

APPENDIX 8.4

Cumulative Impact Assessment

An evaluation of the potential for cumulative air quality effects as a result of the construction and operation of the proposed development and the relevant existing and proposed projects has been undertaken as outlined in **Chapter 8, Section 8.7**. Following on from this assessment, a detailed cumulative assessment of the facility and the relevant industrial emission sources has been carried out using the methodology outlined by the USEPA⁽¹⁾. The relevant nearby air emission points sources identified were Janssen Biologics, Hovione Cork, GSK Ireland, ESB Aghada, Novartis Ringaskiddy Ltd, Pfizer Ireland Pharmaceuticals and BGE Whitegate as outlined below.

As the region around Ringaskiddy is industrialised and thus has several other potentially significant point sources of air emissions, a detailed cumulative assessment has been carried out using the methodology outlined by the USEPA.

The effect of nearby point sources should be examined where interactions between the plume of the point source under consideration and those of nearby sources can occur. These include:

- a. the area of maximum effect of the point source,
- b. the area of maximum effect of nearby sources,
- c. the area where all sources combine to cause maximum effect⁽¹⁾.

In the context of the cumulative assessment, all significant sources should be taken into account. The USEPA has defined “significance” in the current context as an effect leading to a 1 µg/m³ annual increase in the annual average concentration of the applicable criteria pollutant. However, no significant ambient effect levels have been established for non-criteria pollutants (defined as all pollutants except PM₁₀, NO₂, SO₂, CO and lead). The USEPA does not require a full cumulative assessment for a particular pollutant when emissions of that pollutant from a proposed source would not increase ambient levels by more than the significant ambient effect level (annual average of 1 µg/m³). A similar approach has been applied in the current assessment. A significance criterion of 2% of the ambient air quality standard or guideline has been applied for all non-criteria pollutants. These releases consist of NO₂, SO₂, HCl, HF, Dioxins, Cd, PAHs, As and Ni. As emissions of Total Dust (as PM₁₀), CO and TOC are not significant, no cumulative assessment will be carried out for these pollutants. Furthermore, as there are no significant releases of HCl, HF, PAHs, Cd, As and Ni in the vicinity of the facility, no detailed cumulative assessment is necessary for these compounds. Table A8.85 outlines the significant releases from Indaver which also have a nearby facility which is releasing the same pollutants at significance levels.

In order to determine compliance, the predicted ground level concentration (based on the full impact analysis and existing air quality data) at each model receptor is compared to the applicable ambient air quality limit value or PSD increment. If the predicted pollutant concentration increase over the baseline concentration is below the applicable increment, and the predicted total ground level concentrations are below the ambient air quality standards, then the applicant has successfully demonstrated compliance.

When an air quality standard or PSD increment is predicted to be exceeded at one or more receptor in the impact area, it should be determined whether the net emissions increase from the proposed source will result in a significant ambient effect at the point of each violation, and at the time the violation is predicted to occur. The source will not be considered to cause or contribute to the violation if its own effect is not significant at any violating receptor at the time of each violation.

In relation to nearby sources, several significant sources of releases were identified as outlined in Table A8.86. The emission data used in the cumulative assessment is based on the maximum emission limits and volume flows contained in each facilities' IED Licence. For each significant nearby source, an assessment was made of which pollutants from each source were significant. The significant pollutants from each site have been outlined in Table A8.86. In addition, air modelling of road emissions associated with the project have also been undertaken and added to the existing worst-case background pollutant levels. Cumulative effects due to the Port of Cork expansion project have also been included in both the "do-nothing" and "do-something" scenario.

Table A8.85 Assessment of Significant Releases from Indaver

Pollutant	Significance Criteria ($\mu\text{g}/\text{m}^3$ annual average)	Indaver GLC ($\mu\text{g}/\text{m}^3$ annual average)	Significance
NO ₂	1	1.0	√
SO ₂	1	0.34	x
Dioxins	-	0.71 fg/m ³	x

Table A8.86 Assessment of Significant Releases From Nearby Sources

Pollutant	Plant 1	Plant 2	Plant 3	Plant 4	Plant 5	Plant 6	Plant 7
NO ₂	√	√	√		√	√	√
SO ₂	√	√	√	√	√	√	√
Dioxins		√		√	√	√	

Summary of Nearby Sources

Plant 1: Janssen Biologics Ltd

Plant 2: Hovione Cork

Plant 3: ESB Aghada

Plant 4: Novartis Ringaskiddy Ltd.

Plant 5: GSK Ireland

Plant 6: Pfizer Ireland Pharmaceuticals (Ballintaggart)

Plant 7: BGE Whitegate

The cumulative impact assessment has been carried out to assess the effect of emissions from Indaver on the surrounding environment. As such, several conservative approximations have been made in regards to the operating details and physical characteristics of the surrounding sources. Furthermore, the guidance for assessing cumulative effects includes assessing everywhere off-site, including within the site boundary of all nearby sources⁽¹⁾. Thus, the results outlined in this chapter, in regards to emissions from nearby sources, may apply to areas on-site within each source (and thus will not fall under the domain of ambient legislation) and will also most likely over-estimate the effect of these sources in the surrounding environment.

Table A8.87 Assessment of Cumulative Effect of Nitrogen Dioxide Emissions ($\mu\text{g}/\text{m}^3$)

Pollutant	Indaver	All Point Sources Except Indaver	Significance Criteria	All Point Sources ⁽⁵⁾	Limit Value ⁽³⁾
Effect of each source at Indaver Maximum – 99.8 th ile ⁽¹⁾	36.4 (548300, 5740300)	36.7 (548300, 5740300)	100 ⁽⁴⁾	64.6 (548300, 5740300)	200
Effect of each source at Indaver Maximum – Annual Average ⁽²⁾	1.7 (547850, 5742125)	3.0 (547850, 5742125)	20 ⁽⁴⁾	16.7 (547850, 5742125)	40
Effect of each source at maximum of All Sources – 99.8 th ile ⁽¹⁾	4.9 (545900, 5742900)	126.0 (545900, 5742900)	100 ⁽⁴⁾	150.0 (545900, 5742900)	200
Effect of each source at maximum of All Sources – Annual Average ⁽²⁾	0.21 (545900, 5742900)	27.1 (545900, 5742900)	20 ⁽⁴⁾	39.3 (545900, 5742900)	40

(1) Conversion factor, following guidance from USEPA (Tier 3 analysis), based on empirically derived site-specific maximum 1-hour value for $\text{NO}_2 / \text{NO}_x$ of 0.40

(2) Conversion factor following guidance from USEPA (Tier 2 analysis, annual average) based on a default ratio of 0.75 (worst-case).

(3) Directive 2008/50/EC

(4) PSD Increment for Nitrogen Dioxide applicable in the current application (except for the All Sources scenario).

(5) All sources include the background concentration ($12 \mu\text{g}/\text{m}^3$ for the annual mean and $24 \mu\text{g}/\text{m}^3$ for 1-hr maximum (as a 99.8thile)).

Note: Grid co-ordinates are UTM co-ordinates and refer to the location of local maximum

Table A8.88 Assessment of Cumulative Effect of Sulphur Dioxide Emissions ($\mu\text{g}/\text{m}^3$)

Pollutant	Indaver	All Point Sources Except Indaver	Significance Criteria	All Point Sources ⁽⁴⁾	Limit Value
Effect of each source at Indaver Maximum – 99.7 th ile of 1-hr averages ⁽¹⁾	42.4 (547175, 5742725)	19.8 (547175, 5742725)	88 ⁽³⁾	68.0 (547175, 5742725)	350
Effect of each source at Indaver Maximum – 99.2 th ile of 24-hr averages ⁽²⁾	3.9 (547225, 5742725)	4.1 (547225, 5742725)	31.25 ⁽³⁾	23.7 (547225, 5742725)	125
Effect of each source at maximum of All Sources – 99.7 th ile of 1-hr averages ⁽²⁾	5.8 (545700, 5742100)	133.1 (545700, 5742100)	88 ⁽³⁾	158.7 (545700, 5742100)	350
Effect of each source at maximum of All Sources – 99.2 th ile of 24-hr averages ⁽¹⁾	0.28 (545700, 5742000)	56.2 (545700, 5742000)	31.25 ⁽³⁾	75.9 (545700, 5742000)	125

(1) Directive 2008/50/EC – Maximum one-hour concentration not to be exceeded more than 24 times per year (99.7thile)

(2) Directive 2008/50/EC – Maximum 24-hour concentration not to be exceeded more than 3 times per year (99.2thile)

(3) PSD Increment for Sulphur Dioxide applicable in the current application (except for the All Sources scenario)

(4) All sources include the background concentration (25.6 $\mu\text{g}/\text{m}^3$ for the 1-hr maximum (as a 99.7thile) and 19.7 $\mu\text{g}/\text{m}^3$ for the 24-hr (as a 99.2thile)).

Note: Grid co-ordinates are National Grid co-ordinates and refer to the location of local maximum

Table A8.89 Assessment of Cumulative Effect of PCDD/PCDF Particulate Emissions (fg/m^3)

Pollutant	Indaver Ireland	All Point Sources Except Indaver	All Point Sources	Limit Value
Effect of each source at Indaver Maximum – Annual Average ⁽¹⁾	0.71 (548425, 5741725)	1.6 (548425, 5741725)	2.2 (548425, 5741725)	-
Effect of each source of maximum at All Sources – Annual Average ⁽¹⁾	0.1 (545900, 5742900)	9.5 (545900, 5742900)	9.6 (545900, 5742900)	-

Note: Grid co-ordinates are National Grid co-ordinates and refer to the location of local maximum

Note: Refer to Appendix 8.6 for input information on nearby sources

NO₂

The cumulative effect of nitrogen dioxide has been assessed in Table A8.87. In the area of the maximum effect of Indaver for the 99.8th percentile (Grid Co-ordinates 548300, 5740300), the effect from all sources was minor. In relation to the 99.8th percentile of maximum one-hour concentrations, the cumulative effect at this point was only 18% of the limit value in the absence of Indaver. In the presence of Indaver, the cumulative effect with maximum concentrations rose to 20% of the limit value (not including background concentration), which is a minor increase to the maximum concentration of Indaver alone (at 2% of the limit value). The results, therefore, indicate that the contribution of nearby sources were generally separated in time and thus did not lead to any significant increase in levels above the effect of Indaver alone.

The annual average cumulative assessment was likewise minor at the area of the maximum effect of Indaver (Grid Co-ordinates 547850, 5742125). The overall effect leads to an increase of 8% in the annual average levels leading to a cumulative level of 12% of the limit value (not including background concentration).

In the area of the overall maximum effect, the effect from Indaver was very small. In relation to the 99.8th percentile of maximum one-hour concentrations, the effect of Indaver at the point of maximum effect of all nearby sources was 2% of the limit value. Moreover, the maximum one-hour effect of Indaver at each nearby source was separated in time and thus did not lead to any significant increase in levels above the effect of each individual source separately.

The annual average cumulative assessment was likewise minor at the area of the maximum effect of all nearby sources. In the region where all sources combine to cause the maximum effect the effect of Indaver represents only 0.5% of the limit value.

SO₂

The cumulative effect of sulphur dioxide has been assessed in Table A8.88. In the area of the maximum effect of Indaver for the 99.7th percentile (Grid Co-ordinates 547175, 5742725), the effect from all sources was minor. In relation to the 99.7th percentile of maximum one-hour concentrations, the cumulative effect at this point was less than 6% of the limit value in the absence of Indaver. In the presence of Indaver, the cumulative effect with maximum concentrations rose to 12% of the limit value (not including background concentration), which is very similar to the maximum concentration of Indaver alone (at 12% of the limit value).

The cumulative assessment of 99.2nd percentile of 24-hour concentrations also showed insignificant effects at the area of the maximum effect of Indaver (Grid Co-ordinates 547225, 5742725).

In the area of the maximum effect of all nearby sources, the effect from Indaver was very small. In relation to the 99.7th percentile of maximum one-hour concentrations, the effect of Indaver at the point of maximum effect of all nearby sources represents only 2% of the limit value. With regard to the 99.2nd percentile of 24-hour concentrations, the effect of Indaver at the point of maximum effect of all nearby sources represents only 0.2% of the limit value.

PCDD/PCDFs

The cumulative effect of PCDD/PCDFs has been assessed in Table A8.89. In the area of the maximum effect of Indaver (Grid Co-ordinate 548425, 5741725), the effect from each source was minor. In relation to the annual concentration, the cumulative effect was only 1.6 fg/m³ in the absence of Indaver, at the location of the maximum effect from Indaver. In the presence of Indaver, the assessment indicated that the cumulative annual concentrations is 2.2 fg/m³ at this location which includes the contribution from Indaver and all other nearby

sources. Thus the cumulative effect leads to an increase in dioxin levels of approximately 7% as compared to Indaver alone in the area of the maximum effect of Indaver (relative to existing background concentration).

In the area of the maximum effect of all nearby sources, the effect from Indaver was very small. In relation to the annual concentration, the effect of Indaver at the point of maximum effect of each nearby source was 0.1 fg/m^3 . In the region where all sources combine to cause the maximum effect (not including Indaver's maximum), an examination of the effect of Indaver reveals an insignificant effect.