

Technical Note

Project name **EFW CLEAN WtE Facility Brisbane (AU)**
Subject **Technical Note – BERC OCG QH RFI Responses**
Project no. **1100049472**
Client **Cleanaway**
Memo no. **REN2021N00922-RAM-ME-00028**
Version **2.0**
To **Michael Hartley**
From **Anthony Douglas**
Copy to **Marc Revault, Geert Stryg, Anna Stewart**

Prepared by **ADOUGLAS**
Checked by **ADORMER**
Approved by **MREVAULT**

Revision History:

- 1.0 Issued for Client use
- 2.0 Re-issued for Client use

Date 2026/07/22

Dear Michael,

Ramboll Australia Pty Ltd (Ramboll) has reviewed the Request for Information (RFI) from Queensland Health received from the Office of the Coordinator-General (OCG) relating to the Bromelton Energy from Waste Facility – Waste Feedstock Report (reference BERC-ARU-BNE-SYWP-RPT-0002, revision C) and Resource and Waste Management technical report (reference BERC-ARU-BNE-WEWM-RPT-0001, revision C) and the Technical Process Description report.

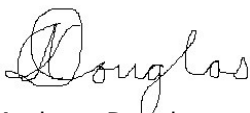
Ramboll attended a meeting with OCG and Queensland Health, Cleanaway and ARUP, on 15 June 2026 to discuss responses to the RFI. Ramboll now wish to formalise the responses to RFI items 42 and 43 in this Technical Note.

Ramboll
Level 2, 696 Bourke Street
Melbourne VIC 3000
Australia

<https://ramboll.com>

If you have any questions, please do not hesitate to contact the undersigned.

Kind regards,



Anthony Douglas
Senior Consultant

Responses to Queensland Health Request for Information

**RFI Item
No. 42**

Issue: Process for removing hazardous waste

Information Requested

The waste feedstock report (reference BERC-ARU-BNE-SYWP-RPT-0002, revision C) and resource and waste management technical report (reference BERC-ARU-BNE-WEWM-RPT-0001, revision C) submitted as part of the application material contain criteria for acceptable waste feedstock. It has not, however, been documented how these criteria will be applied in practice to manage unacceptable waste appropriately. Documentation related to this process should demonstrate that hazardous waste will be appropriately separated from other acceptable waste.

The proponent is requested to submit a revised waste acceptance protocol and feedstock report including the process for separating waste types, including frequency of separation and controls used to ensure hazardous waste will be extracted.

Response

The BERC is not designed or permitted to accept hazardous waste and contractual arrangements with waste suppliers explicitly prohibit the delivery of any material classified as hazardous under applicable legislation.

The Waste Acceptance Protocol establishes a comprehensive contractual framework to ensure that only Acceptable Waste is received and processed at the BERC. Further details on how the controls in the Waste Acceptance Protocol will be implemented in practice are provided below.

Pre-acceptance and contractual controls

- All waste suppliers (e.g. municipal councils, institutions and businesses) are subject to pre-qualification and must enter into Waste Supply Agreements that:
 - Require demonstration that the waste stream is residual and not technically, environmentally or economically practicable to reuse or recycle (TEEP test), consistent with regulatory requirements;
 - Require documented verification of waste classification and composition; and
 - Mandate periodic independent audits e.g. at the suppliers' site or at the transfer station, random inspection of waste loads (as described below under 'Inspection and verification procedures') and quality assurance/quality control (QA/QC) verification of the waste stream.
- These agreements explicitly prohibit the supply of Unacceptable Waste, including hazardous waste, and include enforcement provisions such as audits and compliance reviews. In addition, Waste Supply Agreements typically include terms under which responsibility for the collection, recovery, and appropriate disposal of Unacceptable Waste remains with the waste supplier, who bears all associated costs.

Site entry controls and initial screening

- Upon arrival, all Authorised Delivery Vehicles are:
 - Identified and weighed at the weighbridge; and

- Subject to radiation detection monitoring, with any load exceeding threshold levels diverted to a dedicated quarantine and pre-inspection area for assessment and potential rejection.
- Vehicles may then be directed either to a tipping bay or to a designated inspection or quarantine area depending on risk factors and inspection requirements. There is a designated quarantine and pre inspection bay in the north-west portion of the decoupling area.

Inspection and verification procedures

- The Waste Acceptance Protocol includes multiple inspection layers to identify Unacceptable Waste:
 - Periodic random pre-inspection: Visual checks of selected loads prior to tipping;
 - Waste inspection area: Where feasible, loads can be tipped onto the floor in a designated waste inspection area of the waste reception hall for detailed inspection where required;
 - Post-tipping inspection: Waste will also be visually inspected within the bunker by crane operators and via a closed circuit TV (CCTV) monitoring system.
- If Unacceptable Waste is identified at any stage, the load or relevant fraction is segregated and rejected.

Rejection, quarantine and removal

- While inspections are undertaken, the delivery vehicle will be required to remain on site under controlled conditions. If hazardous waste or non-conforming material is identified, the load will either be rejected in its entirety or the hazardous fraction will be isolated and removed from the load, with the remainder (if uncontaminated) deposited into the waste bunker at the discretion of the operations staff. Rejected loads will be taken off-site by, and at the expense of the waste supplier for lawful disposal at an appropriately licensed facility. Thus providing a contractual incentive not to bring Unacceptable Waste to the BERC.
- This process ensures that hazardous waste is not accepted into the facility and provides a clear enforcement mechanism to maintain feedstock compliance. In addition, the rejection process supports continuous improvement by ensuring that suppliers are informed of non-conformances, enabling corrective actions and reinforcing compliance expectations across the waste supply chain.

Waste bunker monitoring and secondary control

- All waste within the bunker is subject to continuous visual inspection and monitoring using crane operators and CCTV. Upon detection, supplier/delivery details can be logged, and the grab crane can be used to remove the material from the bunker to a skip in the backloading bay for inspection and if necessary, removal from site for alternative resource recovery, resizing via the onsite bulky waste shredder or landfill disposal, if the material is found to be unacceptable waste.
- Operators are trained to identify and remove any suspect or non-conforming material, including oversized materials and hazardous or potentially hazardous waste that may be visually identified within the bunker. Where such material is detected, it will be promptly isolated and removed from the active waste pile. Depending on the nature and accessibility of the material, it may be transferred either to a designated quarantine area within the bunker system or removed directly to a secure skip located in the backloading bay within the tipping hall. This ensures that waste is always managed and handled within the enclosed waste reception hall, and is only removed from site in fully enclosed or covered vehicles, for the purposes of preventing environmental impacts and maintaining amenity (odour control).

- All identified hazardous or non-conforming waste, typically a very small fraction of total waste deliveries, will be stored in a controlled manner pending arrangement for lawful off-site transport and disposal at an appropriately licensed facility.

These controls operate in conjunction with contractual enforcement mechanisms, supplier auditing and facility operating procedures to ensure that hazardous waste is effectively excluded from the process stream. Any supplier found to be in breach of waste acceptance requirements is subject to contractual penalties and potential termination of supply arrangements.

The provision of education and educational resources regarding acceptable and unacceptable waste will also be an important aspect of the on-going community and stakeholder engagement activities being undertaken by the BERC. Project stakeholders also include individual waste suppliers such as businesses and institutions. This may include bringing waste suppliers to site to educate them on why certain waste types cannot be accepted, how unacceptable wastes can impact Facility availability (which potentially impacts them), as well as consumables and residues etc., which will ultimately also impact the gate fees paid by waste suppliers.

Accordingly, the combination of contractual controls, pre-acceptance screening, inbound inspection, continuous visual monitoring within the bunker and quarantine procedures together help to ensure that hazardous waste is identified and removed prior to processing, and that compliant residual waste is combusted at the facility.

**RFI Item
No. 43**
Issue: Combustion temperatures
Information Requested

The Technical Process Description submitted as part of the application material states that maintaining combustion at 850°C is sufficient to destroy potential hazardous components of the feedstock, such as persistent organic pollutants or PVC materials. This may not be accurate. The BATC (2019) European Standard, referred to in the proposal, indicates minimum temperatures of up to 1100°C may be required. Stockholm Convention 2008 Guidelines on best available techniques and provisional guidance on best environmental practices - Waste incinerators also indicate that 'grated' municipal solid waste incinerators should be maintained at 850°C to 950°C, or 1100°C to 1200°C if chlorine is present.

The proponent is requested to provide justification for the selection of the minimum combustion temperature, demonstrating adequacy of combustion and burnout of compounds that could have potential health impacts.

Response

The minimum combustion temperature selected for the BERC has been determined with regard to the nature and composition of the waste feedstock, applicable regulatory requirements and established operational performance criteria to ensure complete combustion and effective destruction of potentially hazardous organic compounds.

The concentration of halogenated organic substances along with other chlorinated compounds within the waste feedstock is indeed a key consideration, as elevated chlorine levels can contribute to boiler corrosion and the formation of air pollutants of concern, and the consumption of lime reagent. The European Union Industrial Emissions Directive (EU IED) requires that combustion gases are maintained at a temperature of at least 850°C for a minimum of two seconds following the final injection of air. Where hazardous waste with a content of more than 1% halogenated organic substances (expressed as chlorine) is incinerated, a higher temperature of at least 1,100°C must be maintained for the same duration.

The Stockholm Convention BAT/BEP Guidelines on best available techniques and provisional guidance on best environmental practices for implementing Article 5 and Annex C¹ (more specifically, Section V.A for Waste Incinerators) published October 2008 and the EU Industrial Emissions Directive (2010) operate at different legal and regulatory levels. The Stockholm Guidelines provide international guidance (including general combustion techniques) for implementing the Convention's obligations to minimise unintentionally produced persistent organic pollutants (POPs). However, for EU waste-incineration installations, Directive 2010/75/EU and the 2019 Waste Incineration BAT Conclusions constitute the more specific and directly applicable regulatory framework, providing mandatory operating, permitting and emission-control provisions. Article 50 of the IED deliberately distinguishes between the general minimum combustion condition of 850°C for at least two seconds and the higher minimum of 1,100°C for at least two seconds only where **hazardous waste** contains more than 1% halogenated organic substances, expressed as chlorine.

As discussed in the response to RFI Item No. 42, the BERC is not being designed to accept hazardous waste. Furthermore, the proposed feedstock for the BERC has been characterised through laboratory testing undertaken by an independent specialist contractor on behalf of Cleanaway, to the extent feasible and subject to the limitations of laboratory analysis. The results of the waste audits and associated analytical testing demonstrate that total chlorine levels in the feedstock were found to be

¹ https://chm.pops.int/Portals/0/Repository/batbep_guideline08/UNEP-POPS-BATBEP-GUIDE-08-2.English.PDF

below 1% on a dry basis (refer to Table 1). On an as-received (wet) basis, chlorine concentrations are even lower (also see Table 1). Additionally, the proportion of halogenated organic substances, expressed as chlorine, is expected to be lower than total chlorine levels due to the presence of inorganic chlorine (e.g. sodium chloride salt in food waste). These findings are consistent with broader testing of Australian municipal solid waste streams undertaken by Cleanaway, which similarly indicate total chlorine content below 1%.

Table 1 HRL analytical combustion characteristics results from Brisbane seasonal residual MSW and C&I waste audits undertaken for Cleanaway

Parameter		Residual MSW – Combined Average	Residual C&I Waste – Combined Average
Test	Unit		
Ash Yield at 550°C	% (db)	23.0	11.8
Moisture Content	% (ar)	38.5	31.8
Carbon	% (db)	43.8	51.0
Hydrogen	% (db)	5.8	7.2
Nitrogen	% (db)	1.1	1.0
Sulphur	% (db)	0.12	0.09
Total Chlorine	% (db)	0.64	0.56
Total Chlorine	% (ar)	0.39	0.38
Calorific Value Net Wet	MJ/kg (ar) (LHV)	10.6	14.0
Volatile Matter	% (db)	68.9	78.6
Fixed Carbon	% (db)	8.2	9.7

db = dry basis

ar = as received (wet)

Operational controls will further support stable and effective combustion. Waste will be homogenised within the bunker through pre-mixing via the grab crane systems to minimise variability in feedstock composition and avoid short-term spikes in contaminant concentrations within the combustion chamber.

The selected design temperature is also consistent with established industry practice. Reference facilities used to inform the BERC design, as well as previously approved waste-to-energy facilities in Victoria and Western Australia, have adopted a minimum combustion temperature of 850°C under comparable feedstock conditions.

During detailed design, Computational Fluid Dynamics (CFD) modelling is used to confirm that the furnace and boiler design will comply with the high temperature residence time requirement. During performance testing (prior to commercial operations), the contractual high temperature residence time requirement will be verified by an independent third party performance testing specialist. In addition to demonstrating the high temperature residence time criteria, the BERC will also be required to demonstrate that its combustion and air pollution controls will comply with the BATC (2019) BAT associated emission level (BAT-AEL) for dioxins and furans under normal operating conditions, which is even lower than the emission limit value for dioxins and furans set in the EU IED (2010).

Ongoing monitoring will be implemented to verify combustion performance and feedstock characteristics during operation. Should changes in waste composition result in increased chlorine levels (as indicated through flue gas monitoring, via the raw gas analysers², and/or reagent consumption), a detailed review

² Raw gas analysers are typically located at the boiler economizer exit (i.e. at the inlet to the flue gas treatment system). The raw gas analysers (1 for each boiler line) monitors concentrations of pollutants such as HCl (chlorine in the feedstock is typically converted to HCl in the combustion chamber), SO₂, oxygen and NH₃. These measurements provide feedback or feedforward control signals to both the automatic combustion control system and the individual reagent dosing control systems.

of deliveries that occurred during the period in which increased raw gas HCl concentrations were observed will be undertaken, and waste acceptance protocols will be reviewed and updated as necessary to ensure continued compliance with applicable requirements. If necessary, audits of waste suppliers or feedstock waste audits will be undertaken to identify the source of any persistent increase in flue gas HCl concentration levels.

On this basis, and since the BERC will not be processing hazardous waste feedstocks, a minimum combustion temperature of 850°C is considered appropriate and consistent with regulatory requirements.