Report

THE ROYAL MINT®
THE ORIGINAL MAKER

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Author	[redacted]
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The Royal Mint, Llantrisant, Pontyclun, CF72 8YT, United Kingdom **t: +44 (0)1443 222111 w: royalmint.com / royalmintbullion.com**

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1- Background

This report has been produced by The Royal Mint in accordance with the Environmental Permit EPR/KP3135KV condition 4.2.2, which requires the following:

A report or reports on the performance of the activities over the previous year shall be submitted to Natural Resources Wales by 31 January (or another date agreed in writing by the Natural Resources Wales) each year. The report(s) shall include as a minimum:

(a) a review of the results of the monitoring and assessment carried out in accordance with the permit including an interpretive review of that data.

(b) the annual production/ treatment data set out in schedule 4 table S4.2: and

(c) the performance parameters set out in schedule 4 table S4.3 using the forms specified in table S4.4 of that schedule.

2- Introduction

The review of The Royal Mint's performance for 2024 is presented in the context of a significant transformation in its operations. The pandemic has accelerated the decline of cash use around the world, this has meant that there is less demand for coins. Therefore, in April 2024, for financial reasons, the decision was made to stop making international circulatory coins. Following the decision, but in order to fulfil existing contracts, production of international circulatory coins continued for the remainder of 2024, however this occurred from a perspective of declining plant use and circulatory coin tonnages produced.

The volume of coinage produced during 2024 was 6,585 tonnes significantly less than the 11,271 tonnes produced in 2023. This reduction has impacted on the efficiency of KPIs being reporting by The Royal Mint.

The impact of the decision to stop making international circulatory coins on performance reporting includes:

- Emission point A10 was turned off at the end of March 2024 and not restarted.
- Emission point A9 was turned off at the end of March 2024, restarted 1st May, then turned off at the end of June and not restarted.
- The annealing furnaces, operating on one pass cooling water, were turned off on the 19th of July 2024 and from that period only a small amount of "process" water was discharged to controlled waters.

During 2024 The Royal Mint continued the process started in 2023 and reduced the inventory of chemicals on site, including removal of solutions in the plating plants no longer in operation.

The expected decommissioning of equipment, reported in the previous year's performance report, has not been undertaken as yet, but is now scheduled for 2025. Also, where possible, rather than being disposed of, plant will be sold on as operational equipment.

2.1 Permit Variation

As part of the transformation of The Royal Mint's business, on the 12th of January 2024 a consolidated permit was issued by Natural Resources Wales for the inclusion of the following activities at The Royal Mint:

- Receiving, storage and treatment of printed circuit boards for the recovery of gold.

During 2024, the installation and commissioning of the equipment required for the recovery operation, including processes for de-soldering, component / board separation, board shredding, chemical treatment and granulation and separation, took place.

At the time of producing this report, The Royal Mint was close to submitting a further permit variation to include a number of additional waste streams and the removal of emission points to air and processes associated with coin production plants that the site no longer requires.

3- Monitoring and Assessment

3.1 Emissions to Air

3.1.1 Permitted Emissions points A9 and A10

The Royal Mint's Environmental Permit requires the monthly monitoring of emissions from points described in the permit as A9 and A10, which control emissions to atmosphere from the Direct Brass Plating line.

3.1.1.1 A10 Sulphur dioxide

At the end of March with no orders for brass plating coins, as brass coins are only required for international markets, the brass plating line was turned off. As a result of the brass plating line being turned off, the emission point A10 was also turned off.

Therefore during 2024, A10 was monitored for a period of three months only and the results from each month for Sulphur dioxide were:

- 0.06 mg/m^3 (Jan),
- 2.6 mg/m^3 (Feb)
- 0.14 mg/m^3 (March).

The February reading was identified as exceeding the permitted level of 0.6 mg/m^3, the report of the exceedance, due to laboratory testing times, was not received at The Royal Mint until 05/03/24. NRW were immediately informed, on receipt of the report, via a schedule 5 notification, and an investigation was undertaken by The Royal Mint.
The probable cause was identified as blinding of the demister pads, which are located within the scrubber unit. The theory on the probable cause was to be confirmed during maintenance, following the March round of emission testing, which was undertaken on the 22/03/24. However, with the decision not to run the brass plating line further this maintenance task did not take place.

3.1.1.2 A9 Hydrogen Cyanide

The emission point A9, like that at A10 was turned off at the end of March. However, unlike A10 a decision to restart during May was made. This decision was made as treatment of plating solution via the ozone cyanide destruction plant was restarted.

During June, the effectiveness of using the ozone plant was reassessed, and the decision was made to turn off the plant at the end of that month. Offsite treatment for the cyanide solutions was used to dispose of the remaining solution. This decision resulted in A10 being turned off permanently.

Therefore during 2024, A9 was monitored for a period of five months and the results from each month for Hydrogen Cyanide were:

- < 0.06 mg/m^3 (Jan),

- < 0.06 mg/m³ (Feb),
- < 0.06 mg/m³ (March).
- 0.49 mg/m³ (May).
- < 0.057 mg/m³ (June).

3.1.2 Permitted Emission points A15.

The emission point A15 associated with Nickel Plating line 4 / Armour Plant 1 does not have any limits set for emissions to atmosphere within The Royal Mint's environmental permit.

Although there are no limits set, this emission point does have a minor impact on the environment, due to its limited emissions. This impact was eliminated in 2024 with the turning off of the plant and the removal of all solutions.

3.1.3 Permitted Emission Points A17-A27

The emission points A17-A27 are associated with annealing ovens and building vents in the annealing and pickling building. There are again no limits set on these emission points but again they can have a minor impact on the environment due to the emissions from them.
During 2024 the number of annealing furnaces in use was reduced to two operational furnaces and there will be a plan put in place to decommission and eventually remove the non-operational furnaces.

3.1.4 Permitted Emission Points A32, A33 and A34

The issuing of The Royal Mint's permit variation EPR/KP3135KV/V006 on 12th January 2024 introduced equipment which can process approximately 4,000 tonnes per annum of printed circuit boards and selected electronic and electrical equipment. This change brought about three new emission points that require annual monitoring.

3.1.4.1 A32 De-soldering / Depopulation Scrubbing Plant

The permit variation introduced the requirement to measure this emission point annually for:

- Particulate Matter limited to 5 mg/m³.
- Hydrogen bromide No limit set.

During 2024 installation, commissioning and refinement of the depopulation plant operation took place. The changes made to the plant did not create an opportunity for monitoring to take place during 2024.
The Royal Mint has engaged a contractor, with personnel holding the required MCERTS competency standard to conduct the required monitoring on the 29th / 30th January 2025.

3.1.4.2 A33 Surface gold reactor scrubbing plant.

The permit variation introduced the requirement to measure this emission point annually for:

- Particulate Matter limited to 5 mg/m³.
- Acetic acid No limit set.
- Hydrogen chloride No limit set.

As part of the initial equipment commissioning, monitoring of this emission point took place 29th July 2024 although at this point the operational controls had not been fully established.

The results obtained during that round of monitoring were:

Total Particulate 3.0 mg/m^3. Where the Measurement Uncertainty associated with the result was +/- 0.55 mg/m^3.

Acetic Acid < 0.01mg/m^3. Where the Measurement Uncertainty associated with the result was +/- 0.003 mg/m^3.

Chloride (as HCl) 0.57 mg/m^3. Where the Measurement Uncertainty associated with the result was +/- 0.05 mg/m^3.

Currently this plant and its associated emission point are not operational. The plant is undergoing identified improvements. Further monitoring will be undertaken following the commissioning / implementation of the improved equipment.

3.1.4.3 A34 Dust extraction from the board shredding operation scrubbing plant.

The permit variation introduced the requirement to measure this emission point annually for:

- Particulate Matter limited to 5 mg/m^3.
- Brominated flame retardants No limit set.

During 2024 installation, commissioning and refinement of the shredding operation took place. The changes made to the plant did not create an opportunity for monitoring to take place during 2024.

The Royal Mint has engaged a contractor, with personnel holding the required MCERTS competency standard to conduct the required monitoring on the on the 29th / 30th January 2025.

3.2 Emissions to Water

3.2.1 W1 One Pass Cooling Water

The Royal Mint's Environmental Permit requires that emission of one pass cooling water, to the river Ely, from the annealing furnaces and surface water is monitored by spot sample / 24-hour proportional sample monthly for the following parameters:

- Free Chlorine - limit 0.1 mg/l
- Suspended solids – limit 50 mg/l
- Temperature – limit 30 °C

The measurement of free chlorine and temperature are undertaken on site by The Royal Mint's analytical team.

The measurement of suspended solids is undertaken by an offsite UKAS and ISO 17025 accredited laboratory - Decus Research Limited based in Ammanford.

On the 19th of July 2024, the furnaces that use one pass colling water were turned off and the furnaces have been identified as equipment to be decommissioned. From the 19th of July 2024 to 31st December 2024 a limited amount of water (0.9 m^3) passed through the system. Monitoring of the discharge at the sample point for W1continued throughout 2024 and the range of measured parameters during the year were:

- Free Chlorine - 0.01 to 0.09 mg/l
- Suspended solids – >1.5 to 2 mg/l
- Temperature – 9.6 to 20.4 °C

The volume of one pass water, discharged to river during 2024 was 28,254 m^3 compared to 89,300 m^3 in 2023.

At the time of producing this report, in 2025, no process water has been discharged to river via emission point W1.

3.2.2 W2, W3, W5, W6, W7 Uncontaminated Surface Water from Roadways and Roofs

The Royal Mint's Environmental Permit requires that emissions of surface water from roadways and roofs to the Nant-Mychydd and river Ely are monitored by spot sample weekly for the presence of oil to confirm that none is present.

Drain checks are undertaken by The Royal Mint's security team weekly to identify if any oils are present. No oil was identified during the monitoring undertaken in 2024.

3.3 Emissions to Sewer

The Royal Mint's Environmental Permit requires that emissions to sewer are monitored by spot sample / hourly average monthly / continuously for the following parameters:

- Free Cyanide – limit 0.2 mg/l
- Copper and its compounds – limit 1.0 mg/l
- pH – limits: minimum 6 - maximum 11

As upstream production reduced in 2024, there was reduction in the volume of solution discharged to sewer. The 24 /7 - two tank batch discharge process, reduced firstly down to one tank discharging on a two by eight-hour shift basis, and then eventually one full time eight-hour shift and an ad hoc second shift as required.

The volume of solution discharged reduced from 45,373 m^3 in 2023 to 27,264 m^3 in 2024.

The changes in upstream production also changed the nature of the discharge to sewer, with reductions in the monitored parameters being reported:

- Free Cyanide – during the course of the year was reported as > 0.05 mg/l.
- Copper and its compounds – 0.0008 to 0.23mg/l
- pH – 8.1 to 9.2

The results are a summary of the results reported from sample supplied to the offsite UKAS and ISO 17025 accredited laboratory - Decus Research Limited based in Ammanford.

At the time of producing this report, the volume discharged to sewer in 2025 was approximately 68 m^3.

3.4 Performanace Parameters

3.4.1 Production Tonnage

Although the decision was made in April 2024 to stop making international circulatory coins, The Royal Mint will continue to fulfil its role to produce UK circulatory coinage. However, the demand for production of new UK circulatory coin is low (in 2024 no UK circulatory coin was produced). Therefore, the volume of coinage to be produced in 2025 is expected to be lower than the 6,585 tonnes produced in 2024.

3.4.2 Mains Water Use

There was a raise in mains water supplied to site during 2024, the volume of mains water supplied was 151,775 m^3 in 2024 compared with 121,014 m^3 in 2023. The raise in volume was due to leakages occurring in the aging below ground site pipework. The water supply volume is broadly comparable to 2022 (153,107 m^3) when leakages were last identified on site. Repairs have been completed and further investigation is planned to be undertaken in 2025 to reduce water losses further.

The mains water usage per tonne of circulatory coin produced approximately doubled during the year from 10.74 m^3 / tonne to 23.05 m^3 / tonne. This is in part to due to lower volumes of circulatory coin production, site leaks having an impact and water now being used in the developing new processes on site.

Based on the water use in last quarter of 2024, water use in 2025 is expected to be in the region of 95,000 m^3. This volume is predicted to be on the basis of no significant leaks occurring, however a leak has recently been identified between the Dwr Cymru Welsh Water meter and the site isolation valve that requires repair.

3.4.3 Water Abstracted from River

The Royal Mint has in place an abstraction licence WA/057/0031/002/R001 which permits abstraction of up to 657,000 m^3 per year from the river Ely.
In 2024 The Royal Mint abstracted 295,368 m^3, which was down on the 2023 figure of 320,620 m^3 but still greater than the 2022 figure of 174,061 m^3.
The abstraction point on the river Ely is approximately a quarter of a mile from The Royal Mint site. It is believed that there is a leak between the abstraction point and the site's water storage tanks, accounting for the high apparent water usage. The future use of and volume of abstracted river water required is being reviewed as part of the site operational changes and will determine when / where investigation work will take place.

3.4.4 Total Water Usage

The total water recorded as being used on site, slightly increased from 441,634 m^3 in 2023 to 447,143 m^3 in 2024. This continued the trend identified in the previous year and can be attributed to leaks as identified previously.
Work on repairing leaks as quickly as possible will continue during 2025. Also, as part of the decommissioning programme pipework will be isolated and cut back in areas where water use is no longer required. These actions along with the change in business operations are expected to reduce water use in 2025.

3.4.5 Electricity Use

The total energy use during 2024 was 20,151,922 kWh, which was a reduction on the 2023 figure, which was 21,840,382 kWh. This continued the downward trend seen in the previous year and this downward trend is expected to continue into 2025, due to the shutting down of the energy intensive plating processes.
However, the introduction of the printed circuit board waste receipt and treatment process will sightly impact the reduction, as the process begins to ramp up to its expected full output.

3.4.6 Electrical Energy Sources

The Royal Mint's electrical energy continues to come from a number of sources that are made up of:

3.4.6.1 Electrical Grid Supplied Electricity

The Royal Mint reduced the amount of electrical grid electricity used on site, partly due to the small reduction in total energy use, but also due to utilising more of the renewable and Combined Heat and Power sources as described below.
The amount of more of electrical grid electricity used in 2024 totalled 5,437,412 kWh, which reduced from 10,385,606 kWh used in 2023.

3.4.6.2 Wind Generated Electricity

There are two wind turbines located north of The Royal Mint site, which supply electricity to the site and additionally to the electrical grid, when site demand is lowered.

The amount of wind generated electricity used on site in 2024, increased from the previous year's amount of 1,165,280 kWh to 2,080,737 kWh

This increase in energy use / generation is mostly due to 2024 being the first full year of operation for the second wind turbine, which came on line in July 2023 and not fully operational until September 2023.

3.4.6.3 Solar Generated Electricity

The Royal Mint has a solar farm located north of the site, operated by a company called Infinite Renewables. The energy generated by the solar farm is used on site or exported to grid at low demand. In 2024 1,846,322 kWh, was used on site, which is broadly in line with predicted volume of energy obtained from this source.

3.4.6.4 Combined Heat and Power (CHP) Generated Electricity

2024 was the first year of full operation of the permanently sited CHP plant. The plant generated 10,787,451 kWh, which was higher than the figure generated in 2023, which was 8,280,826 kWh.

The CHP plant requires a certain amount of base loading to operate efficiently, The Royal Mint continues to manage operations to allow the CHP plant to work as efficiently as possible.

3.4.7 Gas Use

The volume of natural gas used by the site, which is gas used on site and excludes the gas supplied by the site to the Medium Combustion Plant, contained the trend seen in 2023 and was again less than the previous year. The volume of gas consumed in 2024 was 12,661,649 kWh compared to 15,488,014 kWh in 2023.

This reduction in gas use is a result of the decrease in gas required for the plating line plants processes and reductions in gas required in the creation of an inert atmosphere in the annealing furnace process.

With the expectation of reduced volumes of circulatory coins produced in 2025 the majority of gas use on site, will during most months in 2025 be for building heating only.

3.4.8 Total raw material used.

Total raw material reported on the form Performance 1, includes both ferrous and non-ferrous coins, metal anode material (brass and nickel) used in plating and blanks purchased for striking. With the decline and circulation coin produced the volume of this material received during 2024 was 5,674 tonnes.

The difference in material used and production tonnage is due to material as work in progress not accounted for at the start of the calendar year 2024.

3.4.9 CO_2 / Final Product Tonnage

The Carbon Dioxide equivalent / tonne of circulatory coin increased in 2024 to 753.88 Kg CO_{2e} / tonne from the 560.52 Kg CO_{2e} / tonne in 2023. The 2024 figure is still lower than that in 2022, which was 1,074.19 Kg CO_{2e} / tonne.

The 2024 increase is due to the lower tonnage produced in the year, but the impact of the use of more renewable and CHP energy in 2024 can be seen when compared with the 2022 figure, where there was only one wind turbine operating during the year and the temporary CHP and solar farm came online for only a limited part of that year.

The total Carbon Dioxide equivalent in 2024 was 4964 tonnes which was a reduction on the 6318 tonnes in 2023.

3.4.10 Total Wastage / Final Product Tonnage

The figures reported for wastage have been recorded from waste generated by the site's "traditional" functions and waste generated from equipment used in the waste recovery process (e.g. lab waste, filters and scrubber solutions).
The figures do not include waste removed for further processing, as part of the activities introduced for waste receipt and treatment to precious metal recovery, these are reported separately.

With the decline in circulatory coin, it has brought about some reduction in waste generation, but measures such removal of solutions and, stock right offs have kept the actual tonnage higher than would be expected during 2024. This trend is expected to continue during 2025 with plant decommissioning due to commence and further stock right offs taking place.

During the 2024 there was a reduction in the actual amount of waste produced and disposed of it was 4852.4 tonnes. This continues the downward trend identified in 2023, where in 2023 it was 7756.9 tonnes of waste produced and disposed of.

With the reduction in volume / tonnage of Circulatory Coin Produced, the waste per tonne of circulatory coin increased from 0.688 to 0.737 Tonne of waste / Tonne of circulatory coin. However, the figure of 0.688 was below that of 2022 which was 0.983 Tonne of waste / Tonne of circulatory coin.

Notable changes in waste generated and disposed of includes:

- There is an approximate reduction of 50% in the waste metal removed from site. In 2024 the volume removed totalled 2266 tonnes. The reduction has been brought about by the decline in the production of circulatory coinage and reject coinage produced as a result. Also, there was a reduction in the webbing, which is the remaining metal when the blanks have been struck out of the incoming coil / strip.
- The lower production volumes have resulted in lower flows through The Royal Mint's Effluent Treatment Plant, which in turn resulted in a reduction in the amount of filtercake produced.
  The volume produced reduced from 986.88 tonnes in 2023 to 506.12 tonnes in 2024.
- During 2024 around 300 tonnes of brass cyanide plating solution was generated. The majority of this waste stream was generated from the decommissioning / removal of the plating solution following the shutdown of the brass plating process.
- The Royal Mint in part due to the implementing the Waste Separation Requirements (Wales) Regulations 2023 and the lower circulatory coin production, saw a reduction in general waste / mixed municipal waste generated by the site. The waste removed as general waste / mixed municipal waste reduced from 432 tonnes to 223 tonnes.
  The segregated waste streams, of paper and cardboard and plastic, metal and cartons produced 31 tonnes of waste during the year.
- The reduced circulatory coin production brought about a reduction in the use of sulphuric acid on site. This in turn lead to a reduction of acid solution separated from the effluent treatment process and sent off site for disposal. In 2023 the volume of this acid effluent totalled 507 tonne and it 2024 it was 266 tonne.

3.4.11 WEEE waste received and its disposal.

As stated in the introduction, on the 12th of January 2024, a consolidated permit was issued by Natural Resources Wales for The Royal Mint to receive, store and treat printed circuit boards for the recovery of gold.

Since the issue of the permit variation The Royal Mint has received 923.85 tonnes of printed circuit board material and produced 723.62 tonnes of waste from the process, which has been transferred too other waste sites for further treatment / disposal.

4- Future Considerations

4.1 Normalising Data

During 2025 The Royal Mint is expected to produce either no or a limited amount of UK circulatory coin.
Therefore, the current permit reporting / normalising of data against circulatory coin tonnage will no longer be a valid indicator of The Royal Mint's operation. For this reason, The Royal Mint would like to identify with Natural Resources Wales a valid reporting matrix to replace that currently used.

5- Reporting Forms

These will be supplied separately to this report.