

**SITE PROTECTION AND MONITORING PROGRAMME
FOR BRIDGEND ENGINE PLANT BOILER HOUSE,
FORD MOTOR CO LTD**

REQUIRING REFERENCE DATA TO BE COLLECTED

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SPMP DOCUMENT REVIEW

Reviewed By	Date	Comments
Ray Tucker	Jan 2005	Initial SPMP
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Brett James	Dec 2015	General Review. Boiler capacity updated, low NOx burner info added, use of gas and gas oil updated, page 5. Water supply changed to potable, page 6. Emergency response procedure and plan reference updated, page 11.
Brett James	Dec 2017	General Review. Planned changes updated.
Brett James	Dec 2019	General Review. Boiler information updated. Diesel tank & supply removed. Planned changes updated.

Contents

Summary

1.0 Introduction

2.0 Objectives

3.0 Intrusive Investigation to Collect Reference Data

3.1 Investigation and Sampling Strategy

- 3.1.1 General
- 3.1.2 Constraints on Investigations
- 3.1.3 Soil Investigation and Sampling Techniques and Protocols
- 3.1.4 Groundwater Investigation and Sampling Techniques and Protocols
- 3.1.5 Soil-Gas and Vapour Investigation and Sampling Techniques and Protocols
- 3.1.6 Surface Water Investigation and Sampling Techniques and Protocols
- 3.1.7 Infrastructure Investigation and Sampling Techniques and Protocols

3.2 Sample Locations

- 3.2.1 Zone 1
- 3.2.2 Zone 2 etc

3.3 Analytical Strategy

- 3.3.1 Justification of Analytical Suites
- 3.3.2 Justification of Analytical Field Techniques and Detection Limits
- 3.3.3 Laboratory Accreditation / Quality Assurance and Quality Control

4.0 Monitoring Programme

4.1 Objectives of Monitoring Programme

- 4.1.1 Objectives of Environmental Monitoring Programme
- 4.1.2 Objectives of Infrastructure Monitoring Programme

4.2 Environmental Monitoring Infrastructure

- 4.2.1 Location
- 4.2.2 Groundwater monitoring
- 4.2.3 Soil Vapour Monitoring
- 4.2.4 Soil Monitoring
- 4.2.5 Procedure for the Inspection and Maintenance of Environmental Monitoring Infrastructure

4.3 Environmental Monitoring Programme

- 4.3.1 Monitoring Frequency
- 4.3.2 Analytical Suites

4.4 Infrastructure Monitoring Programme

4.5 Assessment and Reporting Procedures

- 4.5.1 Assessment Procedure
- 4.5.2 Reporting Procedure

4.5.3 Recording and Data Management

5.0 Other Issues

6.0 References

7.0 Glossary

Appendices

Appendix A - Figures and Plans

Appendix B - Investigation and Sampling Protocols

Appendix C - Analytical Protocols and Laboratory Accreditation

Appendix D - Quality Assurance and Quality Control

Appendix E - Inspection and Monitoring Protocols

Summary

This document represents the design Site Protection and Monitoring Programme (SPMP) for Bridgend Engine Plant Boiler House submitted to the Environment Agency in pursuance of Condition 4.1.7 of the Permit No. BL2548IF (the "Permit") authorising the operation of the Boiler House (the "installation").

This design document is required by Condition 4.1.7 to be submitted to the Agency within 2 months of the date of issue of the Permit.

An intrusive investigation is required to be undertaken to characterise substances identified as being potentially present in, on or under the ground in the Application Site Report (the "ASR") submitted with the Permit Application. This document also contains the scope of those investigations to collect Reference Data and should be read in conjunction with the ASR for the installation.

The Environmental Monitoring Programme for the installation is presented in Section 4 and Appendices B to E. The results of routine monitoring will be collated into a Monitoring Report and sent to the Agency by the 31st of January each year. The Monitoring Report will also contain any recommendations for changes to the Site Protection and Monitoring Programme which will be incorporated into the SPMP subject to the agreement, in writing, of the Agency. The format of the Monitoring Report is given in Appendix E3.

The testing, inspection and maintenance programme for pollution prevention infrastructure at the site (the Infrastructure Monitoring Programme) has been designed as detailed in Section 4.4 and Appendix E2.

1.0 Introduction

Ford Motor Company (the operator) carry out activities listed as Part A(1) activities under Schedule 1, Section 1.1 (a) ("Burning any fuel in an appliance with a rated thermal input of 50 megawatts or more") of the Pollution Prevention and Control (England and Wales) Regulations 2000

1.1 Site Location

The installation is located at The Bridgend Engine Plant (the "site" is located on Waterton Industrial Estate, Bridgend, Wales, UK CF31 3PJ approximately 2.5km from Bridgend town centre. The centre of the site is at National Grid Reference (NGR) 293510 178400. The site covers an area of approximately 72 hectares. The installation occupies a 0.5 hectare area to the east of the site and can be seen in Figure 1 of Appendix B.

1.2 Details of Installation

The purpose of the defined installation is to provide High Pressure Hot Water (HPHW) to heat the wider Engine Plant site.

The Installation includes all activities necessary for the defined purpose and comprises of the following:

1. Boilers;
2. Gas and Gas-Oil Storage and Distribution;
1. HPHW Circulation System;

A number of additional activities are required to either support the process or control potential emissions from the process. These include:

- Demineralisation Plant
- Pressurisation Unit.
- Distribution Pumps
- Extraction Fans
- Blow Down Pit

A simplified process schematic is presented as Fig 3 of Appendix B.

Boilers

There are 5 Boilers located within the Boiler House. Three 12.7 MW and one 11.18 MW which exhaust through a common stack and one 4.5 MW which exhausts through a separate stack. The boilers are fully automatic units, each consisting of a boiler and burner, together with electrical and mechanical controls to provide automatic and safe operation of the unit. Boilers 4 and 5 have been fitted with low NOx burners as part of energy efficiency actions.

Boilers 1, 2, 3 & 4 have been decommissioned. Only boiler 5 is now in service.

Gas and Gas-Oil Storage and Distribution

The boilers can operate on natural gas fuel.

Gas is supplied as a firm supply from an off-site mains supply via underground pipework.

Gas-oil is no longer stored as a back-up fuel on site however is stored in a bunded 700,000 litre above ground storage tank to the east of the installation for use to supply the fire pumps only.

Gas-oil is delivered to the tank from an off-set fuel fill point on the road side to the south-west of the Boiler House. Gas Oil is piped to the storage tank along a concrete access ducting trough which contains the pipework system.

Gas oil storage tank has been decommissioned & removed along with the associated pipework & concrete bund walls.

HPHW Circulation System

The boilers produce heating water at a temperature of approximately 140 degrees C and a pressure of approx 17 to 25 bar. The water is circulated around the wider plant with the aid of pumps. Each of the five boilers has a shunt pump fitted to maintain flow.

The water is returned back to the boilers at approximately 110 degrees C.

Demineralisation Plant

The water used in the circulation system is required to be of a specific quality. To this end, the Boiler House is equipped with a demineralisation (demin) plant.

The site accepts a potable water supply from Welsh Water. This water is then stored in two large tanks located to the south of the installation.

Water for use in the HPHW circuit is taken from the tanks and passed through the demin plant which comprises of a cation-exchange unit (to remove metals and replace with hydrogen ions to form mineral acids) and an anion-exchange unit (to remove mineral acids through absorption). The units must be purged on a regular basis through the application of acid and alkali solutions respectively, which are stored on bulk containers inside the installation.

The demin plant has a production capacity of 16 m³/hr. The total HPHW circuit and boiler capacity is 87500 litres. Demin water is required once a year for the insurance inspection and maintenance and is required on an ad-hoc basis when specific maintenance is undertaken on the process.

Pressurisation Pumps

The pressurisation unit is used to pressurise the water in the boilers in order to optimise the heating of the water. The pressure vessel holds a nitrogen cushion, which expands and contracts to maintain system pressure.

Distribution Pumps

The distribution pumps are used to drive the HPHW around the factory through external circuit and thereby maintain the flow in the re-circulation system.

Extraction Fans

The extraction fans are situated on the boilers and extract air from the boilers to be emitted through the stacks. The extraction fans maintain the exhaust and thereby limit the potential build up of waste gases in the boiler house itself.

Blow Down Pit

"Blow Down" refers to the emptying of the boilers and the HPHW circuit for maintenance. During the annual insurance inspection when the system is emptied, the discharge is passed to the foul sewer network via the Blow Down Pit, located on the south-western corner of the boiler house building. The pit is an underground holding pit constructed from concrete and bricks with a capacity of 20,000 litres. The pit has an over-flow weir system that allows water to flow to foul drainage network.

Planned Changes.

Bridgend Engine Plant is due to close in September 2020.

PPC Permit No. BL2548IF is to be surrendered.

2.0 Objectives

The objectives of this report are:

- To design investigations to collect Reference Data for the installation by:
 - ◆ Obtaining sufficient information with respect to the site to allow the refinement of the conceptual model of the site and its surroundings.
 - ◆ Determining whether sufficient data exists from investigation works undertaken on the site to collect Reference Data and adequately describe conditions at the site.
 - ◆ Designing a robust and adequate intrusive investigation, which would allow the collection of Reference Data for the Installation.
- To design a monitoring programme for the installation to:
 - ◆ Monitor the effectiveness of pollution prevention infrastructure and provide early warning of any release of polluting substances to ground or groundwater.
 - ◆ To collect data on the condition of the ground at the installation to assist in the permit surrender process.
 - ◆ To provide defensive monitoring at site boundaries for pollutant migration onto the site of the installation.
 - ◆ To monitor the movement of pollutants in the ground and / or groundwater beneath the site of the installation.
- To review and if necessary amend the inspection, testing and maintenance programme for pollution prevention infrastructure at the installation to ensure their continued integrity.

3.0 Intrusive Investigations

The objectives of the intrusive investigation are:

- To collect data to reduce the uncertainties in the conceptual model presented as Section 6 of the Application Site Report (ASR) submitted with the permit application.
- To collect sufficient data on the potentially polluting substances identified in Table D2 of Appendix D of the ASR in order to set Reference Data for the site.
- To install permanent monitoring points to facilitate operational monitoring in line with the recommendations contained in Section 4 below.

3.1 Initial Investigation and Sampling Strategy

3.1.1 General

A total of 4 boreholes (BH 104, BH 105, BH 106, BH 103 and BH 203) were drilled between the 5th and 10th August 2004.

The drilling works were sub contracted to Structural Soils Limited and were supervised by an engineer from URS Corp Ltd.

All soil and ground water analysis was undertaken under sub-contract to URS by Alcontrol Geochem, a company which provides the Monitoring Certification Scheme or MCERTS on soil analysis for all the standard analytical suites.

During the drilling works 2-3 soil samples were collected during percussive drilling and were also screened in the field using a photo-ionisation detector (PID) and the results recorded in the bore hole logs. A minimum of two soil samples were selected for analysis from each borehole, on the basis of both field observations and PID readings.

A groundwater monitoring round was undertaken for both the monitoring wells installed by URS in March 2000 and August 2004. Each monitoring well was examined for the presence of ground water and/or floating product using an air/oil/water interface probe.

The results are presented in the main report in Table 13 in Appendix B.

Groundwater samples were collected from all of the newly installed and two of the March 2000 monitoring wells (BH 101 and BH 201) for laboratory analysis. Approximately 3 well volumes were removed until ground water field parameters were constant, from each monitoring well prior to collection of samples, with the aim that the groundwater sampled was a true representation of the groundwater contained within the formation.

Groundwater field parameters were recorded including pH, Temp, Dissolved oxygen and conductivity using calibrated equipment. Results are presented in Table 14 in Appendix B.

3.1.2 Constraints on Investigations

There were no constraints evident during the investigations.

3.1.3 Soil Investigation and Sampling Techniques and Protocols

For range of investigation and sampling techniques to be used in the investigation refer to the Investigation Works – Boiler House Report 43825-003 on the 12th January 2005 in Appendix B.

3.1.4 Groundwater Investigation and Sampling Techniques and Protocols

For range of investigation and sampling techniques to be used in the investigation refer to the Investigation Works – Boiler House Report 43825-003 on the 12th January 2005 in Appendix B.

3.1.5 Soil-Gas and Vapour Investigation and Sampling Techniques and Protocols

For range of investigation and sampling techniques to be used in the investigation refer to the Investigation Works – Boiler House Report 43825-003 on the 12th January 2005 in Appendix B.

3.1.6 Surface Water Investigation and Sampling Techniques and Protocols

For range of investigation and sampling techniques to be used in the investigation refer to the Investigation Works – Boiler House Report 43825-003 on the 12th January 2005 in Appendix B.

3.1.7 Infrastructure Investigation and Sampling Techniques and Protocols

The only storage tank is located externally and related to the Installation is the 700,000 litre storage tank located to the east of the Installation Building. This tank is located above ground and contains Gas-Oil. The tank is constructed of single skinned, steel and is in good condition. **Now removed.** The tank has a bund that exceeds the required 110% capacity of the tank and is in good condition. **Now removed.** There is a drainage tap located on the bund in order to drain any water and oil from the bund; this effluent drains through an interceptor to the effluent treatment plant. The valve is locked off with the key kept in the Boiler House. Periodical inspections of the bund are carried out.

A culverted underground fuel line runs from the tank to the main road filling area located to the south west of the boiler house building, on the main access road to the fuel delivery line within the designated bay area. **Now removed.** Drain covers are located at the fill point for use during delivery operations where the boiler house operator is in attendance at all times. A Spill kit is located at the fill point for emergency response.

A Sitenentry 800 Monitoring system is installed to monitor the Gas oil system. It is a versatile data acquisition and display system. **Now removed.** It is primarily designed for monitoring the contents of the gas oil storage tank, measuring level, volume and temperature. In the event of a potential leak, the system is alarmed both outside and inside the boiler house. Any contents are contained within the concrete floor bunding.

3.2 Sample Locations

Sample locations were chosen with reference to the sources, pathways and receptors identified within the conceptual model for the site detailed in Section 6 of the ASR.

Sample locations were Bore holes BH104, BH105, BH106, and BH 103/203.

These locations were chosen to monitor both up and down gradient of the surface water flow. Sample locations for the site are shown on Figure 2, 2A and 3 of main report of Appendix B.

3.3 Analytical Strategy

3.3.1 Justification of Analytical Suites

The analytical suite was chosen by reviewing Table D2 of Appendix D of the ASR and is shown in the Investigation Works – Boiler House Report 43825-003 on the 12th January 2005 in Appendix B.

The conceptual model for the site indicated the potential for contaminant migration of Hydrocarbons (typical of gas oil) in groundwater from areas adjacent to the site.

3.3.2 Justification of Analytical / Field Technique and Detection Limits

The laboratory analytical technique for each analysis is referenced in Investigation Works – Boiler House Report 43825-003 on the 12th January 2005 in Appendix B .

Field testing of samples has occurred, the standard operating procedure is referenced in Investigation Works – Boiler House Report 43825-003 on the 12th January 2005 in Appendix B .

Detection Limits for each analytical and field technique are shown in Investigation Works – Boiler House Report 43825-003 on the 12th January 2005 in Appendix B .

3.3.3 Laboratory Accreditation / Quality Assurance and Quality Control

3.3.3.1 Laboratory Accreditation

All laboratory analytical techniques undertaken are within UKAS Accreditation.

3.3.3.2 Quality Control

The Investigation Works – Boiler House Report 43825-003 on the 12th January 2005 in Appendix B contains the sampling and analytical quality assurance and quality control plan.

4.0 Monitoring Programme

4.1 Objectives of the Monitoring Programme

4.1.1 Objectives of Environmental Monitoring Programme

The objective of the Environmental Monitoring Programme for the Installation was to carry out a soil and groundwater study of the surrounding area of the Installation:

- "the interpretation of an upward hydraulic gradient beneath the site resulting in flow from the lias to the alluvian was unsubstantiated and further information was required. Also to provide confirmation of groundwater flow direction"; and,
- Reference data and monitoring data to ensure that any contamination or any adverse impacts are identified at an early stage. Both soil and groundwater analysis is required to set up the reference level. Characterisation sampling and analysis should take into account all of the contamination identified as being used on the site.

4.1.2 Objectives of Infrastructure Monitoring Programme

The objectives of the Infrastructure Monitoring Programme for the Installation is to monitor, control and alarm personnel in the event of a potential pollution incident with regards to the Gas-oil installation and associated pipework.

4.2 Environmental Monitoring Infrastructure

4.2.1 Location

Sample locations were Bore holes BH104, BH105, BH106, and BH 103/203.

Figures 2, 2A and 3 of main report of Appendix B. show the proposed location of monitoring points at the installation.

4.2.2 Groundwater monitoring

On-going groundwater monitoring will occur at the installation during the life of the permit.

This will be conducted on a two year frequency using the up and below gradient boreholes BH104 and BH106 and BH103

Each monitoring point will be finished with a lockable cover and is designed to prevent the ingress of surface water.

4.2.3 Soil Vapour Monitoring

No on-going soil vapour monitoring will occur at the installation during the life of the permit.

Proposed completion details of each soil vapour monitoring installation are contained in Investigation Works – Boiler House Report 43825-003 on the 12th January 2005 in Appendix B. Each installation will be finished with a lockable cover and designed to prevent the ingress of surface water.

4.2.4 Soil Monitoring

No on-going soil monitoring will occur at the installation during the life of the permit.

The design and proposed completion details of soil monitoring points are contained in the Investigation Works – Boiler House Report 43825-003 on the 12th January 2005 in Appendix B .

4.2.5 Procedure for the Inspection and Maintenance of Environmental Monitoring Infrastructure

Any further inspection, testing and maintenance requirements for monitoring infrastructure and reference schedules and protocols for such works will be inline with the contractors procedures as specified in the Investigation Works – Boiler House Report 12th January 2005 in Appendix B

4.3 Environmental Monitoring Programme

4.3.1 Monitoring Frequency

The proposed environmental monitoring programme, including QA/QC checks is contained in the Investigation Works – Boiler House Report 43825-003 on the 12th January 2005 in Appendix B.

On-going Ground Water Monitoring 4.2.2.

Well Number	Location	Frequency/Date
BH103	In the east of the Boiler House and down anticipated gradient of the gas oil AST	Every 2 years starting 2006
BH104	To the Northwest and potentially down gradient of the Boiler Houser	Every 2 years starting 2006
BH106	To the south of the Boiler House, in the area of the below ground redundant pipeline	Every 2 years starting 2006

In the event of an emergency EOS Procedure EOP06-002 Emergency Preparedness and Response and LH-E-ERP Environmental Emergency Response Plan shall be applied.

4.3.2 Sampling and Analysis Protocols

The protocols for analysis will remain the same as those used for the investigations to collect reference data detailed in Section 3.3 above and reproduced in Appendix B.

4.3.3 Personnel Issues

Specialised Contractor Personnel will be responsible for sampling, maintenance and inspection and will be trained in environmental monitoring to an appropriate level to ensure compliance with the quality assurance and quality control plan.

4.4 Infrastructure Monitoring Programme

The existing inspection, testing and maintenance of pollution prevention infrastructure programme meets the objectives identified within Section 4.1.2 above and thus there are no changes to the EMS programme for the installation summarised within the Permit Application.

4.4.1 Personnel Issues

Personnel responsible for the inspection, testing and maintenance of pollution prevention infrastructure are to be trained to an appropriate level to ensure compliance with the Infrastructure Monitoring Programme. Roles and responsibilities for undertaking the Programme (including reporting) and ensuring adequate competence of staff will be specialised contractors.

4.5 Assessment and Reporting Procedures

4.5.1 Assessment Procedure

Conclusions of data will be inline with the existing report having been conducted by a specialised contractor.

4.5.2 Reporting Procedure

Summaries of the monitoring data will be sent to the Agency on the 31st of January each year along with the results of the data assessment, and any recommendations for amendments to the Monitoring Programme.

The formats for standard and emergency reporting procedures are shown in the Investigation Works – Boiler House Report 43825-003 on the 12th January 2005 in Appendix B.

4.5.3 Recording and Data Management

The recording and data management procedures for environmental monitoring data and the results of infrastructure Monitoring and of emergencies will be inline with the previous report and will be submitted by a specialised contractor.

5.0 Other Issues

All Operatives in the boiler house are trained in ISO 14001.

6.0 References

Investigation Works – Boiler House Report 43825-003 on the 12th January 2005 in Appendix B.

7.0 Glossary

HPHW – High Pressure Hot Water

AST - Above ground storage tank

APPENDIX A

FIGURES AND PLANS (SEE APPENDIX B)

Contents

- A1 Plans see - Investigation Works – Boiler House Report 43825-003 on the 12th January 2005. (electronic copy)

APPENDIX B

INVESTIGATION AND SAMPLING PROTOCOLS

Investigation Works – Boiler House Report 43825-003 on the 12th January 2005. (electronic copy)

Contents

- B1 Soil
- B2 Groundwater
- B3 Soil-gas and Vapours
- B4 Surface Water
- B5 Infrastructure

APPENDIX C

ANALYTICAL PROTOCOLS AND LABORATORY ACCREDITATION

Contents

C1 Tables

C2 Analytical Techniques

APPENDIX D

QUALITY ASSURANCE AND QUALITY CONTROL (SEE APPENDIX C)

Contents

D1 Sampling and Analytical Quality Assurance and Quality Control Plan

APPENDIX E

INSPECTION AND MONITORING PROTOCOLS

Contents

- E1 Environmental Monitoring Protocols (see Appendix B)
- E2 Infrastructure Monitoring Protocols (see Appendix B)
- E3 Data Recording and Reporting Procedures (see Appendix B)
- E4 EOS Procedure EOP06-002 Emergency Preparedness and Response