Schedule 5 Request for Further Information

Question 5 – *please provide an operating technique/management system document which demonstrates how you will manage the transitional period between old plant being decommissioned and new plant being switched on, in particular in terms of management of odour and aerial pollutant emissions during this transitional period, including, start-up, operation (including stand-by) and shut-down. Please also provide an update on the production of commissioning plans for new plant and equipment as detailed in this variation. Where commissioning plans are currently produced and available, please provide these for review.*

Introduction

This applies to the installation of the odour abatement plant (new gas oxidiser and MFO). The start-up and standby procedures are documented in Question 1b.

In terms of the blood drying equipment and low temperature offal line, these are additional batch processes that can be operated at low levels and do not require a 'changeover' from one plant to the new version.

Validation of the scrubbing systems for the blood drying equipment is covered in the commissioning plans and this includes odour testing.

Transitional Period

Current Process:

The current arrangement of ducting from the processing units to the collector vessel is being maintained and new collector vessels built for the new units. This will require a changeover of ducting from one collector vessel to the other when each new unit is ready to take process fume. The existing connections will remain in place as a back up system so that in the event of any stoppages the process fume can be re-diverted.

New Process:

Start up and shut down procedures will have been updated during the commissioning process in order to train the relevant staff. These will be amended as required during the process.

As part of the commissioning process the equipment will be run 'dry' to ensure there are no installation problems and to make sure the combustion temperature can be reached and maintained, before any process fume is introduced.

Ducting will be checked for leaks and the alarm systems checked electronically to make sure they react.

All parts of the procedure will be overseen by a competent engineer.

Production levels will be reduced in order to account for stoppages and slow running of the equipment in the early stages. To allow for halting the process in the testing stage, the process fume can be diverted back to the original effluent collector.

Risk Assessment:

The main risks are release of odour and / or release of CO / NOx above statutory limits due to inefficient combustion. Engineers will be in attendance for the start-up periods and initial running of the equipment to minimise any adverse effects.

Odour – the back-up abatement of thermal oxidiser and/or steam boiler(s) and air cooled condenser(s) will be in operation to ensure rapid control of odours should the new plant fail or perform below standard. Once signed off as commissioned, olfactometry testing will be carried out on the stack emissions.

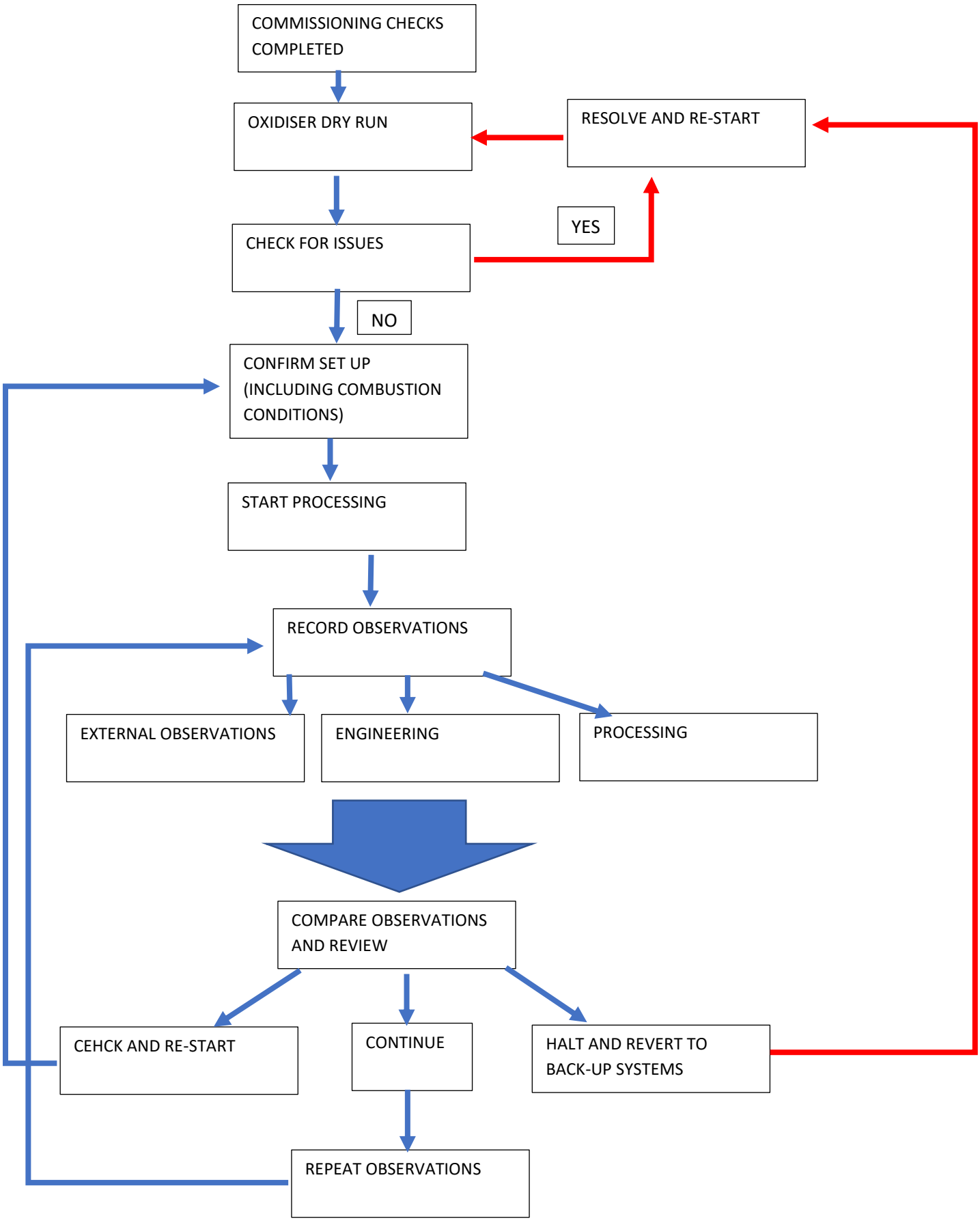
As detailed within the EMS – on site and off site checks will be carried out to check for off-site odour impacts and the commissioning process will be halted if required, following discussion with the commissioning engineers to establish the extent of the problem.

Emissions – for both units the equipment will be set up for optimum use of fuel and effective combustion. Levels of carbon monoxide, oxygen and NOx will be monitored at the exhaust point from the combustion chamber. The combustion chamber temperature will also be monitored. Visual checks for black smoke on initial start-up will also be done to ensure this is minimised.

The MFO also has continuous monitoring systems set for the exhaust gases and this will be calibrated as part of the commissioning process.

Both units have electronic controls on combustion conditions.

Process Flow



Commissioning Plans

A summary of the commissioning plans is detailed here. These are managed by the installation engineers and are subject to change as and when the installation moves to completion. Timescales depend on the successful implementation of each step.

Blood processing and drying

Step	Description	Milestone	Comment
Assembly	Line assembled as per drawings		
Check	Sense check against design	Reviewed and any modifications incorporated	
Cold Testing	Wiring and function to check	Check for signals on sensors and valves	
Mechanical	Functional checks		Repeat as required
Dry Run	Check all parts work together	Make sure all alarms, failsafe operations, stop / start functions work as design	Repeat as required
Hot test on decanter and coagulator	Making sure this section still works as previous	Temperature requirement, no steam leaks	
Re-check	Visual check of mechanical and electrical		
Hot test on full line	Test full line at temperature before adding product. Signal testing Running in of burner	Temperature requirement, no steam leaks	Repeat as required
With Product	Run line with limited amount of product	Check for steam supply, steam or product leaks, make sure temperatures are reached.	Repeat as required
Recheck	Visual check of mechanical and electrical	No deviations from design	Repeat as required
Performance testing	Performance test includes – temperature reached, moisture content of blood meal, containment of odours.	Installer to sign off when commissioning is complete.	Repeat as required
Performance testing of Abatement Equipment	Efficient removal of odours including testing using gastec tubes for H2S and	Exhaust air to be directed to biofilters until test results indicate the levels are	To be tested at different stages in commissioning (as required)

Step	Description	Milestone	Comment
	Ammonia plus Olfactometry testing.	suitable for release to atmosphere	

Biomass Oxidiser

The manufacturer will be directing the commissioning of the equipment during installation and this will cover both cold and hot commissioning work. Timescales are approximate and dictated by the nature of the test and whether any re-testing is required.

The main areas to consider during the process are:

- ***Cold Commissioning***
    - ***Electrical safety***
    - ***Mechanical safety***
    - ***Effectiveness of control measures and instrumentation***
    - ***Effectiveness of safety and emergency equipment***
    - ***Calibration of sampling equipment***

Prior to start a risk analysis is carried out relating to operational safety during the testing phases, necessary warning signs erected and basic safety rules shared. This supplements the existing site rules for contractor safety.
The system is checked for air/water/ lubricant leaks prior to switching on and during initial test runs.
Hydrostatic testing is carried out on pipework and pumps. Thermal insulation is checked prior to any hot testing.

- ***Hot Commissioning***
    - ***Preparation of equipment for first fire***
    - ***Electrical and control testing***
    - ***Refractory drying***
    - ***Biomass feeding and combustion***
    - ***Effective combustion***
    - ***Effectiveness of control measures and instrumentation***
    - ***Effectiveness of safety and emergency equipment***
    - ***Continuous operation test***
    - ***Performance test***

A certificate of operational acceptance will be provided on handover.

Tests on the refractory may take up to two weeks.
Tests on control instrumentation, safety and emergency equipment includes alarm settings and functioning. This includes emergency stop.
Noise and /or vibrations are monitored during test phases.
A dry run (with no process fume) will be carried out as part of the continuous operation test. This may last up to 2 weeks and does not take place until effectiveness of combustion is confirmed.

Gas Oxidiser

The manufacturer will be directing the commissioning of the equipment during installation and this will cover both cold and hot commissioning work. This is very similar to the MFO commissioning, with differences in the fuel handling (natural gas fed via mains supply), control panels, emissions monitoring, combustion chamber set up

The main areas to consider during the process are:

- Cold Commissioning
    - Electrical safety
    - Mechanical safety
    - Effectiveness of control measures and instrumentation

  - Effectiveness of safety and emergency equipment
  - Calibration of sampling equipment

Prior to start a risk analysis is carried out relating to operational safety during the testing phases, necessary warning signs erected and basic safety rules shared. This supplements the existing site rules for contractor safety. The system is checked for air/water/ lubricant leaks prior to switching on and during initial test runs. Hydrostatic testing is carried out on pipework and pumps. Thermal insulation is checked prior to any hot testing.

- Hot Commissioning
  - Preparation of equipment for first fire
  - Electrical and control testing
  - Refractory drying
  - Fuel settings and combustion
  - Effective combustion
  - Effectiveness of control measures and instrumentation
  - Effectiveness of safety and emergency equipment
  - Continuous operation test
  - Performance test（Emission analysis of final exhaust O2, CO, CO2, NOx, using calibrated instruments)

Tests on the refractory may take up to two weeks.
Tests on control instrumentation, safety and emergency equipment includes alarm settings and functioning. This includes emergency stop.
Noise and /or vibrations are monitored during test phases.
A dry run (with no process fume) will be carried out as part of the continuous operation test. This may last up to 2 weeks and does not take place until effectiveness of combustion is confirmed.

Post Commissioning

The site set up for odour abatement and steam production needs to be flexible to ensure that the requirement for both is provided as efficiently and consistently as possible.

Steam production is an essential part of the processing of Animal By Products. If there is insufficient vapour to be processed in the thermal oxidiser(s) then steam production is reduced, hence additional steam needs to be made by the steam boiler(s). A certain amount of flexibility is required to manage changes in material type and switches from continuous to batch processing. This is a change from the continuous processing methods set up on the existing three lines and will need to be managed in a different way.

Given the differences in moisture content of the raw material, the condensers assist in a levelling out of the volume of process fume to be treated by the oxidisers. This is particularly important at start up and shut down, but is also used during a production run. Condenser units will continue to be used as required.

Operation of the thermal oxidisers is subject to an adequate supply of fuel, the supply of process fume and a requirement for steam. An air dispersion model was submitted on the basis of the ‘worst case scenario’ combination for estimation of potential air emissions.

The main duty is expected to be provided by the Multifuel oxidiser with support from the larger gas oxidiser as required. The order in which they come on line is dependent on the commissioning timetable.

Equipment Off Line

When any unit is off line for an amount of time, it will be subject to a specific shut down procedure and a protocol to ensure care of the burner units and refractory - plus a maintenance inspection prior to re-use.

The existing oxidisers (Oxidisers 1 and 2 as listed in the permit) will be taken out of use, but not removed from site. The units will remain as a fall back for emergency use, should the main equipment fail or have to be taken out of service for a significant amount of time. This would be a significant emergency issue and may not arise during the expected lifetime of the equipment, in which case the units would be removed from site. Re-use will be subject to maintenance inspection and a re-commissioning of the key components.

The manufacturer has provided guidance for care and maintenance of plant while moth-balled and procedures for re-starting. A brief summary of these details are included as Appendix I and are part of the site maintenance procedures and SOPs.

The situation with this plant will be reviewed at periodic intervals.

Appendix I - **SUMMARY OF MEASURES FOR MAINTAINING EQUIPMENT DURING AND POST EXTENDED SHUTDOWN PERIODS**

SCOPE

Where the thermal oxidiser equipment is to be shut down and kept under 'moth balling' conditions it is most important to protect the waste heat boiler. The manufacturer has set out key points and these have been incorporated into a Standard Operating Procedure for the site engineering staff.
The amount of work required to re-start the equipment will depend on the length of time the plant has remained idle.

SHORT TERM SHUT DOWN (weeks)

If the plant is to be off for a relatively short time (say a few weeks) between periods of normal work, then it would just be a case of shutting the plant down in the normal manner. The key action, to be reviewed in detail with the boiler water treatment supplier, will be to check and overdose the boiler shell water to protect it against corrosion due to oxygen attack.

This is done by increasing the residual oxygen scavenger present in the boiler shell water. The boiler water treatment specialist will advise on oxygen scavenger type and required dosage, as this varies between units.

The TDS setting can be lowered in advance to increase bottom blowdown rates and therefore get as much sludge out of the boiler before shut down as practicable. All valves on the boiler should then be shut once the boiler has been allowed to fully cool.

Restart would then follow normal procedures, making sure that all necessary valves on the boiler are opened (normal practice) and that the boiler water level is closely monitored and controlled by blowdown as the water temperature increases. This must be done slowly, allowing it to "*soak*" at low fire for a few hours before letting the burner reach full modulation and load.

EXTENDED PERIOD OF SHUTDOWN (months or longer)

For an extended period of shut down it is more important to closely monitor the boiler and usual advice is to fully drain the boiler and store it dry.

Note – This method relates to burners using gas as fuel (as is the current situation). If firing on liquid fuel (such as tallow) then the fuel system and preheaters will be prepared for extended shut down by clearing fuel lines and cleaning burners, to protect vulnerable components from risk of corrosion at low temperatures.

OXIDISER

The Oxidiser will be shut down in the normal manner and once the Oxidiser shut down cooling stops the fans, it should be allowed to fully cool. Then;-

- Shut off the natural gas system and check/clean all burner components. One of the chamber doors will be opened to inspect the chamber brickwork and to allow a reasonable flow of air through the plant to avoid condensation while it cools.

- The effluent isolating damper(s) to the shut down Oxidiser are fully closed and the damper seals are checked to make sure they are in good order. During the shut down the dampers will be checked for operation on demand, on a periodic basis.

BOILER

The boiler will be stored dry when stopped for an extended period. This is achieved by:

- When the boiler is still at pressure and in preparation for an extended shut down and with the Oxidiser burner off, completely blow down the boiler.
- The boiler must be cleared of as much residual debris as possible.
- Warm air can be blown through after washing to aid the drying process.
- Isolate boiler feed pump and high pressure condensate system.
- If the shut down is to be for a very long period the exhaust is isolated from the chimney
- Water to be drained from all lines and pumps.

During the extended period of shut down the plant will be inspected for signs of moisture ingress.
Fans will be rotated on a bi-monthly basis to prevent issues with the impeller, shaft or bearings.
The main control panel will be kept dry and free of condensation (e.g. using silica gel bags or similar).

A clear record of all actions taken to prepare the plant for storage will be made and kept – this will be used to provide a check list for re-start.

BRINGING BACK INTO SERVICE AFTER AN EXTENDED SHUT DOWN

Inspection will be carried out by a competent engineer to ensure it is safe to use, mainly that the boiler and all pressure parts have not suffered deterioration during storage.

Once satisfied that the equipment is ready to be restarted, the burner must be checked in operation and combustion checked and re-set if required.

The combustion chamber and boiler must be slowly brought back up to normal working pressure and given time to normalise. Boiler blowdown must be undertaken and all boiler safety controls checked by a competent person to ensure they function correctly and are interlocked with the Oxidiser controls. all lockout controls must be proven in real operation – not in simulation

EMISSIONS TESTING

Emissions testing will be carried out by an MCERTS approved contractor in the same way as the annual testing requirements, once the unit has been running consistently and exhibiting good combustion performance.
If the plant has been shut down for a short period as described above, then testing would not normally be required beyond the normal operating manual requirements and servicing schedule.

Start up testing would include checks for CO, O2 in the exhaust and typically NOx. The CO levels will be a very good indicator of any combustion issues.
Monitoring of oxygen levels will show some variation depending on the type of effluent being processed (higher oxygen levels in foul air than cooker exhaust), but a very low level of oxygen will indicate a possible combustion issue.