

Bioresources - Tankered Trade Waste			
Document Title	SOP 11 Sewage Sludge Acceptance		
Document Owner Role	Process Manager	Version Number	3.0
Date of Last Review	14/02/22	Date of next Review	14/02/24
Identified Risks			
<p>HS&W risks associated with unsuitable / volatile / hazardous waste streams.</p> <ul style="list-style-type: none"> • Excessive solids could damage the pipework infrastructure • Activated Sludge Process lanes collapse: from Overloading of nutrients <ul style="list-style-type: none"> ○ Inhibition of the microbial activity through the introduction of too many inhibitory compounds such as metals or cyanide or pH concentrations are too extreme • Digesters inhibits Methane (CH₄) generation due to: <ul style="list-style-type: none"> ○ excessive volume of heavy metals such as Chromium (Cr III) and Cadmium (Cd) ○ They can poison the active bacteria and inhibit the methanogenic bacteria ○ This leads the presence of organic acids • Combined Heat Power process impacted by: <ul style="list-style-type: none"> ○ High concentrations of Hydrogen Sulphide (H₂S) can damage engines ○ High concentrations of Siloxanes (Si) pas through the biogas and result in silica deposits. ○ These damage the engine valves, oil life etc. leading to greater downtime and more equipment to be replaced <p>Compliance risks:</p> <ul style="list-style-type: none"> • Loss of waste permits if waste not listed on them permitted or waste does not have the appropriate EWC. • Final effluent discharge consents missed due to high solids or heavy metals or Phosphorus (P) • BAS Compliance for Bio-solids non-conforming if too high metal content • Wider environmental damage from failures of the treatment processes due to unsuitable waste streams being accepted. 			
<p>If this is a printed version please ensure that it is still within the current review period, if not 'DO NOT USE' and contact your line manager for a new version</p>			
<p style="text-align: center;">Remember – If you can't do the job safely, don't do it.</p> <p style="text-align: center;">'DO NOT CARRY OUT THE PROCEDURE' And seek advice from your line manager</p>			

Introduction
Evaluate Sewage Sludge Imports disposal route procedure is a guide to enable the TTWT to assess the dry solid percentage (DS%) content and dispose the sewage sludge into the correct route.

Key Roles and Responsibilities	
Tankered Trade Waste Manager (TWM):	<ul style="list-style-type: none"> ○ Ensure that the operating procedures are followed ○ Ensure that the Tankered Trade Waste Technicians (TTWT) have undergone appropriate training ○ Can make approval decisions if they have been deemed as technically competent ○ Investigate HSW & Environmental concerns from the TTWT
Tankered Process Team (TPT):	<ul style="list-style-type: none"> ○ Ensure that the operating procedures are followed ○ Assess non-conformance risks to treatment process and make suitable decisions to ensure process is not adversely affected ○ Notifying the commercial team once a decision has been made to reject a delivery
Tankered Trade Waste Technicians (TTWT)/Technical Competent Persons(TCP):	<ul style="list-style-type: none"> ○ TTWT have undergone appropriate training and have a valid CMS certificate ○ Has a valid gas monitor training certificate ○ TTWT have been deemed as technically competent ○ Follow the non-conformance procedure if a waste is not suitable and do not permit the load to discharge
Commercial Team:	<ul style="list-style-type: none"> ○ Liaise with TTWT regarding non-conformance issues ○ Contact customer if more information is required about a non-conformance ○ Contact customer if waste delivery is rejected
Tanker Driver:	<ul style="list-style-type: none"> ○ Tanker driver must have a STW induction card, or be given an induction by the TTWT ○ Must adhere to STW PPE and safety regulations whilst on site ○ Must give a representative sample from his waste delivery
Biosolids Team:	<ul style="list-style-type: none"> ○ Confirm Biosolids Limits / Sludge Limits ○ Available to support the Tankered Process Team with approval & expectations of the standards for Sludge and Biosolids

Required Training	
Tankered Trade Waste Technicians (TTWT)	<ul style="list-style-type: none"> ● In date CMS training ● Gas monitor training ● At least 6 months experience in the waste industry (if they are approving low risk wastes) HNC Chemistry, University Degree in a Scientific Area or similar experience ● Experience undertaking sampling and lab testing ● How to use CWID

<p>Tankered Process Team (TPT)</p>	<p>The requirements for the TTWT in addition to:</p> <ul style="list-style-type: none"> • Tankered Waste experience or 12 months experience in the waste industry • CIWM Hazardous Waste Classification course • Cranfield University Biological Processes/Activated Sludge Treatment course • University degree or similar level of experience and knowledge in a Scientific Area
<p>Tankered Trade Waste Manager (TWM):</p>	<ul style="list-style-type: none"> • In date EMS training • Experience of working in the Waste Industry • Understanding of Health, Safety, Wellbeing and Environmental Compliance

Documentation & Resources
<ul style="list-style-type: none"> • Standard Operating Procedures (SOP) • CWID (Commercial Waste Information Database) • Sample of the waste • Gas monitor • STW Interworks logger fob • JRP WASP portal

Procedure:

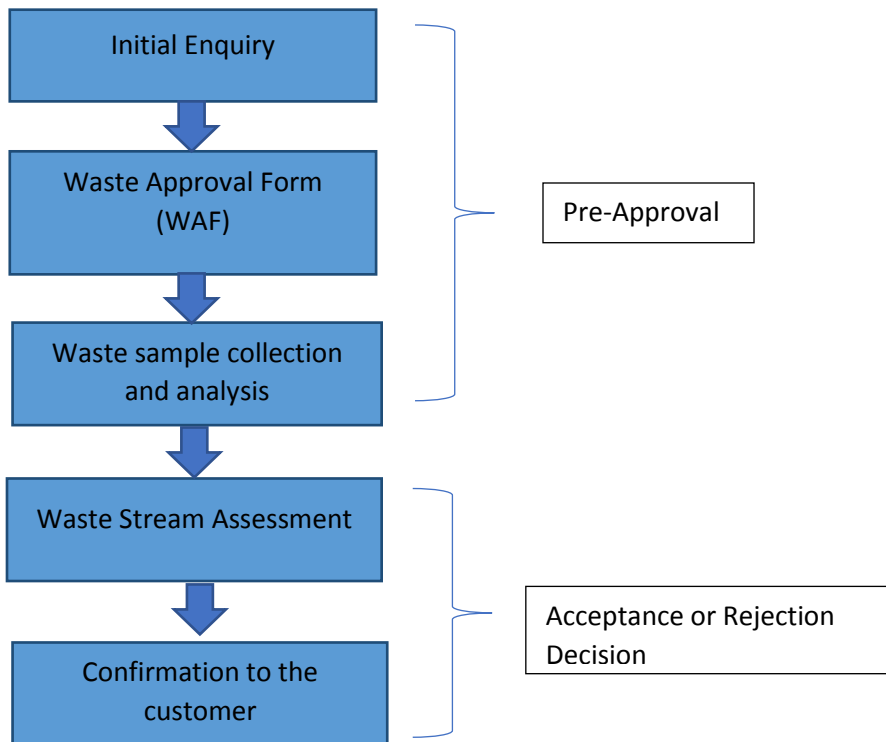


Figure 1: Flow chart depicting the initial assessment prior to arriving onsite

Sewage Sludge Pre-Acceptance:

Initial Enquiry

As outlined in Figure 1, the first step is having the initial enquiry from a customer. The commercial team liaise with the customer and supply them with a Waste Approval Form (WAF). The enquirer fills out a WAF with aim to collect information to support waste characterisation.

This includes:

- the name, location and contact details of the waste producer
- relevant details of the process giving rise to the waste
- an appropriate description of the waste including its physical form
- the estimated quantity expected to be delivered to the operator per load and in a year
- information on the nature and variability of the waste production process(es); EWC code (to be checked against requested site's IED permits and appears suitable for the waste in question – ultimately, the producer is responsible for assignment of the EWC code)
- SIC Code (to be checked is reasonable based on Government/companies house website)
- Process generating the waste
- Nature of the producer business
- Haulier of Waste (if known at time of completion)
- Preferred disposal sites (final approval may be restricted to different sites)
- Approximate yearly tonnage & frequency of delivery
- Other relevant information i.e., COD, Suspended Solids, Ammonia, metal analysis, (sample will be used for this, if not present), List I, List II and Red List substances if present etc.
- Miscible in water declaration (Must be “Yes”, if “No”, the waste must be rejected, as it will not be treatable via the inlet route)
- Biodegradable declaration (Must be “Yes”, if “No”, the waste must be rejected. Waste must be treatable aerobically via activated sludge. “Waste which is not biodegradable shall not be accepted” is stated on all the permits)
- Flash point declaration (Must be >60C, as we currently do not have EX rated discharge equipment/safety apparatus in place for flammable wastes)

As part of the WAF the waste producer identifies whether the waste contains any hazardous properties prior to approval samples being sent off. There are only selected sites which are permitted to take in hazardous waste and of those the hazardous waste streams are assessed on whether they match the waste codes outlined in the permit. There will never be any radioactive waste streams pursued, nor those which may have a risk to contain or be contaminated with radioactive properties.

Waste Sampling

For samples that are less than 3% thickness, they are sent off with the same suite used for other Tankered trade waste (Table 1).

Table 1: List of sampling suites used for regular samples

Description	Units
pH	pH_unit
Suspended Solids [SS]	mg/l
Biological Oxygen Demand [BOD] (2mg/l ATU) 5 day suppressed	mg/l
Ammoniacal Nitrogen [N]	mg/l
Nitrite as [N]	mg/l
Nitrate as [N]	mg/l
Iron [Fe] (total)	mg/l
Aluminium [Al] (total)	mg/l
Cadmium (total) as Cd	mg/l
Chromium (total) as Cr (mg/l)	mg/l
Copper (total) as Cu (mg/l)	mg/l
Lead (Total) as Pb (mg/l)	mg/l
Nickel (total) as Ni (mg/l)	mg/l
Zinc (total) as Zn (mg/l)	mg/l
Phenols monohydric (mg/l)	mg/l
Sulphide as S (mg/l)	mg/l
Fluoride as F (mg/l)	mg/l
COD (total)	mg/l
Phosphorous total as P	mg/l
Arsenic total as As (mg/l)	mg/l
Mercury Total as Hg	mg/l
Selenium (total) as Se (mg/l)	mg Se/l
Tin (total) as Sn (mg/l)	mg Sn/l
Bromide as Br	mg/l
Cyanide excluding Iron Cyanide (mg/l)	mg/l
Antimony (total) as Sb (mg/l)	mg Sb/l
Molybdenum total mg/l	mg/l
COD 1h settled	mg/l
Sulphate as SO ₄	mg SO ₄ /l
Chloride	mg Cl/l
AMTOX nitrification inhibition test 25% dilution	%
AMTOX nitrification inhibition test 10%	%
AMTOX nitrification inhibition test 1%	%
AMTOX nitrification inhibition test 0.5%	%
AMTOX nitrification inhibition test 0.1%	%

AMTOX nitrification inhibition test 5%	%
AMTOX nitrification inhibition test 50%	%
Phenols monohydric (mg/l) HPLC	mg/l

Sewage sludge that is thicker than 3% will be sent off using the suite outlined in table 2.

Table 2: For sewage sludge (>3% thickness) and Biosolids (Cake) samples

Description	Units
Mercury [Hg] (total) as Hg dry weight	mg/kg
Arsenic [As] (total) as As dry weight	mg/kg
Selenium [Se] (total) as Se dry weight	mg/kg
pH sludges and soils	pH_unit
Nitrogen as N % Dry weight	% DW
Phosphate as P % Dry weight	% DW
Potassium as K % Dry weight	% DW
Molybdenum (total) as Mo dry weight	mg/kg
Solids Total at 105c	%
Loss on Ignition dried solids	%
Cadmium (total) as Cd dry weight	mg/kg
Chromium (total) as Cr dry weight	mg/kg
Copper (total) as Cu dry weight	mg/kg
Lead (total) as Pb dry weight	mg/kg
Nickel (total) as Ni dry weight	mg/kg
Zinc (total) as Zn dry weight	mg/kg
Sulphur as SO ₃ % Dry weight	% DW
Sulphur as S % Dry weight	% DW
Magnesium as MgO % Dry weight	% DW
Magnesium as Mg % Dry weight	% DW
Potassium as K ₂ O % Dry weight	% DW

Phosphate as P2O5, % dry weight	% DW
Available Fluoride as F (mg/kg)	mg/kg

Individual waste streams may require additional analysis with consideration to the ecological risk. Furthermore, if the WAF indicates that other contaminants are present these will be investigated with additional analysis undertaken. For example, Siloxane testing is undertaken for wastes with chemical, cosmetic, or pharmaceutical origins. Currently, some waste streams are tested for Biomethane Potential (BMP) by an externally accredited Lab. Assessment of the data is then completed by a competent member of the team discharge terms determined accordingly.

Sewage sludge is often a low-risk waste and is therefore sampled on an annual basis unless there is an issue. Then the sampling frequency will increase appropriately. Waste stream Risk is outlined in the Tanker Trade Waste pre-acceptance operating procedure (SOP01).

All details of the waste enquiry are entered into the CWID database including the Waste Approval Form, A signed seasonal Waste Transfer Note (if one was agreed) and any additional requirements needed.

Sewage Sludge Acceptance (Onsite review)

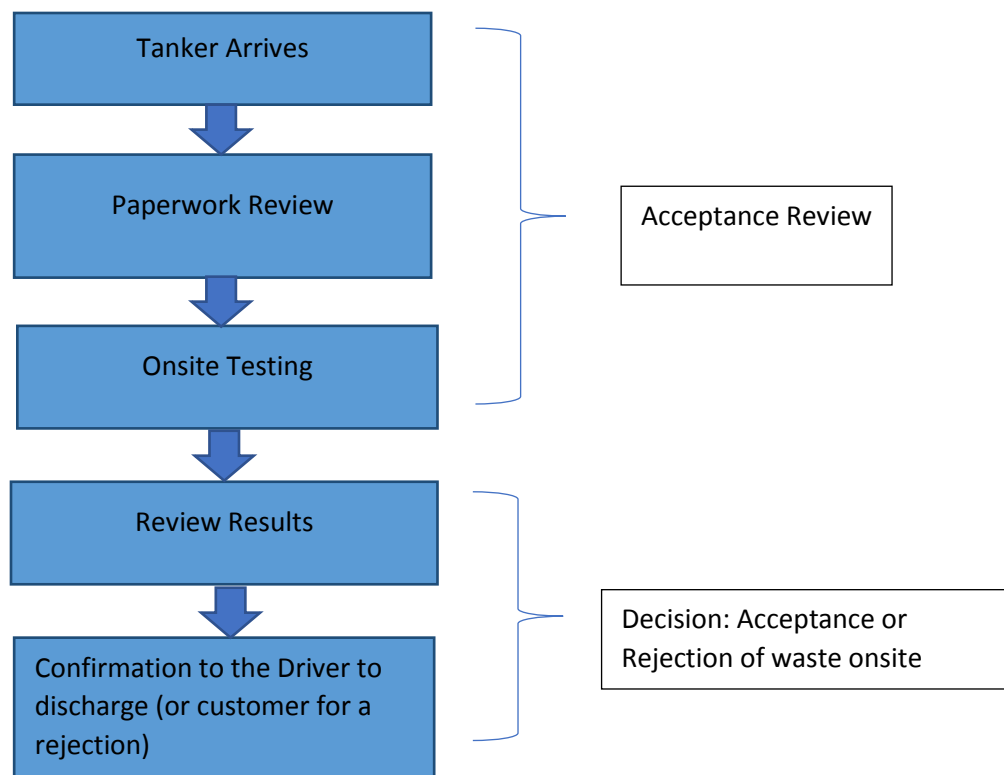


Figure 2: Process Flow of Onsite acceptance procedure

As outlined in Figure 2, the sewage sludge imports are reviewed in line with the standard procedure for waste acceptance (SOP 02) which includes reviewing the results of the approved analysis as per the sampling techniques (SOP 10). An additional assessment will be to review the Dry Solids of the waste via a visual test to determine the sludge disposal route.

Place approximately 200 ml of sludge into a beaker:

- If the sludge dripped in by pipette is runny and blends into the sludge in the beaker as shown in figure 3 the sludge can be discharged into the inlet
- If the sludge forms a layer on the surface as shown in Figure 4, the sludge will be discharged through the sludge route.
- If the sludge shows a similarity to that of Figure 5, (a higher viscosity than other figures) then a judgement will be required to determine if it's around the 8% threshold, which in turn will indicate whether that waste is to be rejected or not.

When time allows (not whilst managing a customer) it is also worth checking you own interpretation of the DS% by comparing the visual analysis against the JRP logger (SOP 04) and Moisture analyser (SOP 14).

Imports of third-party sewage sludge are either discharged via the inlet or the sludge route depending on the dry solid percentage (DS%) of the sludge. Individual sites may have a variance in DS% acceptance, this is reviewed as part of the pre-site and onsite acceptance procedures.



Figure 3: 2% DS sewage sludge is watery



Figure 4: 4% DS sludge looks significantly thicker



Figure 5: 6-8 DS% sewage sludge is thick but still pourable

General Rules:

- Any sewage sludge between 5-8% DS will be discharged into the interworks sludge route.
- Any sewage sludge lower than 4% DS will be discharged into the Interworks inlet.
- Any sewage sludge greater than 8% DS will be rejected

Rejection Procedure:

It may also be rejected if the onsite testing determines there is a discrepancy between the approved analysis and the waste on site. The rejection procedure is described in more detail in TTW Non-Conformance (SOP 03) document.

An outline for sewage sludge rejection procedure is as follows:

1. The customer will be informed that they cannot discharge at our works and will have to leave site for an alternative disposal facility.
2. We will also ask for an investigation as to the reason behind the variation in Dry solids thickness.
3. The rejection will be recorded in our CWID system as part of the waste receipting process.
4. A non-conformance sample will be sent off to the certified lab for analysis.

Where the producer can provide a reasonable explanation for a variance in a waste stream and demonstrate methods or process changes to avoid further occurrences, additional loads may be accepted subject the on-site testing requirements (and possibly additional testing and review). If further variances occur, the waste approval may be removed, and further bookings refused.

Offloading Sewage Sludge

- Once the waste acceptance procedure has been completed and the waste delivery has been receipted into CWID by the TTWT, the driver will be provided with a JRP pin number
- The driver will use a STW Interworks logger fob for the discharge. This must be returned to the TTWT after use. The fob will give the driver access to the logger. The driver must select their company from the options menu and enter the pin number provided
- On the driver's first visit they will be inducted, and then escorted to the discharge point and directed on safe use of connections and loggers (SOP 22).
- Any tanker clear tickets and receipts from non-TW sites will need to be provided to TW techs at least 3 days after month end.

References:

- Technical Guidance WM3: Waste Classification – Guidance on the Classification and assessment of Waste
- BREF for Waste Treatment 2018
- Site Permits
- SOP 02 TTW Waste Acceptance
- SOP 03 TTW Non-conformance
- SOP10 Standard Sampling Tests
- SOP 14 Moisture content sampling procedure
- SOP 17 Biosolids TTW Acceptance & Delivery
- SOP 22 How to use a JRP Logger

Version Control			
Version	Date	Details	Published By
3.0	13/01/22	Updated procedure to include references to testing, approval, and rejection for Sewage sludge.	O.Boertje & C.Bane