Attachment I.1Assessment of Impact of Emission to Air

Schwarz Pharma Ltd. Revised IPPCL Application

Issue No 4

CONTENTS

1. ATTACHMENT I.1

1.1. Introduction

This section of the application requires information to allow an assessment of existing atmospheric emissions. Section 1.2 provides comments on the existing air quality environment. Section 1.3 provides a summary of the conclusions from detailed dispersion modelling of emissions from the Schwarz site, while the full dispersion modelling report is included in Appendix I.1.1.

1.2. Existing Air Quality

The 1998 Environmental Impact Statement for the relocation of the nitration plant from Bay 130 to the main site includes limited air quality monitoring data for sulphur dioxide, suspended particulates, total organic carbon and the following individual solvents:

- Isopropyl alcohol;
- Dichloromethane;
- Methyl ethyl ketone;
- 1,1,1-trichloroethane;
- Toluene;
- O-xylene;
- Methanol; and
- Acetone.

The results for SO_2, particulates and total organic carbon are presented below:

Parameter	Concentration	Limit
SO_2	4.3 µg/m^3 average 50 µg/m^3 peak	20* 350 (99.7th percentile of a years hourly data)
Suspended particulates	10.2 µg/m^3 average 50 µg/m^3 peak	80 (median of a years daily average) 250 (98th percentile of a years daily average)
Total organic carbon	< 0.4 µg/m^3	No specific limit but measured value considered very low

Notes: * Limit value of 20 specified in S.I. 271 of 2002, but applicable to protection of ecosystems only

With regard to the monitoring of the individual species carried out in 1992 (and listed above), it is noted that no concentrations above the detection limit (0.01 ppm) were reported for IPA, methanol or acetone. Monitoring was carried out at a number of different locations within the industrial estate, including one location on the Schwarz site. The report related wind direction to measured concentrations and concluded that the main contaminant was dichloromethane (DCM), but that based on analysis of wind direction data the majority of the measured DCM concentrations did not originate from the Schwarz site. The highest measured DCM concentration at the monitoring location closest to Schwarz was 1.32 ppm, which is equivalent to 4.6 mg/m^3, however this occurred on a day when winds were not from the direction of the Schwarz site, suggesting other significant sources of DCM within the industrial estate. Small quantities of toluene, xylene, MIBK and 1,1,1-trichloroethane were also measured during the monitoring assessment at this location. Samples were collected over a 24-hour period, over a 2-month study period. The majority of analysed samples indicated ground level concentrations of the identified compounds below the analytical detection limit (of 0.1 ppm). The following table summarises the measured concentrations at the monitoring location closest to the Schwarz site (within approximately 150 to the southeast of the site) based on 24-hour average sampling periods. It is noted in the report that the wind direction during periods of very high measured concentration (e.g. 17 – 21 July) was reported not to be from the direction of the Schwarz site. The source of the elevated concentrations is not specifically identified in the report.

Date	DCM µg/m^3	MEK µg/m^3	1,1,1-TCE µg/m^3	MIBK µg/m^3	Toluene µg/m^3	o-Xylene µg/m^3
19-Jun-1992	6.96	8.85	0.00	0.00	7.52	4.33
20-Jun-1992	0.00	8.85	0.00	28.70	75.20	4.33
22-Jun-1992	6.96	0.00	0.00	12.30	22.56	4.33
23-Jun-1992	0.00	0.00	0.00	12.30	30.08	25.98
24-Jun-1992	6.96	0.00	0.00	82.00	75.20	25.98
25-Jun-1992	0.00	0.00	0.00	28.70	30.08	17.32
26-Jun-1992	3.48	0.00	0.00	16.40	75.20	43.30
27-Jun-1992	174.00	29.50	0.00	28.70	15.04	12.99
28-Jun-1992	69.60	17.70	0.00	0.00	3.76	4.33
29-Jun-1992	208.80	29.50	0.00	0.00	7.52	4.33
30-Jun-1992	243.60	29.50	0.00	0.00	11.28	4.33
1-Jul-1992	208.80	29.50	0.00	0.00	7.52	4.33
2-Jul-1992	208.80	29.50	0.00	0.00	7.52	4.33
3-Jul-1992	0.00	8.85	0.00	49.20	30.08	17.32
4-Jul-1992	0.00	0.00	0.00	0.00	3.76	4.33
5-Jul-1992	0.00	8.85	0.00	135.30	71.44	43.30
6-Jul-1992	0.00	0.00	0.00	0.00	0.00	0.00
7-Jul-1992	0.00	0.00	0.00	0.00	0.00	0.00
8-Jul-1992	0.00	0.00	0.00	0.00	0.00	0.00
9-Jul-1992	0.00	0.00	0.00	0.00	0.00	0.00
10-Jul-1992	0.00	0.00	5.54	0.00	0.00	0.00
11-Jul-1992	0.00	0.00	5.54	41.00	15.04	21.65

Date	DCM µg/m³	MEK µg/m³	1,1,1-TCE µg/m³	MIBK µg/m³	Toluene µg/m³	o-Xylene µg/m³
12-Jul-1992	0.00	0.00	5.54	20.50	3.76	25.98
13-Jul-1992	0.00	0.00	0.00	0.00	3.76	4.33
14-Jul-1992	0.00	0.00	0.00	4.10	15.04	8.66
15-Jul-1992	0.00	0.00	0.00	0.00	3.76	4.33
16-Jul-1992	0.00	0.00	11.08	0.00	7.52	8.66
17-Jul-1992	4593.60	236.00	0.00	0.00	33.84	21.65
18-Jul-1992	1948.80	147.50	5.54	32.80	75.20	17.32
19-Jul-1992	2505.60	147.50	0.00	0.00	22.56	21.65
20-Jul-1992	3132.00	206.50	0.00	77.90	67.68	4.33
21-Jul-1992	1948.80	147.50	0.00	0.00	22.56	4.33
22-Jul-1992	0.00	0.00	0.00	0.00	0.00	0.00
23-Jul-1992	0.00	0.00	0.00	0.00	0.00	0.00
24-Jul-1992	278.40	29.50	5.54	28.70	18.80	12.99
10-Aug-1992	69.60	0.00	11.08	41.00	112.80	0.00
11-Aug-1992	104.40	0.00	11.08	82.00	639.20	0.00
12-Aug-1992	452.40	8.85	5.54	41.00	864.80	0.00
13-Aug-1992	174.00	0.00	5.54	41.00	451.20	0.00
14-Aug-1992	417.60	5.90	11.08	82.00	376.00	0.00
15-Aug-1992	243.60	5.90	11.08	82.00	789.60	0.00
16-Aug-1992	348.00	5.90	11.08	82.00	376.00	0.00
17-Aug-1992	0.00	0.00	0.00	0.00	3.76	0.00
18-Aug-1992	0.00	0.00	0.00	0.00	11.28	0.00
19-Aug-1992	0.00	2.95	0.00	0.00	11.28	0.00
20-Aug-1992	0.00	0.00	0.00	0.00	15.04	0.00
21-Aug-1992	0.00	0.00	0.00	0.00	3.76	0.00
22-Aug-1992	0.00	0.00	0.00	0.00	3.76	0.00
23-Aug-1992	0.00	0.00	0.00	0.00	7.52	0.00
24-Aug-1992	0.00	0.00	55.40	0.00	11.28	4.33
25-Aug-1992	0.00	0.00	0.00	0.00	11.28	0.00
26-Aug-1992	0.00	0.00	0.00	0.00	3.76	0.00
27-Aug-1992	0.00	0.00	0.00	0.00	3.76	4.33
28-Aug-1992	0.00	0.00	0.00	0.00	3.76	0.00
29-Aug-1992	0.00	0.00	0.00	0.00	7.52	0.00
30-Aug-1992	0.00	0.00	0.00	0.00	3.76	0.00
Average	309.91	20.44	2.87	18.74	79.90	6.96
Maximum	4593.60	236.00	55.40	135.30	864.80	43.30
Median	0.00	0.00	0.00	0.00	11.28	4.33

1.3. Dispersion Modelling Summary and Conclusions

Dispersion Modelling of current main emission points:

Dispersion modelling of emissions from the Schwarz Pharma site was carried out by URS as part of an application to the Environmental Protection Agency (EPA) for an IPPC licence for the Schwarz Pharma site. The application was submitted to the EPA on September 17 2004. After review of the licence application additional dispersion modelling was requested by the EPA, including some revisions to the original report and also completion of an odour impact assessment and dispersion modelling of emissions based on the guideline emission values included in TA Luft 2002. The revised report, including the odour impact assessment and the TA Luft 2002 modelling was submitted to the EPA in November 2004. Subsequent to this, production ceased at a number of buildings within the plant, resulting in cessation of organic solvent emissions from previously modelled emissions points BVE-002, BVE-003, BVE-022 and VE-135. In January 2005 the EPA then requested additional modelling as follows:

- Modelling of emissions from the remaining main emission points (VE-079 and NVE-001) based on the limits for organics specified in TA Luft 1986 and subsequent revisions;
- Modelling of emissions from the remaining emissions points based on the highest measured emissions during 2004;
- Modelling of emissions from the remaining emission points based on the limits for organics specified in TA Luft 2002 (including methanol and ethanol as Class I compounds).

The above modelling was completed and submitted to the EPA in February 2005. Subsequent to this the EPA then requested that the complete licence application be resubmitted, as information in the application was considered out of date due to ongoing upgrades at the site. In relation to air emissions the upgrades at the site are highly significant, with new scrubbing systems being installed on both VE-079 and NVE-001 main emission points, with the aim of reducing emissions of organics to level below the limits specified in the TA Luft 1986 guidelines. These upgrades are now in place at the site.

Based on the proposed changes, the dispersion modelling report has been updated, with the following modelling results now being presented in this report:

- Modelling of organics emissions from main emission points VE-079 and NVE-001 based on the limits for organics specified in TA Luft 1986 and subsequent revisions;
- Modelling of particulate emissions from VE-135 based on the current IPC licence maximum emission rate;

- Modelling of organics emissions from main emission points VE-079 and NVE-001 based on the limits for organics specified in TA Luft 2002;
- Assessment of the odour impact of releases from NVE-001 and VE-079 based on worst case assumption of continuous emissions at the TA Luft 1986 emission levels;

No monitoring data is yet available from the upgraded abatement equipment (VE-079 and NVE-001), hence modelling of actual emission rates cannot be completed at this time. As the upgraded systems are expected to result in significantly reduced organic emissions, there is not considered to be any benefit in presenting model results based on actual emissions measured prior to the upgrade. If required, after emissions data become available, modelling based on actual emissions can be completed.

Some emissions of inorganics are expected from VE-079 (BPC emission point) and also NO_X emissions from NVE-001. Assessment of these parameters was completed as part of the licence application submitted to the EPA on September 17 2004, with emissions being modelled at the current IPC licence emission limits (assessment of actual emission levels was also carried out, indicating no significant air quality impact) which as with the organics limits, are also based on the TA Luft 1986 guideline values. NO_X emissions from NVE-001 were modelled at a release concentration of 300 mg/m^3 based on the current IPC licence limit for the previous nitration process emission point at Bay 130 (BVE-001). The assessment indicated no likely significant impact on ground level concentrations of inorganic compounds, with predicted concentrations being below the applied ambient air quality guideline values. This modelling has therefore not been repeated in the current report.

The following modelling results are presented in the report in Attachment I.1, with a summary of the findings presented below:

- Modelling of organics emissions from main emission points VE-079 and NVE-001 based on the limits for organics specified in TA Luft 1986 and subsequent revisions (data also used to assess potential odour impact);
- Modelling of particulate emissions from VE-135 based on the current IPC licence maximum emission rate;
- Modelling of organics emissions from main emission points VE-079 and NVE-001 based on the limits for organics specified in TA Luft 2002;

The main findings of the assessment based on the above completed modelling assessment are:

- It is considered that in practice, application of the TA Luft 1986 guideline values will not result in a breach of the applied Occupational Exposure Limit (OEL) derived ground level concentration guideline values or of the applicable Danish guideline values (C-values). The conservative modelling assessment does indicate that continuous release of acetic acid at 2kg/h may potentially result in a 1.4% exceedance of the OEL derived limit value (i.e. at a theoretical continuous emissions of 1.97kg/h or less the limit would not be breached). Therefore

operation of a TA Luft Class II limit of less than 1.9 kg/h compared to the actual limit of 2 kg/h will allow a further margin of safety. The worst-case modelling scenario and assumptions indicates some cases in which the C-value may theoretically be breached (for TA Luft Class II and III organics) however in practice these worst-case conditions are considered unlikely to occur. It can therefore be concluded that operation at or below TA Luft 1986 (Class I and Class III and modified to 1.9kg/h for Class II) will not result in any significant environmental impact.

- Modelling of emissions from the two remaining main emission points based on the maximum emissions allowed under the latest TA Luft emission limit guidelines (TA Luft 2002), indicates that, in practice, compliance with the TA Luft 2002 emission guideline values will not result in any significant environmental impact in terms of breaching either the OEL derived guideline values or the Danish C-values for the emitted compounds;

- Modelling of emissions to determine the potential odour impact of release of Class I, II and III organics indicates no likely significant odour impact;

- Modelling of particulate emissions from VE-135 indicates low ground level particulate concentrations due to the release, with no likely significant impact expected on ground level particulate concentrations.

Additional limited modelling was performed to assess the application (to NVE-001) of a reduced TA Luft 1986 Class II mass emission limit value, 1.9kg/h. This assessment is presented in Appendix I.1.1. The assessment indicates that application of a 1.9kg/h mass emission rate for TA Luft Class II will not result in exceedance of the OEL derived guideline values. Therefore operation at this limit will not result in any significant environmental impact.

Dispersion modelling of the proposed thermal oxidisers' emissions

Dispersion modelling of emissions from the two proposed thermal oxidisers at the Schwarz Pharma site was carried out by URS as part of this IPPC Licence Application.

The details of the modelling assessment are presented in the report in Attachment I.1.1 with a summary of presented below:

- Modelling of emissions from the Nitration Plant thermal oxidiser - Organics based on the limits for organics specified in TA Luft 2002, and NOx and CO based on the applicable WID half-hourly average emission limit values;

- Modelling of emissions from the BPC thermal oxidiser – Organics, NOx, CO, HCl and dioxins based on their WID half-hourly average emission limit values.

The main findings of the assessment based on the above completed modelling assessment are:

Modelling of emissions from the thermal oxidiser emission points indicates that, in practice, compliance with the TA Luft 2002 emission guideline values for organics (Nitration Plant) and compliance with WID emission limit values for organics (BPC), NOx,

CO, HCl and dioxins will not result in exceedance of any of the OEL derived guideline values. The worst-case modelling scenario and assumptions indicates that in the cases of organics, the C-value may theoretically be exceeded (for methylene chloride only) however in practice these worst-case conditions are considered unlikely to occur. It can therefore be assumed that emissions from the thermal oxidisers will not have a significant environmental impact.

Appendix I.1.1

Air Dispersion Modelling Reports