



**GS YUASA BATTERY MANUFACTURING UK
LIMITED
PERMIT NUMBER – EPR/BV5386IX
ASSESSMENT OF SAMPLING TECHNIQUES
DECEMBER 2017**



1. Introduction

Following a variation of Environmental Permit EPR/BV5386IX, this report has been produced to address the requirements of Improvement Condition Reference IC2 as follows:

Reference	Requirement	Date
IC 2	Submit a written plan to NRW assessing sampling techniques against ISO 5667. The plan must contain dates for the implementation of individual measures necessary to demonstrate adherence to ISO 5667. The notification requirements of condition 2.4.2 will be deemed to have been complied with on submission of this plan	6 months from issue (13/12/17) *

*Extension until 31/12/17 agreed with Natural Resources Wales.

The purpose of this report is to outline the current sampling techniques used by the operator and compare these with the requirements set out in ISO 5667 ensuring that any areas which are not as required are addressed and timescales for their implementation are agreed and set out.

2. Details of Point Source Emissions and Monitoring Requirements

As detailed in Environmental Permit EPR/BV5386IX, there is a point source emission to water from uncontaminated site drainage (reference W1), and point source emissions to sewer from site effluent treatment plants at Factories 1 and 2 (reference S1) and Factory 4 (reference S2).

Monitoring requirements for the point source emissions are detailed below (taken from Table S3.2 and Table S3.3 of Environmental Permit EPR/BV5386IX):

Table S3.2: Point Source Emissions to Water (Other than Sewer) and Land Emissions Limits and Monitoring Requirements

Emission point ref. and location	Source	Parameter	Limit	Ref. Period	Monitoring frequency	Monitoring standard or method
W1 on site drainage plan received 03/03/05 discharging to Cwm Nant Mellyn	Uncontaminated site drainage	-	-	-	-	-

Table S3.3: Point Source Emissions to Sewer, Effluent Treatment Plant or Other Transfers Off-Site; Emission Limits and Monitoring Requirements

Emission point ref. and location	Source	Parameter	Limit (incl. unit)	Reference Period	Monitoring frequency	Monitoring standard or method
S1	Site effluent treatment plant at Factory 1 and 2	Lead and its compounds expressed as Lead (Total Pb)	10 mg/l	Spot Sample	Weekly	BS ISO 17294 – 2:2003. BS 6068 – 2.89
		Cadmium and its compounds expressed as Cadmium (Total Cd)	0.01 mg/l		Annual	See footnote 1
		Mercury and its compounds, expressed as Mercury (Total Hg)	0.005 mg/l		Annual	See footnote 1
		pH	6 - 11		Daily	-
S2	Site effluent treatment plant at Factory 4	Lead and its compounds expressed as Lead (Total Pb)	5 mg/l	Spot Sample	Weekly	BS ISO 17294 – 2:2003. BS 6068 – 2.89
		Cadmium and its compounds expressed as Cadmium (Total Cd)	0.01 mg/l		Annual	See footnote 1
		Mercury and its compounds, expressed as Mercury (Total Hg)	0.005 mg/l		Annual	See footnote 1
		pH	6 - 11		Daily	-

¹ Compliance based on mass balance calculation

Monitoring data is reported to Natural Resources Wales (NRW) on a quarterly basis as detailed in Table S4.1 of Environmental Permit EPR/BV5386IX.

3. Assessment Against ISO 5667

The operator takes daily samples of uncontaminated site surface water drainage (emissions point reference W1) and of effluent discharge from the two trade effluent plants (emissions points reference S1 and S2). Quarterly samples of the trade effluent (emissions points reference S1 and S2) are sent to ALS Environmental Limited in Coventry for independent analysis. The quarterly samples are analysed for all determinants required by the Environmental Permit and in addition Benzene and Polycyclic Aromatic Hydrocarbons (PAHs).

Table 1 and Table 2 below details the requirements of ISO 5667 and confirms how GS Yuasa Battery Manufacturing Limited (GS Yuasa) ensures adherence to the standards. Assessment has been carried out against the following standards:

- ISO 5667 Part 1: Guidance on the design of sampling programmes and sampling techniques
- ISO 5667 Part 3: Preservation and handling of water samples

Both standards have been reviewed and the relevant sections which would relate to the sampling carried out by GS Yuasa have been identified and assessed below:

Table 1 - ISO 5667 Part 1: Guidance on the Design of Sampling Programmes and Sampling Techniques

ISO 5667 Part 1 Section	ISO 5667 Part 1 requirement	GS Yuasa Methodology	Improvements Required	Date of Implementation
5 Design of sampling programmes	The samples collected should be as representative as possible of the whole to be characterized, and all precautions should be taken to ensure that, as far as possible, the samples do not undergo any changes in the interval between sampling and analysis.	Trade Effluent is sampled from the pipe before the final release point. The valve is opened, and effluent is allowed to flow for some time before sampling to ensure that a representative sample of the final effluent is obtained. Surface water samples are taken with a long stick with cup attached to the end. Each individual drain has a new bottle for the sample each time and the cup is thoroughly cleaned with de-ionised water between samples. Samples are sent to the laboratory for analysis as soon as possible. In general,	No improvements required	N/A

		samples will be taken from across the site in a round and will then be sent for analysis. However, this will not cause such a delay as to allow samples to deteriorate before analysis.		
5 Design of sampling programmes	Quality control measurements within water or waste water treatment plants used to decide when short term process corrections are required;	Both effluent treatment plants are checked and sampled daily to ensure that they are operating to the required standards. Any issues identified will be resolved at the time and effluent will not be released until the problem is corrected and samples demonstrate that pollutant concentrations are within the required limits for discharge.	No improvements required	N/A
5 Design of sampling programmes	Identification and control of sources of contamination.	New sample bottles are used for sampling of trade effluent and surface water which are to be sent to the external laboratory for analysis. For in-house analysis, due to the frequency of sampling, containers are re-used to avoid waste and are cleaned and prepared using hot water washing followed by cold water rinsing. Sampling equipment is thoroughly cleaned using de-ionised water before and between samples to prevent contamination. Blank samples containing de-ionised water are used to identify any potential contamination issues.	No improvements required	N/A
6 Characteristics and conditions affecting sampling	Sampling programmes should be designed to take into account temperature variation over long or short periods, which can cause changes in the nature of the sample that can affect the effectiveness of equipment used for sampling.	Samples are taken daily and therefore; temperature variations are already accounted for due to the frequency of sampling.	No improvements required	N/A

8 Time and frequency of sampling	Samples should be taken at times which will adequately represent the quality and its variations with minimum effort. The sampling programme should be designed to account for seasonal and diurnal cycles and consider business week cycles, random or transient events, and long-term persistence or trends.	The site is in operation 24 hours a day and as such there are limited cycles which should affect effluent quality. Samples are taken at various times of the day, however, due to staff working patterns, samples are generally taken in the morning.	No improvements required	N/A
11 Sampling equipment	The sample container should be designed to preserve the composition of the sample from losses due to adsorption and volatilization, or from contamination by foreign substances.	Samples are taken in PTFE and glass bottles which are specifically manufactured for effluent samples and designed to preserve the composition of the sample. Samples sent to external laboratory are taken in sample bottles provided by the laboratory.	No improvements required	N/A
12 Sampling equipment for physical or chemical characteristics	Spot samples are usually taken manually. The simplest equipment for taking surface samples is a bucket or wide-mouthed bottle dropped into a body of water and hauled out after filling. The nature of the problem being studied should determine the type of sample that needs to be collected. In general, it is best to take the sample directly into the sample container.	Surface water samples are taken direct from the surface water manhole pot using a long stick with a cup attached to the end. Trade effluent samples are taken direct into the bottles, they are filled to the top and caps are cleaned with de-ionised water before sealing the bottles.	No improvements required	N/A
13 Avoidance of contamination	Control and identification of contamination can be achieved by the following actions, where appropriate: a) adopting a philosophy of maximizing the degree of isolation for the sample bottle from contamination, which produces better quality data; b) taking care to avoid disturbance at the sampling site; c) thoroughly rinsing the equipment;	New sample bottles are used for sampling of trade effluent and surface water which are to be sent to the external laboratory for analysis. For in-house analysis, due to the frequency of sampling, containers are re-used to avoid waste and are cleaned and prepared using hot water washing followed by cold water rinsing.	No improvements required	N/A

	d) rinsing the funnel inside and out after sub-sampling preserved samples; e) rinsing the barrel of the syringe and filter medium before use; f) storing bottle caps and tops securely to avoid contamination; g) wiping and drying ropes, chains or extension handles between sampling and prior to storage; h) avoiding touching the sample itself with fingers, hands or gloves; this is particularly important during microbiology sampling where no contact should be made with the interior or rim of the bottle or the cap; i) ensuring that all ice augers, vehicles and boats are well downwind (and downstream in the case of boats), allowing a few minutes for exhaust gases to dissipate; j) examining each sample or sample bottle for large particles such as leaves or detritus; if these are observed, discard the sample and collect a new sample; k) using suitable quality assurance techniques as outlined in ISO 5667-14.	Sampling equipment is thoroughly cleaned and rinsed using de-ionised water before and between samples to prevent contamination. Caps are cleaned with de-ionised water before sealing the bottles, and bottles are cleaned with de-ionised water before transportation and storage. Blank samples containing de-ionised water are used to identify any potential contamination issues.		
14 Transport to, and storage of samples at, the depot or laboratory	If the samples are to be exposed to excessive heat, i.e. contained in the sampling vehicle in hot conditions, then the samples (or those sub-samples prone to heat degradation) should be cooled.	ALS Laboratories which undertakes the external analysis, use refrigerated vans for transporting samples to the laboratory. Internal on-site samples are not currently cooled between sampling and analysis	Samples are to be stored in a cool box with ice packs between sampling and analysis.	By 31 December 2017

14 Transport to, and storage of samples at, the depot or laboratory	Samples that cannot be delivered to the laboratory within a day should be stabilized or preserved in accordance with the provisions of ISO 5667-3 or with alternative suitable preservation techniques as agreed with the laboratory. It is the laboratory's responsibility to ensure storage is suitable after the samples have been delivered. A system should be in operation that clearly identifies to the laboratory courier which samples and associated paper work are for transmission to the laboratory.	Samples are scheduled to be collected by the external laboratory and transported for analysis on the same day as the sample is taken. Therefore, no preservatives are used. Internal on-site samples are also analysed on the same day as they are taken, and hence do not require preservatives.	No improvements required	N/A
14 Transport to, and storage of samples at, the depot or laboratory	All preservation steps should be recorded in the report and the temperature measured and recorded on site, if appropriate. Ideally other physical and chemical parameters (e.g. pH value) should be determined on site or as soon as possible afterwards.	Samples are scheduled to be collected by the external laboratory and transported for analysis on the same day as the sample is taken therefore no preservatives are used. Internal on-site samples are also analysed on the same day as they are taken, and hence do not require preservatives. pH values are measured and recorded at the time of sampling.	No improvements required	N/A
15 Sample identification and records	The source of the sample and the conditions under which it was collected should be recorded and a suitable record attached to the bottle immediately after filling. A water analysis is of limited value if it is unaccompanied by detailed information about the sample.	Date / time / sample ID are recorded on sample bottles, and these details, along with the weather conditions at the time of sampling are recorded on the daily monitoring information sheet.	No improvements required	N/A

15 Sample identification and records	The results of any on-site analyses carried out should also be included in a report with the sample. Labels and forms should always be completed at the time of sample collection. The sampler should never move on to another task before completing all documentation at a site.	Required information on the sample is recorded on the chain of custody sheet which can be seen in Appendix B . pH analysis results are recorded on the daily monitoring information sheet at the time of sampling.	No improvements required	N/A
15 Sample identification and records	The sampling report should include at the least the following information: a) location and name of sampling site, with coordinates and any other relevant locational information; b) details of sampling point, including kind of sample (e.g. water intended for human consumption, waste water), c) date of collection; d) time of collection; e) name of sample collector; f) sample type (e.g. single sample, composite sample); g) weather conditions; h) field observations; i) water temperature; j) nature of any pretreatment including preservation; k) method of collection and any details of non-compliance with standard conditions or sampling practices (e.g. sample collected through ice, seasonal observations, land-based activities).	Date / time / sample ID are recorded on sample bottles, and these details, along with the weather conditions at the time of sampling are recorded on the daily monitoring information sheet. As the samples are taken daily and are consistent in the kind of sample; sample type; nature of pre-treatment and method of collection, this information is not recorded unless there is a change to be detailed. No water temperature is recorded at the time of sampling.	Operator to review the options for taking sample temperature at the time of sampling and to implement temperature monitoring into the sampling procedure.	By 31 December 2017

Table 2 - ISO 5667 Part 3: Preservation and Handling of Water Samples

ISO 5667 Part 3 section	ISO 5667 Part 3 requirement	GS Yuasa Methodology	Improvements Required	Date of Implementation
4 Sampling and chain of custody	All preparation procedures shall be checked to ensure positive or negative interferences do not occur. As a minimum, this shall include the analysis of blanks (e.g. field blank or sample container) or samples containing known levels of relevant analytes as specified in ISO 5667-14.	New sample bottles are used for sampling of trade effluent and surface water which are to be sent to the external laboratory for analysis. For in-house analysis, due to the frequency of sampling, containers are re-used to avoid waste and are cleaned and prepared using hot water washing followed by cold water rinsing. Sampling equipment is thoroughly cleaned and rinsed using de-ionised water before and between samples to prevent contamination. Caps are cleaned with de-ionised water before sealing the bottles and bottles cleaned with de-ionised water before transportation and storage. Blank samples containing de-ionised water are used to identify any potential contamination issues. Bottles and chain of custody sheets for samples to be sent to external laboratory are provided by the laboratory.	No improvements required	N/A
5 Reagents and materials	Preservation and storage conditions identified for Lead samples – Acidify to pH 1 to pH 2 with Nitric acid (HNO₃) Nitric acid ($\rho \approx 1,42 \text{ g/ml}$), HNO₃, $w(\text{HNO}_3) > 65 \%$, $c(\text{HNO}_3) = 15,8 \text{ mol/l}$.	Samples are scheduled to be collected by the external laboratory and transported for analysis on the same day as the sample is taken therefore no preservatives are used. Internal on-site samples are also analysed on the same day as they are taken, and hence do not require preservatives.	No improvements required	N/A

6 Containers	For normal conditions, PTFE is recommended for Lead sampling.	Samples are taken in PTFE and glass bottles.	No improvements required	N/A
6 Containers	The container shall be filled completely unless prescribed differently in Tables A.1 to A.3 or the analytical International Standard used. If no preservatives are present in the bottle, then pre-rinsing the bottle may be advisable.	Effluent samples are taken directly into the bottles, they are filled to the top and caps are cleaned with de-ionised water before sealing the bottles. Surface water samples are taken with a long stick with cup attached to the end. Bottles are filled to the top and caps are cleaned with de-ionised water before sealing the bottles. Sample bottles are not pre-rinsed before sampling.	Operator to add pre-rinsing of sample bottle before sampling into sampling procedure.	By 31 December 2017
8 Sample transport	Cooling or freezing procedures shall be applied to samples to increase the time period available for transport and storage and if required.	ALS Laboratories who undertake the external analysis use refrigerated vans for transporting samples to the laboratory. Internal on-site samples are not currently cooled between sampling and analysis.	Samples are to be stored in a cool box with ice packs between sampling and analysis.	By 31 December 2017
8 Sample transport	During transportation samples shall be stored in a cooling device capable of maintaining a temperature of $(5 \pm 3) ^\circ\text{C}$. For proper evaluation of the conditions during transport a device capable of recording the (maximum) temperature of the air surrounding the sample may be used.	ALS Laboratories who undertake the external analysis use refrigerated vans for transporting samples to the laboratory. Internal on-site samples are not currently cooled between sampling and analysis.	Samples are to be stored in a cool box with ice packs between sampling and analysis.	By 31 December 2017
9 Identification of samples	Container labels should withstand wetting, drying and freezing without detaching or becoming illegible. The labelling system shall be waterproof to allow use on site. In all cases, an indelible label shall be secured to the sample container.	Sample bottles are marked with the required information using a permanent marker pen. Samples for analysis at the external laboratory are marked with labels provided by the laboratory which are waterproof and can withstand wetting, drying and freezing.	No improvements required	N/A

9 Identification of samples	For each sample, at least the following information shall be available. A unique identifier, traceable to — date, time and location of sampling; — sample number; — description of sample; — name of sampling personnel; — details of sample preservation, or fixation used; — details of sample storage used; — any information regarding integrity and manipulation of the sample; — any other information, as necessary. A unique identifier, traceable to sample date, location, and sample number shall appear on the label of the sample container. All other information is supplementary and should be detailed in the sample report.	Date / time / sample ID are recorded on sample bottles, and these details, along with the weather conditions at the time of sampling are recorded on the daily monitoring information sheet. As the samples are taken daily and are consistent in the kind of sample; sample type; nature of pre-treatment and method of collection, this information is not recorded unless there is a change to be detailed. No water temperature is recorded at the time of sampling.	Operator to review the options for taking sample temperature at the time of sampling and implement temperature monitoring into the sampling procedure.	By 31 December 2017
11 Sample storage	Samples for Lead analysis shall be stored no longer than 6 months	A 1 litre sample is kept for approximately 6 months after sampling.	No improvements required	N/A

Copies of the GS Yuasa procedure for trade effluent sampling, Lead analysis and pH calibration can be found in **Appendix A**.

Copies of the ALS Environmental Limited accreditation certificate and chain of custody can be found in **Appendix B**.

4. Summary

GS Yuasa Battery Manufacturing UK Limited undertakes regular internal sampling to meet the requirements of and to demonstrate compliance with their Environmental Permit. The process on site operates for 24 hours a day and this results in the input to the effluent treatment plants being relatively constant. As such, this allows a sampling programme and methodology to be carried out with minimum changes over time.

Daily samples are taken of trade effluent and weekly samples taken of uncontaminated surface waters, with quarterly samples of both being sent to UKAS accredited laboratory ALS Environmental Limited in Coventry for external analysis.

Assessment against the standards detailed in ISO 5667 has shown that the majority of the requirements are being met through the current sampling procedures which can be seen in **Appendix A**. Areas where improvements are required are shown below:

Internal on-site samples are not currently cooled between sampling and analysis. In order to meet this requirement, GS Yuasa will update their sampling procedures to ensure that samples are stored in a cool box with ice packs between sampling and analysis. This will be implemented by **31 December 2017**.

No water temperature is recorded at the time of sampling. In order to meet this requirement, GS Yuasa will review the options for taking the sample temperature at the time of sampling, and will implement temperature monitoring into the sampling procedure. This will be implemented by **31 December 2017**.

Sample bottles are not pre-rinsed before sampling. In order to meet this requirement, GS Yuasa will add the pre-rinsing of sample bottles before sampling into the sampling procedure. This will be implemented by **31 December 2017**.

Natural Resources Wales shall be updated when the improvements have been implemented.

Appendix A – Sampling Procedure

*GS YUASA BATTERY MANUFACTURING UK LTD					
Operator Instruction	Ref.	EV OI 492	Issue No.	1	Official Stamp
	Page No.	1 of 3			
Process. Sampling, processing, preservation and storage of trade effluent water samples	Issue Date	12.12.2017			

	Plant Manager	Quality Manager
Signature		
Date		

Issue Level	Issue Date	Amendment Detail Record
1	12/12/17	First issue.

All samples of trade effluent obtained for analysis must be taken from a point in the wastewater stream that is representative of the whole stream composition. This is normally just after the “V” Notch discharge point located at either effluent plant S1 or S2, as appropriate.

The volume of sample taken must be sufficient to allow for analysis of all required analytes plus associated quality control samples e.g. field blank, see below.

1. Internal sampling and analysis

It is the user's responsibility to demonstrate that the sampling equipment is clean, free from contamination and suitable for use. Generally, new containers are considered to be clean, however, containers which have previously been used, must be cleaned and prepared using hot water washing followed by cold water rinsing. Each sample must be clearly identified with the time and date the sample is taken, the actual temperature of the water and its location.

2. External sampling and analysis

It is the responsibility of the external laboratory to provide sampling equipment which is clean, free from contamination and suitable for use, however, the person undertaking internal sampling, shall confirm this by performing a simple basic visual examination to ensure the container(s) is/are clean.

The external laboratory shall also provide “Chain of Custody” documentation which shall be followed by the person undertaking the internal sample which is applicable from receipt of the clean, empty containers through to the point of sending to the external analysis laboratory.

3. Health and Safety Considerations Prior to the Taking of Internal Trade Effluent Samples

Wear the required personal protective equipment (PPE) as required by trade effluent sampling safe working method ENSWM 29.

4.1 On-Site Trade Effluent Sampling Protocol

Sampling, preservation and storage for wastewater for analysis is fulfilled by manual sampling using the appropriate clean plastic container.

A grab sample may be taken from after the “V” Notch at either effluent plant S1 or S2 and collected into the appropriate laboratory container by holding it at an angle, submerged into the liquid until it is full and air bubbles have been expelled, at which time it is carefully retrieved, capped and labelled with all appropriate information.

Care must be taken to avoid sample contamination from the outside of the container.

In cases where independent trade effluent samples are taken for external analysis, such as by Dwr Cymru or ALS Laboratories, an internal sample shall also be taken from one continuous effluent stream to ensure representative water sample(s) are obtained.

A field blank shall also be taken for every sampling run performed.

All samples shall be clearly identified immediately with the time and date the sample was taken, temperature of the water and the location it has been taken from.

4.2 Preservation and Storage

Each sample collected shall be placed into a thermally insulated cool carrying bag which shall be closed between sample collections and the cool bag shall be kept in the refrigerator when not in use so as to be immediately available for use.

It shall be taken to the water treatment plant as soon as possible where the sample(s) may be removed from the bag and placed inside a refrigerator which must be maintained at a temperature of around 10° c.

Samples stored in the water treatment plant are unlikely to reach freezing point.

Where possible, internal samples shall be analysed immediately, or as soon as is reasonably practicable after.

The same shall apply to external trade effluent samples which shall be returned to the analysis laboratory as quickly as possible.

Depending on the number and type of samples to be collected, each may be dedicated to a specific type of analysis.

5. Record Keeping

For internal sampling, the appropriate company documentation shall be completed whilst external sampling shall be the subject of a report prepared and sent by the external water analysis company.

In cases where electronic records apply, these shall also be suitably updated paying attention to any limits set by the site environmental permit and/or Water Company Discharge Consent Limits. (See Operational Control Procedure EVQP-HSE203 for full details)

6. Calibration

All analytical equipment used on site must be calibrated in accordance with good laboratory practice and shall be included in the company Inspection, Measuring and Test Equipment procedure EVQP-QA 206.

Appendix B – UKAS Accreditation Certificate and Chain of Custody Sheet

United Kingdom Accreditation Service

ACCREDITATION CERTIFICATE



**TESTING LABORATORY
No. 1314**

ALS Environmental Ltd - Coventry

is accredited in accordance with the recognised International Standard ISO/IEC 17025:2005
General Requirements for the competence of testing and calibration laboratories.

This accreditation demonstrates technical competence for a defined scope as detailed in and at the locations
specified in the schedule to this certificate, and the operation of a laboratory quality management system (refer
joint ISO-ILAC-IAF Communiqué dated January 2009).

The schedule to this certificate is an essential accreditation document and from time to time may be revised and
reissued by the United Kingdom Accreditation Service. The most recent issue of the schedule of accreditation,
which bears the same accreditation number as this certificate, is available from the UKAS website
www.ukas.com.

This accreditation is subject to continuing conformity
with United Kingdom Accreditation Service requirements. The absence of a schedule on the UKAS website
indicates that the accreditation is no longer in force.



Accreditation Manager, United Kingdom Accreditation Service

Initial Accreditation date
14 January 1993

This certificate issued on
08 February 2013

UKAS is appointed as the sole national accreditation body for the UK by The Accreditation Regulations 2009 (SI No 3155/2009) and
operates under a Memorandum of Understanding (MoU) with the Department for Business, Innovation and Skills (BIS).

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