dB noise level change, no correction factor was applied.

5.4 Adjustments for duration Table 4.2 INP (Tables 4.1 and 4.2 INP)

Although the INP provides some allowance for short duration noises, the INP states that claiming these allowances is only acceptable if the noise does not have other annoying characteristics, such as, being tonal or impulsive. For example, claiming a duration allowance for a reversing alarm or a PA system is not acceptable. Further, claiming a duration allowance is only permitted if there is only one such event in any 24 hour period. Period adjustments must be justified and clearly isolated one off events.

The compliance reports appear to claim duration adjustments as one-off events without any justification or being able to show that those events only occurred just once in a 24 hour period. For example, a ship departure at 7pm is used to claim a 5dB additional noise level limit. This is not acceptable when the ship has been at dockside for the preceding daytime period.

Although the modifying adjustments are identified in the WM report, they have largely not been identified and incorporated into the compliance reports. For example, some of the ship fans are likely to have tonal components. To make this assessment, 1/3 octave band sound measurements need to be completed. No reference is made to any 1/3 octave band sound measurements being performed. Impulsive noise, such as that from hammering, requires sound measurements to be made using both the "impulse" and "fast" response on a sound level meter. Although the compliance reports make reference to the existence of banging noise, no "impulse" response sound level measurements are provided.

The importance of modifying factor corrections is that the existence of a modifying factor is treated differently if the noise limit is driven by the intrusiveness criterion or the amenity criterion. The correct criterion for a particular time period could shift from an amenity criterion to an intrusiveness criterion if a modifying factor applies. For example, a tonal noise at night in Grafton Street must comply with the criterion of 40dB(A) $L_{eq,15min}$ as the intrusiveness criterion applies. In day time, hammering impulsive noise in Grafton Street is required to satisfy a 45dB(A) $L_{eq,15min}$ as the intrusiveness criterion applies.

6. Access Road Traffic Noise Assessment

Road traffic on the access road is a particular problem that requires detailed attention in assessing the impact of this facility. This is because noise from the vehicles on the private road must be assessed as industrial noise not as road traffic noise. Such vehicle movements are generally intermittent and need to be distinguished from noise from vehicles on Anzac Bridge. The vehicle movements are most likely to affects residents in the Dockside Apartments. How motor vehicle noise was assessed in the Compliance Reports is questioned from the comments in Table 5 of the Dawn Princess Report. L_{Amax} noise levels at the Dockside Apartments are indicated to be 60 to 75dB(A). It is unclear if these noise levels are included in the quoted $L_{Aeq,15\ min}$ of 61dB(A) at this location.

7. Sleep disturbance assessment

Sleep disturbance assessment is required to be performed for all night time activities. The criterion used is that the $L_{A1\ (1\ min)}$ should not exceed the $L_{A90\ (15\ min)}$ by more than 15dB(A). Table 4-4 in the WM Report provides a listing of the sleep disturbance criteria. The limit for the Dockside Apartments should be reduced from 63dB(A) to 58dB(A) $L_{A1\ (1\ min)}$ to account for the lower background noise levels recorded at this site from the compliance monitoring reports.

Ships arriving at the facility prior to 7am are expected to significantly exceed the sleep disturbance criteria at Camerons Cove and Grafton Street on each occasion that an early arrival takes place.

8. Noise limits used in monitoring reports vs WM Planning Report

The SLR compliance reports appear to claim an increase in noise limits to account for shipping noise falling within the duration adjustment requirements under the INP. The justification for these "adjustments" is questioned and needs to be reviewed under the terms of the INP.

Table of noise limits proposed by WM and those used by SLR:

Site	WM Planning Report Limits			SLR Compliance Report Limits		
	Day	Evening	Night	Day	Evening	Night
Grafton St, Balmain	50	48	45	56	54	49
Donnelly St, Balmain	52	52	49	54	52	49
Dockside Apartments	53	52	46	60	57	53/46
Refinery Dr Pyrmont	55	47	42p	55	53	51/42
Oxley St, Glebe	58	47	43p	58	47	47/43
Camerons Cove, Balmain	50	48	42p	50	48	45/42

Notes: (1) Values for limits at Dockside are corrected from WM Report

(2) Values for limits in WM Report are $L_{Aeq,15\ min}$ and values with p are $L_{A,eq,period}$

(3)All values in SLR limits are $L_{Aeq,15\ min}$ – second values at night are $L_{A,eq,period}$

9. WM Compliance Report - Pacific Jewel 14 June 2013 (day measurements)

Results describe a "banging" noise evident at Grafton Street during the daytime yet do not make any mention of the penalty weighting which applies to impulsive and intermittent noise. Banging noise was required to be assessed to determine if it satisfies the "impulsive" classification under the INP. The INP calls for a penalty of 5dB(A) for impulsive noise and a further 5dB(A) penalty for intermittent noise. Hence banging noise (assuming this noise satisfies the "impulsive" requirement) may incur a total penalty of 10dB(A). This was not included in the compliance report.

Vehicles entering and departing the site generate intermittent noise. The INP requires a 5dB(A) penalty to be applied for noise with intermittent characteristics.

10. SLR Sun Princess 16-17 Oct 2013 (day and night measurements)

Table 7 states that ship noise exceeded the noise goal by 6dB(A) at night at Grafton Street. (49dB(A) $L_{eq\ 15\ min}$)

11. SLR Sea Princess 20 Oct 2013 (daytime measurements)

Table 4 states impact noise evident in Grafton Street start time 2:08pm. No assessment for "impulsive" noise was provided. Vessel PA system recorded a L_{Amax} noise level of 65 to 68 dB(A) at Refinery Drive. PA systems are likely to be intermittent and be classified as having an annoying characteristic.

12. SLR Pacific Jewel 23 Oct 2013 (daytime measurements)

The report claimed that no exceedances were detected. Impact noise evident at Grafton Street yet no assessment for "impulsive" noise was provided as required under the INP. Traffic noise evident at the Dockside apartments yet no assessment provided on intermittency correction as required under INP.

13. SLR Pacific Pearl 25 Oct 2013 (daytime measurements)

Table 4 claims impact noise (54-57dB(A)) was present during measurement at Donnelly Street, a reversing alarm (65-67dB(A)) was present during measurements at Refinery Drive and site works of 55-58dB(A) including workers playing music at 51-55dBA(A) during measurements at Camerons Cove. It is uncertain if vehicles on the access road were included in site noise assessment. The report should have considered modifying factors and whether they applied to the noise being generated or not.

Table 5 claims there were no exceedances.

14. SLR Ocean Princess 4 Nov 2013 (daytime measurements)

Table 4 states that a reversing alarm having a noise level of 59-60dB(A) was present during measurements at Grafton street. The reversing alarm is assumed to be intermittent. No assessment is included of an adjustment to the measured level for intermittency as a modifying factor.

Although wind noise is mentioned as affecting measurements, no wind speed measurements appear to have been made.

Table 5 claims there was just a 1dB(A) exceedance at Grafton street which appears to ignore the measurement of the reversing alarm and the need for a modifying factor correction.

15. SLR Dawn Princess 15 Nov 2013 (day and night measurements including berthing)

Table 4 night time noise measurements includes comment of measured noise from music on ship of 56dB(A), impact noise of 62dB(A) and ship engine noise of 58dB(A) at Camerons Cove. There was mention of a claimed 50Hz hum at Camerons Cove that was estimated to have a noise level of 30dB(A). Experience with transformer noise shows that the generated sound is dominated by a 100Hz tone not 50Hz as claimed. In any case, narrow ban analysis results should be provided to verify this claim.

Table 5 day time measured noise levels includes comment of 65-67dB(A) site works noise at Grafton street, 60-65dB(A) warning system noise at Donnelly street, 60-75dB(A) traffic on access road at Dockside apartments and 68-70dB(A) site works noise at Camerons Cove. Penalties for annoying characteristics should have been considered in the report.

Table 6 states $L_{Aeq,15min}$ exceedances of 15 and 11 dB(A) respectively at Grafton Street and Camerons Cove. Application of corrections required under the INP are likely to show the exceedance was much greater than that claimed.

Table 8 states L_{Amax} exceedances of 9 and 7dB(A) respectively at Grafton Street and Camerons Cove.

This report appears to suggest that the magnitude of the exceedance is reduced by claiming that the noise only lasts for a brief period relative to the total night-time allowance. Short duration noises should be assessed using the intrusiveness criterion ie $L_{Aeq,\ 15\ min}$.

16. SLR Pacific Jewel and Costa Neo Romantica 5-6 Dec 2013 (day and overnight ship)

There appears to have been significant wind during the noise measurement period. This appears to have influenced measured levels.

Table 10 states that night-time noise levels exceeded the criterion by 11 and 8dB(A) respectively at Grafton Street and Camerons Close. Action is required to address this level of exceedance.

Table 12 states that the night-time noise level criterion for L_{Amax} was exceeded by 14 and 10dB(A) respectively at Grafton Street and Camerons Close. Action is required to address this level of exceedance.

Noise measurement results given in the Appendix contain values where justified complaints from affected residents are to be expected. For example, an $L_{Aeq,15\ min}$ of 62dB(A) at 10:21pm in Grafton Street is likely to yield a serious noise complaint. An L_{Amax} of 69dB(A) would be expected to cause sleep disturbance.

17. Conclusions on noise regulation

The noise criteria adopted for the shipping terminal do not reflect a fair application of the INP. Consequently, the compliance reports understate the noise problems arising from the facility. From a site inspection at each of the residential areas with and without shipping terminal activities taking place, it is evident that noise from the shipping terminal is the predominant source of ambient noise at all of the Balmain sites when these activities are taking place. The claim that each of the potentially affected residential areas represents an industrial interface is not supported by site inspection and comments made in the compliance reports which identify traffic noise as being the predominant contributor to ambient noise apart from the terminal itself. The absence of shipping terminal activities results in a pronounced improvement in acoustic amenity at each of the Balmain residential sites.

Additionally, there was an error in the WM report which led to higher noise limits for the Dockside Apartments than should have been used.

When the error for the Dockside Apartments is corrected and the “urban” interface is selected, the new noise limits derived under the INP are significantly lower than those in the WM Report in the evening and night time periods. The proposed new noise limits are likely to protect 90 percent of the affected population as the stated objective of the INP.

The lower limits will provide no immediate relief to residents affected by noise from the shipping facility. Producing compliance reports which contain multiple exceedances of noise limits are of no benefit to affected residents. Action is required to address a substantial noise problem arising from the facility.

18. Recommendations

It is recommended that all shipping and associated activities be restricted to day time only ie 7am to 6pm until effective noise controls are implemented which make a substantial impact

on reducing the level of non-compliance with noise limits. It is not satisfactory to continue the existing operations where substantial noise level exceedances are taking place. Aircraft flight movements at Sydney Airport have operated with curfew times for many years. Applying curfew times for this shipping facility should also be implemented until effective acoustic controls are implemented.

Shore power was proposed by the former Maritime Services Board as the most effective means of reducing shipping noise over 35 years ago. It is yet to be applied. Shore power would only partly address the existing noise problem. It is not reasonable that the current situation is permitted to continue while further investigations take place.

The compliance reports appear to suggest that road vehicles on access roads that a part of the facility do not need to be included as noise coming from the facility. This is incorrect. Vehicles on roads forming part of the facility must be assessed in terms of L_{Amax} at night and the contribution to L_{Aeq} at all times of the day.

Future compliance reports must also include correction factors for noise emitted from the facility as provided for under the INP. It is essential that noise emissions from shipping do include assessments for annoying characteristics, such as, tonality, impulsiveness and intermittency. All future noise compliance reports need to include an assessment of submitted to date appear to have overlooked any assessment of these noise penalties. This requires action in future compliance assessment reports.

A noise fee based structure should be developed and applied to shipping using the facility. This would provide a market mechanism for port users to introduce further noise controls on ship noise. Without a fee structure, there is no incentive for port users to investigate and implement noise reduction works on their ships.

The above new requirements should be issued in the form of a “prevention notice” issued by the EPA to the proponent. The notice should include the revised noise limits detailed above and impose a timetable for the proponent to adhere to. The notice should also include new monitoring requirements which specify the need for weightings to be applied as specified in the INP.