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ENVIRONMENT  
AGENCY

## Permit with introductory note

Pollution Prevention and Control Regulations 2000

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***IQE Silicon Compounds Ltd  
Cypress Drive  
St Mellons  
Cardiff  
CF3 0LW***

Permit number

***BJ6968***

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## Introductory note

### ***This introductory note does not form a part of the Permit***

The following Permit is issued under Regulation 10 of the Pollution Prevention and Control Regulations 2000 (S.I.2000 No.1973) ("the PPC Regulations") to operate an installation carrying out one or more of the activities listed in Part 1 to Schedule 1 of those Regulations, to the extent authorised by the Permit.

The Permit includes conditions that have to be complied with. It should be noted that aspects of the operation of the installation which are not regulated by those conditions are subject to the condition implied by Regulation 12(10) of the PPC Regulations, that the Operator shall use the best available techniques for preventing or, where that is not practicable, reducing emissions from the installation.

Techniques include both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned.

### **Brief description of the installation regulated by this permit**

The main purpose of the activity at the installation is:-

IQE Silicon Compounds Ltd manufactures conventional silicon wafers by epitaxial deposition, growing a thin film of single crystalline silicon onto the surface of a base silicon wafer. This process takes place in clean room facilities, at high temperature in a single wafer reactor that can produce about 40,000 wafers per year. It is envisaged that up to 18 reactors will be installed in the facility, though this will be in a phased manner. This Authorisation permits the full 18 reactors, although only the 1<sup>st</sup> phase of the development, namely 6 reactors are covered in a detailed fashion (such as exact locations).

During the deposition of the silicon, the electrical properties of the crystalline layer are altered by doping the silicon with other atoms. The dopants used are arsenic, phosphorous, boron and germane; and they are used in their hydride forms, i.e. arsine ( $\text{AsH}_3$ ), phosphine ( $\text{PH}_3$ ), diborane ( $\text{B}_2\text{H}_6$ ) and germane ( $\text{GeH}_4$ ). The dopants are only used in very low concentrations; e.g. the arsenic concentration required to achieve the desired electrical property in the wafers is equivalent to one arsenic atom for every 10,000,000 silicon atoms.

In the process the reactor chamber and carbon platform (on which the wafers are placed) are brought up to operational temperature (900-1200°C) under a hydrogen and hydrogen chloride atmosphere in order to etch (or clean) surfaces. The hydrogen chloride flow is stopped, the reactor is cooled slightly and a pure silicon base wafer (delivered to the plant pre-cleaned and in a sealed cassette) is automatically loaded into the reactor and baked to a constant temperature under a hydrogen atmosphere.

The deposition gases (normally a chlorosilane and a very low concentration dopant gas) are pumped at a fixed rate and concentration for a specified time over the wafer to effect growth.

Reactant gases passing through the reactor are treated by an integrated water scrubber, followed by a polishing absorbent column to reduce their

concentrations to insignificant levels. Exhaust gases following the abatement plant comprising largely hydrogen, nitrogen and trace quantities of process gases are sent to atmosphere via individual 7m stacks.

The majority of the flammable, toxic or corrosive gases are stored outside the main production building, in ventilated gas bunkers with gas detectors fitted in the extracts. The chlorosilane gases are stored in cylinders within the reactor cabinets, and are likewise the subject of continuous monitoring. Safety features include alarms from these monitors being used to shut off gas supplies, and to terminate wafer processing.

Liquid Effluent onsite arises from a number of associated processes. On occasions it is necessary to pre-clean and etch silicon base wafers, or reactor parts after they have become soiled with prolonged use. This is done using an automated transport through a series of chemical and water-rinse baths. These baths are separately scrubbed to remove traces of acids used (HF and HCl). The process requires high purity water to be used, which necessitates the operation of a water treatment plant onsite. The system involves equipment for water softening, reverse osmosis, UV treatment, Ion Exchange, de-oxygenation and sub-micron filtration.

An onsite wastewater treatment plant is operated to provide the opportunity to neutralise liquors from the scrubbers on the reactors and wet bench, and also to handle wastewaters from the de-ionisation plant. Releases from the treatment plant are discharged to foul sewer under a trade effluent consent from Welsh Water, and will contain low levels of salt solutions and trace quantities of other process chemicals.

There are no process wastewaters discharged to any surface water system, although rainwater falling on the site is released

There are minimal solid wastes requiring off-site disposal. There are no direct process wastes, although it may be necessary to periodically remove small quantities of silicon dioxide that precipitates out in the effluent neutralisation tanks.

**Other PPC Permits relating to this installation**

Permit holder	Permit Number	Date of Issue
None		

**Superseded Licenses/Consents/Authorisations relating to this installation**

Holder	Reference Number	Date of Issue
<i>IQE Silicon Compounds</i>	<i>BJ7565</i>	<i>14<sup>th</sup> December 2000</i>

## Talking to us

If you contact the Agency about this Permit please quote the Permit Number.

The Operator should use the Emergency Hotline telephone number (0800 80 70 60) or any other number notified to it to give a notification under condition 5.1.1.

## Confidentiality

The Permit requires the Operator to provide information to the Agency. The Agency will place the information onto the public registers in accordance with the requirements of the PPC Regulations. If the Operator considers that any information provided is commercially confidential, it may apply to the Agency to have such information withheld from the register as provided in the PPC Regulations. To enable the Agency to determine whether the information is commercially confidential, the Operator should clearly identify the information in question and should specify clear and precise reasons.

## Variations to the permit

This Permit may be varied in the future. The Status Log within the Introductory Note to any such variation will include summary details of this Permit, variations issued up to that point in time and state whether a consolidated version of the Permit has been issued.

## Surrender of the permit

Before this Permit can be wholly or partially surrendered, an application to surrender the Permit has to be made. For the applicant to be successful, they would have to be able to demonstrate to the Agency, in accordance with Regulation 19 of the PPC Regulations, that there is no pollution risk and that no further steps are required to return the site to a satisfactory state.

## Transfer of the permit or part of the permit

Before the Permit can be wholly or partially transferred to another person, a joint application to transfer the Permit has to be made by both the existing and proposed holders, in accordance with Regulation 18 of the PPC Regulations. A transfer will be allowed unless the Agency considers that the proposed holder will not be the person who will have control over the operation of the installation or will not ensure compliance with the conditions of the transferred Permit. If the Permit authorises the carrying out of a specified waste management activity, then there is a further requirement that the transferee is considered to be a "fit and proper person" to carry out that activity.

## Status Log

Detail	Date	Comment
Application BJ6968	Received 21/12/00	
<i>Response to request from 1<sup>st</sup> Schedule 4 Information Notice.</i>	<i>Request dated 20/02/01</i>	<i>Response dated 27/03/01 and 06/04/01</i>
<i>Response to request from 1<sup>st</sup> Schedule 4 Information Notice.</i>	<i>Request dated 18/04/01</i>	<i>Response dated 22/05/01</i>
Permit BJ6968	Determined 6/07/01	

*End of introductory Note.*

**Permit**

Pollution Prevention and Control  
Regulations 2000



**ENVIRONMENT  
AGENCY**

## Permit

Permit number

**BJ6968**

The Environment Agency (the Agency) in exercise of its powers under Regulation 10 of the Pollution Prevention and Control Regulations 2000 (S.I. 2000 No. 1973), hereby authorises **IQE Silicon Compounds Ltd** ("the Operator"),

Whose *Registered Office* is

**Beech House  
Cypress Drive,  
St Mellons  
Cardiff  
CF3 0LW**

**Company registration number 3986643**

to operate an Installation at

**Cypress Drive  
St Mellons  
Cardiff  
CF3 0LW**

to the extent authorised by and subject to the conditions of this Permit.

Signed

A rectangular box containing a handwritten signature in black ink, which appears to be "N.P. Allen".

**Dr N.P.Allen**

Authorised to sign on behalf of the Environment Agency

Date

A rectangular box containing the handwritten date "6<sup>th</sup> July 2001" in black ink.

## Conditions

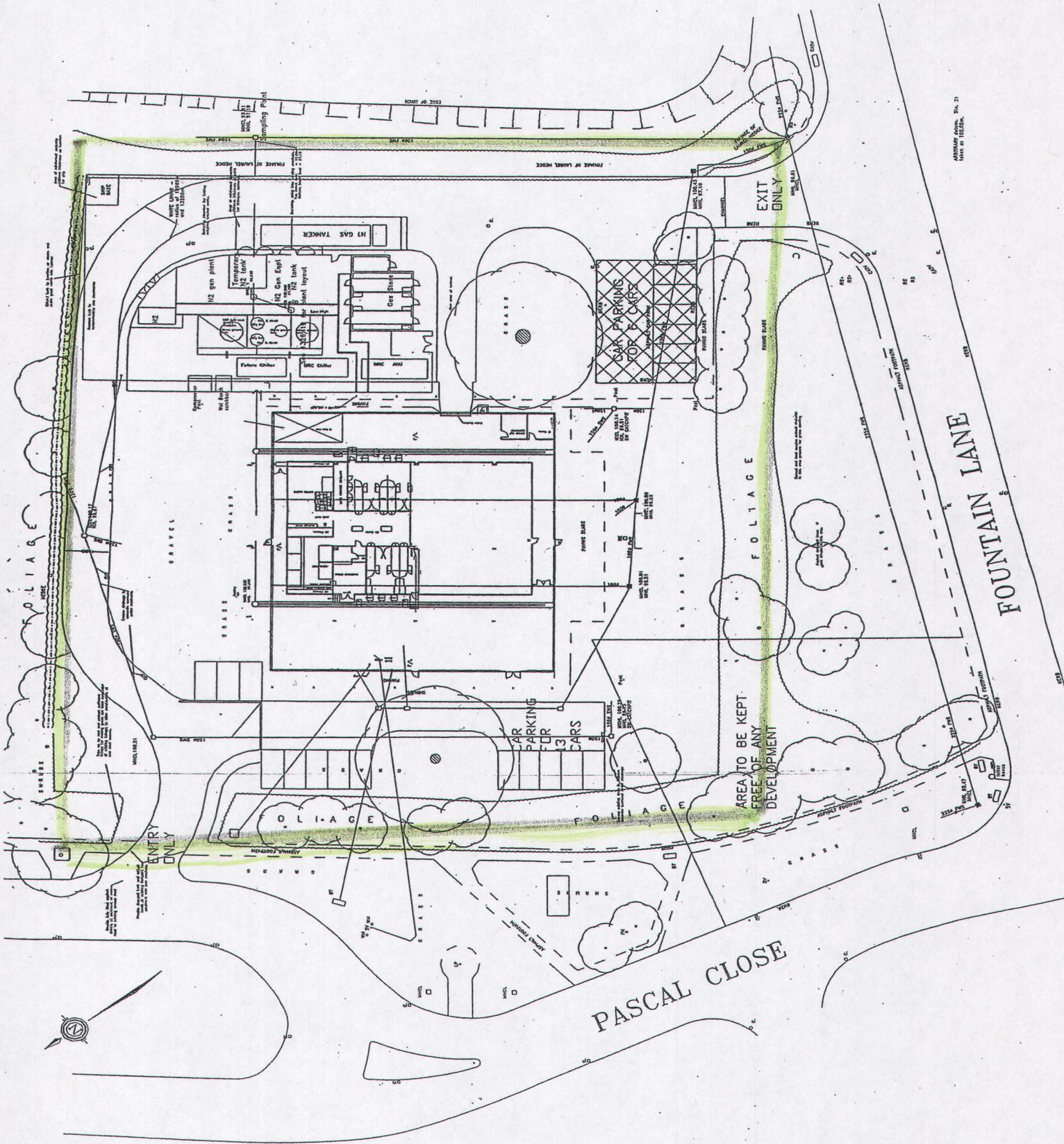
### 1 The permitted installation

1.1.1 The Operator is authorised to carry out the activities and/or the associated activities specified in Table 1.1.1.

**Table 1.1.1**

<b>Activity under Schedule 1 of the Regulations/ Associated Activity</b>	<b>Description of specified activity</b>	<b>Limits of specified activity</b>
<i>A manufacturing process which uses or is capable of releasing into the air ... hydrogen halides, i.e. Schedule 1, 4.2 A(1) Para (b)</i>	<i>Manufacture of silicon wafers by epitaxial deposition.</i>	<i>Receipt of raw materials to material despatch to customers.</i>

1.1.2 The activities authorised under condition 1.1.1 shall not extend beyond the Site, being the area shown edged in green on the plan below.



- a** There are no pre-operation conditions

## 2 Operational Matters

### 2.1 Management techniques and control

2.1.1 The Permitted Installation shall, subject to the conditions of this Permit, be managed and controlled as described in the documentation specified in Table 2.1.1, or as otherwise agreed in writing by the Agency.

**Table 2.1.1 : Management and control**

Description	Parts	Date Received
Application	The response to question 2.1 given in pages 21-23 /section 4 of the application	21/12/00
Response to request from 1 <sup>st</sup> Schedule 4 Information Notice.	Response to questions within Section 2.1	27/03/01 06/04/01

2.1.2 All plant, equipment and technical means used in operating the Permitted Installation shall be maintained in good operating condition.

2.1.3 The Permitted Installation shall be supervised by staff who are suitably trained and fully conversant with the requirements of this Permit.

2.1.4 A copy of this Permit and those parts of the application referred to in this Permit shall be available, at all times, for reference by all staff carrying out work subject to the requirements of the Permit.

2.1.5 All staff shall be fully conversant with those aspects of the Permit conditions, which are relevant to their duties and shall be provided with appropriate training and written operating instructions to enable them to carry out their duties.

### 2.2 Raw materials (including water)

2.2.1 The Operator shall, subject to the conditions of this Permit, use raw materials (including water) as described in the documentation specified in Table 2.2.1, or as otherwise agreed in writing by the Agency.

**Table 2.2.1 : Raw materials (including water)**

Description	Parts	Date Received
Application	The response to question 2.2 given in pages 24-26 /section 5 of the application	21/12/00
Response to request from 1 <sup>st</sup> Schedule 4 Information Notice.	Response to questions within Section 2.2	27/03/01 06/04/01

## 2.3 Operating Techniques

- 2.3.1 The Permitted Installation shall, subject to the conditions of this Permit, be operated using the techniques and in the manner described in the documentation specified in Table 2.3.1, or as otherwise agreed in writing by the Agency.

**Table 2.3.1: Operating techniques**

Description	Parts	Date Received
Application	The response to questions 2.3 given in pages 27 – 45 /section 6 of the application and Appendices 2,3 & 4.	21/12/00

## 2.4 Groundwater protection

- 2.4.1 The Permitted Installation shall, subject to the conditions of this Permit, be controlled as described in the documentation specified in Table 2.4.1, or as otherwise agreed in writing by the Agency.

**Table 2.4.1: Groundwater protection**

Description	Parts	Date Received
Application	The response to questions 2.4 given in page 46 / section 7 of the application	21/12/00

## 2.5 Waste handling and storage

- 2.5.1 The Operator shall, subject to the conditions of this Permit, handle and store waste as described in the documentation specified in Table 2.5.1, or as otherwise agreed in writing by the Agency.

**Table 2.5.1: Waste handling and storage**

Description	Parts	Date Received
Application	The response to question 2.5 given in page 47 / section 8 of the application	21/12/00

2.5.2 *Waste materials specified in Table 2.5.2 shall only be stored on the site in the location and manner specified in that Table.*

<b>Table 2.5.2: Waste stored on site</b>			
<b>Description of Waste</b>	<b>Location of Storage on Site</b>	<b>Manner of Storage</b>	<b>Storage Conditions</b>
<i>Material for off site disposal</i>	<i>L1</i>	<i>In skip in segregated area</i>	<i>Concrete hard standing</i>
<i>Empty chemical containers</i>	<i>L2</i>	<i>Within building in a segregated area</i>	<i>Covered hard standing</i>

## 2.6 **Waste recovery and disposal**

2.6.1 The Operator shall, subject to the conditions of this Permit, recover and dispose of waste as described in the documentation specified in Table 2.6.1, or as otherwise agreed in writing by the Agency.

<b>Table 2.6.1: Waste recovery and disposal</b>		
<b>Description</b>	<b>Parts</b>	<b>Date Received</b>
<i>Application</i>	<i>The response to question 2.6 given in page 47 /section 8 of the application</i>	<i>21/12/00</i>
<i>Response to request from 1<sup>st</sup> Schedule 4 Information Notice.</i>	<i>Response to questions within Section 2.2</i>	<i>27/03/01</i>

## 2.7 **Energy Efficiency**

2.7.1 The Operator shall, subject to the conditions of this Permit, use energy as described in the documentation specified in Table 2.7.1, or as otherwise agreed in writing by the Agency.

<b>Table 2.7 1: Energy efficiency</b>		
<b>Description</b>	<b>Parts</b>	<b>Date Received</b>
<i>Application</i>	<i>The response to question 2.7 given in pages 48-54 / section 9 of the application</i>	<i>21/12/00</i>
<i>Response to request from 1<sup>st</sup> Schedule 4 Information Notice.</i>	<i>Response to questions within section 2.8</i>	<i>27/03/01</i>

2.7.2 *The Operator shall produce a report annually on the energy consumption of the installation.*

2.7.3 *The Operator shall have an energy management plan which shall be updated annually.*

## 2.8 Accident prevention and control

- 2.8.1 The Operator shall, subject to the conditions of this Permit, prevent and limit the consequences of accidents as described in the documentation specified in Table 2.8.1, or as otherwise agreed in writing by the Agency.

Table 2.8.1 : Accident prevention and control		
Description	Parts	Date Received
Application	The response to question 2.8 given in pages 55-59 /section 10 of the application.	21/12/00
Response to request from 1 <sup>st</sup> Schedule 4 Information Notice.	Response to questions within section 2.7	27/03/01 06/04/01

## 2.9 Noise and vibration

- 2.9.1 The Operator shall, subject to the conditions of this Permit, control noise and vibration as described in the documentation specified in Table 2.9.1, or as otherwise agreed in writing by the Agency.

Table 2.9.1 : Noise and vibration		
Description	Parts	Date Received
Application	The response to question 2.9 given in pages 60 – 66 /section 11 and Appendix 5 of the application.	21/12/00
Response to request from 1 <sup>st</sup> Schedule 4 Information Notice.	Response to questions within section 2.9	27/03/01

## 2.10 Monitoring

- 2.10.1 The Operator shall, subject to the conditions of this Permit, carry out, evaluate and assess monitoring as described in the documentation specified in Table 2.10.1, or as otherwise agreed in writing by the Agency.

**Table 2.10.1 : Monitoring**

Description	Parts	Date Received
Application	The response to question 2.10 given in pages 67-69/ section 12 of the application	21/12/00
Response to request from 1 <sup>st</sup> Schedule 4 Information Notice.	Response to questions within section 2.10	27/03/01

2.10.2 Where requested in writing by the Agency, the Operator shall provide at least 14 days advance notice of undertaking monitoring/spot sampling.

2.10.3 There shall be provided:

- a safe and permanent means of access to enable sampling/monitoring to be carried out in relation to the emission points specified in Schedule 2, unless otherwise specified in that Schedule and
- b safe means of access to other sampling/monitoring points when required by the Agency.

## 2.11 Decommissioning

2.11.1 The Operator shall, subject to the conditions of this Permit, make provision for decommissioning the installation as described in the documentation specified in Table 2.11.1, or as otherwise agreed in writing by the Agency.

**Table 2.11.1 : Decommissioning**

Description	Parts	Date Received
Application	The response to question 2.11 given in pages 70-71 /section 13 of the application	21/12/00

## 2.12 Multi-operator installations

This is not a multi-operator installation.

3

## Records

- 3.1.1 A record (a "Specified Record") shall be made of:-
- a** any malfunction, breakdown or failure of plant, equipment or techniques (including down time and any short term and long term remedial measures) that may have, has had or might have had an effect on the environmental performance of the Permitted Installation. These records shall be kept in a log maintained for that purpose.
  - b** all monitoring and sampling taken or carried out and any assessment or evaluation made on the basis of such data.
- 3.1.2 There shall be made available for inspection by the Agency at any reasonable time:
- a** Specified Records
  - b** any other records made by the Operator in relation to the operation of the Permitted Installation ("Other Records")
- 3.1.3 A copy of any Specified or Other Records shall be supplied to the Agency on demand and without charge
- 3.1.4 Specified Records and Other Records shall:-
- a** be legible
  - b** be made as soon as reasonably practicable
  - c** indicate any amendments which have been made and shall include the original record wherever possible
- 3.1.5 Specified Records and Other Records shall be retained for a minimum period of 4 years from the date when the records were made.
- 3.1.6 For all waste received at or produced from the Permitted Installation, the Operator shall record (and shall retain such records for a minimum of 4 years)
- a** its composition, or as appropriate, description;
  - b** the best estimate of the quantity produced;
  - c** its disposal routes; and
  - d** the best estimate of the quantity sent for recovery.
- 3.1.7 A record shall be made at the Permitted Installation of any complaints concerning the Installation's effect or alleged effect on the environment. The record shall give the date of complaint, time of complaint, a summary of any investigation and the results of such investigation. Such records shall be made in a log kept for this purpose.

## 4 Reporting

- 4.1.1 All reports and notifications required by this Permit, or by Regulation 16 of the PPC Regulations, shall be sent to the Environment Agency at the address notified in writing to the Operator by the Agency .
- 4.1.2 The Operator shall report the parameters listed in Table S2 to Schedule 2 as follows:
- a** in respects of the emission points specified;
  - b** for the reporting periods specified in Table S2 to Schedule 2 and using the forms specified in Table S3 to Schedule 3;
  - c** giving the information from such results and assessments as may be required by the forms specified in those Tables; and
  - d** sending the report to the Agency within 28 days of the end of the reporting period.
- 4.1.3 *Following the introduction of a formal environmental management system applying to the Permitted Installation which encompasses annual improvement targets the Operator shall, not later than 31 January in each year, provide a summary report of the previous year's progress against such targets.*

5

## Notifications

- 5.1.1 The Operator shall notify the Agency **without delay** of:-
- a** the detection of an emission of any substance which exceeds any limit or criteria in this Permit specified in relation to the substance;
  - b** the detection of any fugitive emission which has caused or may cause pollution unless the quantity emitted is so trivial that it would be incapable of causing pollution;
  - c** the detection of any malfunction, breakdown or failure of plant or techniques which has caused or may have the potential to cause pollution; and
  - d** any accident which has caused or may have the potential to cause pollution.
- 5.1.2 The Operator shall submit written confirmation to the Agency of any notification under condition 5.1.1 in accordance with Schedule 1 to this Permit, by sending the information listed in Part A of Schedule 1 to this Permit within 24 hours of such notification. The Operator shall send the more detailed information listed in Part B of that Schedule as soon as practicable thereafter;
- 5.1.3 The Operator shall give written notification as soon as practicable, of any of the following
- a** permanent cessation of the operation of any part of or all of the Permitted Installation;
  - b** cessation of the operation of any part of or all of the Permitted Installation for a period, likely to exceed *1 year*; and
  - c** resumption of the operation of any part of or all of the Permitted Installation after a cessation notified under 5.1.3(b).
- 5.1.4 The Operator shall notify the following matters to the Agency, in writing, within 14 days of their occurrence:
- a** *where the Operator is a registered company:*
    - i** any change in the Operator's trading name, registered name or registered office address;
    - ii** a change to any particulars of the Operator's ultimate holding company (including details of an ultimate holding company where the Operator has become a subsidiary);
    - iii** any steps taken with a view to the Operator going into administration, entering into a company voluntary arrangement or being wound up.

## 6 Emissions

### 6.1 Emissions into air

6.1.1 Emissions to air from the emission point(s) specified in Table 6.1.1 shall only arise from the sources specified in that Table.

**Table 6.1.1: Emission points into air**

Emission point reference/description	Operator markings (as per drawing number 1345 100)	Source	Location of emission point
A1-A6	CE1 – CE6	Scrubbed reactor vents from 6 reactors.	As per drawing No 1345 100 submitted in letter of 26 <sup>th</sup> June 2001
A26-A37	CE7 – CE18	Scrubbed reactor vents from 12 reactors.	To be advised to Agency and agreed before installation.
A7,A8	R1,R2	Reactor cooling/purge air vents	As per drawing No 1345 100 submitted in letter of 26 <sup>th</sup> June 2001
A9	S1	Wet bench extract system.	As per drawing No 1345 100 submitted in letter of 26 <sup>th</sup> June 2001
A10	G1	Extract from toxic/flammable gas bottle cabinets in 1 <sup>st</sup> gas hut.	As per drawing No 1345 100 submitted in letter of 26 <sup>th</sup> June 2001
A11	G2	Extract from toxic/corrosive gas bottle cabinets in 2 <sup>nd</sup> gas hut.	As per drawing No 1345 100 submitted in letter of 26 <sup>th</sup> June 2001
A12	G3	Extract from toxic/corrosive gas bottle cabinets in 3 <sup>rd</sup> gas hut.	As per drawing No 1345 100 submitted in letter of 26 <sup>th</sup> June 2001
A13	G4	Extract from Trichlorosilane gas bottle cabinets in 4 <sup>th</sup> gas hut.	As per drawing No 1345 100 submitted in letter of 26 <sup>th</sup> June 2001
A14-A25	V1 – V12	Extract from valve manifold box	As per drawing No 1345 100 submitted in letter of 26 <sup>th</sup> June 2001
A38-A65	V13 – V40	Extract from valve manifold box	To be advised to Agency and agreed before installation.

6.1.2 The limits for emissions into air for the parameters and emission points set out in Table 6.1.2 shall not be exceeded.

6.1.3 The Operator shall carry out monitoring of the parameters listed in Table 6.1.2, from the emission points and at least at the frequencies specified in that Table.

**Table 6.1.2: Emission limits into air**

Parameters	Emission Point	
	A1-A6 A26-A37	A1-A6 A26-A37 (Note1)
<i>Hydrogen Chloride</i>		
<i>max concentration over any 1hr period.</i>	10	-
<i>mg m<sup>-3</sup></i>		
<i>Frequency of monitoring</i>	<i>six monthly</i>	
<i>Total Silanes</i>		
<i>mass emission over any period of 1hr</i>	-	0.1
<i>g hr<sup>-1</sup></i>		<i>Annually</i>
<i>Frequency of monitoring</i>		
<i>Arsine</i>		
<i>mass emission over any period of 1hr</i>	-	0.05
<i>g hr<sup>-1</sup></i>		<i>Annually</i>
<i>Frequency of monitoring</i>		
<i>Phosphine</i>		
<i>mass emission over any period of 1hr</i>	-	0.05
<i>g hr<sup>-1</sup></i>		<i>Annually</i>
<i>Frequency of monitoring</i>		
<i>Diborane</i>		
<i>mass emission over any period of 1hr</i>	-	0.005
<i>g hr<sup>-1</sup></i>		<i>Annually</i>
<i>Frequency of monitoring</i>		
<i>Germane</i>		
<i>mass emission over any period of 1hr</i>	-	0.05
<i>g hr<sup>-1</sup></i>		<i>Annually</i>
<i>Frequency of monitoring</i>		

Note 1: These mass emission limits will be reviewed following a further analytical review of the process.

6.1.4

Where an annual mass limit for a substance is stated in Table 6.1.4, the aggregate emission of such substance from the Permitted Installation into air from the emission point(s) specified in Table 6.1.2 shall not exceed that limit in any year.

**Table 6.1.4 Annual mass limits**

Substance	Limit - kg
-	-
-	-

**6.2 Emissions to land**

6.2.1 There shall be no emission to land from the Permitted Installation

6.2.2 The Operator shall notify the Agency, as soon as practicable, of any information concerning the state of the Site which affects or updates that provided to the Agency as part of the Site Report submitted with the application for this Permit.

6.3 **Emissions to water [other than emissions to sewer]**

6.3.1 There shall be no emission to water from the Permitted Installation

## 6.4 Emissions to sewer

6.4.1 Emissions into sewer from the emission point(s) specified in Table 6.4.1 shall only arise from the source(s) specified in that Table.

**Table 6.4.1 Emission points into sewer**

Emission point reference	Source	Sewer
<i>S1 (referenced N1 in drawing 1345 100 submitted to the Agency 26th June 2001)</i>	<i>All waste waters from the on-site effluent treatment plant, and the discharges from the water purification plant.</i>	<i>Dwr Cymru Cyf</i>

6.4.2 The limits for the emissions into sewer for the parameter(s) and emission point(s) set out in Table 6.4.2 shall not be exceeded.

**Table 6.4.2 Emission limits into sewer**

Parameter	Frequency of monitoring	Emission point S1
<i>Total suspended solids mg l-1</i>	<i>monthly</i>	<i>400</i>
<i>pH range</i>	<i>monthly</i>	<i>Between 6 and 11</i>
<i>Max flow m<sup>3</sup>/hr</i>	<i>-</i>	<i>21</i>
<i>Daily flow m<sup>3</sup>/day</i>	<i>-</i>	<i>520</i>

6.4.3 There shall be no emission into sewer from the Permitted Installation of any substance prescribed for water for which no limit is specified in Table 6.4.2 except in a concentration which is no greater than the background concentration.

6.4.4 Where an annual mass limit for a substance is stated in Table 6.4.4, the aggregate emission of such substance from the Permitted Installation into sewer from the emission points specified in Table 6.4.1 shall not exceed that limit in any year.

**Table 6.4.4 Annual mass emission limit**

Substance	Annual limit – kg
<i>-</i>	<i>-</i>
<i>-</i>	<i>-</i>

6.5

**Emissions of heat**

Provisions proposed in the Application with regards to emissions of heat have been assessed. No further specification of requirements is deemed necessary.

## 6.6 Emissions of noise and vibration

The provisions proposed in the Application with regards to emissions of noise have been assessed.

A noise limit of 5 dB(A) over the measured background level as measured in the application at the location of identified receptors 3a, 3b, 4 and 5 (as identified in Figure 11.1) should be met in regard to noise emissions arising from the installation. This condition will be reviewed following the results of the survey required under condition 9.5 of this permit.

## 7 Transfer to effluent treatment plant

- 7.1.1 No transfers to effluent treatment plant are controlled under this part of this Permit. Emissions to water are controlled under 6.4

8

## Off site conditions

8.1.1

There are no off site conditions.

9

## Improvement programme

9.1.1

The Operator shall complete the requirements specified in Table 9.1.1 by the date specified in that Table, and shall send written notification of the date of completion of each requirement to the Agency, at the Reporting Address, within 14 days of the completion of each such requirement.

**Table 9.1.1: Improvement programme requirements**

Reference	Requirement	Date
9.1	The Operator shall, within 36 months of the issue of this Permit, submit a report on potential environmental improvements to the Permitted Installation. For each of the subject areas identified in Section 2 of the appropriate technical guidance, the report shall assess the costs and benefits of alternative techniques that may provide environmental improvement. This shall include, but not be limited to, those techniques listed in guidance. The methodologies used should be based on those given in Agency guidance note E2 and should justify, against the BAT criteria, where potential improvements are not planned to be implemented. As part of their management system, the Operator shall submit an updated report <i>every 36 months</i>	7 July 2004 for 1 <sup>st</sup> report.
9.2	A report shall be sent to the Agency on establishing an Environmental Management System having regard to section 2.1 of the relevant IPPC Sectoral or other Technical Guidance. The report shall include any proposals to implement such a programme	31 December 2001
9.3	Fugitive emissions shall be reviewed on an annual basis and a summary report on this review shall be sent to the Agency detailing such releases and the measures taken to reduce them.	31 January 2002 and annually thereafter
9.4	The Operator shall make available to the Agency for inspection all training and operating procedures for the Permitted Installation.	31 July 2001
9.5	The Operator shall carry out a noise survey according to procedures laid down in BS4 142, over a period of time when normal manufacturing processes are being carried out. The specification of the survey shall be agreed with the Agency prior to undertaking this work, and the results reported to the Agency.	31 December 2001
9.6	A site closure plan shall be sent to the Agency having regard to section 2.11 of the IPPC General Sectoral Guidance.	31 December 2001
9.7	The Operator shall review the scenario of an HCl leak from a gas bottle, in terms of its likelihood, environmental consequences and potential mitigating measures (including prevention).	31 December 2001

Improvement programme

9.8	The Operator shall submit a report to the Agency detailing plans for how firewater run-off will be contained on site. The plans, once approved by the Agency, shall be implemented.	31 December 2001
9.9	The Operator shall submit a report reviewing all opportunities that exist for water to be further recycled / reused.	31 December 2001
9.10	The Operator shall provide proposals for agreement with the Agency as to the method to be used for the disposal of any Silicon Dioxide precipitated at the effluent treatment plant.	30 November 2001
9.11	The Operator shall carry out an assessment of the releases to air from the Permitted Installation by methods previously agreed with the Agency. A report of the findings shall be submitted to the Agency.	30 September 2001

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## Interpretation

10.1.1

In this Permit, the following expressions shall have the following meanings:

*"Authorised Officer"*

means any person authorised by the Agency under section 108(1) of The Environment Act 1995 to exercise, in accordance with the terms of any such authorisation, powers specified in Section 108(4) of that Act.

*"Background concentration"*

means the same as "background quantity" as defined in paragraph 11 to Part 2 to Schedule 1 of the PPC Regulations.

*"Fugitive emission"*

means an emission from any point other than those specified in the Tables in part 6 of this Permit.

*"LAeq"*

means the A-weighted equivalent continuous equal energy level (dBA)

*"Monitoring"*

includes the taking and analysis of samples, instrumental measurements (periodic and continual), calibrations, examinations, tests and surveys.

*"Permitted Installation"*

means the activities and the limits to those activities described in Table 1.1.1 of this Permit.

*"PPC Regulations"*

means the Pollution Prevention and Control Regulations 2000 (S.I. 2000 No. 1973) and words and expressions defined in the PPC Regulations shall have the same meanings when used in this Permit.

*"Staff"*

includes employees, directors or other officers of the Operator, and any other person under the Operator's direct or indirect control, including contractors.

*"substances prescribed for water"*

means those substances mentioned in paragraph 13 of Part 2 of Schedule 1 to the PPC Regulations.

*"year"*

means year ending 31 December.

10.1.2

Where a minimum limit is set for any emission parameter, references to exceeding the limit shall mean that the parameter shall not be less than that limit.

10.1.3

Unless otherwise stated, any references in this Permit to concentrations of substances in emissions into air means;

- a in relation to gases from combustion processes, the concentration in dry air at a temperature of 273K, at a pressure of 101.3 kPa and with an oxygen content of 3% dry for liquid and gaseous fuels, 6% dry for solid fuels; and/or

- b** in relation to gases from non-combustion sources, the concentration at a temperature of 273K and at a pressure of 101.3 kPa, with no correction for water vapour content.

## 11 Written agreement to changes

- 11.1.1 When the qualification "or as otherwise agreed in writing" is used in a condition of this Permit, the Operator shall seek such agreement in the following manner:
- a** the Operator shall give the Agency written notice of the details of the proposed change, indicating the relevant part(s) of this Permit; and
  - b** such notice shall include an assessment of the possible effects of the proposed change (including waste production) on risks to the environment from the Permitted Installation.
- 11.1.2 Any change proposed according to condition 10.1.1 and agreed in writing by the Agency, shall not be implemented until the Operator has given the Agency prior written notice of the implementation date for the change. As from that date, the Operator shall operate the Permitted Installation in accordance with that change, and any relevant documentation referred to in this Permit shall be deemed to be amended.

## Schedule 1

### Confirmation of condition 5.1.1 notifications, in accordance with condition 5.1.2

This Schedule outlines the information that the Operator must provide to the Agency to satisfy condition 5.1.2 of this Permit.

Units of measurement used in information supplied under Part A and B requirements must be appropriate to the circumstances of the emission. Where appropriate, a comparison should be made of actual emissions and authorised emission limits.

If any information is considered commercially confidential, it should be separated from non-confidential information, supplied on a separate sheet and accompanied by an application for commercial confidentiality under the provisions of the PPC Regulations.

Returns should contain

#### **Part A**

- Name of Operator.
- Permit Number
- Location of Installation.
- Date information provided.
- Time, date and location of the emission.
- Identity and details of the substance[s] emitted to include:-
  - Best estimate of the quantity or the rate of emission, and the time during which the emission took place.
  - Environmental medium into which the emission took place.
  - Measures taken, or intended to be taken, to stop the emission.

#### **Part B**

- Any more accurate information on the matters notified under Part A.
- Measures taken, or intended to be taken, to prevent a recurrence of the incident.
- Measures taken, or intended to be taken, to rectify, limit or prevent any pollution of the environment or harm which has been or may be caused by the emission.
- The dates of any Part A notifications within in the previous 24 months.

Name

Post.....

Signature

Date

Statement that signatory is authorised to sign on behalf of IQE Silicon  
Compounds Ltd

## Schedule 2

### Reporting of monitoring data

Parameters for which reports shall be made, in accordance with conditions 4.1.2 of this Permit, are listed below.

Parameter	Emission point	Reporting period	Period begins
Hydrogen Chloride $\text{mg m}^{-3}$	A1- A6 A26-A37	Every 6 mths	01/07/01
Total Silanes $\text{g hr}^{-1}$	A1- A6 A26-A37	Every year	01/07/01
Arsine $\text{g hr}^{-1}$	A1- A6 A26-A37	Every year	01/07/01
Phosphine $\text{g hr}^{-1}$	A1- A6 A26-A37	Every year	01/07/01
Diborane $\text{g hr}^{-1}$	A1- A6 A26-A37	Every year	01/07/01
Germane $\text{g hr}^{-1}$	A1- A6 A26-A37	Every year	01/07/01
Suspended solids $\text{mg l}^{-1}$	S1	Every 6 mths	01/07/01
pH	S1	Every 6 mths	01/07/01

## Schedule 3

### Forms to be used

Unless otherwise agreed in writing between Agency and the Operator, the following Agency forms are to be used for reports submitted to Agency.

Media/parameter	Form Number	Date of Form
<i>Air</i>	<i>A1</i>	<i>30/04/01</i>
<i>Air</i>	<i>A2</i>	<i>30/04/01</i>
<i>Water</i>	<i>S1</i>	<i>30/04/01</i>
<i>Energy</i>	<i>E1</i>	<i>30/04/01</i>

**END OF PERMIT**