Corteva Agriscience New Zealand Ltd

Monitoring Programme

Annual Report

2020-2021

Technical Report 2021-65

Working with people | caring for Taranaki

Taranaki Regional Council

Taranaki Regional Council
Private Bag 713
Stratford

ISSN: 1178-1467 (Online)
Document: 2893120 (Word)
Document: 2740078 (Pdf)
March 2022

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Executive summary

Corteva Agriscience New Zealand Limited (Corteva), previously Dow AgroSciences (NZ) Ltd, operates an industrial agrichemical formulating and packaging facility located at Paritutu Road, New Plymouth, in the Herekawe catchment. This report for the period July 2020 to June 2021 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess Corteva's environmental and consent compliance performance during the period under review. The report also details the results of the monitoring undertaken and assesses the environmental effects of Corteva's activities.

During the monitoring period, Corteva Agriscience New Zealand Ltd demonstrated an overall high level of environmental performance.

The Council's monitoring programme for the year under review included four inspections, four sets of water samples collected for pesticide analysis, two biomonitoring surveys of receiving waters and an intertidal marine inspection. Corteva provided groundwater and air quality data from monitoring carried out by independent consultants.

The monitoring showed that Corteva has had no significant impact on air quality in the vicinity of the plant or on water quality in the Herekawe Stream.

During the year, Corteva demonstrated a high level of both environmental performance and administrative compliance with the resource consents.

For reference, in the 2020-2021 year, consent holders were found to achieve a high level of environmental performance and compliance for 86% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 11% of the consents, a good level of environmental performance and compliance was achieved.

In terms of overall environmental and compliance performance by the consent holder over the last several years, this report shows that the consent holder's performance remained at a high level.

This report includes recommendations for the 2021-2022 year.

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1 Introduction

1.1 Compliance monitoring programme reports and the Resource Management Act 1991

1.1.1 Introduction

This report is for the period July 2020 to June 2021 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by Corteva Agriscience New Zealand Limited (Corteva). Corteva operates an industrial agrichemical formulation plant situated at Paritutu Road, New Plymouth, in the Herekawe catchment.

The report includes the results and findings of the monitoring programme implemented by the Council in respect of the consents held by Corteva that relates to discharges of water within the Herekawe catchment, and the air discharge permit held to cover emissions to air from the site.

One of the intents of the *Resource Management Act 1991* (RMA) is that environmental management should be integrated across all media, so that a consent holder's use of water, air, and land should be considered from a single comprehensive environmental perspective. Accordingly, the Council generally implements integrated environmental monitoring programmes and reports the results of the programmes jointly. This report discusses the environmental effects of the Company's use of water, land and air, and is the 29th combined annual report by the Council for the site.

1.1.2 Structure of this report

Section 1 of this report is a background section. It sets out general information about:

- consent compliance monitoring under the RMA if RMA not referenced in full in section 1.1.1 then state full title in the following format here: *Resource Management Act 1991* (RMA) and the Council's obligations;
- the Council's approach to monitoring sites though annual programmes;
- the resource consents held by Corteva in the Herekawe catchment;
- the nature of the monitoring programme in place for the period under review; and
- a description of the activities and operations conducted at Corteva's site.

Section 2 presents the results of monitoring during the period under review, including scientific and technical data.

Section 3 discusses the results, their interpretations, and their significance for the environment.

Section 4 presents recommendations to be implemented in the 2021-2022 monitoring year.

A glossary of common abbreviations and scientific terms, and a bibliography, are presented at the end of the report.

1.1.3 The Resource Management Act 1991 and monitoring

The RMA primarily addresses environmental 'effects' which are defined as positive or adverse, temporary or permanent, past, present or future, or cumulative. Effects may arise in relation to:

a. the neighbourhood or the wider community around an activity, and may include cultural and social-economic effects;
b. physical effects on the locality, including landscape, amenity and visual effects;

c. ecosystems, including effects on plants, animals, or habitats, whether aquatic or terrestrial;
d. natural and physical resources having special significance (for example recreational, cultural, or aesthetic); and
e. risks to the neighbourhood or environment.

In drafting and reviewing conditions on discharge permits, and in implementing monitoring programmes, the Council is recognising the comprehensive meaning of 'effects' in as much as is appropriate for each activity. Monitoring programmes are not only based on existing permit conditions, but also on the obligations of the RMA to assess the effects of the exercise of consents. In accordance with Section 35 of the RMA, the Council undertakes compliance monitoring for consents and rules in regional plans, and maintains an overview of the performance of resource users and consent holders. Compliance monitoring, including both activity and impact monitoring, enables the Council to continually re-evaluate its approach and that of consent holders to resource management and, ultimately, through the refinement of methods and considered responsible resource utilisation, to move closer to achieving sustainable development of the region's resources.

1.1.4 Evaluation of environmental and administrative performance

Besides discussing the various details of the performance and extent of compliance by Corteva, this report also assigns them a rating for their environmental and administrative performance during the period under review.

Environmental performance is concerned with actual or likely effects on the receiving environment from the activities during the monitoring year. Administrative performance is concerned with Corteva's approach to demonstrating consent compliance in site operations and management including the timely provision of information to Council (such as contingency plans and water take data) in accordance with consent conditions.

Events that were beyond the control of the consent holder and unforeseeable (that is a defence under the provisions of the RMA can be established) may be excluded with regard to the performance rating applied. For example loss of data due to a flood destroying deployed field equipment.

The categories used by the Council for this monitoring period, and their interpretation, are as follows:

Environmental Performance

High: No or inconsequential (short-term duration, less than minor in severity) breaches of consent or regional plan parameters resulting from the activity; no adverse effects of significance noted or likely in the receiving environment. The Council did not record any verified unauthorised incidents involving environmental impacts and was not obliged to issue any abatement notices or infringement notices in relation to such impacts.

Good: Likely or actual adverse effects of activities on the receiving environment were negligible or minor at most. There were some such issues noted during monitoring, from self-reports, or during investigations of incidents reported to the Council by a third party but these items were not critical, and follow-up inspections showed they have been dealt with. These minor issues were resolved positively, co-operatively, and quickly. The Council was not obliged to issue any abatement notices or infringement notices in relation to the minor non-compliant effects; however abatement notices may have been issued to mitigate an identified potential for an environmental effect to occur.

For example:

- High suspended solid values recorded in discharge samples, however the discharge was to land or to receiving waters that were in high flow at the time;
- Strong odour beyond boundary but no residential properties or other recipient nearby.

Improvement required: Likely or actual adverse effects of activities on the receiving environment were more than minor, but not substantial. There were some issues noted during monitoring, from self-reports, or during investigations of incidents reported to the Council by a third party. Cumulative adverse effects of a persistent minor non-compliant activity could elevate a minor issue to this level. Abatement notices and infringement notices may have been issued in respect of effects.

Poor: Likely or actual adverse effects of activities on the receiving environment were significant. There were some items noted during monitoring, from self-reports, or during investigations of incidents reported to the Council by a third party. Cumulative adverse effects of a persistent moderate non-compliant activity could elevate an 'improvement required' issue to this level. Typically there were grounds for either a prosecution or an infringement notice in respect of effects.

Administrative performance

High: The administrative requirements of the resource consents were met, or any failure to do this had trivial consequences and were addressed promptly and co-operatively.

Good: Perhaps some administrative requirements of the resource consents were not met at a particular time, however this was addressed without repeated interventions from the Council staff. Alternatively adequate reason was provided for matters such as the no or late provision of information, interpretation of 'best practical option' for avoiding potential effects, etc.

Improvement required: Repeated interventions to meet the administrative requirements of the resource consents were made by Council staff. These matters took some time to resolve, or remained unresolved at the end of the period under review. The Council may have issued an abatement notice to attain compliance.

Poor: Material failings to meet the administrative requirements of the resource consents. Significant intervention by the Council was required. Typically there were grounds for an infringement notice.

For reference, in the 2020-2021 year, consent holders were found to achieve a high level of environmental performance and compliance for 86% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 11% of the consents, a good level of environmental performance and compliance was achieved. [1]

1.2 Process description

Corteva prepares a range of agricultural chemicals at its facility in New Plymouth (Figure 1). It both manufactures (reacting substances to form new ones) and formulates (blending active ingredients and other agents). The production is based on 'batch' processes (i.e. not continuous) involving chemical reactions, blending or packaging. Various formulation types are produced/packed or repacked, including liquid concentrates, flowable suspensions, wettable powders and coated granules. There are approximately 36 different active ingredients handled on the site. Of these, 13 are contained in products that are only repacked or stored for further distribution. The remainder are used in the formulation of products in varying quantities. There are five production plants on the site, and in addition there are support activities such as laboratories and a high temperature waste incinerator.

[1] The Council has used these compliance grading criteria for more than 17 years. They align closely with the 4 compliance grades in the MfE Best Practice Guidelines for Compliance, Monitoring and Enforcement, 2018

Figure 1 Aerial photograph of the Corteva Paritutu Road site

1.2.1 History

The plant has been located at the present site since 1960. The manufacturing processes for phenoxy herbicide active ingredients (2, 4-D, MCPA and MCPB) and triclopyr were discontinued in early 1998 and the Phenoxy Plant shut down. These active ingredients were then imported for formulation into herbicide products. As a result of the closure of the Phenoxy Plant a number of raw materials are no longer used on the site, including chlorophenols (2,4-dichlorophenol and p-chloro-o-cresol) and monochloroacetic acid (MCAA). The cessation of these chemical syntheses reduced the number of chemicals stored on site and consequently has reduced the potential for odour to be emitted from the site.

Changes to the site over the past three decades have included:

- production of the herbicide 2,4,5-T ceased in 1987;
- ceasing the manufacture of dairy sanitisers and detergent bases;
- the high temperature solids incinerator has been upgraded to include a new control system, an extended secondary combustion chamber, and the installation of a liquids nozzle to allow liquids to be burnt;
- cessation of use of the 'liquids' incinerator in 1994, and demolition of the liquids incinerator in June 2000;
- diversion of stormwater from the roads in the vicinity of the incinerator to a new HDPE-lined stormwater pond (SV9200) in the 1995-1996 year;
- termination of the production of phenoxy herbicides (2,4-D, MCPA and MCPB) and triclopyr in 1998;
- introduction of the insecticide active ingredient spinosad, and start-up of the Spinosad Plant in 1998;
- closure of the powders side of the Powders/Protectants Plant at the end of 1999;

- in accordance with the revised site Groundwater Management Plan, 18 groundwater bores were closed in 2001-2002; dedicated pumps were installed into remaining sampling wells in May 2002;
- formulation of solid herbicides ceased in June 2002 and the Solids Plant closed;
- the formulation of water-based glyphosate product was introduced during 2002-2003;
- from 2003-2004, there was reduced use of the High Temperature Incinerator, with the operation changed from continuous use to operation 5 days per week (24 hours) intermittently for a total of 6 months of the year;
- the esterification process of 2,4-D esters recommenced in October 2005, in the Commodity Herbicides Plant;
- the neutralisation process with amines of MCPA (2006) and 2,4-D (2007) recommenced, and of glyphosate (2007) and clopyralid (2012) commenced, in the Commodity Herbicides Plant;
- a new building air extraction and vent treatment system for improved odour control was completed in 2011 for the warehouse where 2,4-D acid is stored;
- the pilot plant and TCP plant were demolished in 2014;
- the amine neutralisation of glyphosate was ceased in 2013; and
- the esterification of 2,4-D was ceased in 2015.

1.2.2 Herbicides Plant

Formulations involving a wide range of active ingredients are prepared for sale. Both liquid (water and solvent based) and granular herbicides are produced. Triclopyr is the highest volume active ingredient.

Air from liquid formulation preparation areas is passed through a coarse filter to capture dust, before treatment through a series of carbon beds and then discharged to atmosphere.

1.2.3 Commodity Herbicides Plant

The amine neutralisation of MCPA recommenced in September 2006, using the same equipment that was used in 2, 4-D esterification. Imported MCPA is mixed with dimethylamine (DMA) to convert the acid to the amine.

The amine neutralisation of 2, 4-D recommenced in August 2007. Imported 2, 4-D flake is mixed with a dimethylamine/dimethylethanolamine (DMEA) mixture to convert the acid to amine form.

The amine neutralisation of clopyralid commenced in September 2012. Imported clopyralid is mixed with DMA to convert the acid to amine form.

The process ventilation system is connected to a caustic scrubber followed by a carbon filter, to remove organic vapours before discharge to atmosphere.

1.2.4 Insecticides Plant

Liquid organophosphate insecticides, mostly based on chlorpyrifos, and adjuvants are blended and packaged for sale. The process ventilation system is connected to a sodium hypochlorite scrubber, in which chemical reactions between hypochlorite and compounds released from the process lead to the solubilisation of those compounds and their capture in the scrubber.

1.2.5 Granular Herbicides Plant

Granules, based on picloram, are formulated and packaged. Discharges are passed through a bag filter and absolute (high performance) filter before discharge.

1.2.6 Suspension Concentrates (Spinosad) Plant

Liquid spinosyn and sulfoxaflor based insecticides are formulated and packaged. The process ventilation system passes through a bag filter and absolute filter before discharge.

1.2.7 High Temperature Incinerator

A high temperature incinerator provides for the thermal destruction of wastes. Materials to be combusted include all chemically contaminated clothing and production plant wastes. The liquids nozzle allows the burning of liquids such as wash water.

Emissions are controlled primarily by optimising the conditions of combustion, together with the proper design of the combustion chamber and stack.

1.2.8 Laboratories

Fumes from the laboratories are extracted either as general building ventilation air or through fume cupboard hoods. The quantities of chemicals involved are minute by comparison either with the formulating processes or with the amounts that would be handled by an end user of Corteva's products.

1.2.9 Maintenance workshops

Activities carried out in the workshops, and periodically on site, include welding, painting, abrasive blasting, and other typical operations. Ventilation systems extract air from around particular process areas.

1.2.10 Product Development Laboratory

The building is used only infrequently, to trial process control or to produce small scale batches.

1.3 Resource consents

Corteva holds two resource consents the details of which are summarised in Table 1 below. Summaries of the conditions attached to each permit are set out in Section 3 of this report.

A summary of the various consent types issued by the Council is included Appendix I, as are copies of all permits held by Corteva during the period under review.

Table 1 Summary of consents held by Corteva

Consent number	Purpose	Granted	Review	Expires
Water discharge permit				
4108-2	To discharge stormwater from an industrial agrichemical manufacturing site via retention dams together with uncontaminated stormwater from landscape and no-manufacturing areas into the Herekawe Stream	September 2008	-	June 2026
Air discharge permit				
4020-4	To discharge contaminants to air form all activities associated with current and future operation of an agricultural formulation and packaging plant	November 2014	June 2026	June 2044

1.4 Monitoring programme

1.4.1 Introduction

Section 35 of the RMA sets obligations upon the Council to gather information, monitor and conduct research on the exercise of resource consents within the Taranaki region. The Council is also required to assess the effects arising from the exercising of these consents and report upon them.

The Council may therefore make and record measurements of physical and chemical parameters, take samples for analysis, carry out surveys and inspections, conduct investigations and seek information from consent holders.

The monitoring programme for the Corteva site consisted of six primary components.

1.4.2 Programme liaison and management

There is generally a significant investment of time and resources by the Council in:

- ongoing liaison with resource consent holders over consent conditions and their interpretation and application;
- discussion over monitoring requirements;
- preparation for any consent reviews, renewals or new consent applications;
- advice on the Council's environmental management strategies and content of regional plans; and
- consultation on associated matters.

1.4.3 Site inspections

The Corteva site was visited four times during the monitoring period. With regard to consents for the abstraction of or discharge to water, the main points of interest were plant processes with potential or actual discharges to receiving watercourses, including contaminated stormwater and process wastewaters. Air inspections focused on plant processes with associated actual and potential emission sources and characteristics, including potential odour, dust, noxious or offensive emissions. Sources of data being collected by the Company were identified and accessed, so that performance in respect of operation, internal monitoring, and supervision could be reviewed by the Council. The neighbourhood was surveyed for environmental effects.

1.4.4 Stormwater sampling

Stormwater is sampled and analysed for chemical and physical parameters before it is released. If the collected stormwater does not meet the release criteria, an application for approval is sought from New Plymouth District Council before it is pumped to the trade waste system.

Results of monitoring are reported by Corteva to the Council, and samples of stormwater are taken by the Council for comparative laboratory analysis. The stormwater discharge was sampled by Council on four occasions, and the samples sent to an independent laboratory for acid herbicides analysis and a multi-residue pesticide scan.

1.4.5 Groundwater monitoring

Corteva conducts an on-going groundwater monitoring and modelling program, prepared in consultation with the Council, to assess the quality of groundwater beneath the site. Results are forwarded to the Council annually, while relevant matters are discussed as they arise. Shallow groundwater under the site flows under

natural gradients north and west towards the coastal marine area, including the Sugar Loaf Islands (Nga Motu) Marine Protected Area.

To address the low-level contamination found through a past investigation, Corteva developed a Site Groundwater Management Plan, which was received and agreed to by the Council during the 1996-1997 period and (updated) in 2001. Contaminants (phenoxies and chlorophenols) were initially detected at low levels and groundwater flow suggested that the contamination evident would pose no environmental risk and would reduce to levels below detection.

Corteva fully evaluated the site and recommended a monitoring approach to ensure that, as predicted by modelling, no adverse environmental effects occur. The current monitoring approach adopted through the Site Groundwater Management Plan requires the Council to remain fully informed of the results. The approach enables the risk of effects on the environment to be assessed fully on an on-going basis, and appropriate action to be taken. The information available at this time suggests that no adverse environmental effects are likely and that the contaminants will fully degrade before migration from the site occurs.

In July 2008, the Council agreed to a change in the date of annual sample collection, from October to June-August, to coincide with maximum groundwater levels. This was in response to most of the monitoring wells being found dry in October 2007.

1.4.6 Freshwater biological surveys

The Council has a bio-monitoring programme to assess biological diversity and richness of the Herekawe Stream. Two surveys were conducted during the monitoring year to assess whether discharges from Corteva's Paritutu Road site were having any environmental impact on the stream.

1.4.7 Foreshore marine ecology inspection

The Council carries out an annual marine ecology inspection on the Back Beach foreshore by Corteva's Paritutu Road plant to look for any evidence of a discharge from the site (including any groundwater seeps) and to assess any environmental impact.

2 Results

2.1 Water

2.1.1 Inspections

Stormwater from the production plants, dangerous goods storage compound, despatch store, incinerator and roads in these areas is collected in two retention pond systems. It is sampled and analysed for comparison with release criteria. If the stormwater meets the release criteria, it is discharged to the Herekawe Stream. Stormwater which fails to meet the release criteria may be pumped to the trade waste system with approval from the New Plymouth District Council.

Stormwater from the southern part of the site drains directly to a New Plymouth District Council stormwater drain and then to the Herekawe Stream. This part of the site is predominantly an open grassed area surrounding a parking area, two storage buildings, the closed pilot plant and the access road to the site.

There are four stormwater retention ponds at the Paritutu Road site: SV9000, SV9100, SV9200 and SV8000. Stormwater from building roofs and roading is collected in SV9100 after treatment in separators to remove silt. SV9000 is used as an overflow retention pond. Stormwater from around the incinerator building and roadway is collected in SV9200, while stormwater from around the despatch and dangerous goods storage areas is collected in SV8000.

If stormwater does not meet the release criteria, Corteva seeks to identify the source of the contaminant so corrective actions can be implemented to prevent a recurrence.

Officers of the Council carried out regular inspections of the site during the 2020-2021 monitoring period. The inspections included the storage of raw materials and product, the maintenance and housekeeping of process areas and roadways, the stormwater collection and retention systems, stormwater sampling and release records and inspections of the discharge point and receiving waters in the Herekawe Stream. Scheduled inspections were carried out on 21 August and 5 November 2020, and 11 February and 20 May 2021.

Notes from these visits are summarised below. Records of production and incinerator operation were inspected and found to be satisfactory.

21 August 2020

It was raining during the inspection and 27 mm of rainfall had been recorded over the previous week at the Brooklands Zoo weather station. Pond SV8000 contained 900 m^3 of stormwater, while SV9000 was full at 275 m^3 and had overtopped into SV9100. The ponds had a clear appearance with some wind-blown pollen with no sheen or odours noted. The incinerator was still offline, but was expected to be recommissioned in October. Site housekeeping was excellent. All roadways and stormwater catchments were clean.

5 November 2020

Intermittent rain fell during the inspection, with 20 mm of rainfall recorded over the previous week at the Brooklands Zoo weather station. Pond SV8000 contained 600 m^3 of stormwater while SV9000 contained 225 m^3. The ponds were clean with some wind-blown pollen with no sheen or odours noted. Activities on site were winding down towards the plant closure in 2021. Commodities production had ceased with some packaging ongoing. Insecticides production and packaging had finished. There was some repacking continuing for the suspension concentrates. Production and packaging in granules was ongoing. A process upset had delayed stack testing for the granules plant until early 2021. Operations in the herbicides plant were expected to continue until approximately the end of February 2021. The incinerator was to commence operation the following week. Site housekeeping was excellent. All roadways and stormwater catchments were clean.

11 February 2021

The weather was fine with a westerly breeze. A total of 13 mm of rainfall had been recorded over the previous week at the Brooklands Zoo weather station. Pond SV8000 contained 600 m^3 of stormwater while SV9000 contained 180 m^3. The ponds were clean with some wind-blown debris and no sheen or odours were noted. Production had ceased in the commodities and insecticides plants and was scheduled to end completely in all plants the following week. Air monitoring of the incinerator and granules plant had been undertaken the week before. It was intended that the majority of product would be removed from the site by the end of March and clean up was to be carried out in April and May 2021. The timeline for this work was being finalised and a meeting was to be held to discuss consent and monitoring requirements during and after the shutdown process. The incinerator was to continue operating until mid-May to dispose of liquid wastes only. Site housekeeping was excellent. All roadways and stormwater catchments were clean. The Herekawe Stream was in low flow and there was minimal visual disturbance from the discharge.

20 May 2021

The weather was fine with a westerly wind. It had rained over the previous week, with a total of 83 mm rainfall recorded at the Brooklands Zoo weather station. Pond SV8000 contained 700 m^3 of stormwater while SV9000 contained 180 m^3. The ponds were clean with some wind-blown debris and no sheen or odours were noted. Corteva was on track with the shutdown schedule. The final rinsate wastes were awaiting collection from the dangerous goods storage area. All production chemicals had been removed from the site and all buildings and equipment had been cleaned. Final checks of the tradewaste system and sumps were being undertaken. The last day of liquid waste burning was occurring at the time of inspection. The incinerator would then be cleaned by burning water for a few days before being shut down. A consultant had been contracted to carry out the remaining stormwater monitoring, they had been working with Corteva for the previous six weeks to ensure that the process was correct and accurate, and would undertake testing of all stormwater prior to release until the agreed monitoring period was completed. The on-site laboratory was to continue operating for a couple of weeks to undertake validation testing of the cleaned plant. The draft stormwater and air discharge monitoring plans for the idle site were to be submitted to Council for approval shortly. Property maintenance and some administration duties were to continue until the sale of the property was completed. Site housekeeping was excellent. All roadways and stormwater catchments were clean. The Herekawe Stream was in moderate flow and there was minimal visual disturbance from the discharge.

2.1.2 Results of discharge monitoring

All stormwater collected in the four stormwater retention ponds is sampled and analysed by Corteva prior to release. The samples are checked for the parameters controlled by consent 4108; floatable and suspended materials, odour, colour and visual clarity, pH and the potential chemical contaminants phenoxy herbicides, organophosphates, triclopyr, picloram, glyphosate, and oxyfluorfen. During the 2020-2021 year, a total of 155 stormwater samples were collected and analysed by Corteva. On all occasions, the release criteria were met.

Two of the stormwater ponds are also sampled by the Council for consent compliance checking and inter-laboratory comparison on four occasions each year. In 2020-2021, sampling was undertaken by an officer from the Council with staff from Corteva on 21 August and 5 November 2020, and 11 February and 20 May 2021.

The focus of monitoring continued to be on acid herbicides, in connection with the recommencement of esterification of 2, 4-D and neutralisation of MCPA and 2, 4-D with amines, rather than on organophosphorus pesticides, which had not been detected from monitoring over the previous decade. A total of 111 pesticide residues and acid herbicide compounds were tested for in each sample.

The results of Council monitoring for 2020-2021 are presented in Table 2 and Table 3.

Table 2 Stormwater results for acid herbicides and pH in 2020-2021

Parameter	Maximum concentration detected (g/m^3 or mg/L)	
	SV8000 (n=4)	SV9100 (n=4)
2,4,5-T	0.0007	0.0003
2,4-D	0.0011	0.0014
2,4-DB	< 0.0004	< 0.0004
MCPA	0.0005	< 0.0004
MCPB	< 0.0004	< 0.0004
Picloram	0.0012	0.0189
Triclopyr	0.0039	0.0033
pH (range)	6.7-7.6	6.5-7.2

Table 3 Stormwater results for pesticides in 2020-2021

Parameter	Maximum concentration detected (g/m^3 or mg/L)		
	SV8000 (n=4)	SV9100 (n=4)	Maximum
Chlorpyrifos	0.00005	0.00007	0.00007
Chlorpyrifos-methyl	<0.00004	<0.00004	<0.00004
Oxyfluorfen	<0.00002	<0.00002	<0.00002

A summary of Corteva's results from inter-laboratory comparison exercises is presented in Table 4. The results indicate good agreement between laboratories, and compliance with the conditions of stormwater discharge consent 4108.

Table 4 Corteva's stormwater results from 2020-2021 inter-laboratory comparisons

Consent Item	Consent limit	SV8000 (n=4)	SV9000 (n=4)	SV9100 (n=2)	SV9200 (n=1)
Oil, floatables, suspended solids	None present	Pass	Pass	Pass	Pass
Objectionable odour	None present	Pass	Pass	Pass	Pass
Colour and visual clarity	No change	Pass	Pass	Pass	Pass
pH	6.0 – 9.0	7.1-7.3	7.1	7.1	6.8
Total phenoxy herbicides	0.10 mg/L	0.075*	0.075*	0.075*	0.075*
Total organophosphates	0.0005 mg/L	0.0004**	0.0004**	0.0004**	0.0004**
Triclopyr	0.10 mg/L	0.025*	0.025*	0.025*	0.025*
Picloram	0.10 mg/L	0.025*	0.025*	0.025*	0.025*

* none detected, assumes 2,4-D, MCPA, MCPB (phenoxy herbicides), and, triclopyr and picloram all present at half detection limit of 0.05 mg/L
** none detected, assumes chlorpyrifos and chlorpyrifos-methyl both present at half detection limit of 0.0004 mg/L
*** none detected, assumes oxyflurofen present at half detection limit of 0.0007 mg/L

The Council received a stormwater report from Corteva summarising the monitoring and discharge data for the Corteva site during the 2020-2021 monitoring period. It also details process management of stormwater and its release from site. During 2020-2021 the dangerous goods compound bunding was improved to ensure the risk of uncontrolled release from storm events was reduced.

2.1.3 Groundwater monitoring

Field investigations into possible groundwater contamination at the site were commenced by Corteva in 1993 and concluded in 1996. The site investigation identified two locations where soil and/or groundwater have been impacted by phenoxy herbicides and chlorophenols.

For a history of groundwater monitoring see 'Dow AgroSciences (NZ) Ltd, Monitoring Program Annual Report 2002-2003' Technical Report 2003-72.

The Council received a groundwater management report from Corteva covering the period between July 2020 and June 2021. The report is based on the results of the groundwater sampling round undertaken in September 2020 by consultant Tonkin & Taylor.

Groundwater sampling of the nine Groundwater Monitoring Plan wells was carried out in September 2020 using in-well bladder pumps in accordance with a "Low Flow Sampling Methodology".

The results of the chlorophenol and phenoxy acid analyses are listed in Table 5.

Table 5 Groundwater monitoring results September 2020

Well identification No.	Phenoxy Herbicides Concentration (µg/L)	Chlorophenol Concentration (µg/L)
Shallow perimeter wells		
1	ND	ND
21	ND	ND
Deep Perimeter wells		
20	ND	ND
32R	ND	ND
41	ND	ND
42	ND	ND
47R	ND	ND
Additional non-perimeter wells		
39R	≤ 1.5	≤ 3.3
46A	≤ 35.0	≤ 61.0
Trigger levels	50,000	10,000

Phenoxy herbicides [2,4-D; 2,4,5-T; MCPA; MCPB]
Chlorophenols [2,4-DCP; 2,4,5-TCP; 2,4,6-TCP; PCOC]
ND = below laboratory reporting limits (<1.6 µg/L for phenoxy acids and <0.2µg/L for chlorophenols)

No phenoxy acid or chlorophenol was detected in either of the shallow perimeter wells (1 and 21), or in any of the deep perimeter wells (20, 32R, 41, 42 and 47R).

Non-perimeter wells 39R and 46A showed low levels of phenoxy herbicides (≤1.5 µg/L and ≤3.3 µg/L respectively) and chlorophenols (≤35.0 µg/L and ≤61.0 µg/L respectively). These values were well below the trigger levels (which do not apply to non-perimeter wells anyway as these are sampled for interest and not subject to the established action levels).

Total phenoxy acid herbicide and total chlorophenol concentrations have not exceeded the Groundwater Management Plan trigger levels since sampling rounds began in 1993, and if detected, concentrations typically continue to show a decreasing trend.

Wells 20, 32, 39J, 41 and 47 were redeveloped in August 2013 to provide more reliable groundwater levels for low flow sampling techniques, and to free up the dedicated sampling pump in well 20. Wells 32, 39J and 47 frequently had insufficient water to sample and as a result were decommissioned in August 2015 and replaced with adjacent new wells 32R, 39R, and 47R.

In accordance with the Groundwater Management Plan, all 28 existing monitoring wells (five shallow and 23 deep) were gauged on 28 September 2020 to assess groundwater levels, water column and silt build-up thickness. This five-yearly survey of all the wells is next due in 2025-2026.

2.1.4 Freshwater biological monitoring

Freshwater biological surveys were undertaken in the Herekawe Stream on 8 October 2020 and 4 February 2021.

The surveys were undertaken using standard Council procedures and indicated that the streambed communities had not been significantly affected by stormwater discharges from the Corteva site or other industrial sites in the vicinity. Decreases in the MCI and $SQMCI_s$ scores between the upstream 'control' site and site downstream of the discharges was more likely attributable to habitat differences between these sites which appeared to be related primarily to substrate type and possibly seawater inundation.

Copies of biomonitoring reports for this site are available from the Council upon request.

2.1.5 Marine ecological inspection

A marine ecological inspection was undertaken of the intertidal area at Back Beach on 27 January 2021.

An area of intertidal reef is present at the north-eastern end of Back Beach at the base of Paritutu Rock. The landward edges of the reef are subject to fluctuating levels of sand inundation. During this inspection, sand cover appeared similar to the previous year, however, it was apparent that sand build up had increased in the middle of the bay; further burying the western flank of the intertidal reef (Photo 1).

A steady groundwater seep was observed flowing down the cliffs to the south west of Paritutu Rock (approximately 30 m from the beach access). The seep flowed down the beach and around the exposed reef before entering the sea.

Rapid, qualitative surveys of intertidal rocky reef biota were undertaken at three locations varying in distance from the groundwater seep.

The first survey area was immediately beneath the groundwater seep, in the mid-high intertidal zone. As is typical for this intertidal zone, biomass and diversity was relatively low. Four algal species were identified, as were two species of barnacle, including *Chamaesipho columna*; which was particularly widespread. Four species of grazing molluscs were identified, with the ornate limpet, *Cellana ornata,* being the most abundant. A number of purple rock crabs, *Leptograpsus variegatus*, were also found in close proximity to the groundwater flow.

Photo 1 Rocky intertidal reef at the northern end of Back Beach (top; Jan 2020, bottom; Jan 2021)

The second survey area was in the low intertidal zone, where the groundwater seep mixed with the sea. Biomass and diversity was much higher at this site (typical for this intertidal zone). Six algal species were identified, with *Scytothamnus australis* having highest coverage. Barnacles were present, but less abundant than at the high shore site. Instead, coverage of the little black mussel *Xenostrobus pulex* increased significantly. Seven species of grazing molluscs (limpet, chiton and top shells) and one species of predatory mollusc (*Haustrum scobina*) were present. The olive anemone (*Isactinia olivacea*) was also found at this site. Red-billed Gulls (*Chroicocephalus novaehollandiae*) were observed in the water where the seep mixed with the sea.

The third survey area was in the low intertidal zone, 50 m west of where the groundwater seep mixed with the sea. Diversity was similar to the previous site; however, there appeared to be greater biomass at this site. Although the increased sand had reduced under-boulder habitat, the large boulders at this location appeared to be providing a stable habitat for seaweeds (in particular *S. australis* and *Petalonia binghamiae*) and encrusting animals (i.e. *Xenostrobus pulex*) to establish. Five grazing molluscs were identified, two anemone species, and a barnacle. Presumably, owing to the high biomass, numerous large predators were present, in particular the whelk *Dicaithais orbita* and reef star *Stichaster australis* (Photo 2).

Overall, based on observations made during this inspection, the groundwater seep did not appear to be adversely affecting the local reef biota. Instead, the fluctuating sand coverage at this site (and resultant changes in habitat availability), appears to be a significant driver in rocky reef community structure. The diversity of reef biota immediately west of Paritutu Rock is typical of that seen at other intertidal reefs in the Taranaki region.

Photo 2 Reef star (*S. australis*), whelks and their eggs (*D. orbita*) on a large boulder in the low intertidal zone

2.2 Air

2.2.1 Inspections

Officers of the Council carried out regular inspections of the Corteva Paritutu Road site during the 2020-2021 monitoring period. Scheduled inspections were undertaken on 21 August and 5 November 2020, and 11 February and 20 May 2021.

During each inspection a record was made of weather conditions prevailing at the time. An odour survey was carried out on the site boundary and around the surrounding neighbourhood. No odours were detected during any of the inspections.

The vents on site were visually checked for emissions during each inspection. At no time were any emissions noticed. A high standard of housekeeping in all areas of the site was noted at each inspection.

2.2.2 Corteva air emissions report

Council received an air emissions report from Corteva covering the period from July 2020 to June 2021.

The report addresses changes in plant processes, emission control technology, resource consent requirements, and emission monitoring. Process management of air emissions is described, and the results from monitoring of point source emissions produced. General aspects of air quality management are covered, including the Air Discharge Management and Monitoring Plan (ADMMP). The results of monitoring are summarised below.

2.2.3 Process vents

Monitoring of process vent emissions from the Herbicides plant was carried out by independent specialist Source Testing New Zealand Ltd (STNZ). Emissions were sampled by STNZ using international standard methods where applicable, and analysed by an IANZ accredited laboratory.

The monitoring was undertaken in accordance with the Stack Emission Monitoring Plan attached to the ADMMP.

Sampling was timed and conducted to provide data representative of the various production and formulation processes.

Monitoring of vents associated with the Insecticides and Suspension Concentrates plants was scheduled during the 2020-2021 year, however this was not undertaken as the independent contractor who carries out

the monitoring was not available prior to cessation of the production of products requiring chlorpyrifos, spinosad or spinetoram in October 2020.

Sampling was initially undertaken in the Granulated Herbicides Plant in November 2020, however at this time it was discovered that the HEPA filter was bypassing and operations were stopped until the filters could be replaced. The remaining monitoring was completed over 3 to 4 February 2021.

A summary of the emission test results and associated information is presented in Table 6.

Table 6 Summary of process vent emission monitoring results 2020-2021

Plant	Vent	Emission component	No.	Sampling period	Concentration* µg/m³	Emission limit**	
						µg/m³	%
Insecticides	03-5	Chlorpyrifos	-	Due 2020-21^	-	132,240	-
Suspension Concentrates	BB600	Spinosad Spinetoram	-	Due 2020-21^	-	3,078,000	-
Granulated Herbicides	03-14	Picloram	3	4 Nov 2020 3-4 Feb 2021	118.0[a] 24.8[b]	40,185,000	0.0003%[a] 0.00006%[b]
Herbicides	03-8	2,4-D, Haloxyfop-R methyl ester,	-	-	-	214,000 6,420	-
Commodity Herbicides	48-1	Clopyralid	3	2-3 Nov 2020	0.45	870,000	0.00005%

* all data corrected to 0˚C, one atmosphere, dry gas basis

** limits for emission component concentrations derived from Schedules 1 and 3 attached to consent 4020-4

^ not undertaken as production of products requiring chlorpyrifos, spinosad or spinetoram ceased in October 2020

[a] maximum emission concentration during upset operating conditions

[b] maximum emission concentration under normal operation conditions

Condition 3 of consent 4020-4 requires that the discharge of contaminants to air, other than from the High Temperature Incinerator Stack, shall be controlled to ensure that the maximum ground-level concentrations off site do not exceed air quality limits listed in Schedule 1 to the consent, using the following formula:

Maximum stack concentration (µg/m³) = air quality limit (µg/m³) x Dilution Factor

The Dilution Factor is taken from the table in Schedule 3 to the consent, based on worst-case predictions from air dispersion modelling of the dilution of contaminants with ambient air between each process plant stack and ground level at the site boundary.

Table 6 presents the emission component concentrations as a percentage of the relevant maximum stack concentrations that are allowed. The highest emission concentration measured was 0.0003% of the respective limit, for picloram from the Herbicides Plant stack.

2.2.3.1 Multiple sources

Where multiple sources of an individual contaminant are involved, individual stack concentrations for that contaminant will be determined to ensure the air quality limit is complied with on a cumulative basis (Schedule 3 of consent 4020-4).

Clopyralid is the only substance that has the potential to have multiple sources as it is used in both the Herbicides Plant and the Commodity Herbicides Plant, however it is predominantly used in only one plant at a time. During 2020-2021, there were no situations identified where this occurred therefore there was no requirement to undertake a determination of multiple sources.

2.2.4 High Temperature Incinerator

Conditions on Corteva's air discharge permit 4020-3 placed limits on the discharge of dioxins/furans and of hydrogen chloride from the High Temperature Incinerator. Renewed discharge permit 4020-4 retained the concentration limit on dioxins/furans, and changed the mass discharge limit for hydrogen chloride (HCl) to include total halides (HF, HCl and HBr).

Under the Stack Emission Monitoring Plan, discharges from the High Temperature Incinerator stack shall also be monitored annually for particulates, sulphur dioxide and metals.

Monitoring for each type of emission component was carried out during the 2020-2021 period.

2.2.4.1 Dioxins and furans

Special condition 4 on Corteva's air discharge consent 4020-4 states that the total concentration of polychlorinated dibenzodioxins (PCDD) and polychlorinated dibenzofurans (PCDF) from the High Temperature Incinerator Stack shall not exceed 0.1 ng/m^3 (adjusted to 0°C, dry gas basis, 101.3 kPa pressure and 11% oxygen) when calculated as total toxic equivalents using World Health Organisation 2005 toxic equivalence factors. Compliance is determined based on the average of not less than three samples, each of which is taken while the incinerator is fed on different waste types.

Monitoring of the incinerator for dioxin and furan emissions was carried out by independent specialist STNZ using the modified USEPA Method 23A sampling train incorporating a water-cooled probe. The sampling periods were all four hours. Testing during incineration of liquid waste occurred on 27 to 29 January 2021. A summary of the results is presented in Table 7.

Table 7 High Temperature Incinerator PCDD/PCDF monitoring results January 2021

Date	Waste type	PCDD/PCDF concentration (ng/m^3 Total WHO-TEQ Upper Bound)	PCDD/PCDF emission rate (ng/hr Total WHO-TEQ Upper Bound)
27 January	Liquid waste	0.0138	33.3
28 January	Liquid waste	0.0167	44.3
29 January	Liquid waste	0.1920	626
Average		**0.0742**	**235**
Consent limit		**0.1**	

Key: PCDD polychlorinated dibenzodioxins
PCDF polychlorinated dibenzofurans
ng/m^3 nanograms per cubic metre, adjusted to 0°C, 101.3 kPa, 11% oxygen, dry gas basis
ng/hr nanograms per hour
WHO-TEQ World Health Organisation – Total Toxic Equivalence

Results are presented in terms of WHO 2005 toxic equivalence factors. Maximum upper bound values are reported, for PCDD/PCDF concentration and emission rate.

Condition 4 of consent 4020-4 sets a limit of 0.1 ng/m^3, however advice note 3 states that compliance is determined based on the average of not less than three samples. So although the concentration of 0.1920 ng/m^3 measured on 29 January 2021 exceeds 0.1 ng/m^3, the average concentration value for the three sampling runs, 0.0742 ng/m^3 WHO-TEQ, is less than the limit of 0.1 ng/m^3 on consent 4020-4.

The maximum mass emission rate value for the three sampling runs was 626 ng/hr WHO-TEQ. All emission rate values were higher than the results obtained in 2017.

2.2.4.2 Total halides (HF, HCl, HBr)

Special condition 5 on consent 4020-4 limits the discharge of total halides from the High Temperature Incinerator Stack to 1.5 kg/hr.

Testing for hydrogen fluoride (HF), hydrogen chloride (HCl) and hydrogen bromide (HBr) was undertaken on 26 January 2021. Two-hour samples were collected during normal operations processing liquid waste. The results are presented in Table 8.

Table 8 High Temperature Incinerator HF, HCl, HBr and Total Halide monitoring results 26 January 2021

Date	Waste type	Concentration mg/m³				Emission rate kg/hr			
		HF	HCl	HBr	Total	HF	HCl	HBr	Total
Run 1	Liquid waste	0.32	122	<0.02	122	0.0008	0.315	<0.00005	0.316
Run 2	Liquid waste	0.30	216	<0.02	216	0.0008	0.550	<0.00005	0.550
Run 3	Liquid waste	0.31	215	<0.02	215	0.0008	0.550	<0.00005	0.551
Consent limit									**1.5**

Key: mg/m³ milligrams per cubic metre, adjusted to 0°C, 101.3 kilopascals pressure, 11% oxygen, and calculated as a dry gas
kg/hr kilograms per hour

The results of the total halide monitoring performed showed that the mass emission rate ranged from 0.316 to 0.551 kg/hr, complying with the maximum limit of 1.5 kg/hr. Bromide concentrations were non-detectable at <0.02 mg/m³ for all samples. These results were higher than those observed in March 2017.

2.2.4.3 Particulate matter

Testing for particulate matter was undertaken on 26 January 2021. Two-hour samples were collected during normal operations processing liquid waste. The results are presented in Table 9. The results for particulate matter monitoring performed showed that the mass emission rate ranged from 0.0201 to 0.0247 kg/hr, approximately 10% of the March 2017 results. There is no limit within the consent on mass emission rate of particulate, or on particulate concentration.

Table 9 High Temperature Incinerator particulate matter monitoring results 26 January 2021

Sampling run	Waste type	Particulate matter Concentration mg/m³	Particulate matter Emission rate kg/hr
Run 1	Liquid waste	9.6	0.0247
Run 2	Liquid waste	9.6	0.0244
Run 3	Liquid waste	7.8	0.0201

Key: mg/m³ milligrams per cubic metre, adjusted to 0°C, 101.3 kilopascals pressure, 11% oxygen, and calculated as a dry gas
kg/hr kilograms per hour

2.2.4.4 Sulphur dioxide

Testing for Sulphur dioxide was undertaken on 26 January 2021. Approximately two hour samples were collected during normal operations processing liquid waste. The results are presented in Table 10.

Table 10 High Temperature Incinerator sulphur dioxide monitoring results 26 January 2021

Sampling run	Waste type	Sulphur dioxide Concentration mg/m^3	Sulphur dioxide Emission rate kg/hr
Run 1	Liquid waste	1.7	0.0044
Run 2	Liquid waste	<0.9	<0.0022
Run 3	Liquid waste	<1.1	<0.0028

Key: mg/m^3 milligrams per cubic metre, adjusted to 0°C, 101.3 kilopascals pressure, 11% oxygen, and calculated as a dry gas
kg/hr kilograms per hour

The results for sulphur dioxide monitoring performed showed that the mass emission rate ranged from <0.0022 to 0.0044 kg/hr. There is no limit with the consent on mass emission rate of sulphur dioxide.

2.2.4.5 Metals

Testing for metals was carried out 1 and 2 February 2021. Two hour samples were collected during normal operations processing liquid waste. The results are presented in Table 11.

Table 11 High Temperature Incinerator metals monitoring results 2020-2021

Metal	Discharge Concentration mg/m^3		Emission rate g/hr	
	Range	Average	Range	Average
Aluminium	0.0252 – 0.0299	0.0268	0.0668 – 0.1130	0.0885
Antimony	0.0020-0.0027	0.0023	0.0053 – 0.0101	0.0078
Arsenic	<0.0052 - <0.0053	<0.0052	<0.0138 – <0.0198	<0.0171
Boron	0.0175 – 0.0405	0.0254	0.0465 – 0.153	0.0869
Cadmium	<0.00031 – <0.00032	<0.00031	<0.0008 – <0.0012	<0.0010
Chromium	0.0110 – 0.0139	0.0124	0.0293 – 0.0524	0.0410
Cobalt	<0.0010 – <0.0011	<0.0010	<0.0028 – <0.0040	<0.0034
Copper	0.0098 – 0.0110	0.0104	0.0261 – 0.416	0.0343
Iron	0.159 – 0.196	0.179	0.422 – 0.620	0.0594
Lead	0.00339 – 0.00439	0.00385	0.0090 – 0.0166	0.0128
Lithium	0.0073 – 0.0091	0.0080	0.0139 – 0.342	0.0265
Manganese	0.0250 – 0.0311	0.0304	0.0665 – 0.119	0.101
Mercury	<0.0047	<0.0047	<0.013 - <0.018	<0.015
Molybdenum	0.0037 – 0.0048	0.0039	0.0097 – 0.0163	0.0130
Nickel	0.0152 – 0.0196	0.0174	0.0515 – 0.0656	0.564
Tin	0.0057 – 0.0068	0.0062	0.0148 – 0.0256	0.0204
Vanadium	<0.0022 – <0.0052	0.0035	0.0057 – 0.018	0.0117
Zinc	0.0525 – 0.0818	0.0676	0.140 – 0.308	0.227

Key: mg/m^3 milligrams per cubic metre, adjusted to 0°C, 101.3 kilopascals pressure, 11% oxygen, and calculated as a dry gas
g/hr grams per hour

These results are similar (where comparison is possible) to those found from the metals testing of incinerator emissions that was carried out in May 2017. There is no limit on consent 4020-4 on mass emission rate of metals.

2.3 Incidents, investigations, and interventions

The monitoring programme for the year was based on what was considered to be an appropriate level of monitoring, review of data, and liaison with Corteva. During the year matters may arise which require additional activity by the Council, for example provision of advice and information, or investigation of potential or actual causes of non-compliance or failure to maintain good practices. A pro-active approach, that in the first instance avoids issues occurring, is favoured.

For all significant compliance issues, as well as complaints from the public, the Council maintains a database record. The record includes events where the individual/organisation concerned has itself notified the Council. Details of any investigation and corrective action taken are recorded for non-compliant events.

Complaints may be alleged to be associated with a particular site. If there is potentially an issue of legal liability, the Council must be able to prove by investigation that the identified individual/organisation is indeed the source of the incident (or that the allegation cannot be proven).

Table 12 below sets out details of any incidents recorded, additional investigations, or interventions required by the Council in relation to Corteva's activities during the 2020-2021 period. This table presents details of all events that required further investigation or intervention regardless of whether these were found to be compliant or not.

Table 12 Incidents, investigations, and interventions summary table

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
17 Feb 2021	A complaint was received concerning a chemical odour on Paritutu Road	Y	N	An odour survey was undertaken by Council. No odours were found and no further action was taken.

3 Discussion

3.1 Discussion of site performance

In general, from the inspections of the site and from discussions held with staff, Council officers have concluded that Corteva has a comprehensive, carefully documented and well considered approach to all areas of environmental performance. This included written methods for process management and technical control, documentation of processes and emissions, a self-monitoring programme implemented by Corteva and regular provision of information to the Council. Staff are assigned particular areas of responsibility, so that familiarity and experience are gained. All major air emissions sources have appropriate treatment systems and in most cases general building ventilation is also extracted through similar treatment systems.

No new products were introduced to the site during 2020-2021.

During the 2020-2021 year routine maintenance was carried out on the stormwater system and the Dangerous Goods Compound compound bunding was improved to ensure the risk of uncontrolled release from storm events was reduced.

Upon application of the "process for relating stack concentrations to air quality limits" as prescribed in Schedule 3 of air consent 4020-4, the discharge of contaminants to air was found to be controlled so that ground-level concentrations off-site did not exceed the relevant air quality limits.

The annual report on air emission monitoring was produced as required under consent 4020-4. Compliance with the consent conditions was demonstrated.

The annual report on stormwater discharge monitoring was produced as required under consent 4108-2. Compliance with the consent conditions was demonstrated.

The annual groundwater management report was produced as agreed in the Site Groundwater Management Plan. All groundwater samples from the perimeter wells were found to be significantly below the contaminant action levels.

A minor change to the Air Discharge Management and Monitoring Plan was made to align with current Corteva requirements. The retention period for incinerator burn records was updated to five years plus current calendar year, where previously it was 50 years.

During the 2020-2021 year, production ceased at the New Plymouth site.

- Final product was packed on 19 February 2021.
- The high temperature incinerator was recommissioned in December 2020 for liquids disposal only. Incineration activities ceased on 20 May 2021.
- Manufacturing function employees ceased employment on 31 May 2021 after all equipment was cleaned and chemicals removed.
- Corteva engaged an external laboratory to continue testing of stormwater prior to release.
- By the end of the monitoring year, the site had entered an idle state with a reduced number of administrative and maintenance staff present.

3.2 Environmental effects of exercise of consents

Environmental investigations, including biomonitoring of the Herekawe Stream, found no cause for concern over the effects of the discharge of stormwater from the site.

The results of emission testing indicated that there is no potential health effect from the primary contaminants discharged from the site, according to recognised guidelines.

3.3 Environmental effects of exercise of groundwater movement

Monitoring of groundwater quality beneath the site has confirmed modelling that predicts that historical groundwater contamination at two points beneath the site would not result in any off-site effects, nor detection at the limits used by Corteva for its routine monitoring.

3.4 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Tables 13-14, with an evaluation of performance over time presented in 15.

Table 13 Summary of performance for consent 4108-2

Purpose: ***To discharge stormwater from an industrial agrichemical manufacturing site via retention dams together with uncontaminated stormwater from landscape and no-manufacturing areas into the Herekawe Stream***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adopt best practicable option	Checking that standard operating procedures to achieve compliance with consent conditions are followed	Yes
2. Stormwater catchment area not to be exceeded	Inspections of plant site	Yes
3. Provision of stormwater management plan	Latest plan on file June 2021	Yes
4. Keeping of discharge records	Inspection by Council and annual report by Corteva received in October 2021	Yes
5. Controls on effect of discharge in receiving water	Inspections, chemical sampling and biomonitoring	Yes
6. Concentration limits upon potential contaminants in discharge	Chemical sampling by Corteva with validation by Council	Yes
7. Optional review provision re environmental effects	No further option to review prior to expiry	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

N/A = not applicable

Table 14 Summary of performance for consent 4020-4

Purpose: To discharge contaminants to air from all activities associated with current and future operation of an agrichemical formulation and packaging plant		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Maintenance and operation of emission control equipment	Monitoring of activity as necessary by Council Officers and review of the ADMMP required by condition 11	Yes

Purpose: To discharge contaminants to air from all activities associated with current and future operation of an agrichemical formulation and packaging plant		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
2. Prohibition of offensive odour or dust beyond boundary	Monitoring of activity as necessary by qualified Council officers	Yes
3. Limits on contaminants, other than from incinerator, beyond the site	Testing as detailed in ADMMP	Yes
4. Limit on specific incinerator emission components	Independent consultant monitoring	Yes
5. Limit on specific incinerator emission components mass discharge rate	Independent consultant monitoring	Yes
6. No incineration of certain materials	Inspection and liaison with consent holder	Yes
7. Incinerator monitoring record keeping	Information not requested	N/A
8. Incinerator oxygen concentration	Inspection and liaison with consent holder	Yes
9. Incinerator secondary chamber temperature	Inspection and liaison with consent holder	Yes
10. Incinerator exhaust gas temperature	Inspection and liaison with consent holder	Yes
11. Air Discharge Management and Monitoring Plan	Plan up to date	Yes
12. Maintenance of Chemical Materials Register for current use	Review of records received by Council	Yes
13. Introduction of new items to Chemical Material Register	Liaison with consent holder, no new chemicals during period under review	Yes
14. Air Monitoring and triggers	No action required	Yes
15. Annual report on monitoring results, process change, and consultation	Report received September 2021	Yes
16. Six-yearly report on technological advances in emission reduction	Received April 2020, next due April 2026	Yes
17. Review of consent	Option for review in June 2026 if required	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 15 Evaluation of environmental performance over time

Year	Consent no	High	Good	Improvement req	Poor
2010-11	4108-2	1	-	-	-
	4020-3	-	1	-	-
2011-12	4108-2	1	-	-	-
	4020-3	-	1	-	-
2012-13	4108-2, 4020-4	2	-	-	-
2013-14	4108-2, 4020-3	2	-	-	-
2014-15	4108-2, 4020-3	2	-	-	-
2015-16	4108-2, 4020-4	2	-	-	-
2016-17	4108-2, 4020-4	2	-	-	-
2017-18	4108-2, 4020-4	2	-	-	-
2018-19	4108-2, 4020-4	2	-	-	-
2019-20	4108-2, 4020-4	2			
Totals		18	2		

During the year, Corteva demonstrated an overall high level of both environmental performance and administrative compliance with the resource consents as defined in Section 1.1.4

3.5 Recommendations from the 2019-2020 Annual Report

In the 2019-2020 Annual Report, it was recommended:

1. THAT in the first instance, monitoring of consented activities at the DAS Paritutu Road plant in the 2020-2021 year continue at the same level as in 2019-2020.
2. THAT should there be issues with environmental or administrative performance in 2020-2021, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

These recommendations were implemented.

3.6 Alterations to monitoring programmes for 2021-2022

In designing and implementing the monitoring programmes for air/water discharges in the region, the Council has taken into account:

- the extent of information already made available through monitoring or other means to date;
- its relevance under the RMA;
- the Council's obligations to monitor consented activities and their effects under the RMA;
- the record of administrative and environmental performances of the consent holder; and
- reporting to the regional community.

The Council also takes into account the scope of assessments required at the time of renewal of permits, and the need to maintain a sound understanding of industrial processes within Taranaki exercising resource consents.

Due to the cessation of activities at the Corteva site, the monitoring programme for 2021-2022 will be altered by reduction of stormwater sampling from four occasions per year to one.

It should be noted that the proposed programme represents a reasonable and risk-based level of monitoring for the site in question. The Council reserves the right to subsequently adjust the programme from that initially prepared, should the need arise if potential or actual non-compliance is determined at any time during 2021-2022.

4 Recommendations

1. THAT in the first instance, monitoring of consented activities at the Corteva Agrisciences New Zealand Ltd Paritutu Road plant in the 2021-2022 year be altered from that in 2020-2021 by reducing the stormwater sampling occasions from four to one.
2. THAT should there be issues with environmental or administrative performance in 2021-2022, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

Glossary of common terms and abbreviations

The following abbreviations and terms may be used within this report:

2,4-D	2,4 di-chloro-phenoxy-acetic acid, a herbicide.
2,4-DB	2,4 di-chloro-phenoxy-butanoic acid, a herbicide.
2,4,5-T	2,4,5 tri-chloro-phenoxy-acetic acid, a herbicide.
AEE	Assessment of environmental effects.
ADMMP	Air Discharge Management and Monitoring Plan.
Biomonitoring	Assessing the health of the environment using aquatic organisms.
Bund	A wall around a tank to contain its contents in the case of a leak.
Conductivity	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 25°C and expressed in mS/m.
DMA	Dimethylamine.
DMEA	Dimethylethanolamine.
Dioxins	See PCDD.
g/m^3	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
IPA	Isopropylamine.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.
Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.
Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident.
Incident Register	The Incident Register contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan.
L/s	Litres per second.
MCI	Macroinvertebrate community index; a numerical indication of the state of biological life in a stream that takes into account the sensitivity of the taxa present to organic pollution in stony habitats.
MCPA	Methyl-chloro-phenoxy-acetic acid, a herbicide.
MCPB	Methyl-chloro-phenoxy-butanoic acid, a herbicide.
mS/m	Millisiemens per metre.
Mixing zone	The zone below a discharge point where the discharge is not fully mixed with the receiving environment. For a stream, conventionally taken as a length equivalent to 7 times the width of the stream at the discharge point.
ng/m^3	Nanograms per cubic metre.

NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.
PCDD	Polychlorinated dibenzo-para-dioxins, a contaminant of phenoxy herbicides.
PCDF	Polychlorinated dibenzofurans, a contaminant of phenoxy herbicides.
pH	A numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5.
Physicochemical	Measurement of both physical properties (e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment.
Resource consent	Refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15).
RMA	*Resource Management Act 1991* and including all subsequent amendments.
SQMCI	Semi quantitative macroinvertebrate community index.
TCP	Trichlorophenol.
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU.

For further information on analytical methods, contact a Science Services Manager.

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Appendix I

Resource consents held by Corteva Agriscience New Zealand Ltd

(For a copy of the signed resource consent
please contact the TRC Consents department)

Water abstraction permits

Section 14 of the RMA stipulates that no person may take, use, dam or divert any water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or it falls within some particular categories set out in Section 14. Permits authorising the abstraction of water are issued by the Council under Section 87(d) of the RMA.

Water discharge permits

Section 15(1)(a) of the RMA stipulates that no person may discharge any contaminant into water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or by national regulations. Permits authorising discharges to water are issued by the Council under Section 87(e) of the RMA.

Air discharge permits

Section 15(1)(c) of the RMA stipulates that no person may discharge any contaminant from any industrial or trade premises into air, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Permits authorising discharges to air are issued by the Council under Section 87(e) of the RMA.

Discharges of wastes to land

Sections 15(1)(b) and (d) of the RMA stipulate that no person may discharge any contaminant onto land if it may then enter water, or from any industrial or trade premises onto land under any circumstances, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Permits authorising the discharge of wastes to land are issued by the Council under Section 87(e) of the RMA.

Land use permits

Section 13(1)(a) of the RMA stipulates that no person may in relation to the bed of any lake or river use, erect, reconstruct, place, alter, extend, remove, or demolish any structure or part of any structure in, on, under, or over the bed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Land use permits are issued by the Council under Section 87(a) of the RMA.

Coastal permits

Section 12(1)(b) of the RMA stipulates that no person may erect, reconstruct, place, alter, extend, remove, or demolish any structure that is fixed in, on, under, or over any foreshore or seabed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Coastal permits are issued by the Council under Section 87(c) of the RMA.

Appendix I

Resource consents held by Corteva Agriscience New Zealand Ltd

(For a copy of the signed resource consent
please contact the TRC Consents department)

Water abstraction permits

Section 14 of the RMA stipulates that no person may take, use, dam or divert any water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or it falls within some particular categories set out in Section 14. Permits authorising the abstraction of water are issued by the Council under Section 87(d) of the RMA.

Water discharge permits

Section 15(1)(a) of the RMA stipulates that no person may discharge any contaminant into water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or by national regulations. Permits authorising discharges to water are issued by the Council under Section 87(e) of the RMA.

Air discharge permits

Section 15(1)(c) of the RMA stipulates that no person may discharge any contaminant from any industrial or trade premises into air, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Permits authorising discharges to air are issued by the Council under Section 87(e) of the RMA.

Discharges of wastes to land

Sections 15(1)(b) and (d) of the RMA stipulate that no person may discharge any contaminant onto land if it may then enter water, or from any industrial or trade premises onto land under any circumstances, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Permits authorising the discharge of wastes to land are issued by the Council under Section 87(e) of the RMA.

Land use permits

Section 13(1)(a) of the RMA stipulates that no person may in relation to the bed of any lake or river use, erect, reconstruct, place, alter, extend, remove, or demolish any structure or part of any structure in, on, under, or over the bed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Land use permits are issued by the Council under Section 87(a) of the RMA.

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Section 12(1)(b) of the RMA stipulates that no person may erect, reconstruct, place, alter, extend, remove, or demolish any structure that is fixed in, on, under, or over any foreshore or seabed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Coastal permits are issued by the Council under Section 87(c) of the RMA.

Discharge Permit

Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of Consent Holder:	Corteva Agriscience New Zealand Limited Private Bag 2017 New Plymouth 4340	
Decision Date (Change):	5 June 2020	
Commencement Date (Change):	5 June 2020	(Granted Date: 5 November 2014)

Conditions of Consent

Consent Granted:	To discharge contaminants to air from all activities associated with the current and future operation of an agrichemical formulation and packaging plant
Expiry Date:	1 June 2044
Review Date(s):	June 2026, June 2032, June 2038
Site Location:	89 Paritutu Road, Spotswood
Grid Reference (NZTM)	1688529E-5675602N

For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document

General condition

a. The consent holder shall pay to the Taranaki Regional Council all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act 1991.

Special conditions

1. The consent holder shall ensure that all emissions control equipment, including but not limited to that referred to in condition 16(b) is maintained and operated effectively and efficiently at all times.

2. The discharges authorised by this consent shall not give rise to any odour, or dust emissions, at or beyond the boundary of the site that is offensive or objectionable.

3. The discharge of contaminants to air, other than from the High Temperature Incinerator Stack (see conditions 4 and 5) shall be controlled to ensure that the maximum ground-level concentrations off-site do not exceed:

   (a) Subject to condition 3(b),the relevant air quality limits listed in Schedule 1 of this consent and assessed using the process set out in Schedule 3; and

   (b) In the case of emissions due to raw materials or formulations introduced to the site after this consent commences, limits developed in accordance with the approach set out in Schedule 2 and assessed using the process set out in Schedule 3.

   See Advice Notes 1 and 2.

4. The total concentration of polychlorinated dibenzodioxins and polychlorinated dibenzofurans in any discharge from the High Temperature Incinerator Stack shall not exceed 0.1 nanograms per cubic metre (adjusted to 0 degrees Celsius, dry gas basis, 101.3 kPa pressure and 11% oxygen) when calculated as total toxic equivalents using the World Health Organization 2005 toxic equivalence factors.

   See Advice Notes 1 and 3.

5. The rate of discharge of total halides from the High Temperature Incinerator stack shall not exceed 1.5 kg/hour.

   See Advice Note 1.

6. There shall be no incineration of plastics and packaging that contain brominated flame retardants.

7. The consent holder shall record, and make available to the Chief Executive, Taranaki Regional Council upon request:

   a) the carbon monoxide concentration within or at the exit from the secondary combustion chamber;
   b) the feedstock type and loading rate;
   c) operating times; and
   d) the prevailing weather conditions

   for each incinerator burn. Records shall be retained for a period of six months.

8. The oxygen concentration within the secondary combustion chamber of the incinerator shall be maintained between 6% and 9% (by volume) as far as is practicable, and shall not be less than 4.5% (by volume), for more than 60 seconds at any time during the incineration of material during any 24-hour period.

9. The temperature in the secondary chamber of the High Temperature Incinerator shall not be less than 1100 degrees Celsius at any time during the incineration of waste.

10. The temperature of the exhaust gas from the High Temperature Incinerator shall not be less than 1000 degrees Celsius at any time during the incineration of waste.

11. Within three months of the date of commencement of consent, and at intervals not exceeding three years thereafter, the consent holder shall prepare and provide to the Chief Executive, Taranaki Regional Council and the Medical Officer of Health for Taranaki, for comment, a draft Air Discharge Management and Monitoring Plan ("ADMMP") for the site. The ADMMP shall be finalised and submitted to the Chief Executive, Taranaki Regional Council within a further three months. The ADMMP shall be to the satisfaction of the Chief Executive of the Taranaki Regional Council, acting in a technical certification capacity, and shall detail the management and monitoring of air discharges on the site and procedures and methodologies to ensure consent compliance. As a minimum, the ADMMP shall include:

    (a) A summary of the on-site air discharge activities and the nature of the discharges to air from each source on-site;

    (b) A description of how compliance with the conditions of this consent will be achieved;

    (c) A description of the air quality control measures and equipment, and maintenance programme in place for each of the air treatment systems used on-site, including specifically the systems used in the:
        - Commodity Herbicides Plant;
        - Herbicides Plant;
        - Granular Herbicides Plant;
        - Insecticides Plant;
        - High Temperature Incinerator Stack and Building;
        - Raw Material Storage Warehouse;
        - Product Development Laboratory;
        - Bulk Storage Tanks;
        - Natural gas-fired boiler; and
        - Any other air discharge sources on-site.

    (d) Descriptions of the site operating requirements related to the air discharge activities on-site, including:
        - Operating procedures;
        - Monitoring and supervision procedures including any performance indicators ; and
        - Waste processing and discharge logs.

(e) A description of the High Temperature Incinerator operational record-keeping and reporting procedures and requirements including:
- Feedstock type and loading rate, operating times and the prevailing weather conditions for each incinerator burn;
- Continuous monitoring of oxygen, carbon monoxide and temperature;
- Limits on the oxygen concentration at the outlet of the secondary combustion chamber; and
- limits on the halogen content of the feedstock;

(f) A description of the management procedures for the Product Development Laboratory, including management of the air treatment system, to minimise discharges to air to the extent practicable;

(g) A description of any additional air quality limits determined in accordance with condition 3(b);

(h) The consent holder's Air Monitoring Programme including, as a minimum:
- Identification of the contaminants and compounds being monitored;
- A description of the methodology for the air monitoring programme;
- Monitoring locations and frequency; and
- A description of how compliance with consent conditions will be demonstrated.

(i) A description of the Odour Register for the site, which is used to record any observations of odour (both on-site and off-site), the findings of any investigations, and any recommendations that arise; and

(j) A 'Contingency Plan' detailing measures and procedures to be undertaken to avoid or mitigate the adverse environmental effects of any spillage or discharge of contaminants not authorised by this consent. The Contingency Plan shall include the requirement that the Medical Officer of Health for Taranaki be notified as soon as practicable following any contingency event occurring that is likely to adversely affect human health beyond the boundary of the site.

12. At all times the consent holder shall maintain:

(a) A Chemical Materials Register containing details of all of the chemicals or product formulations currently received, prepared, stored, mixed or otherwise processed on-site; and

(b) The Safety Data Sheet, toxicology information and environmental fate information for each chemical and product listed in the Chemical Materials Register; and

(c) Details of the assessments and resulting air quality limits determined in accordance with condition 3(b).

The information required by this condition shall be retained and be made available to the Chief Executive, Taranaki Regional Council upon request.

13. Before any new chemicals or product formulations are introduced to the site for purposes other than research or development, they shall be added to the Chemical Materials Register.

14. For any air monitoring undertaken, the following actions apply:

    (a) If a measured air quality parameter would result, or has resulted in air quality that is 25% or less of the relevant limit referred to in condition 3, then no action is required;

    (b) If the measured air quality parameter would result, or has resulted in air quality that is more than 25% and less than or equal to 50% of the relevant limit referred to in condition 3, the consent holder shall notify the Chief Executive, Taranaki Regional Council within three working days of receipt of the monitoring results;

    (c) If the measured air quality parameter would result, or has resulted in air quality that is more than 50% and less than or equal to 100% of the relevant limit referred to in condition 3, the consent holder shall notify the Chief Executive, Taranaki Regional Council immediately upon receipt of the monitoring results, and investigate, and where appropriate remedy, the cause of the decrease in discharge quality. The consent holder shall notify the Chief Executive, Taranaki Regional Council of the outcomes of any investigations and subsequent actions, within 10 working days of receipt of the monitoring results; and

    (d) If the measured air quality parameter would result, or has resulted in air quality that is greater than 100% of the relevant limit referred to in condition 3, the consent holder shall immediately cease the discharge activity and notify the Chief Executive, Taranaki Regional Council upon receipt of the monitoring results. The consent holder shall then investigate the cause of the decrease in discharge quality, and remedy the cause of the exceedance prior to any recommencement of the discharge activity. A summary report shall be provided to the Chief Executive, Taranaki Regional Council within 10 working days of the original notification.

15. Before 30 September each year the consent holder shall provide to the Chief Executive, Taranaki Regional Council the following information for the 12 month period ending on the previous 30 June:

    (a) The results of all air quality monitoring that the consent holder has undertaken under the Air Monitoring Programme in accordance with condition 11(h);

    (b) A description of any process changes or changes to emission control technology that have been implemented at the site; and

    (c) A description of any consultation undertaken and any views put forward by those consulted.

16. No later than 30 April 2020 and every six years thereafter, the consent holder shall provide to the Chief Executive, Taranaki Regional Council, a written report which includes:

    (a) A review of any relevant technological advances in the reduction or mitigation of discharges to air from the site activities, and the costs and benefits of these advances;

    (b) A summary concluding which air discharge and treatment methods will be operated on-site and why; and

    (c) A description of any significant changes in air quality assessment methodology since the previous reporting period (including computer modelling techniques and the associated dilution factors set out in Schedule 3) that are likely to materially affect the assessment of environmental effects of the activities authorised by this consent.

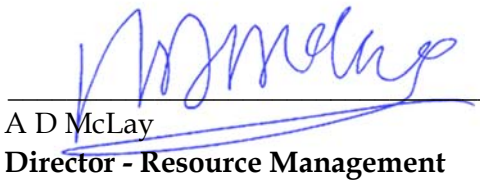
17. In accordance with section 128 and 129 of the Resource Management Act 1991, the Chief Executive, Taranaki Regional Council, may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review:

    (a) During the month of June 2020 and/or June 2026, and/or June 2032, and/or June 2038 for the purpose of ensuring that the conditions are adequate to avoid, remedy or mitigate any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at that time; and

    (b) Within three months of receiving any report provided pursuant to condition 16 to direct the consent holder to adopt the best practicable option to remove or reduce any adverse effect on the environment.

Transferred at Stratford on 13 April 2021

For and on behalf of
Taranaki Regional Council



A D McLay
Director - Resource Management

Advice Notes

1. *Compliance with the limits in conditions 3, 4, and 5 shall be demonstrated by monitoring, or, as described in the ADMMP, by the use of air emission technology that has been designed to ensure any discharge meets those limits.*

2. *The methodology used for relating stack concentrations to air quality limits shall be determined in accordance with the process provided for in Schedule 3 of this consent.*

3. *If any monitoring is undertaken to assess compliance with condition 4, compliance shall be determined based on the average of not less than 3 samples, each of which shall be taken while the incinerator is fed on different waste types.*

SCHEDULE 1: Air quality limits applying beyond the boundary of the site

The air quality limits for the one hour and the 24-hour average will apply at any location beyond the site boundary. The air quality limits for the annual average will apply at any land on which any residential activity (excluding any temporary or transient residential activity) is established.

Agrichemical actives

Substance	Air quality limit (annual average)
2,4-D acid, esters and salts	2 µg/m^3
2,4-DB acid and salts	4 µg/m^3
aminopyralid acid and amine salts	10 µg/m^3
Buprofezin	2 µg/m^3
Chlorpyrifos	0.57 µg/m^3
chlorpyrifos-methyl	1.9 µg/m^3
clopyralid acid and amine salts	30 µg/m^3
cyhalofop-butyl	0.6 µg/m^3
dicamba acid and amine salts	57 µg/m^3
Fenpyroximate	2 µg/m^3
Florasulam	10 µg/m^3
fluroxypyr, methylheptyl ester	153 µg/m^3
glyphosate acid and amine salts	191 µg/m^3
haloxyfop-R methyl ester	0.06 µg/m^3
lambda cyhalothrin	3.7 µg/m^3
MCPA acid, esters and salts	10 µg/m^3
MCPB acid and salts	2 µg/m^3

(s)-methoprene	10 µg/m^3
methoxyfenozide	19 µg/m^3
myclobutanil	6 µg/m^3
Oxyfluorfen	0.6 µg/m^3
picloram acid, esters and salts	57 µg/m^3
Quinoxyfen	38 µg/m^3
Spinetoram	6 µg/m^3
Spinosad	4 µg/m^3
Sulfoxaflor	6 µg/m^3
triclopyr, ester and amine salt	6 µg/m^3

Note: most of the toxicity data makes no distinction between the individual substances and their esters, amines, or salt forms. The air quality limit specified is a total, inclusive of all forms of the active.

Other compounds

Substance	Air quality limit	Averaging period
Benzene	3.6 µg/m^3	Annual
2,4-dichlorophenol	0.6 µg/m^3	Annual
2-ethyl hexanol	160 µg/m^3	Annual
Diethanolamine	3 µg/m^3	Annual
diethylene glycol monoethyl ether	27 µg/m^3	Annual
Dimethylamine	9 µg/m^3	Annual
dimethylethanolamine	50 µg/m^3	Annual
dipropylene glycol monomethyl ether	310 µg/m^3	Annual
EDTA	5 µg/m^3 120 µg/m^3	Annual 24-hour
Ethylbenzene	570 µg/m^3 1,000 µg/m^3	Annual 24-hour
Isopropylamine	12 µg/m^3	Annual
Monoethanolamine	7.5 µg/m^3	Annual
Naphthalene	3 µg/m^3	Annual
N-methyl-2-pyrrolidone	100 µg/m^3	Annual
propylene glycol	120 µg/m^3	24-hour
sodium bicarbonate	5 µg/m^3	Annual
sodium hydroxide	2 µg/m^3	Annual
triethanolamine	5 µg/m^3	Annual

Substance	Air quality limit	Averaging period
1,2,4-trimethylbenzene	20 µg/m^3	Annual
toluene (as a component in some distillate solvents)	5000 µg/m^3	Annual
triisopropanolamine	40 µg/m^3	Annual
xylene (as a component in some distillate solvents)	870 µg/m^3	Annual

SCHEDULE 2: Process for developing air quality limits for emissions associated with new raw materials or formulations.

The air quality limit for any particular contaminant shall be determined in accordance with the hierarchy set out in the Good Practice Guide (GPG) for Assessing Discharges to Air from Industry (Ministry for the Environment, June 2008), or another hierarchy as may be specified in the ADMMP.

In the event that no recognised air quality criteria (as described in the GPG) are available, a limit will be developed by calculating the air concentration that would give rise to an exposure equivalent to one tenth of the Acceptable Daily Intake (or equivalent) set by the New Zealand Environmental Protection Agency, Joint FAO/WHO Meeting on Pesticide Residues (JMPR) or European Commission. This procedure is described in Appendices E5 and E8, Dow AgroSciences (NZ) Ltd: Technical Air Quality Assessment - Discharges to Air – Paritutu Road Site, New Plymouth, Volume 2, prepared by Graham Environmental Consulting Ltd and Tonkin & Taylor Ltd, 31 October 2013.

The air quality limits for the one hour and the 24-hour average will apply at any location beyond the site boundary. The air quality limits for the annual average will apply at land on which any residential activity (excluding any temporary or transient residential activity) is established.

SCHEDULE 3: Process for relating stack concentrations to air quality limits.

Assessment of compliance with the air quality limits in Schedule 1 and those determined in accordance with Schedule 2 can be achieved based on actual or potential stack emissions, by using the following formula:

Maximum stack concentration ($\mu g/m^3$) = air quality limit ($\mu g/m^3$) x Dilution Factor

Where:

a) The stack concentration of any particular contaminant may be measured by stack emission testing or estimated based on the measured stack concentration of another representative contaminant and corrected for differences in molecular weight and vapour pressure; and

b) The Dilution Factor is taken from:

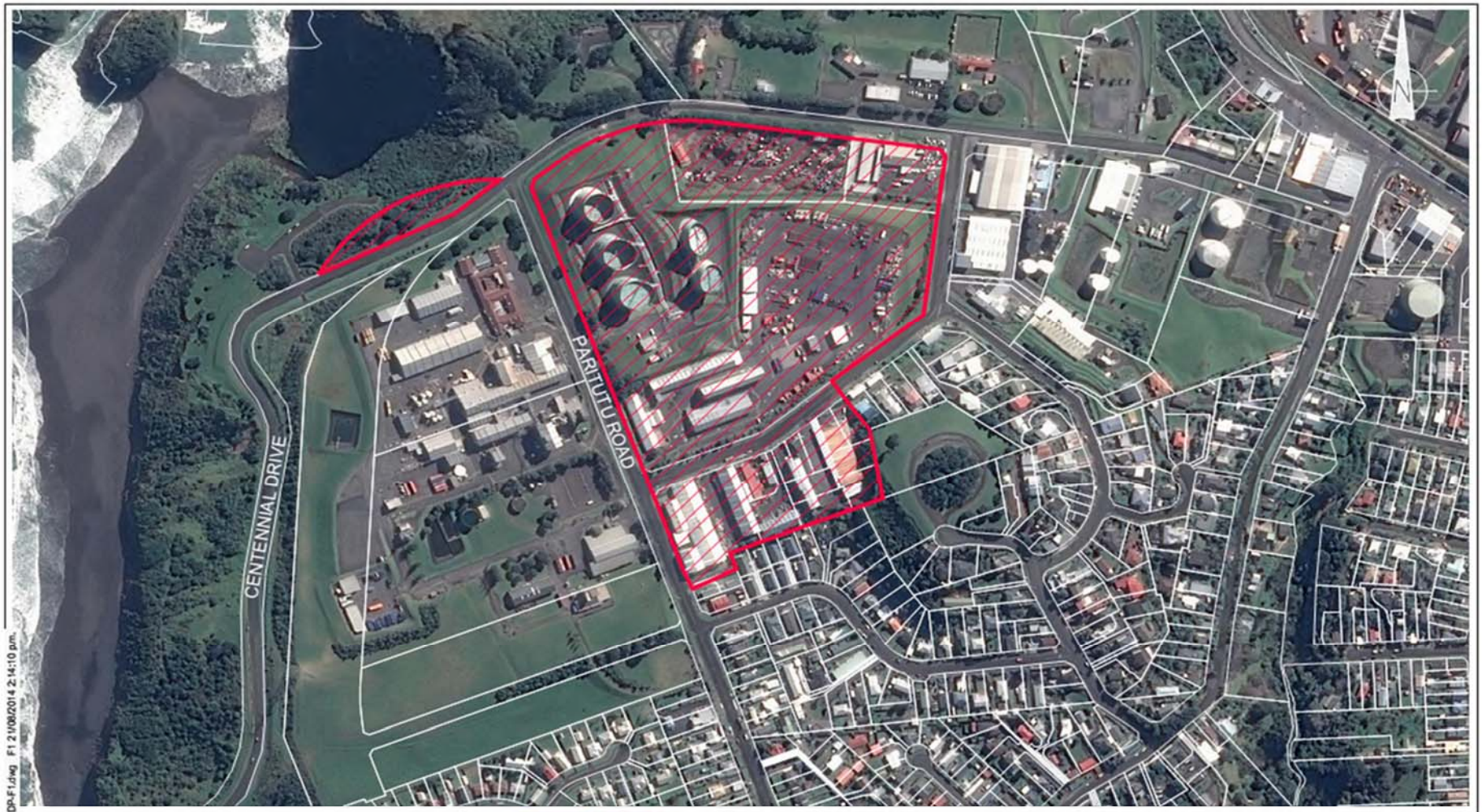
   i. the following table for the averaging period specified for the relevant air quality criterion; or

   ii. where the relevant averaging period is annual average and a residential activity (excluding any temporary or transient residential activity) has established within the hatched area shown on Figure 1 attached, the results of an atmospheric dispersion modelling study carried out to a similar standard as that provided with the application.

Where multiple sources of an individual contaminant are involved, individual stack concentrations for that contaminant will be determined to ensure that the air quality limit is complied with on a cumulative basis.

Process for relating stack concentrations to air quality limits

Plant stack	Dilution Factor		
	1-hour average	24-hour average	Annual average
Commodity Herbicides	750	1,300	29,000
Herbicides	550	1,150	107,000
Granular Herbicides	2,200	3,900	705,000
Insecticides – Emulsifiable Concentrates	700	1,250	232,000
Insecticides – Suspension Concentrates	1,500	2,750	513,000



SCALE 1: 5000

0 50 100 150 200 250 (m)

Aerial photo sourced from Google Earth(Copyright: 2009). Images Copyright; Image @ 2013 DigitalGlobe. Flown 23/02/2013.

Property boundaries sourced from Land Information New Zealand data as at 8-Jul-2013 (Crown Copyright Reserved).

Tonkin & Taylor
Environmental and Engineering Consultants
105 Carlton Gore Road, Newmarket, Auckland

DRAWN	RBS	Aug. 14
DRAFTING CHECKED		
APPROVED		
CADFILE : 85 199.200-ADP-F 1.dwg		
SCALES (AT A4 SIZE) 1: 5000		
PROJECT No. 85 199.200		

DOW AGROSCIENCES (NZ) LTD
AIR DISCHARGE PERMIT
PARITUTU, NEW PLYMOUTH
Site Plan

FIG. No. Figure 1

REV. 0

\85 199.200\CAD\85199.200-ADP-F1.dwg F1 21/08/2014 2:14:10 p.m.

Discharge Permit

Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of Consent Holder:	Corteva Agriscience New Zealand Limited Private Bag 2017 New Plymouth 4340
Decision Date	4 September 2008
Commencement Date	4 September 2008

Conditions of Consent

Consent Granted:	To discharge stormwater from an industrial agrichemical manufacturing site via retention dams together with uncontaminated stormwater from landscape and non-manufacturing areas into the Herekawe Stream
Expiry Date:	1 June 2026
Site Location:	89 Paritutu Road, New Plymouth
Grid Reference (NZTM)	1688226E-5675009N
Catchment:	Herekawe

For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document

General conditions

a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.

c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:

   i) the administration, monitoring and supervision of this consent; and
   ii) charges authorised by regulations.

Special conditions

1. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects on the environment from the exercise of this consent.

2. The stormwater discharged shall be collected from a catchment area of no more than 16 hectares.

3. The consent holder shall maintain, and comply with at all times, a stormwater management plan, approved by the Chief Executive, Taranaki Regional Council, detailing measures and procedures to be undertaken to prevent spillage or accidental discharge of contaminants not licensed by this consent, and measures to avoid, remedy or mitigate the environmental effects of such a discharge.

4. The consent holder shall keep records of the date and time that the stormwater discharges begin and end, the volume of water discharged, and the results of all physicochemical testing carried out on water discharged to the Herekawe Stream. These records shall be made available to the Chief Executive, Taranaki Regional Council, upon request.

5. After allowing for a mixing zone of 25 metres from the point of discharge, the discharge shall not give rise to any of the following effects in the Herekawe Stream:

   a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
   b) any conspicuous change in the colour or visual clarity;
   c) any emission of objectionable odour;
   d) any significant adverse effects on aquatic life.

6. Concentrations of the following components shall not be exceeded in the discharge:

Component	**Concentration**
Total phenoxy herbicides [2,4-D, MCPA and MCPB]	0.10 mg/L
Total organophosphates [chlorpyrifos and chlorpyrifos-methyl]	0.0005 mg/L
Triclopyr 0.10	mg/L
Picloram 0.10	mg/L
Glyphosate	0.10 mg/L
Oxyfluorfen	0.005 mg/L
pH [range]	6.0 – 9.0

This condition shall apply prior to the entry of the stormwater into the Herekawe Stream, at designated sampling points approved by the Chief Executive, Taranaki Regional Council.

7. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2014 and/or June 2020, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Transferred at Stratford on 13 April 2021

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management