

Site Name : IXOM Wyong (Ixom Operations Pty Ltd)

Site Address : 8 Pavitt Crescent Wyong 2259 NSW

The site has five Monitoring/Discharge Points identified in the licence. There are three discharge to air point and two noise monitoring points as detailed below.

Monitoring & discharge points

EPA ID no.	Type of Monitoring Point	Type of Discharge Point	Location Description	Monitoring Frequency
Point 1	Discharge to Air	Discharge to Air	Poly Aluminium Chloride Reactor 3 within Production Area	Yearly
Point 2	Discharge to Air	Discharge to Air	Poly Aluminium Chloride Reactor 4 within Production Area	Yearly
Point 3	Discharge to Air	Discharge to Air	Poly Aluminium Chloride Reactor 1 within Production Area	Yearly
Point 4	Noise monitoring	Noise	2 Florin Place Wadalba	Yearly
Point 5	Noise monitoring	Noise	72 Settlement Drive Wadalba	Yearly

Discharge to Air Concentration Limits - Point 1,2,3

Pollutant	Units of measure	100 percentile conc. limit
Hydrogen Chloride	mg/m ³	100
Solid Particles	mg/m ³	50

Air Monitoring Requirements

Pollutant	Units of measure	Frequency	Sampling Method
Hydrogen chloride	milligrams per cubic metre	Yearly	TM-8
Molecular weight of stack gases	grams per gram mole	Yearly	TM-23
Oxygen (O2)	milligrams per cubic metre	Yearly	TM-25
Solid Particles	milligrams per cubic metre	Yearly	TM-15
Temperature	degrees Celcius	Yearly	TM-2
Velocity	metres per second	Yearly	TM-2

Noise Limits - Point 4,5

Time period	Measurement parameter	Noise level dB(A)
Day, Evening, Night	LAeq (15 Minute)	35
Night	LAm _{ax}	45

Air monitoring - sampling events

Date samples taken	Points Sampled	Date results obtained	Date results published
April 17-19 2018	1,2,3	May 17 2018	November 19 2018
May 30 2018	2	June 6 2018	November 19 2018
June 19-20 2018	1,2	June 29 2018	November 19 2018
Jun 15-17 2019	1,2,3	July 15 2019	July 18 2019
June 17-18 2020	1,2,3	July 1 2020	July 9 2020
May 11-12 2021	1, 2,3	May 27 2021	June 30 2021
June 17 2021	1	June 28 2021	June 30 2021
June 28 2022	1,2,3	July 4 2022	July 8 2021

Noise monitoring - sampling events

Date samples taken	Points Sampled	Date results obtained	Date results published
Sep 13-14 2018	4,5	October 18 2018	November 19 2018
Aug 28 2018	4,5	September 26 2018	October 25 2018
Jun 29-30 2020	4,5	Jul1 1 2020	July 9 2020

Air Monitoring Results

Pollutant	Units	Limit	Point1			Point 2			Point 3		
			Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Hydrogen chloride	mg/m3	100	4	173	500	0.1	24	95	1.7	1.7	1.7
Molecular weight of stack gases	g / mol	-	29	29	30	29	30	30	29	29	29
Oxygen (O2)	mg/m3	-	2.86	12.6	18.0	4.65	7.9	11.1	20.9	20.9	20.9
Solid Particles	mg/m3	50	0	80	240	0	46	160	14	14	14
Temperature	C	-	33	66	99	24	58	91	32	32	32
Velocity	m/s	-	2	2	3	1.3	2	4	2	2	2
Samples taken			3			4			1		

Noise Monitoring Results

A summary of results for L_{Aeq} , L_{A90} , L_{max} and attenuation (SPL) in comparison with the applied amenity criteria are shown in Table 4-5 for all three locations monitored over the day, evening and night time periods.

Table 4-5: Summary of noise monitoring results for IXOM

Location	Time period	Receiver dB(A)*	L_{A90} dB(A)	L_{max} dB(A)	SPL dB(A)	SPL_{max} dB(A)	EPL L_{Aeq} Limit dB(A)	EPL L_{max} Limit dB(A)
EPL Point 4	Day	46.7*	41.5	N/A	29.1 ¹	-	35	-
EPL Point 5		44.8*	39.2	N/A	29.0 ²	-	35	-
IXOM		59.4	48.3	N/A	-	-	-	-
EPL Point 4	Evening	40.9*	36.2	N/A	7.2 ¹	-	35	-
EPL Point 5		40.1*	36.5	N/A	7.1 ²	-	35	-
IXOM		37.5	35.8	N/A	-	-	-	-
EPL Point 4	Night	37.0*	31.9	48.3*	2.1 ¹	9.5 ¹	35	45
EPL Point 5		35.4*	30.0	50.4*	2.0 ²	9.4 ²	35	45
IXOM		32.4	29.9	39.8	-	-	-	-

*Results reflect the total noise measured at the location, which potentially includes noise sources external to IXOM operations.

¹ 655 metres to IXOM operations

² 660 metres to IXOM operations

The location of the identified receivers and the distance from the IXOM site are identified in Figure 2-1.



Figure 2-1: IXOM location map showing identified noise monitoring locations and distances from site

The Pacific Highway is situated nearby and can experience heavy traffic.

Air Monitoring Results

Pollutant	Units	Limit	Point1			Point 2			Point 3		
			Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Hydrogen chloride	mg/m3	100	4.8	4.8	4.8	1.7	1.7	1.7	3.9	3.9	3.9
Molecular weight of stack gases	g / mol	-	29	29	29	30	30	30	29	29	29
Oxygen (O2)	mg/m3	-	17.0	17.0	17.0	7.3	7.3	7.3	20.9	20.9	20.9
Solid Particles	mg/m3	50	4.9	4.9	4.9	27	27	27	3.8	3.8	3.8
Temperature	C	-	65	65	65	78	78	78	26	26	26
Velocity	m/s	-	2	2	2	1.6	1.6	1.6	2	2	2
Samples taken			1			1			1		

4.4 Summary of Noise Monitoring

A summary of results for L_{Aeq} , L_{A90} , L_{Amax} and attenuation (SPL) in comparison with the applied amenity criteria are shown in Table 4-5 for all three locations monitored over the day, evening and night time periods.

Table 4-5: Summary of noise monitoring results for IXOM

Location	Time period	Receiver dB(A)*	L_{A90} dB(A)	L_{max} dB(A)	SPL dB(A)	SPL_{Max} dB(A)	EPL L_{Aeq} Limit dB(A)	EPL L_{max} Limit dB(A)
EPL Point 4	Day	43.0*	36.5	N/A	31.2 ¹	-	35	-
EPL Point 5		46.2*	38.9	N/A	31.1 ²	-	35	-
IXOM		61.5*	57.3	N/A	-	-	-	-
EPL Point 4	Evening	43.3*	37.2	N/A	12.0 ¹	-	35	-
EPL Point 5		52.9*	39.4	N/A	11.9 ²	-	35	-
IXOM		42.3*	37.4	N/A	-	-	-	-
EPL Point 4	Night	43.9*	35.4	61.2*	8.8 ¹	23.0 ¹	35	45
EPL Point 5		44.4*	36.3	62.0*	8.7 ²	22.9 ²	35	45
IXOM		39.1*	36.1	53.3*	-	-	-	-

*Results reflect the total noise measured at the location, which potentially includes noise sources external to IXOM operations.

¹ 655 metres to IXOM operations

² 660 metres to IXOM operations

Air Monitoring Results

Pollutant	Units	Limit	Point1			Point 2			Point 3		
			Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Hydrogen chloride	mg/m3	100	87	87	87	0.9	0.9	0.9	2.7	2.7	2.7
Molecular weight of stack gases	g / mol	-	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
Oxygen (O2)	mg/m3	-	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9
Solid Particles	mg/m3	50	6.3	6.3	6.3	6.5	6.5	6.5	3.9	3.9	3.9
Temperature	C	-	86	86	86	90	90	90	41	41	41
Velocity	m/s	-	2.9	2.9	2.9	1.6	1.6	1.6	1.6	1.6	1.6
Samples taken			1			1			1		

4.4 Summary of Noise Monitoring

A summary of results for L_{Aeq} , L_{A90} , L_{Amax} and attenuation (SPL) in comparison with the applied amenity criteria are shown in Table 4-5 for all three locations monitored over the day, evening and night time periods.

Table 4-5: Summary of noise monitoring results for IXOM

Location	Time period	Receiver dB(A)*	L_{A90} dB(A)	L_{max} dB(A)	SPL dB(A)	SPL_{Max} dB(A)	EPL L_{Aeq} Limit dB(A)	EPL L_{max} Limit dB(A)
EPL Point 4	Day	47.2*	43.9	N/A	29.5 ¹	-	35	-
EPL Point 5		46.5*	42.4	N/A	29.4 ²	-	35	-
IXOM		59.8*	48.7	N/A	-	-	-	-
EPL Point 4	Evening	55.4*	40.3	N/A	15.7 ¹	-	35	-
EPL Point 5		42.7*	37.2	N/A	15.6 ²	-	35	-
IXOM		46*	38.5	N/A	-	-	-	-
EPL Point 4	Night	44.3*	41.9	54*	17.2 ¹	40.3 ¹	35	45
EPL Point 5		55.7*	43.2	70*	17.1 ²	40.2 ²	35	45
IXOM		47.5*	41.1	70.6*	-	-	-	-

*Results reflect the total noise measured at the location, which potentially includes noise sources external to IXOM operations.

¹ 655 metres to IXOM operations

² 660 metres to IXOM operations

Air Monitoring Results

Pollutant	Units	Limit	Point1			Point 2			Point 3		
			Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Hydrogen chloride	mg/m ³	100	15.70	58.20	100.60	38.2	38.2	38.2	36	36.0	36.0
Molecular weight of stack gases	g / mol	-	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
Oxygen (O ₂)	mg/m ³	-	20.9	20.9	20.9	3.8	3.8	3.8	20.9	20.9	20.9
Solid Particles	mg/m ³	50	2.2	3.0	3.7	3.4	3.4	3.4	3.9	3.9	3.9
Temperature	C	-	88.1	91.1	94.0	92.8	92.8	92.8	38.5	38.5	38.5
Velocity	m/s	-	1.34	2.1	2.9	1.6	1.6	1.6	1.6	1.6	1.6
Samples taken			2			1			1		

The Site obtained a result of 100.6 mg/m³ vs a licence limit of 100 mg/m³ in L2.2 during its initial testing of emissions (Initial Results). Results of the "re-test" during standard operating conditions did not show any exceedances (Re-test Results).

The exceedance occurred when restarting reactor 3 first stack after it was idle for 48 hours to undertake fire suppression testing. This was tested during an abnormal plant condition, whereby the acid was more concentrated when the reaction started to heat up compared to a standard batch. The reactor stack discharge was sampled a month later and re-tested well below the license limit conditions.

The work instruction has been changed to include a limit of the HCl concentration that is added before the reaction starts.

Noise Monitoring Results

Table 4-2: L_{Aeq}, L_{A90} and attenuation (SPL_x) results for Daytime monitoring

Monitoring Station	Date	Time	L _{Aeq} dB(A)	L _{A90} dB(A)	SPL _(x) dB(A)	Limit L _{Aeq} dB(A)
EPL Point 4	09/09/2021	7:44 – 7:59	62.9*	57.9	33.4 ¹	35
EPL Point 5		8:00 – 8:15	54.4*	44.4	33.3 ²	
IXOM		7:01 – 7:17	63.7	57.4	-	-

*Results reflect the total noise measured at the location, which potentially includes noise sources external to IXOM operations.

¹ 655 metres to IXOM operations

² 660 metres to IXOM operations

4.2 Evening Sampling

Table 4-3 presents the results from the evening monitoring period.

Table 4-3: L_{Aeq}, L_{A90} and attenuation (SPL_x) results for Evening monitoring

Monitoring Station	Date	Time	L _{Aeq} dB(A)	L _{A90} dB(A)	SPL _(x) dB(A)	Limit L _{Aeq} dB(A)
EPL Point 4	09/09/2021	18:00 – 18:15	60.3*	35.5	28.2 ¹	35
EPL Point 5		18:18 – 18:34	58.2*	41.5	28.1 ²	
IXOM		19:01 – 19:16	58.5	45	-	-

*Results reflect the total noise measured at the location, which potentially includes noise sources external to IXOM operations.

¹ 655 metres to IXOM operations

² 660 metres to IXOM operations

4.3 Night Sampling

Table 4-4 presents the results from the night-time monitoring period.

Table 4-4: L_{Aeq}, L_{A90}, L_{Amax} and attenuation (SPL_x) results for Night-time monitoring

Monitoring Station	Date	Time	L _{Aeq} dB(A)	L _{A90} dB(A)	L _{max} dB(A)	SPL _(x) dB(A)	SPL _{(x)max} dB(A)	Limit L _{Aeq} dB(A)	Limit L _{max} dB(A)
EPL Point 4	09/09/2021	5:54 – 6:09	61.8*	46.9	81.6*	25.8 ¹	36.58 ^{1*}	35	45
EPL Point 5		6:14 – 6:29	65.4*	57.6	88.1*	25.7 ²	36.4 ^{2*}		
IXOM		5:29 – 5:44	56.1	46.7	66.8	-	-	-	-

*Results reflect the total noise measured at the location, which potentially includes noise sources external to IXOM operations.

¹ 655 metres to IXOM operations

² 660 metres to IXOM operations

The IXOM plant was operational during sampling and no peak noises were measured from the plant. The greatest noise contributor while monitoring at the boundary of the IXOM facility was noted to be from cars and trucks driving by the facility. The measured L_{max} at the facility, was recorded to be as a result of a passing truck. Cars and trucks driving past the facility were not associated with the IXOM site. Notes were taken onsite as to when external road truck noise peaked the measured maximum noise levels at the site.

During the monitoring at EPL Point 4 and 5, noises external to IXOM that contributed to the levels measured included highway traffic (Pacific Highway) including trucks, industrial noise, residential noise and wildlife.

Air Monitoring Results

Pollutant	Units	Limit	Point1			Point 2			Point 3		
			Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Hydrogen chloride	mg/m ³	100	15.70	58.20	140.00	38.2	38.2	38.2	36	36.0	36.0
Molecular weight of stack gases	g / mol	-	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
Oxygen (O ₂)	mg/m ³	-	20.9	20.9	20.9	3.8	3.8	3.8	20.9	20.9	20.9
Solid Particles	mg/m ³	50	2.2	3.0	3.7	3.4	3.4	3.4	3.9	3.9	3.9
Temperature	C	-	88.1	91.1	94.0	92.8	92.8	92.8	38.5	38.5	38.5
Velocity	m/s	-	1.34	2.1	2.9	1.6	1.6	1.6	1.6	1.6	1.6
Samples taken			2			1			1		

The Site obtained a result of 140 mg/m³ vs a licence limit of 100 mg/m³ in L2.2 during its initial testing of emissions (Initial Results). Results of the "re-test" during standard operating conditions did not show any exceedances (Re-test Results).

The exceedance occurred when restarting reactor 3 first stack after it was idle for 48 hours to undertake fire suppression testing. This was tested during an abnormal plant condition, whereby the acid was more concentrated when the reaction started to heat up compared to a standard batch. The reactor stack discharge was sampled a month later and re-tested well below the license limit conditions.

The work instruction has been changed to include a limit of the HCl concentration that is added before the reaction starts.

Air Monitoring Results

Pollutant	Units	Limit	Point1			Point 2			Point 3		
			Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Hydrogen chloride	mg/m ³	100	46.00	46.00	46.00						
Molecular weight of stack gases	g / mol	-	28.2	28.2	28.2						
Oxygen (O ₂)	%	-	0.4	0.4	0.4						
Solid Particles	mg/m ³	50									
Temperature	C	-	94.0	94.0	94.0						
Velocity	m/s	-	2	2.0	2.0						
Samples taken			1								

The Site obtained a result of 140 mg/m³ vs a licence limit of 100mg/m³ in L2.2 during its initial testing of emissions (Initial Results).

Notified EPA, improved the process and conducted retest on Hydrogen Chloride on the 20/10/22. The chart above shows the result of the retest

Noise Monitoring Results

4.1 Daytime Sampling

Table 4-2 presents the results from the daytime monitoring period.

Table 4-2: L_{Aeq} , L_{A90} and attenuation (SPL_x) results for Daytime monitoring

Monitoring Station	Date	Time	L_{Aeq} dB(A)	L_{A90} dB(A)	$SPL_{(x)}$ dB(A)	Limit L_{Aeq} dB(A)
EPL Point 4	16/08/2022	7:39 – 7:54	50*	44.9	22.1 ¹	35
EPL Point 5		7:21 – 7:38	48.2*	45	22 ²	
IXOM		7:00 – 7:15	52.4	43.5	-	-

*Results reflect the total noise measured at the location, which potentially includes noise sources external to IXOM operations.

¹ 655 metres to IXOM operations

² 660 metres to IXOM operations

4.2 Evening Sampling

Table 4-3 presents the results from the evening monitoring period.

Table 4-3: L_{Aeq} , L_{A90} and attenuation (SPL_x) results for Evening monitoring

Monitoring Station	Date	Time	L_{Aeq} dB(A)	L_{A90} dB(A)	$SPL_{(x)}$ dB(A)	Limit L_{Aeq} dB(A)
EPL Point 4	15/08/2022	18:47 – 19:02	43.1*	37.3 ¹	9.8 ¹	35
EPL Point 5		19:03 – 19:18	41.5*	36.1 ²	9.7 ²	
IXOM		19:25 – 19:40	40.1	32.3	-	-

*Results reflect the total noise measured at the location, which potentially includes noise sources external to IXOM operations.

¹ 655 metres to IXOM operations

² 660 metres to IXOM operations

The IXOM plant was operational during sampling but there were no staff present on site.

During the monitoring at EPL Point 4 and 5, noises external to IXOM that contributed to the levels measured included highway traffic (Pacific Highway), trains, residential noise, industrial noise, and wildlife.

4.3 Night Sampling

Table 4-4 presents the results from the night-time monitoring period.

Table 4-4: L_{Aeq} , L_{A90} , L_{Amax} and attenuation (SPL_x) results for Night-time monitoring

Monitoring Station	Date	Time	L_{Aeq} dB(A)	L_{A90} dB(A)	L_{max} dB(A)	$SPL_{(x)}$ dB(A)	$SPL_{(x)max}$ dB(A)	Limit L_{Aeq} dB(A)	Limit L_{max} dB(A)
EPL Point 4	16/08/2022	5:55 – 6:10	47.1*	42.7	65.4*	20.5 ¹	39.8 ¹	35	45
EPL Point 5		6:11 – 6:26	47.4*	43	65.1*	20.4 ²	39.7 ²		
IXOM		6:40 – 6:55	50.8	44.2	70.1	-	-	-	-

*Results reflect the total noise measured at the location, which potentially includes noise sources external to IXOM operations.

¹ 655 metres to IXOM operations

² 660 metres to IXOM operations

The IXOM plant was operational during sampling and no peak noises were measured from the plant. The greatest noise contributor while monitoring at the boundary of the IXOM facility was noted to be from cars and trucks driving by the facility. The measured L_{max} at the facility, was recorded to be as a result of a passing truck. Cars and trucks driving past the facility were not associated with the IXOM site. Notes were taken onsite as to when external road truck noise peaked the measured maximum noise levels at the site.

During the monitoring at EPL Point 4 and 5, noises external to IXOM that contributed to the levels measured included highway traffic (Pacific Highway) including trucks, industrial noise, residential noise and wildlife.

Air Monitoring Results

Pollutant	Units	Limit	Point 1			Point 2			Point 3		
			Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Hydrogen chloride	mg/m3	100	60	60	60	2.7	2.7	2.7	2.6	2.6	2.6
Molecular weight of stack gases	g / mol	-	28.4	28.4	28.4	28.4	28.4	28.4	28.8	28.8	28.8
Oxygen (O2)	mg/m3	-	8.7	8.7	8.7	8.5	8.5	8.5	20.9	20.9	20.9
Solid Particles	mg/m3	50	19	19	19	4.5	4.5	4.5	9.1	9.1	9.1
Temperature	C	-	89.8	89.8	89.8	82.1	82.1	82.1	24.2	24.2	24.2
Velocity	m/s	-	2.3	2.3	2.3	2.1	2.1	2.1	1.5	1.5	1.5
Samples taken			1			1			1		

Summary of Noise Monitoring

Direct environmental noise monitoring was conducted at two (2) EPL locations during the day, evening and night time period.

The results are presented as:

- LAeq (15min) (the equivalent continuous sound level);
- LA90 (15min) (the sound pressure level exceeded for 90% of the measurement period); and
- the LMax (15min) (the highest time-weighted sound level measured during a period).

Direct environmental noise monitoring results from EPL locations (2 Florin Place Wadalba and 72 Settlement Drive Wadalba) are presented in Table 5 and attenuation calculated environmental noise results are presented in Table 6.

Table 5 Direct IXOM Environmental Noise Results, 10 August 2023

Period	EPL Point	Time	LAeq dB(A)	LA90 dB(A)	LMax dB(A)	Observations
Day	4	11:00	50.2	46.6	66.9	Constant traffic noise from Pacific Highway, local wildlife (birds, dogs), IXOM is not audible at time of measurement
	5	10:30	50.4	45.4	78.6	Constant traffic noise from Pacific Highway, occasional vehicle on Settlement Drive, IXOM is not audible at time of measurement
	IXOM	11:58	47.6	50.0	54.6	Continuous concrete loading across from IXOM, occasional vehicle on Pavitt Crescent
Evening	4	20:03	49.5	42.5	68.7	Constant traffic noise from Pacific Highway, Plane flying overhead, IXOM is not audible at time of measurement
	5	19:45	47.5	40.9	70.9	Constant traffic noise from Pacific Highway, occasional vehicle on Settlement Drive, police siren, IXOM is not audible at time of measurement
	IXOM	20:27	45.6	40.3	64.7	Occasional vehicle on Pacific Highway, No noise was observed from IXOM site at the time of measurement
Night	4	23:17	38.8	34.4	47.6	Occasional vehicle on Pacific Highway, IXOM is not audible at time of measurement
	5	22:59	38.1	34.8	47.0	Occasional vehicle on Pacific Highway, IXOM is not audible at time of measurement
	IXOM	22:32	39.1	35.9	52.1	No noise was observed from IXOM site at the time of measurement

Table 6 Attenuation Calculated IXOM Environmental Noise Results, 10 August 2023

Period	EPL Point	Time	Calculated LAeq dB(A)	LAeq Noise EPL limit dB(A)	Calculated LA90 dB(A)	Calculated LMax dB(A)	LAmax Noise EPL limit dB(A)	Compliant
Day	4	11:00	17.3	35	19.7	24.3	-	Yes
	5	10:30	17.3	35	19.6	24.2	-	Yes
Evening	4	20:03	15.3	35	10.0	34.4	-	Yes
	5	19:45	15.2	35	9.9	34.3	-	Yes
Night	4	23:17	8.8	35	5.6	21.8	45	Yes
	5	22:59	8.7	35	5.6	21.7	45	Yes

On 10 August 2023 the IXOM facility was operating under normal conditions. At the time of monitoring, site noise from IXOM was very minor compared to the surrounding industries and highway between the EPL locations. IXOM was not audible at the two (2) EPL points at either day, evening or night periods, therefore an attenuation calculation was used to determine LAeq and LMax site noise contribution and remove the influence of extraneous noise sources.

All environmental noise results for 10 August were below the LAeq (15 minute) and LMax EPL noise limits