The Royal Mint

Royal Mint, Llantrisant, Pontyclun, Mid Glamorgan, CF72 8YT

Application Site Report (ASR)

Application for a permit to operate a Part A2 Installation under the Pollution Prevention and Control (England and Wales) Regulations 2000 (as amended)

Record of Changes

Issue	Description of Status	Date	Reviewer Initials	Author Initials
A	First draft to client	29/07/04	SPR	MJS
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Project No:	63-C7960
Report Status:	FINAL
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Approved:	Steven Rowan
Date:	July 2004

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Summary

This document represents the Application Site Report (ASR) for the Royal Mint, Llantrisant, submitted as part of an application to the Local Authority (ENVIRON Ref: 63-C7960) for a permit to operate an Installation under Regulation 10 of *The Pollution Prevention and Control (England and Wales) Regulations 2000 (as amended)*. The Royal Mint site at Llantrisant, Mid Glamorgan is responsible for the design, production and distribution of coinage for the United Kingdom whilst also exporting to over 65 countries World-wide. It employs approximately 1,000 people and occupies a 28 acre site.

Records of the site and surrounding areas have been reviewed along with operational site records in order to describe the condition of the site and, in particular, to identify any substance in, on or under the land that may constitute a pollution risk to the land. Pollution prevention measures have been identified and an assessment of pollution potential to land has been undertaken.

After consideration of the five primary tests detailed in Table D2 the Royal Mint consider that, at the present time, there is a *'Reasonable possibility of localised pollution'* within the following areas.

- 01 – Machine coolant tanks and pit located within MRB
- 02 – Coolant storage chamber located on the southern side of the MRB
- 03 – Use of Chrome swills storage chamber (19c)
- 04 – Use of Nickel plating process

The Royal Mint propose that through the inspection and physical testing of 01 to 03 above these locations could be reclassified as representing *'Little likelihood of pollution'* (*i.e.* if the integrity of primary and secondary containment can be demonstrated).

The environmental incident (04) involving the release, to unsurfaced ground, from Nickel Plating line 1 was reported to the Environment Agency and the area was cleaned up, in accordance with EA guidance. This area is not believed to represent a significant source of contamination that could represent a hazard to off-site receptors. However, the ASR notes that slightly elevated Nickel concentrations, above background, maybe present within this area.

The Royal Mint recognise that the site was greenfield prior to the development of the existing site operations and that elevated concentrations of substances or materials, in use within the installation, found within the subsurface soils could be directly attributable to the site operations. At the present time the Royal Mint does not consider that reference data, with regards the site condition, needs to be collected as long items 01 to 04 above are successfully completed. These actions have been incorporated into the proposed improvement programme (See main report Section 5).

The Royal Mint is aware that it will need to submit a Site Protection and Monitoring Programme (SPMP) to the Local Authority, within two months after permit issue, in order to ensure the protection of the land throughout the lifetime of the Installation. At the present time the Royal Mint would propose to submit a SPMP without reference data.

1 Introduction

1.1 Site Location

ENVIRON has been commissioned by The Royal Mint, to undertake the Application Site Report (ASR) in accordance with the Environment Agency's IPPC guidance.

The Royal Mint site at Llantrisant, Mid Glamorgan is responsible for the design, production and distribution of coinage for the United Kingdom. It also exports to over 65 countries world-wide. It employs approximately 1,000 people and occupies a 28 acre site surrounded by farmland to the north and east and light industrial units to the south and west. The eastern end of the site is bordered by a small tributary watercourse which flows into the River Ely and beyond to the Cardiff Bay estuary.

The Installation is located towards the north western and north eastern parts of the Royal Mint site, to the north of Llantrisant, approximately 15 km to the north west of Cardiff city centre. This application is for a new IPPC permit for an existing process at:

Royal Mint,
Llantrisant, Pontyclun
Mid Glamorgan
CF72 8YT

The centre of the Installation is at National Grid Reference 304000 184900. The car park (south) and disused farm (southeast) are not included as part of the installation (i.e. there is no direct technical connection to the installation). The Royal Mint plot slopes gently north-south from 72m AOD to 65m AOD.

The Royal Mint site is bordered by:

- North and northwest – undeveloped agricultural land.
- Southeast – the River Nant Muchudd is located adjacent to the sites boundary'
- East – Llantrisant Business Park.
- South – main road beyond which lies one of the sites car parks and various commercial properties.
- West and southwest – Light industrial manufacturing facilities.

The majority of land to the east, south and west of the site is designated for industrial use. The nearest area of human occupation is Ynysmaerdy, an area of residential housing which is located approximately 400m to the southwest of the installation. Individual small holdings are also located in the surrounds. The larger residential areas of Beddau and Llantrisant are located approximately 1.5km east and 1.1km to the south of the site (respectively). A hospital is located approximately 600 m to the south of the site. A map search has identified several schools in the surrounding area, the nearest of which is located approximately 1km to the south east of the site.

The agricultural land to the north of the site has been identified as open fields. There is no evidence that it is utilised for food production beyond the grazing of livestock. In addition, four food related industrial units have been noted in the vicinity of the site, these are as follows:

- SC (Simply Citrus) – juice packers and suppliers, 500m from the site; and
- Three units occupied by Sunjuice Ltd – Fruit juice packers and suppliers, 350 m, 450 m and 500m from the site.

Ground and surface water abstractions for general agricultural purposes are detailed in this report; however no records of abstractions for potable drinking water purposes have been noted. It is understood that the nearest drinking water abstraction, from groundwater, is located approximately 10km to the southwest of the site.

1.2 Scope of the Installation

The installation is comprised of technically connected stationary technical units as described in Section 2.3 Surface Treatment in excess of 30m^3 in connection with Part A(2) Section 2.2 Non-Ferrous Metals activity. The application is therefore for a single Part A(2) IPPC permit. The stationary technical units are:

- Non-ferrous melting & casting activity in Melting Rolling Blanking (MRB);
- Copper plating (CP1);
- Copper plating (CP2);
- Copper plating (CP3);
- Nickel plating line 1;
- Nickel plating line 2;
- Pickling;
- Duplex plating line; and
- Chrome plating.

Based upon the definition of a technical connection, The Royal Mint has formally agreed with the Local Authority that there are only a limited number of up and down stream activities with a technical connection. These are:

- Scrap metal storage (various areas) and the chemical store;
- Coin store;
- Effluent treatment;
- Annealing and burnishing;
- Striking;
- Services area for acid storage and dilution;
- Maintenance workshop;
- Oil store;
- Water treatment plant; and
- Heat treatment and tool room.

The Royal Mint has formally agreed the scope of the application with the Local Authority and the Environment Agency who will be a Statutory Consultee.

Full process descriptions are provided in Section 2.3 of the main application document.

There are no planned significant changes to operational layout or processes.

2 Objectives

The objectives of this report are:

To satisfy the requirements of the IPPC Regulations at time of permitting by:

- Identifying the environmental setting and land pollution history of the site;
- Identifying activities that will be conducted at the Installation that may lead to land pollution;
- Identifying and assess the preventative measures that are in place to protect the land; and
- Assessing whether there is: (1) little likelihood that land pollution or leaks to land will occur during the future life of the Installation; or there is: (2) a reasonable possibility that there is potential for current or future land pollution of the land from the Installation.

3 Site Setting and Sources of Desk Study Information

3.1 Introduction

The following sections detail the sources of desk study information searched in order to describe the condition of the Installation and, in particular, to determine the potential for substances to be present in, on or under the land associated with present and past uses of the Installation and its surrounding areas.

3.2 Environmental Consents, Licences, Site & Surrounding Area

A publicly available third-party environmental database (ENVIROCHECK) was consulted to provide records of any Discharge Consents within 250m of the Installation boundary, Waste Management Licences and IPC Authorisations for the site and within 1 km of the Installation boundary and for Abstraction Licences within a 2km radius of the site boundary.

Information held on site was inspected with respect to a trade effluent consent, surface water discharge consent and the Part B authorisation for the non-ferrous metal activity.

The Countryside Council for Wales and JNCC website was consulted to provide details of any Nature Conservation Designations within 10 kilometres of the site boundary.

A summary of the ENVIROCHECK information is presented in Appendix C1.

3.3 Geological and Hydrogeological Data

Geological and hydrogeological information for the site was obtained from the following sources:

- British Geological Survey 1:50,000 geological map for Pontypridd (Sheet No. 248), (an exert of which is provided as Figure 09);
- The Environment Agency Groundwater Vulnerability map Sheet 36, Gwent South and Mid Glamorgan, 1:100,000 scale

- Environment Agency Groundwater Source Protection Zone data, from the EA website.

Hydrological data (Water Quality Data) was obtained from the Environment Agency website (address details Appendix C3) and ENVIROCHECK for the water courses within 250m of the Installation (Appendix C1).

3.4 Site Operational Records and Incidents

Site management together with information provided by ENVIROCHECK were consulted to provide records of any land and/or controlled water pollution incidents associated with the site and within 500 metres of the site boundary.

Site operational layout plans, including the location and nature of underground services (foul and surface water drainage), the location of bulk storage tanks and raw materials / product storage areas are shown in the main report.

3.5 Existing Site Investigation and Assessment Reports

There has been no previous relevant site investigation or assessment undertaken at this site. Localised geotechnical investigations have been undertaken and the borehole logs are presented in Appendix C5.

3.6 Other Information

None identified.

4 Site Reconnaissance

4.1 Introduction

The site reconnaissance was undertaken on 30th June 2004 by two environmental consultants, Tim Patterson and Michael Sylvester, from ENVIRON. The site walkover included the Installation area together with relevant interviews with site management.

The purpose of the reconnaissance was to inspect the Installation and surrounding area for indicators of potential land pollution. Site infrastructure was visually inspected to assess its competence and potential to cause or have caused releases to land.

Photographs of the key storage areas and associated surface conditions have not been included due to National Security reasons.

IMPORTANT: In-line with the Environment Agency document 'H7 Guidance - Application Site Report and Site Protection and Monitoring Programme' this report does not repeat any data collection exercise and fully cross references documents provided in other parts of the application wherever possible.

4.2 Storage Tanks and Associated Pipe Work

For a full description of storage tanks and pipework please see the following sections:

Report	Reference	Description
Main Report 63-C7960	Section 2.1.2 Stationary Technical Units	This includes a detailed description of every process bath within the installation.
Main Report 63-C7960	Section 2.2.6 Fugitive Emissions to Surface Water, Sewer and Groundwater	It provides an assessment of primary, secondary and tertiary containment throughout the installation

4.3 Hardstanding and Bunds

For a full description of hardstanding and bunds please see the following section:

Report	Reference	Description
Main Report 63-C7960	Section 2.2.6 Fugitive Emissions to Surface Water, Sewer and Groundwater	It provides an assessment of primary, secondary and tertiary containment throughout the installation

4.4 Vegetation

There are areas of soft landscaping around the outside of some of the buildings associated with the installation. This includes the grassed area at the rear of Nickel Plating line 1.

4.5 Surface Water Features

There is no surface water feature located on or within the Installation. The nearest surface water feature is the River Nant Muchudd, which flows adjacent to the installation's south-eastern boundary. The River flows in a southerly direction to join the River Ely (Afon Elai), some 1.5 km downstream. The River Ely flows in a southerly direction approximately 450 m to the west of the site boundary, at its nearest point. A network of small ditches and drains flow from the hillside to the north and are culverted through the Royal Mint site to enter the Nant Mychydd.

Information sourced from the Environment Agency website details that south eastern corner of the site is located in both an indicative floodplain and a flood warning zone. The flood warning zone also covers part of the installation.

4.6 Nature of the Storage and Handling of Materials

For a full description of the storage and handling of materials please see the following section:

Report	Reference	Description
Main Report 63-C7960	Section 2.1.4.1Scrap Material Storage and Chemical Stores	Provides a description of the storage arrangements with regards the installation.
Main Report 63-C7960	Section 2.8 Accidents and their Consequences	Provides an assessment of materials handling techniques.

4.7 Surface Water and Foul Drainage

For a full description of the surface water and foul drainage please see the following sections:

Report	Reference	Description
Main Report 63-C7960	Section 2.2.2Abatement of Point Source Emissions to Surface Water and Sewer	This section describes the surface and foul water systems present across the site.
Main Report 63-C7960	Section 2.2.4 Point Source Emissions to Groundwater	This section states that there are no releases, via point sources, to groundwater.

4.8 Other Indicators

Historical Contamination Issues

County Series and Ordnance Survey historical maps of the Installation and the surrounding areas have been reviewed. Historical maps indicate that the Installation was a Greenfield site from the earliest available maps dated 1886, 1900, 1921 and 1947, until at least 1965. By 1975, the latest available map, the Installation and the wider surroundings had been developed. The installation roughly reflects the current day layout and was labelled as the 'Royal Mint', whilst the surrounding areas had been developed to comprise of buildings annotated as "factory" and "works". In the surrounding area, the Llantrisant and Taff Vale Junction Railway, running adjacent to the installations northern boundary was present from the earliest map dated 1886 through to 1947. By 1965 the railway was marked as dismantled.

Based on this review there is *'little likelihood'* of land contamination from previous land uses of the site.

Existing Contamination Issues (i.e. as a result of site operations)

Throughout the installation there are various below ground sumps and chambers (primary containment) that are used to hold potentially environmentally hazardous materials, they include:

- Waste soluble oil sump – Cast concrete chamber 3.5m x 3.5m x 2.8m = 34.3m^3. The soluble waste coolant oil chamber is located on the southern side of the MRB. Oil enters the chamber via pipework from the MRB via a point located at the top of the chamber. Levels in the chamber are monitored and a warning system notifies personnel when it needs emptying. There has been no check on the integrity of either the pipework or the sump. This has been included within the improvement programme.

- Underground effluent storage tanks (Chamber 9c) – Cast concrete chamber 3.5m x 9.0m x 2.8m = 88.2m^3. The chamber contains two PVC effluent storage tanks for chrome and acidic rinse water. The contents of these tanks are discharged to the effluent plant for treatment on a periodic basis.

- Underground storm water containment tank – This tank is made from PVC. The tank is used to store contaminated rain water that has entered the COMAH storm water system. The environmental risk is minimal has the composition of the contaminated water is similar to the river discharge consent conditions.

Site management have reported several spillages including spills of acid, metal containing solutions, oils/diesel and cyanide solutions on to roadways. There was also a reported leak of nickel containing solution on to the unsurfaced ground at the rear of Nickel Plating Line 1. There have also been numerous small scale chemical spillages. All potentially significant releases have been cleaned up and remediated and have been notified to the Environment Agency.

Site management reported that there have been three known pollution incidents to controlled waters, attributable to the site. The incidents are as follows:

- 1998, fish kill in Rivers Nant Mychedd and Ely as a result of a sulphuric acid spill via storm drain from a split acid distribution line. The EA classified the incident as category 1 (major incident). (EA incident reference 35907).

- 1999, fish kill in Rivers Nant Mychedd and Ely via storm water drain as a result of a cyanide spill from one of the copper plating plants. No detail regarding the EA classification of the incidents severity was available.

- 2000, fish kill in River Ely as a result of a discharge of high ammonia via site effluent plant due to a process control malfunction. No detail regarding the EA classification of the incidents severity was available.

The ENVIROCHECK report confirms the above. The ENVIROCHECK report details that the closest off site pollution incident to controlled waters occurred approximately 110m to the South-west of the site. The incident which occurred on the 30th of May 1992 involved an unnamed pollutant from a building site entering an unspecified watercourse. The incident (incident reference 4154) was classified as a category3 (minor incident) by the EA.

The next closest incident to the site is reported as having occurred on the 17th of March 1997, 140m to the South-west of the Installation (incident reference 31606). Again the incident involved an unnamed entering an unspecified watercourse. The incident was classified as a category3 (minor incident) by the EA.

The next closest incident to the site occurred 220m to the south-east of the Installation on the 16th of March 1995 (incident reference 22864). The incident involved the discharge of raw sewage into an unspecified watercourse. This incident was recorded as being a category 3 (Minor incident).

No other details were available at the time this report was produced.

5 Assessment of Land Pollution Potential

5.1 Polluting Substances and Relevant Activities

For a full description of the potential polluting substances and environmental impacts associated with the materials in use within the installation please see the following sections:

Report	Reference	Description
Main Report 63-C7960	Section 2.4 Material Inputs	This section describes the various materials used within the installation and the approximate annual quantities.
Main Report 63-C7960	Section 2.5 Waste Handling	The section describes the various wastes produced from the installation and the handling and storage arrangements.

It is important to note that potential environmental impacts may only occur when the substance(s) are released into the environment in an uncontrolled manner (i.e. spills, leaks or unplanned emissions). In order for an impact to occur there needs to be a SOURCE (e.g. a material), a PATHWAY (e.g. a drain) and a RECEPTOR (e.g. water course, fish, humans etc.). The Royal Mint recognise that the materials in use within the installation are all potentially hazardous to the environment if released above the limits assessed as not causing a significant impact. All materials are managed in such a manner so as to prevent uncontrolled releases into the environment.

5.2 Preventative Measures

The pollution preventative measures (physical infrastructure and those relating to testing, inspection and maintenance) for each relevant activity associated with the potentially polluting substances have been identified and their extent and condition assessed.

For a full description of the preventative measures please see the following sections:

Report	Reference	Description
Main Report 63-C7960	Section 2.2.6 Fugitive Emissions to Surface Water, Sewer and Groundwater	It provides an assessment of primary, secondary and tertiary containment throughout the installation

5.3 Assessment of the Likelihood of Land Pollution

Appendix D2 contains an assessment of the likelihood of land pollution from the Installation. The information is presented in tabular form and addresses additional measures that the Royal Mint has implemented to prevent accidents and to limit any consequences. More information on the primary, secondary and tertiary containment used within the facility is described within the main application report Section 2.2.6.

The Royal Mint has assessed the effectiveness of the pollution prevention measures and has referred to Boxes 4 and 5, and Figure 2 of the H7 *'Guidance on the Protection of Land Under the PPC Regime: Application Site Report and Site Protection and Monitoring Programme'*. After consideration of the five primary tests detailed in Table D2 the Royal Mint consider that, at the present time, there is a *'Reasonable possibility of localised pollution'* within the following areas (*Table 01*).

Table 1. Areas of where there is a 'Reasonable possibility of localised pollution'

No.	Location	Risk & Justification
01	Machine coolant tanks and pit located within MRB	**Low / Medium** No detailed visual inspection or testing of the coolant containment pit (secondary containment) has been undertaken. This structure could represent a source of localised contamination.
02	Coolant storage chamber located on the southern side of the MRB	**Medium** No detailed visual inspection or testing of the coolant containment pit (primary containment) has been undertaken. This structure could represent a source of localised contamination.
03	Use of Chrome swills storage chamber (19c)	**Low** No detailed visual inspection or testing of the coolant containment pit (primary containment) has been undertaken. This structure could represent a source of localised contamination although the material is only Chrome rinse waters (i.e. low Chrome levels).
04	Use of Nickel plating process	**Low** The incident involving the release, to unsurfaced ground, from Nickel Plating line 1 was reported to the Environment Agency. The area was cleaned up, in accordance with EA guidance. This area is not believed to represent a significant source of contamination that could represent a hazard to off-site receptors. However, the ASR notes that slightly elevated Nickel concentrations, above background, maybe present within this area.

The Royal Mint propose that through the inspection and physical testing of 01 to 03 above these locations could be reclassified as representing *'Little likelihood of pollution'* (*i.e.* if the integrity of primary and secondary containment can be demonstrated).

The environmental incident (04) involving the release, to unsurfaced ground, from Nickel Plating line 1 was reported to the Environment Agency and the area was cleaned up, in accordance with EA guidance. This area is not believed to represent a significant source of contamination that could represent a hazard to off-site receptors. However, the ASR notes that slightly elevated Nickel concentrations, above background, maybe present within this area.

The Royal Mint recognise that the site was greenfield prior to the development of the existing site operations and that elevated concentrations of substances or materials, in use within the installation , found within the subsurface soils could be directly attributable to the site operations. At the present time the Royal Mint does not consider that reference data, with regards the site condition, needs to be collected as long items 01 to 04 above are successfully completed. These actions have been incorporated into the proposed improvement programme (See main report Section 5).

The Royal Mint is aware that it will need to submit a Site Protection and Monitoring Programme (SPMP) to the Local Authority, within two months after permit issue, in order to ensure the protection of the land throughout the lifetime of the Installation. At the present time the Royal Mint would propose to submit a SPMP without reference data.

6 Conceptual Site Model

It should be noted, that in order to provide a full understanding of the geology of the Installation and its immediate surroundings, the geological data for the entire Royal Mint site has been included in this section of the report.

6.1 Geology and Hydrogeology

6.1.1 Published Information

Information sourced from the British Geological Survey 1:50,000 geological map for Pontypridd (Sheet No. 248), the geological sequence beneath the site is as follows:

- Made Ground, underlain by;
- Quaternary (recent) Alluvium (present in the southern half of the site only);
- Quaternary (recent) Sand and Gravel underlain by Boulder Clay;
- Carboniferous Coal Measures;
- Carboniferous Limestone to depth.

Table 2. Summary of Geological Strata from Published Sources

Superficial Deposits	**Description**	**Geological Age**
Made ground	Clayey sand and gravel with cobbles	Recent
Alluvium (southern portion of the site only)	Soft to firm silty sandy clays.	Quaternary (recent)
Sand and Gravel	Granular deposits with varying proportions of silt and / or clay.	Quaternary (recent)
Boulder Clay	Firm to stiff cohesive sandy gravelly silts and clays to clayey silty and sand gravels.	Quaternary (recent)
Solid Geology	**Description**	**Geological Age**
Coal measures `	Strong sandstones, siltstones, mudstones, seatearths and coal horizons.	Carboniferous
Carboniferous Limestone	Limestone.	Carboniferous

Made Ground

The presence of Made Ground underlying the site is not indicated on the geological map. However, given the industrial history of the site and surrounding area it can be expected that Made Ground would be present.

There is potential for perched groundwater to be present in granular horizons of made ground.

Alluvium

The southern half of the site is shown to be underlain by Alluvium. Alluvial deposits typically occur as laterally discontinuous horizons of soft to firm silty and sandy clays which may contain disseminated organic material and/or peat horizons. Lenses of sand and/or gravel may also be present. The alluvium could be expected to be between 2.0m and 5.0m thick, increasing in thickness towards the Nant Muchudd, to the south east of the site.

Shallow groundwater may be present within the alluvium, and may potentially be in hydraulic continuity with the Nant Muchudd. The Environment Agency's groundwater vulnerability map (sheet 36, Gwent South and Mid Glamorgan, 1:100,000 scale) designates the alluvial deposits as a minor aquifer.

Sand and Gravel Glacial Deposits

The Sand and Gravel deposits are granular deposits with varying proportions of silt and/or clay. Generally Boulder Clay varies from firm to stiff cohesive sandy gravelly silts and clays to clayey/silty sands and gravels, both with occasional to frequent cobble to boulder size fragments of sandstone. The composition of the deposit may vary laterally as well as vertically. The thickness of the deposits can be expected to be between 5 and 15m.

There is potential for shallow groundwater to be present within these deposits, which may migrate both vertically and laterally. The groundwater may be in hydraulic continuity with the Nant Muchudd, and could be expected to flow in a south east to easterly direction under the remainder of the site.

The Environment Agency's groundwater vulnerability maps designate these deposits as a minor aquifer. The majority of the unconsolidated deposits underlying the site have been designated as being of a high leaching potential (H2). These are deep, permeable, coarse textured soils which readily transmit a wide range of pollutants because of their rapid drainage and low attenuation potential. The soils underlying the north west quarter of the site have been designated as low leaching potential (L). These are soils in which pollutants

are unlikely to penetrate because water movement is largely horizontal and they have the ability to attenuate diffuse pollutants.

Coal Measures

The Coal Measures comprise a thick cyclic sequence of strong sandstones, siltstones and mudstones, seatearths and coal horizons. The strata immediately underlying Boulder Clay deposits comprises the Upper and Lower Pennant Series, which is dominated by strong sandstone horizons. Fractures are common, especially in areas which have been subject to mining operations. The coal measures are expected to be between 500m and 600m thick underlying the site.

According to the Environment Agency, the Coal Measures are designated as a minor aquifer, with groundwater flow via fractures and intergranular mechanisms. They contain large quantities of water with separate water bodies in each sandstone horizon. Supplies from the sandstone formations support both private and public abstractions and also baseflow to rivers.

Coal authority data received in July 2000 confirms that the site is not within the zone of likely physical influence on the surface from past or present or known future underground coal workings. In addition, the site is not within a geographical area for which a license to extract coal by underground methods has been granted or is awaiting determination by the Environment Agency.

Carboniferous Limestone Formation

This formation comprises Limestone of varying composition, and could be expected to be between 300m and 400m thick. The Carboniferous Limestone is designated as a major aquifer and its water resources are heavily used for public potable supply. Groundwater flow is via fractures.

Regional Groundwater

Regional Groundwater would be expected to flow in an overall southerly direction, in line with regional topography, regional river flow and towards the sea.

The strata beneath the site are classified by the EA as follows:

- Quaternary Alluvium (present in the southern half of the site only) (Minor Aquifer)
- Quaternary Sand and Gravel underlain by Boulder Clay (Minor Aquifer)
- Carboniferous Coal Measures (Minor Aquifer)
- Carboniferous Limestone to depth (Major Aquifer)

6.1.2 Previous Report Field Information

A summary of the various geological horizons encountered during the previous Site Investigation, conducted by John Campbell (dated August 1991, report reference 043/16) is provided below. Borehole logs are provided in Appendix C5 of this report. The geology of the entire site was found to be consistent with published information and comprised of recent superficial deposits overlying Upper coal measures.

Made Ground

The made ground was generally noted to comprise reworked natural materials, consisting of medium dense intermixed, brown, clayey, sand, gravel and cobbles. During the investigation, the thickness of made ground within both boreholes was found to be 0.5m.

The made ground was underlain by Glacial Till to a maximum depth of 9m. The Glacial Till consisted of dense and very dense brown silty sand and sub-angular to sub-rounded sandstone gravel with variable proportions of cobbles and boulders.

Solid Geology

Light grey fragments of sandstone were retrieved after chiseling at the base of both boreholes. These fragments are thought to represent either boulders or possible bedrock.

According to the Bradley Associates geotechnical report dated August 1991 (reference 043/16) groundwater was not encountered during boring at the site.

Hydrogeological regime

Groundwater flows from areas of recharge to areas of discharge. In the region of the site, it is expected that the groundwater flow direction will be dominated by the River Nant Mychydd. Rivers are an important means of discharge and groundwater can often form substantial proportions of the river flow (known as baseflow). Groundwater typically discharges into rivers; hence this is normally the direction of flow.

Glacial deposits are relatively thin and variable in nature, but good inter-granular permeabilities can enable them to provide local water supplies. However, this may not be the case local to the site due to the silty nature of the deposit. Shallow groundwater levels under the northern portion of the site are deeper than 9m below ground level. As the site is immediately adjacent to the Nant Mychydd, it is likely that groundwater in the glacial till is in hydraulic continuity with the River (River level 62-64m AOD). Local shallow groundwater flows are probably in southerly direction towards the River.

A major accident involving loss of containment and release to the ground could impact on the underlying aquifer via vertical migration. However, significant vertical migration could only occur if a major spill to ground were to take place, although the contaminant would be restricted by both the silty layers in the glacial till and the siltstones and shales in the coal measures. In particular, these deposits will provide protection to the underlying Carboniferous Limestone, which underlies the site at depth below the above glacial deposits. It is considered that horizontal migration would predominate, with the potential for horizontal flow to the Nant Mychydd.

Information sourced from the Environment Agency website details that the site is not located within a groundwater source protection zone.

In summary, groundwater beneath the site is likely to flow in a south to south easterly direction, in hydraulic continuity with the River Nant Mychydd.

6.2 Surface Water Features

The surface water regime in the area surrounding the Installation is dominated by the Rivers Nant Mychydd and Ely, the quality of which has been classified by the EA. The Environment Agency has classified the Nant Mychydd, adjacent to the south east boundary of the installation as Grade 1 (very good). The River Ely to the west of the site has been classified as Grade 2 (good). The quality of the Nant Mychydd approximately 1.5 km downstream of the site (where it meets the River Ely) has been classified as “Bad”. This deterioration in river quality is thought to reflect the industrial activity in the area surrounding the site.

A network of small ditches and drains flow from the hillside to the north of the site, and are culverted through the Royal Mint site to enter the Nant Mychydd. The ditches and Nant Mychydd are relatively fast flowing and any spill into these waters could be spread downstream quickly to the River Ely. In addition, the Nant Mychydd is a relatively small Watercourse affording little dilution to mitigate the effects of contaminated surface water runoff or spillages.

6.3 Results of Previous Investigations/Assessments

There has been no previous relevant site investigation or assessment undertaken at this site. Localised geotechnical investigations have been undertaken and the borehole logs are presented in Appendix C5.

6.4 Other Receptors

According to the Countryside Council for Wales, there is one currently designated Site of Special Scientific Interest (SSSI) within a 1km radius of the site. The site (Llantrisant Common & pastures) is located approximately 1km to the southeast of the site. The site is of special interest for its extensive area of predominantly acidic marshy grassland in a lowland setting and for smaller areas of species rich neutral and acidic grassland and sologeneous flush. It is also or special interest for populations of nationally rate and nationally scarce plant species.

One Special Area of Conservation (SAC) was noted within a 10km radius of the site. The SAC Cardiff Beech Woods is located approximately 8km to the southeast of the site. No Special Protection Areas or RAMSAR sites have been identified within a 10km radius of the site.

6.5 Site Zoning

The desk-based study and site reconnaissance undertaken for the preparation of this Application Site Report have identified situations where there is a reasonable possibility of significant land contamination and the site has been divided into a series of zones based upon the site setting and the possible (and actual) location of potentially polluting substances.

These zones are shown on Figure 11. Table D2 in Appendix D2 indicates the relative distribution of relevant activities (i.e. potentially polluting activities) in relation to these zones. The zones are described in more detail below.

6.6 Summary of Conceptual Site Model

6.6.1 Introduction

The findings of the desk study and site reconnaissance (detailed above) have been used to develop the conceptual site model (CSM) for the site. Uncertainties in the CSM are identified and their significance discussed.

6.6.2 Graphical Representation of the Site

A graphical representation of the CSM has been produced and is shown as Figure 06.

6.6.3 Uncertainties in the CSM

None identified.

Appendix A - Figures and Maps

A1 Site Location Plan

Figure 01 within main application report

A2 Geological Maps and Cross Sections

Figure 09 within main report.

A3 Site Layout Plan

Figure 02 within main application

A4 Site Drainage Plans

Figures 05a and 05b within main application report

A5 Plans Showing the Location of Sensitive Receptors

Figures 07 and 08 within main report

A6 Plans Showing the Location of Contaminant Sources

Figure 11 within main report

A7 Plans Showing Zones

Figure 11 within main report

Appendix B - Site Reconnaissance

B1 Site Layout and Storage Areas

Figure 02 within main report.

B2 Photographs

None provided due to National Security.

B3 Relevant Test Certificates

None relevant to the application.

Appendix C - Desk Study Information

C1 Environmental Consents etc. – Consultation Responses

The following information has been taken from the ENVIROCHECK report for the Installation dated 25/02/04.

Discharge Consents

There is a record of one discharge consent within a 250m radius of the Installation. The consent is held by Lacre Pde for the discharge of "other matter-surface water" into the Nant Muchydd (discharge reference AN0049701) at a point 100m east of the Installation.

Waste Management Licences

There are no waste management facilities within 500m of the Installation, and one within a 1km radius of the Installation. The facility, which was no longer licensed to operate after July 1991, was a medium capacity landfill (<75,000 tonnes per year). The former landfill accepted brick and concrete, excavation waste, subsoil natural stone and shale.

Abstraction Licences

There are no records of groundwater abstraction licences associated with the installation. The nearest abstraction point is located 900m to the south west of the site licensed to Mr Trevor W John (Licence reference 21/57/31/0026) for abstractions from a well or borehole for general agricultural purposes. One groundwater abstraction is located within a 2km radius of the installation (Licence reference 21/57/31/0052). The abstraction is licensed to Mr J Johnson from a point (spring) located approximately 1,340m to the north east of the site for a daily abstraction rate of 2000m^3 (annual rate of 664,000 m^3).

The installation abstracts surface water from the River Ely to the north west (upstream) of the site for cooling purposes; however no consent is required as the site holds crown immunity. The sites immunity was reconfirmed with the Environment Agency in June 2004. There are no records of surface water abstractions within a 1km radius of the Installation One surface water abstraction is located within a 2km radius of the installation (licence reference 21/57/31/0045). The licensed is held by Mr J Johnson for abstraction of an unspecified quantity of water from two abstraction points on the River Nant Muchudd 1,220m and 1,270m to the north of the site for general agricultural purposes. There are no surface water abstractions within 2km to the south of the site.

IPPC / IPC Authorisations

The database does not hold any records of any current, revoked or superseded Integrated Pollution Control (IPC) Authorisations within 1km of the Installation. The site activities

The records detail an Air pollution control authorisation held by the installation (permit reference EPA 024) for iron, steel and non-ferrous metal foundry processes). There are records of a three further Local Authority Air Pollution Control authorisations within a 1km radius of the installation, two of which have been superseded. The next nearest consent to the installation is recorded as operational, located 350m to the south of the site (permit reference EPA 043). The consent is held by Alumax for powder costing processes (including sheradizing). The two superseded authorisations are located 450m to the southwest and 650m to the east of the site for powder coating processes and respraying of road vehicles (respectively).

Trade Effluent Consents

For information regarding trade effluent consents please refer to section 4.7 surface water and foul drainage of the text.

C2 Geological and Hydrogeological Data

None further information provided

C3 Hydrological Data

Hydrological data was gathered from the Environment Agency's web site. To access this information please refer to the 'What's in Your Backyard' pages of the website and enter the site postcode.

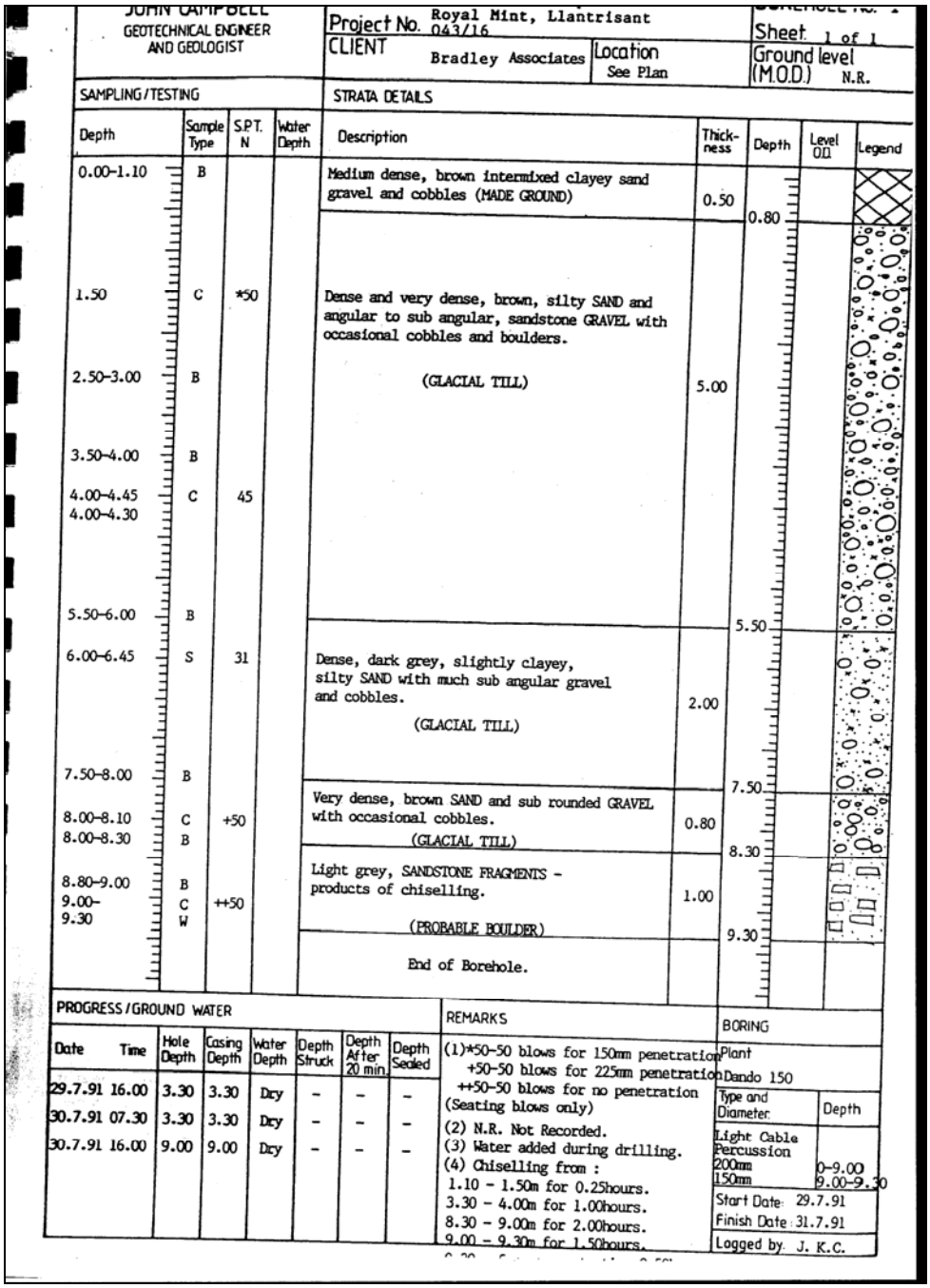
http://www.environmet-agency.gov.uk/yourenv/

C4 Site Operational Records, Records of Any Land Pollution on Site

For information regarding pollution incidents please refer to Section 6.4 other receptors

C5 Existing Site Investigation, Assessment and Remediation Records

Borehole 1



JOHN CAMPBELL
GEOTECHNICAL ENGINEER AND GEOLOGIST

Project No. 043/16 — Royal Mint, Llantrisant
CLIENT — Bradley Associates
Location — See Plan
Sheet 1 of 1
Ground level (M.O.D.) N.R.

SAMPLING / TESTING

Depth	Sample Type	S.P.T. N	Water Depth
0.00-1.10	B		
1.50	C	*50	
2.50-3.00	B		
3.50-4.00	B		
4.00-4.45	C	45	
4.00-4.30			
5.50-6.00	B		
6.00-6.45	S	31	
7.50-8.00	B		
8.00-8.10	C	+50	
8.00-8.30	B		
8.80-9.00	B		
9.00-9.30	C	++50	
	W		

STRATA DETAILS

Description	Thickness	Depth	Level O.D.	Legend
Medium dense, brown intermixed clayey sand gravel and cobbles (MADE GROUND)	0.50	0.80		
Dense and very dense, brown, silty SAND and angular to sub angular, sandstone GRAVEL with occasional cobbles and boulders. (GLACIAL TILL)	5.00	5.50		
Dense, dark grey, slightly clayey, silty SAND with much sub angular gravel and cobbles. (GLACIAL TILL)	2.00	7.50		
Very dense, brown SAND and sub rounded GRAVEL with occasional cobbles. (GLACIAL TILL)	0.80	8.30		
Light grey, SANDSTONE FRAGMENTS - products of chiselling. (PROBABLE BOULDER)	1.00	9.30		
End of Borehole.				

PROGRESS / GROUND WATER

Date	Time	Hole Depth	Casing Depth	Water Depth	Depth Struck	Depth After 20 min	Depth Sealed
29.7.91	16.00	3.30	3.30	Dry	-	-	-
30.7.91	07.30	3.30	3.30	Dry	-	-	-
30.7.91	16.00	9.00	9.00	Dry	-	-	-

REMARKS

(1) *50-50 blows for 150mm penetration
+50-50 blows for 225mm penetration
++50-50 blows for no penetration (Seating blows only)
(2) N.R. Not Recorded.
(3) Water added during drilling.
(4) Chiselling from :
1.10 - 1.50m for 0.25hours.
3.30 - 4.00m for 1.00hours.
8.30 - 9.00m for 2.00hours.
9.00 - 9.30m for 1.50hours.

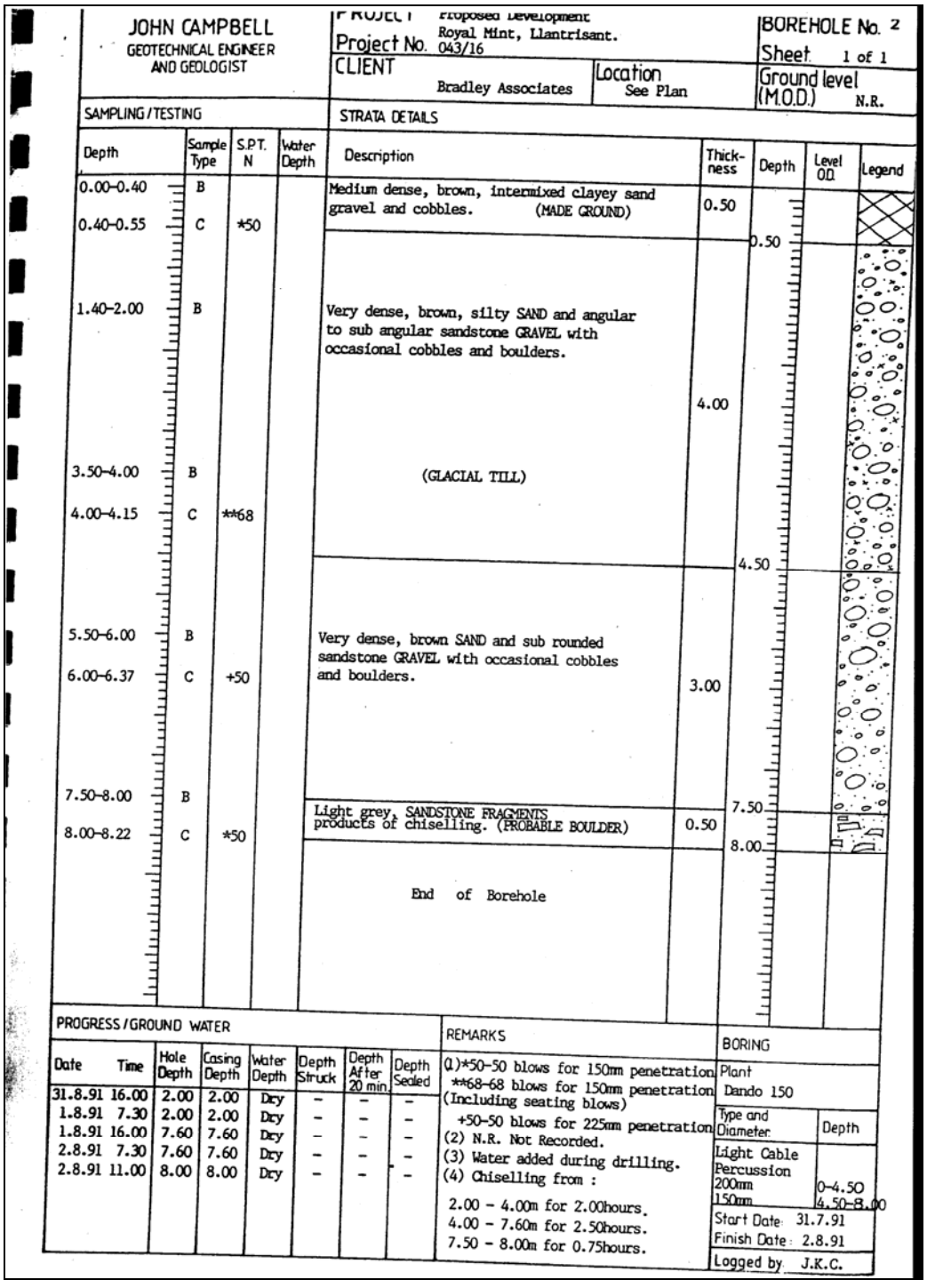
BORING

Plant: Dando 150

Type and Diameter	Depth
Light Cable Percussion	
200mm	0-9.00
150mm	9.00-9.30

Start Date: 29.7.91
Finish Date: 31.7.91
Logged by: J. K.C.

Borehole 2



JOHN CAMPBELL
GEOTECHNICAL ENGINEER AND GEOLOGIST

PROJECT: Proposed Development, Royal Mint, Llantrisant.
Project No. 043/16
CLIENT: Bradley Associates
Location: See Plan
BOREHOLE No. 2
Sheet 1 of 1
Ground level (M.O.D.) N.R.

SAMPLING/TESTING / STRATA DETAILS

Depth	Sample Type	S.P.T. N	Water Depth	Description	Thickness	Depth	Level O.D.	Legend
0.00–0.40	B			Medium dense, brown, intermixed clayey sand gravel and cobbles. (MADE GROUND)	0.50	0.50		
0.40–0.55	C	*50						
1.40–2.00	B			Very dense, brown, silty SAND and angular to sub angular sandstone GRAVEL with occasional cobbles and boulders.	4.00			
3.50–4.00	B			(GLACIAL TILL)				
4.00–4.15	C	**68				4.50		
5.50–6.00	B			Very dense, brown SAND and sub rounded sandstone GRAVEL with occasional cobbles and boulders.	3.00			
6.00–6.37	C	+50						
7.50–8.00	B			Light grey, SANDSTONE FRAGMENTS products of chiselling. (PROBABLE BOULDER)	0.50	7.50		
8.00–8.22	C	*50				8.00		
				End of Borehole				

PROGRESS/GROUND WATER

Date	Time	Hole Depth	Casing Depth	Water Depth	Depth Struck	Depth After 20 min.	Depth Sealed
31.8.91	16.00	2.00	2.00	Dry	–	–	–
1.8.91	7.30	2.00	2.00	Dry	–	–	–
1.8.91	16.00	7.60	7.60	Dry	–	–	–
2.8.91	7.30	7.60	7.60	Dry	–	–	–
2.8.91	11.00	8.00	8.00	Dry	–	–	–

REMARKS

(1) *50-50 blows for 150mm penetration
**68-68 blows for 150mm penetration
(Including seating blows)
+50-50 blows for 225mm penetration
(2) N.R. Not Recorded.
(3) Water added during drilling.
(4) Chiselling from :
2.00 – 4.00m for 2.00hours.
4.00 – 7.60m for 2.50hours.
7.50 – 8.00m for 0.75hours.

BORING

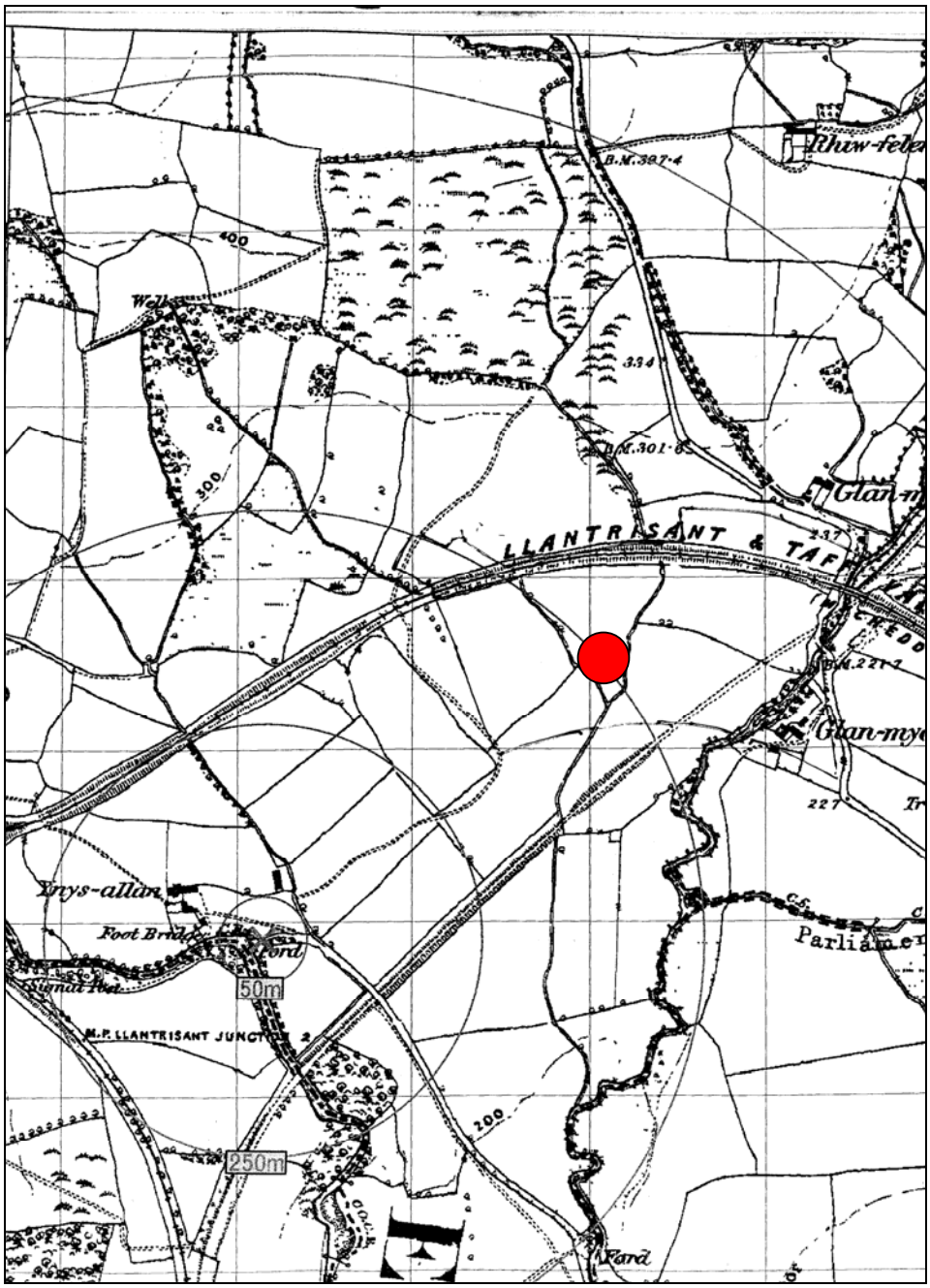
Plant: Dando 150

Type and Diameter	Depth
Light Cable Percussion 200mm	0–4.50
150mm	4.50–8.00

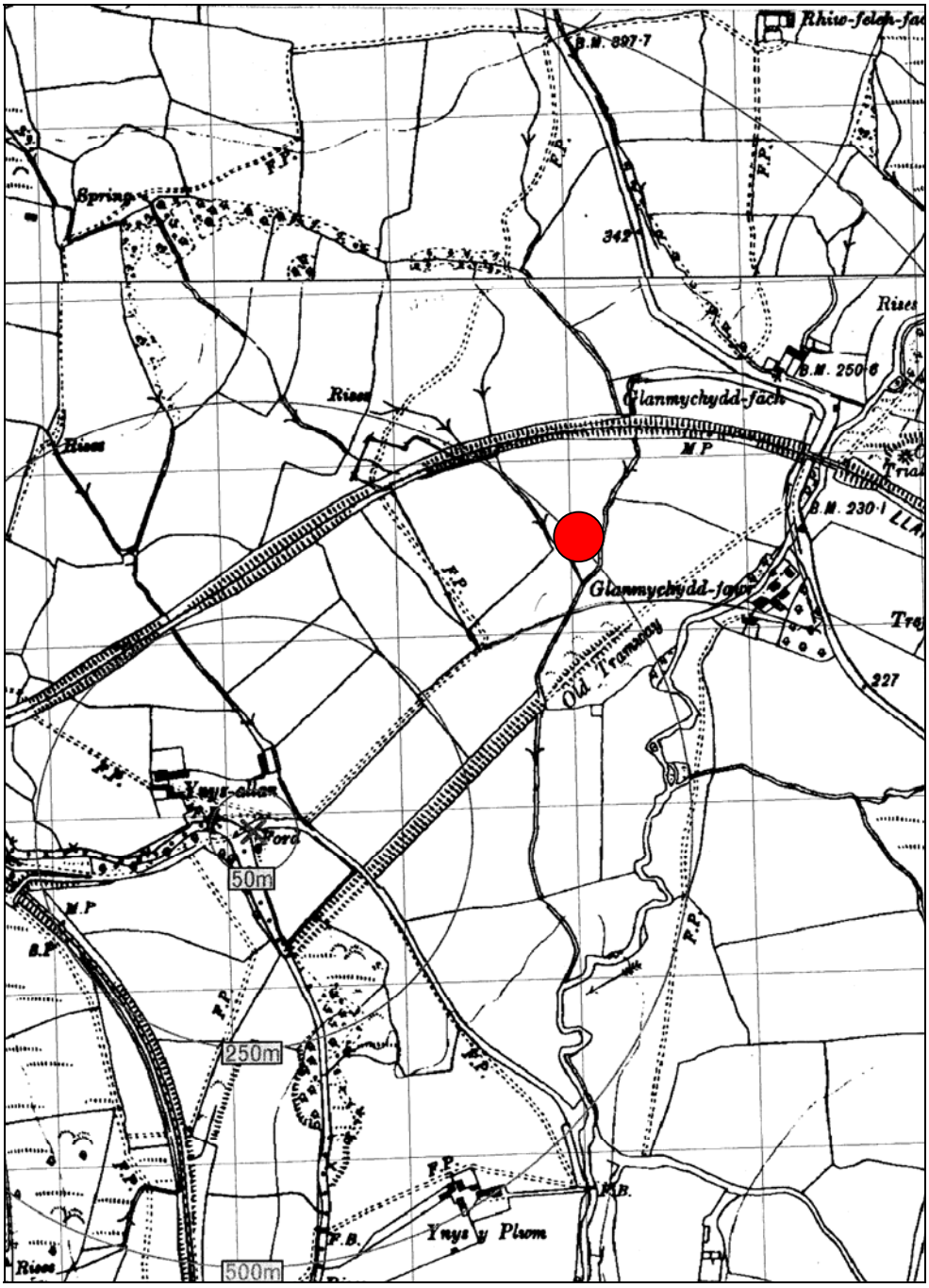
Start Date: 31.7.91
Finish Date: 2.8.91
Logged by: J.K.C.

C6 Other Information

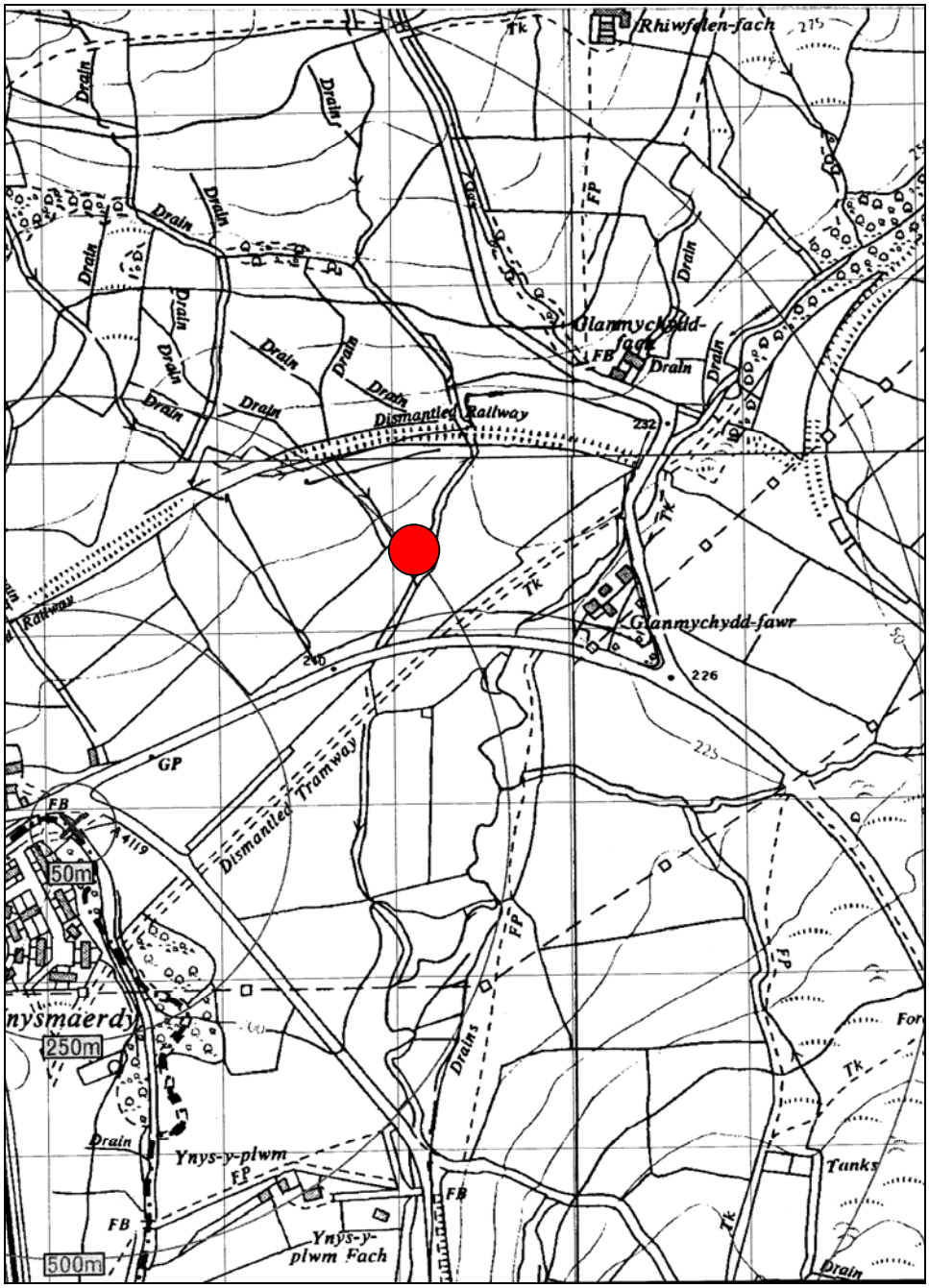
Historical Map: 1886



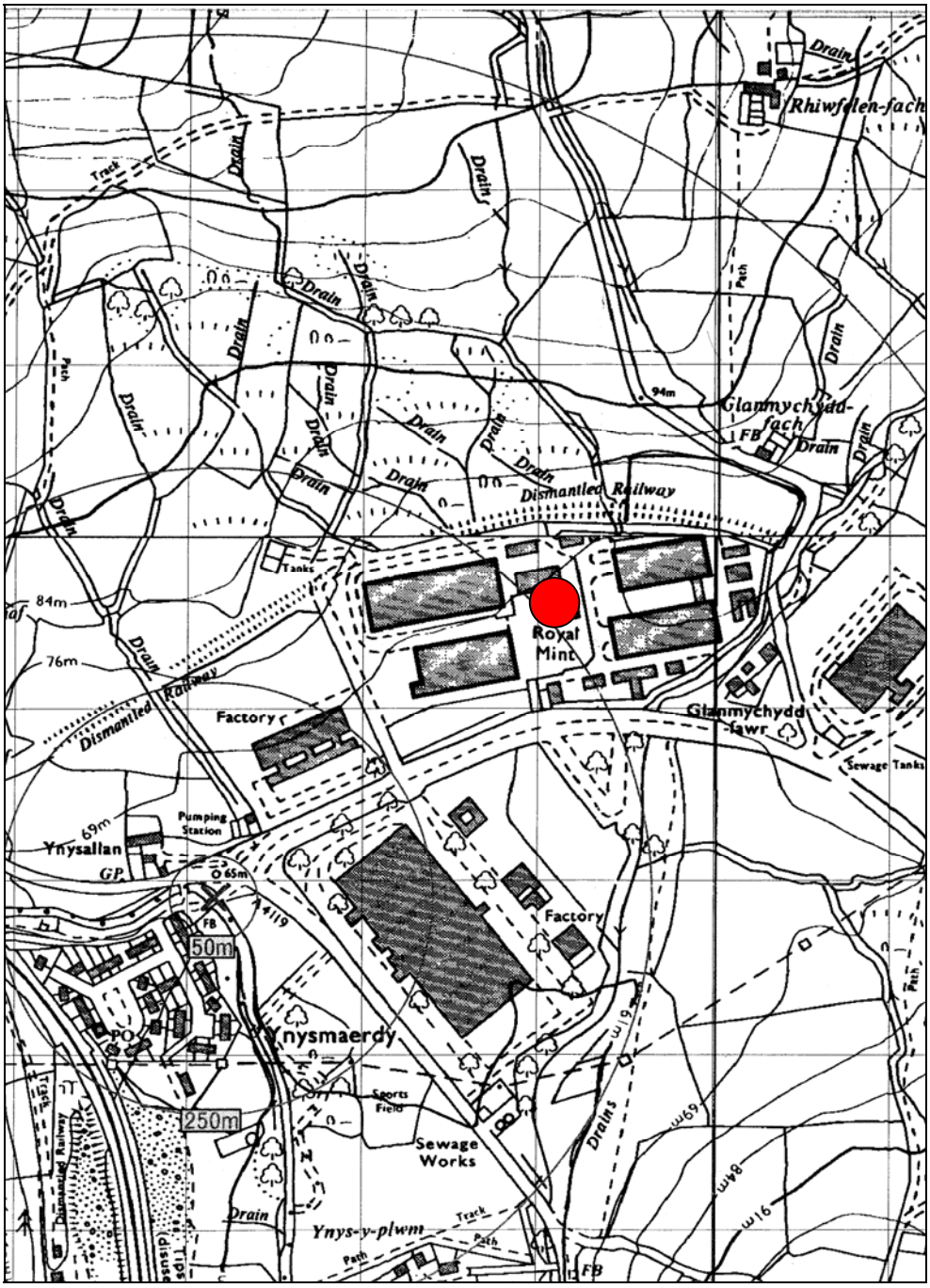
Historical Map: 1921



Historical Map: 1965



Historical Map: 1975



Appendix D - Data Assessment

D1 Potentially Polluting Substances

Please see main IPPC application report Section 2.4 'Material Inputs' and Section 2.5 'Waste Handling' for information concerning the raw materials in use/produced by the installation

D2 Assessment of Land Pollution Potential

Please see Table D2.

Appendix E - Conceptual Site Model

E1 Tabular CSM

Table 03 identifies the primary generic sources, pathways and receptors and summarises their relative sensitivities.

Table 3. Potential environmental pathways and receptors

(S) Source & (P) Pathway	Receptor	Sensitivity
(S) Surface water (P) Drainage system	River Nant Muchudd	MEDIUM/HIGH – surface water from the installation is directed into the adjacent watercourse.
(S) Trade effluent (P) Pipework	River Ely	LOW/MEDIUM – trade effluent from the site is discharged, under consent, to Coslech STW operated by Welsh Water.
(S) Trade effluent (P) Pipework	River Ely	LOW/MEDIUM – trade effluent from the site is discharged, under EA consent, to the River Ely.
(S) Emissions, noise & odour (P) Air emissions	Human receptors	LOW/MEDIUM - the closest residential area is approximately 400 metres southwest of the installation. There are various other industrial units operating within the area.
(S) Leaks & spills (P) Damaged site containment	Groundwater	MEDIUM – site is underlain by a minor aquifer. No abstractions close to the site.
(S) Emissions, noise & odour (P) Air emissions	Habitats	LOW – limited potential to impact receptor due to distance from site.

Potential sources of pollution, pathways and receptors which have been identified for the installation are shown in the conceptual model. The assessment of potential impacts and their significance upon the environment around the installation are discussed in more detail in the next section.

E2 Graphical CSM

Please see Figure 06 within main report.