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ICS Ref: 100203
22nd November 2019

Greater Wellington Regional Council
PO Box 11646
Wellington 6011

Attention: Michelle Conland

Dear Michelle,

Resene application for variation of discharge to air consent: Response to Section 92 Request

Resene has applied to the Greater Wellington Regional Council (GWRC) to change conditions of their existing discharge consent (Discharge Permit # WGN160337) as a variation under section 127 of the RMA. Resene has received a request for further information from the GWRC, in a letter dated 26th September 2018, under Section 92 of the Resource Management Act 1991 ("Section 92 request"). Additional clarification was requested by the GWRC reviewing consultant.

This application is for the change of consent condition relates only to the quantity of VOCs emission discharged and not PM₁₀. Therefore, only the effects of the increase of VOCs emissions shall be considered in this application.

Industrial Compliance Solutions Limited (ICS) has been engaged by Resene to prepare the response to the clarification questions, as set out below.

Section 2.2 Sensitivity of receiving environment

1. Reference is made to MfE's 2003 odour good practice guide (GPG). The current version of MfE's odour GPG is dated 2016. Please amend Table 2.1 and the assessment to reflect current guidance.

Table has been amended. Updated version of the assessment of effects on the environment is attached.

Section 3.1.1 Ventilation System

2. Describe the processes within the Resene plant that produce PM₁₀ (Table 3.1)

PM₁₀ is produced during the batch on the raw materials. The dry raw materials (pigments etc) are extremely dusty when handled. All areas where these materials are handled have active dust extraction which discharges through the cartridge filter.

3. The plant is ventilated through both passive roof vents and through the discharge stack. Only the contaminants discharged from the stack have been assessed. It is unclear why the discharge from the roof vents have been excluded from the assessment. Please provide an explanation or amend the assessment to include the contaminants discharged from the roof vents.

For this assessment any discharge of contaminants to the environment from the roof vents is considered insignificant. The purpose of the roof vents is to provide thermal comfort within the building and allowing air into the building while the extraction system is operating.

All areas within the plant when paint and solvents are openly mixed are actively extracted and discharged to the cartridge filter.

Section 3.2 Discharges to air

Table 3.2 defines the type and quantity of pollutants discharged.

1. We understand the contaminants listed in Table 3.2 were identified by emission testing.
 - a. Describe the emission test method and clarify if this was capable of identifying a wide range of VOCs.

Emission testing method used was USEPA Method 18 and undertaken by an IANZ accredited emission testing company. The initial testing was screening for all VOCs. Only VOCs above the limit were reported and used to develop emission factors.

- b. Compare the contaminants listed in Table 3.2 to the contaminants identified in the MSDS for the paint components being used at the time of testing and either
 - i. Confirm all the potential contaminants are listed in Table 3.2.
 - ii. Expand Table 3.2 to include all the potential contaminants.

All raw materials which contained components with vapour pressures which would potentially cause VOC emission were identified. This was compared to the compounds identified in the screening emission testing. Only compounds which were actually measured were included in the potential contaminants list.

2. Given the variety of products manufactured by Resene, do the VOCs included in Table 3.2 cover all the contaminants potentially discharged from the plant? If not, please expand the assessment to include all contaminants discharged.

VOCs included in the AEE are based on screening analysis of the stack emission undertaken as a part of the initial resource consent application in 2014. The compounds were compared to the SDS of the raw materials used in the paint manufacture process.

3. *The 2018 and 2019 Air Emission Testing reports list the products being produced at the time of testing. However, no information is provided on the rate of production. Please detail the production rate at the time of emission testing for the results presented in Table 3.2.*

The paint manufacturing process used at the Resene site is a batch process. Emission is only undertaken when the plant is operating a maximum capacity – 15,000 litres per day.

4. *Compare the production at the time of testing with typical and maximum production levels. Provide a production rate context for the assessment provided.*

The production operation is a batch process. Testing is scheduled when the plant is operating at maximum capacity (approximately 15,000 litres over a 10-hour production day) and when the products with high solvent loading are being manufactured.

5. *The application states that the variance in VOC emission rates is likely a result of increased plant temperatures. Please provide:*
 - a. *The plant temperatures during each emission test.*
 - b. *The peak temperature likely to be experienced by the plant*
 - c. *An analysis of the likelihood of higher temperatures occurring within the plant causing emission rates above those assessed; and*
 - d. *If necessary, an amended assessment of effects based on maximum likely VOC emission rates.*

A review of the testing results to date had highlighted an increase in the emission concentration during the warmer months. The review, undertaken by Industrial Compliance Solutions, look the ambient temperature and stack discharge temperature on the day of the emission testing. There was no internal plant temperature data collection during the emission. The review found that on days with higher ambient and stack temperatures, the level of VOCs was also higher. It was found that as temperature increased, so did the vapour pressure of the bulk solvents used in all the paint formulations. The vapour pressure increase ranged from 80 to 130%.

The emission testing had been moved into the summer months to coincide with best weather conditions, which also bring warmer temperatures.

This was the basis for Resene seeking a variation to the existing VOC consent limit, as emission testing is likely to continue during the summer months. These conditions also produce the worst-case emissions from the plant.

The current emission factors used in the AEE reflect the increase in VOC emission rates.

6. *Provide a copy of the 2018 and 2019 Source Testing New Zealand reports including the stack emission test results, airflow velocity and temperature in the stack;*

Source Testing New Zealand reports attached.

7. *Provide the calculation sheet used to derive the final emission rates given in Table 3.2.*

Spreadsheet for emission rate calculations attached

8. *Table 4.5 lists the temperature of discharge gas as 16°C. Text in Section 3.2 defines the temperature of discharge gas as 39.7°C. Please clarify which is correct and what value was used in the modelling.*

This was a typo in the AEE. The temperature used in the updated modelling was 39.7 °C. Updated version of the assessment of effects on the environment is attached.

Section 4.2. Air quality assessment criteria

1. *The California Office of Environmental Hazard Assessment (OEHHA) chronic inhalation Reference Exposure Levels (REL) for toluene is 300µg/m³; significantly lower than the US EPA RfC value of 5000µg/m³ provided in Table 4-2. Please review the OEHHA RELs and integrate these into the criteria where appropriate. Or where a higher value has been chosen from the available assessment criteria provide a brief explanation on why this specific assessment criteria is appropriate for this assessment.*

A review of the California Office of Environmental Hazard Assessment (OEHHA) chronic inhalation Reference Exposure Levels (REL) has found that the list is limited, with only 4 of the compounds listed. Of the 4 listed only toluene had chronic inhalation concentration lower than the criteria used in the modelling assessment (table below)

Air quality assessment criteria for VOCs

Pollutant	Concentration (µg/m ³)	Time average	Source
Toluene	1880 (odour)	1 hour	TCEQ ESL
	37,000	Annual average	OEHHA
	5000		US EPA RfC
	300		OEHHA
1,3-Dichloropropane	45	1 hour	TCEQ ESL
	4.5	Annual	TCEQ ESL

Chlorobenzene	460 46 1000	1 hour Annual	TCEQ ESL TCEQ ESL OEHHA
Ethyl benzene	2,000 (odour) 1,000 1000 2000	1 hour 24 hour Annual	TCEQ ESL Ontario US EPA RfC OEHHA
o, m & p xylene	3700 (odour) 22,000 730 100 700	1 hour 24 hour Annual average	TCEQ ESL OEHHA Ontario US EPA RfC OEHHA
iso-propylbenzene (cumene)	500 (odour) 400	1 hour Annual	TCEQ ESL US EPA RfC
n-propylbenzene	500 (odour) 400	1 hour Annual	TCEQ ESL US EPA RfC
1,3,5-Trimethylbenzene	1250 220 125	1 hour 24 hour Annual	TCEQ ESL Ontario TCEQ ESL
1,2,4-Trimethylbenzene	1250 220 125	1 hour 24 hour Annual	TCEQ ESL Ontario TCEQ ESL
sec-butylbenzene	2740 274	1 hour Annual	TCEQ ESL TCEQ ESL
4-iso-propyltoluene (p-cymene)	2745 275	1 hour Annual	TCEQ ESL TCEQ ESL
n-butylbenzene	2740 274	1 hour Annual	TCEQ ESL TCEQ ESL
MIBK (methyl isobutyl ketone)	2050 1200 (odour) 3000	1 hour 24 hour Annual	TCEQ ESL Ontario US EPA RfC

Taking the OEHHA chronic level for toluene ($300 \mu\text{g}/\text{m}^3$), the modelled maximum ground level concentration (annual) was $27.2 \mu\text{g}/\text{m}^3$, which is 9% of the OEHHA level. On this basis, the effects of VOC emissions on human health are still assessed as being negligible.

Section 4.3 Dispersion Modelling

2. A 50m modelling grid seems quite coarse considering the proximity of near sensitive receptors. Either:
 - a. Provide justification for this grid resolution; or
 - b. Provide MGLC results from a finer grid (e.g. 25m), to confirm the model resolution is sufficient for identifying potential offsite effects.
3. Provide a copy of the Calpuff input and output files.

The model was updated to increase a finer resolution grid (25 metres). Results from the updated modelling run are presented in the table below. Overall there was little difference in the MGLC between 50 and 25 metres, with a slight increase being observed in the 24 hour averages.

Pollutant	Updated Modelling Assessment		Assessment criterion ($\mu\text{g}/\text{m}^3$)
	MGLC ($\mu\text{g}/\text{m}^3$) – 50m grid	MGLC ($\mu\text{g}/\text{m}^3$) – 25m grid	
Toluene	614.8 27.2	614.8 27.1	1880 (1 hour - odour) 5000 (annual)
1,3-Dichloropropane	4.2 0.173	4.2 0.185	45 (1 hour) 4.5 (annual)
Chlorobenzene	0.240 0.010	0.240 0.011	460 (1 hour) 46 (annual)
Ethyl benzene	696.8 271.0 28.7	696.9 395.5 30.7	2000 (1 hour - odour) 1000 (24 hour) 1000 (annual)
m, p & o xylene	1090.3 424.0 44.9	1090.4 619.9 48.0	3700 (1 hour - odour) 730 (24 hour) 100 (annual)
iso-propylbenzene (cumene)	5.9 0.24	5.9 0.26	500 (1 hour - odour) 400 (annual)
n-propylbenzene	11.6 0.48	11.6 0.51	500 (1 hour - odour) 400 (annual)
1,3,5-Trimethylbenzene	27.4 10.7 1.1	27.4 15.6 1.2	1250 (1hour) 220 (24 hour) 125 (annual)
1,2,4-Trimethylbenzene	77.3 30.1 3.2	77.3 43.9 3.4	1250 (1hour) 220 (24 hour) 125 (annual)
sec-butylbenzene	0.995 0.041	0.995 0.044	2740 (1 hour) 274 (annual)
4-iso-propyltoluene (p-cymene)	0.893 0.037	0.893 0.039	2745 (1 hour) 275 (annual)

n-butylbenzene	0.973	0.973	2740 (1 hour)
	0.040	0.043	274 (annual)
MIBK (methyl isobutyl ketone)	6.9	6.9	2050 (1 hour)
	2.7	3.9	1200 (24 hour - odour)
	0.284	0.304	3000 (annual)

These slight changes in the MGLC will not affect the overall conclusion of the assessment.

Section 5.2.4 Discussion of potential for odour effects

The assessment concludes that the effects of odour from the site are considered negligible.

However, GWRC have received more than 20 odour complaints in the vicinity of the Resene plant over the period 1 January 2016 to 04 April 2019. The sources/causes of many of the odour complaints have not been identified.

For each complaint assess whether:

- a. Resene was downwind of the complaint location at the time of the complaint.*
- b. Resene was operating at the time of the complaint.*
- c. The nature of the odour matches that of VOCs discharged from Resene.*
- 4. Use the findings of the odour complaint analysis to support the conclusions reached in the assessment.*

The 30 odour complaints received by GWRC have been assessed to determine whether emissions from the Resene operation were likely to have contributed to the reported odour. It is noted that GWRC have not been able to identify the odour source.

For this assessment wind direction data was taken from the NIWA Trentham meteorological site (hourly data), approximately 3.5 km to the southwest, and from NCI Packaging site meteorological site (1-minute data), approximately 300 metres to the east.

A 50-degree downwind sector from the Resene point source (wind from 210 to 260 degrees), was established which included the locations of all the complaints.

The times of the complaints were then compared to the wind direction data to establish potential sources of the odours (plus and minus 1 hour each side of the complaint). Plant operational data was also reviewed to determine what the plant was manufacturing during any potential odour events. The results of the assessment are presented in the table below.

Address in the vicinity of the detected odour	Date of Odour	Time of Odour	Details	Wind Direction	Products being manufactured at the time	Comments
Mountbatten Grove	27/01/2016	11:40 and 13:40		122 – 180 degrees	Enamel U/C HS Acrythane clear IR227 Kwila Deck	Wind direction would indicate that the odour source was not Resene
43 Mountbatten Grove	28/01/2016	20:30	'Paint smell'	81 – 193 degrees	Was at 8:30 at Night	Plant was not operating. Wind direction would indicate that the odour source was not Resene
Montgomery Crescent	1/4/2016		Strong chemical smell	260 – 120 degrees	Trueprime	Wind direction would indicate that the odour source was not Resene. No time was provided for complaint so the whole 24 hours were considered
Mountbatten Grove	5/04/2016	13:30-15:30	Very strong chemical smell (spray paint/nail polish) No odour detected at 16:30.	70 – 166 degrees	Trueprime Woodsman Wood Oil Stain A/Cote Hardener	Wind direction would indicate that the odour source was not Resene.
43 Mountbatten Grove	26/04/2016	13:10		350 – 190 degrees	Sureseal Low Odour Trueprime U/cryl 403 UDB Vinyl Etch Grey	Wind direction would indicate that the odour source was not Resene. Wind shifted from a north/north-easterly to a southerly
43 Mountbatten Grove	8/02/2017	20:23	Odour near garage.	119 – 155 degrees	Was at 8:23pm at Night We are closed from 4.00pm and all vats are covered	Plant was not operating. Wind direction would indicate that the odour source was not Resene
Mountbatten Grove cul de sac	20/02/2017	11:54	Strong odour - beautiful warm summery day, very light winds	255 - 177	Trueprime Multigard GP5 Imperite IF 503 FleetPrime Hi Build	Wind direction would indicate that the odour source was not Resene
43 and 40 Mountbatten Grove	8/03/2017	13:45	Moderate odour	120 – 188 degrees	Woodsman Oil Stain Furniture and Decking Oil	Wind direction would indicate that the odour source was not Resene
Montgomery Cres	28/7/17	12:15	Strong smell	159 – 253 degrees	IR129 intermediate	Wind direction would indicate that Resene could be contributing to the odour complaint.
43 and 40 Mountbatten Grove	31/07/2017	14:20	Intermittent weak odour.	280 – 350 degrees	None	Wind direction would indicate that the odour source was not Resene.

Address in the vicinity of the detected odour	Date of Odour	Time of Odour	Details	Wind Direction	Products being manufactured at the time	Comments
						No product was being manufactured at the time.
35 Mountbatten Grove	3/08/2017	16:55	Intermittent odour	135 – 213 degrees	Armourcote 220 Uracryl 404 UDT	Wind direction would indicate that the odour source was not Resene
Mountbatten Grove	13/11/2017	10:34		145 – 210 degrees	Armourcote 220 Dark Grey Woodsman Oil stain Armourcote 210 Armourcote 220 Hardener A/Zinc 120 Green	Wind direction would indicate that the odour source was not Resene
Mountbatten Grove	14/11/2017	10:40 and 13:40		2 - 356	Trueprime Supergloss Mid Enamel U/C Varishade	Highly variable direction during the day. At the time of the complaints the wind direction was between 65 – 85 degrees and 248 – 254 degree. This would indicate that Resene is unlikely to be the source of the odour
Mountbatten Grove	14/11/2017	08:11, 10:45, 14:05		2 – 356 degrees	As above	Highly variable direction during the day. At the time of the complaints the wind direction was: 1) 258 – 270 degrees 2) 44 – 112 degrees 3) 239 – 254 degrees This would indicate that Resene is unlikely to be the source of the odour for the first two complaints. For the third complaint the wind direction would indicate that Resene could be contributing to the odour complaint.
Mountbatten Grove	21/11/2017	11:10, 12:50, 14:07	Odour in Mountbatten Grove reported by GWRC. Detected an O&O but of short duration.	132 – 204 degrees	Armourcote 220 Grey Auck Drum PI Grey Write On Part B Proselect Cure	Wind direction would indicate that the odour source was not Resene
Montgomery Cres	30/11/17		Chemical type odour	3 - 357	Woodsman Wood Oil Stain Durapox Hardener	No time was provided for complaint so the whole 24 hours were considered.

Address in the vicinity of the detected odour	Date of Odour	Time of Odour	Details	Wind Direction	Products being manufactured at the time	Comments
						Wind was coming from a direction which could indicate that Resene was contributing to the odour. However, most of these events were in the early morning when the plant was not operating. Without more information we are unable to draw a conclusion.
Mountbatten Grove	7/12/2017	13:15		191 – 264 degrees	A/Zinc 120 Green	Wind direction would indicate that Resene could be contributing to the odour complaint.
Mountbatten Grove, not 40 Mountbatten Grove	18/12/2017	10:59 12:35	Odour in Mountbatten Grove reported by GWRC at 10:59 and they visited Mountbatten Grove at 12:35 and noticed a short duration odour. No odour at 11:10.	140 - 208	Armourcote 220 Grey Acrythane Binder Multigard GP48 IS033 Wet Edge Thinner No8	Wind direction would indicate that the odour source was not Resene
Fergusson/Montgomery roundabout	18/12/2017	11:10 12:35	GWRC considered odour to be different to what was smelt at Mountbatten Grove.	140 - 208	As above	Wind direction would indicate that the odour source was not Resene
Alleyway between Fergusson Drive and Mountbatten Grove	18/12/2017		Strong odour	140 - 208	As above	Wind direction would indicate that the odour source was not Resene
31 & 40 Mountbatten Grove	20/12/2017	12:57		181 - 209	Galvo One	Wind direction would indicate that the odour source was not Resene
40 Mountbatten Grove	9/02/2018	16:44 PM	Strong odour at 16:44 for about 15 mins	279 - 38	All vats covered and factory closed at 4.00pm this was at 4:44	Wind direction would indicate that the odour source was not Resene Plant was not operating
35 Mountbatten Grove	22/2/2018		Chemical odour	76 - 357	A/Cote 220 Grey	No time was provided for complaint so the whole 24 hours were considered.

Address in the vicinity of the detected odour	Date of Odour	Time of Odour	Details	Wind Direction	Products being manufactured at the time	Comments
						Wind direction would indicate that Resene could be contributing to the odour complaint.
Cnr Fergusson Drive and Montgomery Cres	20/2/18		Strong odour, thought to be coming from Resene - complainant advised that it caused an asthma attack while they were in their car	284 - 360	Trueprime IR227 Bentone SD1 Woodsman oil stain IA002 IA003	Wind direction would indicate that the odour source was not Resene
35 Mountbatten Grove and cul de sac	2/5/2018	6:30 8:00	Strong odour persisted all day	0 - 360	At 9:30 Solvent Premix At 1:30 Multigaurd GP5 At 2:00 Woodsman wood oil stain	Highly variable direction during the day. At the time of the complaints the wind direction was between 102 – 128 degrees and 95 – 157 degree. This would indicate that Resene is unlikely to be the source of the odour. Wind speed for the day was also very low.
Mountbatten Grove	31/10/2018		Strong odour	0 - 360	A/Cote 220 Grey Woodsman Wood Oil Stain	Wind was coming from a direction which could indicate that Resene was contributing to the odour. However, most of these events were in the late afternoon when the plant was not operating. Without more information we are unable to draw a conclusion.
Mountbatten Grove	1/11/2018	10:42 PM		45 - 126	Was at 10:42PM at Night We shut at 4:00	Wind direction would indicate that the odour source was not Resene
Mountbatten Grove, Regional Council	14/01/2019	15:00 15:45	Strong odour in Mountbatten Grove	165 – 210	Furniture an Decking oil Abodo Protector WB Ebony	Wind direction would indicate that the odour source was not Resene
31 Mountbatten Grove	16/01/2019	9:01:00 AM to 15:00	In the afternoon the odour was weak (1-2).	21 – 213	Multigard GP48	Wind direction would indicate that the odour source was not Resene

Address in the vicinity of the detected odour	Date of Odour	Time of Odour	Details	Wind Direction	Products being manufactured at the time	Comments
40 Mountbatten Grove	29/01/2019	13:20 PM		28 - 190	Pal S/J Enamel Write on part B	Wind direction would indicate that the odour source was not Resene
43 Mountbatten Grove	15/03/2019	11:06		262 – 73	Trueprime Abodo protector Ebony Alumastic Hardener	Wind direction would indicate that the odour source was not Resene
40 Mountbatten Grove	3/04/2019	14:20	Intermittent odour	27 - 222	Trueprime Abodo protector Ebony Alumastic Hardener	Wind direction would indicate that the odour source was not Resene

Based on the analysis of the wind direction, the locations of the complaints and Resene production data it is unlikely that Resene is the major source of any of the odour complaints. There are four occasions where, if Resene was generating any odour it could contribute to the observed odour.

Considering the number of complaints received by GWRC and the common location it would indicate that the source of the odours is likely to be close to the complainants' location.

Background odours in the general area are considered to be lower with any effect being localised close to the source. As a result, background odour levels have not been considered in this assessment.

Section 5 Assessment of quality effects

Section 2.5 of the AEE notes there are several neighbouring businesses which have the potential to generate odour. There are also businesses that undertake spray painting and printing which discharge VOCs within 300 m of the Resene site. Given the nature of the receiving environment background concentrations of PM₁₀ are likely to be elevated during the cooler months of the year.

5. *To address the issues noted above, provide an assessment of cumulative effects (Resene discharges plus background) for:*
 - a. *PM₁₀*
 - b. *Odour (this assessment could be linked to the answers of questions 16 and 17)*
 - c. *VOCs.*

PM₁₀ levels in the Upper Hutt are monitored by the GWRC at the Savage Park AQ monitoring site, which is located approximately 1 km to the west of the Resene. The average PM₁₀ (24 hr average) for the last five years (from 1/1/14) is 10.4 µg/m³ and the maximum is 30.0 µg/m³.

The maximum ground level concentration (MGLC) predicted by Calpuff is 7.5 µg/m³ (24 hr average). If the average PM₁₀ concentration in the surrounding area is taken as the background the MGLC as a result of the Resene site would be 17.9 µg/m³. However, this is not a new source to the airshed and its contribution to the airshed would already be included in the PM₁₀ monitoring results.

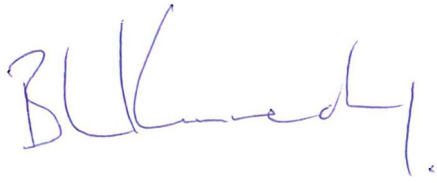
Background odour effect have been addressed in the previous response.

Background VOC data for the area is not available and has not been considered in the application. There are other sources of solvent discharge in the area such as Wedgelock who spray paint heavy machinery and NCI Packaging who coat cans. The area does experience significant air movement therefore it is expected that the background levels of VOCs will be low.

This report has been prepared for the benefit of Resene with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

If you have any further queries, please do not hesitate to contact Brent Kennedy on ph: 027 702 7654 or brent.kennedy@xtra.co.nz.

Yours sincerely

A handwritten signature in blue ink, appearing to read "BK Kennedy". The signature is written in a cursive style with a large initial "B" and "K".

Brent Kennedy M.Sc (Chem) MNZIC
Principal Scientist