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Anaergia

Biodynamic (Nottingham)

FINAL HAZOP REPORT

December 2021

CONTENTS

INTRODUCTION

This report is a comprehensive reference document that details the development of the Biodynamic (Nottingham) Digestion Plant HAZOP study (hereafter referred to as HAZOP study) from start to conclusion.

Within the report are the minutes of the HAZOP meeting which provide a record of the discussions and the actions that were raised. Supporting these are notes that do not necessarily form part of the HAZOP process but provide important contextual information.

The report also includes the action response sheets generated at the study and further comment on the status of these is provided in Sections 2 & 4.

It is important that the constructed plant is checked against this report to ensure that all proposals have been implemented as required.

2.0 SUMMARY

The HAZOP study comprised: -

- A two-day Microsoft Team, virtual meeting attended by representatives from Anaergia and FBW Engineering Services.
- Distribution of minutes and action response sheets.
- A Response Review Meeting attended by the HAZOP Chairman and HAZOP Secretary.
- Preparation of the HAZOP Report.

During the HAZOP Study meeting a number of deviations were identified and these can generally be split into two categories: -

- The design has made allowance for the deviation and the existing provisions are adequate. The minutes record this and identify that no further action is considered necessary.
- It is not evident whether the design has or has not made allowance for the identified deviation and further action is required.

Where further action is considered necessary Action Response sheets were issued to the personnel identified during the study for their completion.

Each completed response has been reviewed by the Chairman and Secretary at the Response Review Meeting. The purpose of this meeting was to review the responses and any proposed solutions to determine if these could be considered complete or if further action was required. A summary of this meeting is provided in Section 4.0 Action Response Review.

3.0 HAZOP NOTES

Several points were noted which do not warrant individual HAZOP actions to be generated but provide important contextual background information. These are summarised below: -

3.1 Meeting General Notes / Observations

1) The plant at Biodynamic is a waste processing facility which primarily treats food waste along with other variants including liquid slurry imports.
2) There are two Phase to the projects and where appropriate comments on Phase 2 are referenced below however this HAZOP Study is primarily concerned with Phase 1 works.
3) Incoming packaged waste is deposited onto the floor of the Reception Hall and loaded into a "Tiger" unit where packing is removed and discharged to skips for disposal. In a proposed second phase of development an additional Tiger unit is to be incorporated and the packaging is to be processed via conveyors to a Runi Press to remove additional moisture prior to disposal from site. This additional moisture from Phase 2 has been accounted for in the process Mass Balance.
4) The liquid fraction from the Tiger unit is collected in a hopper or bath and is pumped via a macerator to a Reception Tank from where flows will be pumped to the Pasteurisation Plant.
5) Within the Reception Hall is a Rainwater Harvesting system which receives surface water from around the site and transfers this to the Tiger liquid fraction hopper. There are also 2 No. sump pumps which collect drainage from the Reception Hall and also transfer this to the same location.
6) Liquid slurry is imported to 3 No. Liquid Tanks though only 1 No. is being provided in Phase 1. The slurry from these tanks is pumped to the Pasteurisation Plant.
7) A Pasteurisation Plant is provided with 2 No. Pasteurisation Tanks each complete with a mixing / discharge pump. The Pasteuriser are fed by 2 No. macerator / pump lines drawing from any of the Depack Reception Tank or Liquid Tanks.
8) During Phase 1 the Pasteurisers will be heated using an existing steam boiler however in Phase 2 the intention is to change this to LTHW system supplied by the existing CHP Engines.
9) Pasteurised fluid is transferred to a buffer tank from where it is pumped to 3 No. Digesters (2 No. Primary and 1 No. Secondary) which discharge into a Post Digester from where digestate is disposed off-site.
10) Biogas from the digesters is treated prior to being delivered to a number of consumers including 2 No. CHP Engines (providing heat for the process and electricity for on-site use / export), 2 No. Flare Stacks and an Air Liquide plant which further upgrades the gas prior to exporting to the gas network.
11) Anaergia advised that a separate Access, Lifting and Maintenance (ALM) review will be undertaken.
12) There is an issue with the power supply to the site with concerns that the existing supply is inadequate and that certain cables may be under-rated and subject to failure should there be a fault on what is know on the CEMA switchboard. This is currently being reviewed to understand what is required to provide a secure power supply to the whole site and it was noted that temporary generation may be required until this is resolved.
13) Anaergia advised that a Fire Risk Assessment will be carried out for the whole site.
14) Anaergia advised that Noise Assessment will be carried out for the whole site.

15) Anaergia advised that from a security perspective the site will be manned 24/7 however consideration is being given to intruder alarms / CCTV will be carried out for the whole site.
16) A DSEAR Assessment is currently being developed. For the purposes of the HAZOP, it is assumed that all recommendations have been or will be incorporated however it is the responsibility of the design team to ensure that this is checked and carried out.
17) Anaergia advised that a Traffic Management Plan was to be carried out which would cover waste delivery and site vehicle movement protocols.
18) There are no issues onsite with security/intruders. The site is manned 24 hours. An automatic gate is provided at the site entrance which is locked from 2000h to 0600h. CCTV is provided at the permitter and an anti-climb fence is also installed.
19) A new EA Permit Application is required covering environmental constraint and Animal Health.
20) Anaergia advised that spares would be held for high wear items such as pump rotors / stators.

3.2 Node Specific Notes & Observations

Node 1 – Material Feed & Tiger Units

1) Varying waste is brought to the Reception Hall and loaded into the Tiger unit including dry and wet coffee production waste, supermarket waste, Amazon waste and Animal waste.
2) Waste is deposited on the floor of the Reception Hall and is fed to and processed through the Tiger throughout the day. The Tiger is currently operated manually via pushbutton on the panel integral to the unit however there are proposals to automate the operation.
3) The Tiger unit being used in Phase 1 is existing. There is experience with blockages which if occur have to be cleared manually which is accepted by the operations team.
4) The existing Tiger is to be refurbished and an action was raised to check that this would take into consideration the current HSE Regulations
5) It was note that the drain valve on the liquid hopper needs adding to the P&ID.
6) Under Phase 1 skips will be used to collect the separated packaging and it was noted that this would require changing several times per day.
7) Spill kits are provided to manage any fuel or hydraulic leaks / spillages in the Reception Hall and minimise risk of contamination of the main process.
8) The water for the wheel wash and pressure washer used in the Reception Hall is supplied for the mains supply to the site.
9) An action was raised to consider if any additional measures could be implemented to address the risk with dangerous, foreign objects being transferred to the Tiger e.g. fire extinguishers however the operations team advised that their first response would be to go back to the waste supplier to ensure correct material is delivered to site.
10) Anaergia advised that there was a robust sampling regime for the incoming waste in place.
11) Delivery drivers are appropriately trained and certified and will be inducted to the site.
12) MSDS were in place for the ferric additions added to the process.

Node 2 – Reception Hall Sumps / Pumps

1) Two large sumps are provided in the Reception Hall slab connected via a balance pipe. One of the sumps is to have a radar level instrument and level probe installed along with two suction pipes that will supply the 2 No. Sump Pumps.
2) The 2 No pumps are “Bullfrog” diaphragm type pumps which will transfer any drainage to the Tiger liquid hopper
3) The sump with the instruments and suction pipes is currently provided with a sold manhole cover which is likely to be removed to accommodate the new arrangement. There are concerns how this may affect the zonal classification in this area and an action was raised to review this.
4) Spill kits are provided to manage any fuel or hydraulic leaks / spillages in the Reception Hall and minimise risk of contamination of the main process.
5) Concerns were also raised about balance pipe arrangement and whether or not this would always leave a volume of fluid in one of the sumps. An action was raised to review this.

Node 3 – Rainwater Harvesting / Dilution Water

1) The P&ID currently shows two separate tanks connected together to act as one tank collecting rainwater for transfer to the Tiger liquid hopper for dilution purposes. However, it is apparent that exact tank configuration along with what flows are entering these tanks is unclear.

   The Operations team advised that the tanks were not going to receive rainwater direct from the Reception Building roof. This rainwater is believed to be discharged with other surface water into the site bund from where it will be pumped into these tanks.

   Also, Operations advised that a single tank was to be re-used not the two currently shown.

   Several actions were raised to confirm the current site drainage / surface water arrangements and how this is managed and how it is to be interfaced with whatever tanks are being proposed along with any consequent impact on solids content, DSEAR etc.
2) The central pump draws from is suction points in priority order, these currently being
   a. Feeding from reception pit to Digester 1
   b. Separated liquid pit emptying to residue.

   Manual control is also available. Pneumatic valves are provided to control flows from each priority area.
3) Control of the central pump is via a variable speed drive; this speed is set manually depending upon where the pump is drawing from and discharging to.
4) A second pumping station is provided in the event that the central pumping station fails. This is not shown on the P&IDs. CPS2 was installed as a back up to the main CPS1 Pumping Station and is a much simpler system to give additional capacity.
5) There is no flow monitoring provided on the discharge of the central pump into the digesters. Ixora advised that flows can be derived via the rise and fall of levels within the tanks and that there is no need to consider flow monitoring on this pump.

6) The line from the secondary digester to the digestate pit is currently blocked. A new pipe has been provided from the central pump to the digestion pit, this is not shown on the P&ID and is manually controlled. A route is also provided to the residue tank, this is also not shown on the P&ID.
7) The central pump is a rotary lobe pump, there is currently no pressure relief provided in the pump discharge pipework, an action was raised to review this.
8) A stone trap is provided upstream of the central pump to prevent solid damage to the pump.
9) The central pump is located within a container which is provided with adequate lighting and natural ventilation. The doors are retailed in an open position to prevent the any build-up of ammonia an action was raised to review the need for additional ventilation to enable the container doors to be closed.
10) Ear protection is required when working within the central pump kiosk.
11) Samples are obtained from the stone trap on the suction of the pump.
12) The central pump container is considered a non-hazardous environment by Anaergia.

Node 4 – Tiger Macerators / Discharge Pumps

1) Rodding points on pipework was discussed but the consensus of the team was that there were enough 2" tappings on the pipework and ability to dismantle sections to clear any blockages that specific rodding facilities were not required.

Node 5 – Depack Reception Tank / Mixing Pump

1) The Depack Reception Tank to be used is an existing GRP tank that was generally considered to be in poor condition. However the use of this tank was the result of a Client instruction and an action was raised to communicate the HSE risks of using this to the Client.
2) Grit settlement within the tank was considered unlikely due to the upstream measures in place. It was noted that the mixing pump was for organic suspension and not to prevent solids settlement.
3) Spares are held on site, so ant failure of the pump could be addressed quickly without major disruption to the process.

Node 6 – Tanker Off-Loading System

1) Liquid slurry is imported into 3 No. Liquid Tanks (1 No. in Phase 1) via a tanker off-loading system comprising macerator and transfer pump.
2) Selection of the tank that should receive the imported slurry is selected by the operations team via manually operated valves. There have been discussions regarding automating this but currently the proposal remains manual selection.
3) The level signals from each tank are to be repeated to the tanker loading panel however an action was raised to review how the control system would know which tank was being filled and which level to look at so that the pump could be shut down on high level.
4) The risk of solids settlement in the off-loading pipework when not in use was discussed however the risk was considered minimal.
5) All tankers must enter site via a weighbridge and have the appropriate waste code and tanker loading is always manned.

6) Actions were raised to review the drainage and surface water arrangements in the area to understand how liquid slurry spillages are managed. It was noted that whilst a major tanker spillage would be contained on site it would be a significant problem.

Node 7 – Liquid Reception Tank & Mixers

1) The Liquid Tanks are existing glass coated steel tanks that are being re-used and number of actions were raised to review that the required process connections e.g. overflow, vent, draIn etc. were provided.
2) 2 No. propeller mixers, mounted at the same height, are provided in each tank.

Node 8 – Pasteuriser Feed Macerators / Pumps

1) It was noted that the pneumatic actuators on the system were air to open / air to close, therefore in the event of loss of air the valve would remain in position. Anaergia advised that should a valve fail to close then the whole Pasteuriser feed system would fail, though an action was raised to confirm this.

Node 9 – Pasteurisation System (inc. Mixing and Discharge)

1) 2 No. existing tanks of different design, each with 60m3 volume are being used for the pasteurisers.
2) A pasteurisation batch is 50m3 which will be heated to 72°C, over a nominal 4-hour period, using steam injected direct into the tank. This steam will add approximately 6m3 of water into the tank. This will increase the amount of digestate removed from site but this did not raise any major concerns.
3) It was noted that the original design was for 3 pasteurisers which provide security of throughput in the event of a failed batch. However, the Client has instructed to remove the third digester which risks achieving throughput. An action was raised to identify this risk to the Client

Node 10 – Steam Boiler

1) In Phase 1 an existing steam boiler is to be used to transfer heat to the pasteurisers via an injection lance to be installed in the tanks.
2) Anaergia have confirmed that the boiler has been inspected and has the 12 months certification. A number of modifications are being carried out to bring the boiler into operation (blowdown facilities) and training on its operation is being carried out.
3) The current water supply to the site is insufficient to feed the boiler and provide the steam production capacity. A new borehole supply is being implemented however as the output will be greater than 20m3/day a new license is being applied for.
4) There are concerns with the boiler capacity particularly as the total dissolved solids content of the borehole water will create more blowdown cycles thus affect the steam throughput. An action was raised to highlight this risk to the Client.
5) The existing boiler building does not have compliant ventilation requirements however the condition of the building is poor and as the use of the boiler is a temporary measure this is to be monitored during operation.

Node 11 – Hot Water Distribution / Heat Exchanger

1) In Phase 2 the steam boiler is to be replaced with a LTHW system which will use hot water from the CHP engines and transfer heat to the pasteurisers via a shell and tube heat exchanger.
2) Currently this area has not been developed sufficiently to undertake a HAZOP and will need to be reviewed at a later date.

Node 12 – Buffer Tank (Mixing & Digester Feed)

1) A new tank is to be provided and an existing pump will transfer pasteurised sludge primarily to the Digesters with an alternative option of delivering to the Post Digester, with the desired route being via SCADA.
2) It was noted that the pneumatic actuators on the system were air to open / air to close, therefore in the event of loss of air the valve would remain in position. Anaergia advised that should a valve fail to close then the whole Digester feed system would fail, though an action was raised to confirm this.

Node 13 – Odour Extract & Control

1) An existing odour extract and control plant is installed at site but is not currently operational. This comprises 2 No. extract fans and what is believed to be a biofilter. The fans are operational however the biofilter is not. The intention is to replace this whole system however this has not yet been designed or procured. Once details are available for this new system this should be subject to a HAZOP review.
2) The P&ID studied is not an accurate representation of either the current system or proposed system which in reality has not yet been determined and an action was raised to confirm exactly the requirements with regards to odour control and process ventilation.
3) The current programme is for the whole plant to be operational by January 2022 including the new Odour Control Plant. However the Anaerobic element of the plant is currently being brought into service and the DSEAR Assessment is based upon the critical assumption that the required process ventilation is available and operational.

   It is not clear if the calculated process ventilation rates specified in the DSEAR Assessment can be achieved with the existing plant. A number of actions were raised to ensure the DSEAR requirements were made available so that the assessment of the existing plant can be made or if there needed to be interim zonal classifications.

Node 15 – Main Pump

1) A single centrifugal, chopper pump is provided with in the pumping room which is capable of transferring digestate between the various digesters as dictated by route selection from the SCADA.
2) Route selection is facilitated by pneumatic valves. If any of these are in the incorrect position then the whole system is failed and pumping is inhibited.
3) The fact that there is only a single. Duty pump provided was discussed. Anaergia were confident in the reliability of the pump being used reporting minimal failures however an action was raised to consider if a boxed spare stored on site was required.

Node 15 – Digesters / Post Digester (inc. mixing and gas membrane)

1) The digester and post digester are existing A-Consult tanks which have been inspected and refurbished where necessary. The gas membranes above each tank are new.
2) It was advised that anti-foaming dosing measures had been removed from the project by the Client. However due to the risk associated with potentially over-pressurising the gas membrane an action was raised to review providing this anyway due its criticality.
3) It was noted that during the summer months there will be a need to cool the digesters and there is a facility to dump heat which is further discussed under Node 16.
4) It was acknowledged that over time there would be solids deposition at the bottom of the digester and this would need to be removed as part of the 5-year inspection process.
5) The digesters are located within a bunded area with any spillage contained on site with operational decisions made as to how this should be disposed.
6) Access to the top of the digesters and vehicle movements around the digester area are to be reviewed as part of a separate ALM.

Node 16 – Heating System

1) At present heating at site is being provided by a diesel boiler however this is a temporary measure only and the permanent sources will be the CHPs and this is the system that was studied.
2) Temperature in the system is controlled by a temperature transmitter and 3-way control valve upstream of the hot water recirculation pump. The temperature transmitter in each digester then regulates flow to it via a flow control valve on each supply branch. If no heat is required then there is control valve which allows full bypass back to the CHPS.
3) There is a single hot water recirculation pump however this is a commercially available model (typically Grundfos hot water recirculatory) and the required response time is days not hours.
4) Should the digesters require cooling then there is an option to re-route return water from the digesters to the Post Digester and dump heat, up to several 100kW. If additional cooling water is required then connections are provided on the hot water distribution pipework to connect a chilling plant.

Node 17 – Desulphurization

1) Air is injected into the digesters via a blower dedicated to each tank. The blowers operate continuously with air vented into the pump room if there is no demand in the digester. The biogas analyser will monitor Oxygen content and if required will open the appropriate solenoid valve to route air into the digester.
2) In the future it is intended to change the air system to an Oxygen generation and injection system.
3) High Oxygen level will shut the system down thus preventing LEL being reached.

Node 18 – Biogas to CHPs

1) The gas conditioning equipment upstream of the CHPs is existing equipment, free issued to Anaergia by the Client. There was insufficient detail to fully HAZOP these packages though in reality there would be little that Anaergia could do to influence the design of these as they are being free issued.

A general review was carried out however it must be noted that there could be operational and H&S risks with this area that are not within the control of this HAZOP Study. It is strongly recommended that Anaergia satisfy themselves that the plant being issued by the Client is safe and fit for purpose.

Node 19 – Flare

1) The gas conditioning equipment upstream of the CHPs is existing equipment, free issued to Anaergia by the Client. There was insufficient detail to fully HAZOP these packages though in reality there would be little that Anaergia could do to influence the design of these as they are being free issued.

   A general review was carried out however it must be noted that there could be operational and H&S risks with this area that are not within the control of this HAZOP Study. It is strongly recommended that Anaergia satisfy themselves that the plant being issued by the Client is safe and fit for purpose.

Node 20 – Gas Upgrader

1) A gas upgrade plant is provided and operated by Air Liquide. Anaergia are responsible for supplying conditioned gas to the upgrade plant however as with the CHP stream the conditioning equipment existing, free issued to Anaergia by the Client. There was insufficient detail to fully HAZOP these packages though in reality there would be little that Anaergia could do to influence the design of these as they are being free issued.

   A general review was carried out however it must be noted that there could be operational and H&S risks with this area that are not within the control of this HAZOP Study. It is strongly recommended that Anaergia satisfy themselves that the plant being issued by the Client is safe and fit for purpose.

2) If gas quality as analysed by the upgrade plant is not at the required levels this is rejected and routed back to the digester. There is some CO_2 conditioning to ensure that the reject gas is no too enriched.

Node 21 – Leachate Pit

No particular notes or observations

Node 22 – Gas Upgrader Condensate Pit

1) Condensate discharge into the pit is via upturned pipework which terminates below a fixed water level to create a trap and prevent biogas discharging into the pit.

2) It was noted that the condensate would have a pH of 9 to 10 and would release (but not generate) gasses such as Ammonia or H_2S. An action was raised to ensure that this was identified as part of operator training.

Node 23 – CHP Condensate Pit

1) Condensate discharge into the pit is via upturned pipework which terminates below a fixed water level to create a trap and prevent biogas discharging into the pit.

2) It was noted that the condensate would have a pH of 9 to 10 and would release (but not generate) gasses such as Ammonia or H_2S. An action was raised to ensure that this was identified as part of operator training.

Node 24 – Surface Pit

1) It was noted pit contents could release (but not generate) gasses such as Ammonia or H_2S. An action was raised to ensure that this was identified as part of operator training.

Node 25 – Pump Room Ventilation

No particular notes or observations

Node 26 – Biogas Analyser

No particular notes or observations

Node 27 – Service Water

1) It was advised that the service water is supplied from a potable water tank and booster pump however these are not shown on any P&ID and thus it was not possible to fully review these elements.
2) The under / over pressure valves are constantly topped up by opening the relevant solenoid valves on a timed basis with any overflow being routed to the associated digester.

Node 28 – Air Compressors

1) It was advised that the accumulator was sized to close all valve in the event of power failure.
2) It was confirmed that the installation was compliant with the current pressure system safety regulations.

4.0 ACTION RESPONSE REVIEW

The HAZOP study raised 100 possible deviations for which further action was required and the appropriate actions response sheets were generated.

Following a meeting of both the meeting chair and secretary where all HAZOP responses were reviewed it was considered that several actions remain open and require further work is required prior to the HAZOP being fully closed out.

The actions are listed below and it is strongly recommended that a HAZREV / Design Review Meeting is convened to discuss these outstanding actions and ensure the completed responses are incorporated into the design / site operating procedures as necessary.

Action 4

Action 4 was associated with considering the need for additional measures to protect personnel and plan from foreign objects deposited in the Reception Hall.

The response provided states that an SOP has been developed but does not detail the measures taken and as such further information is required to fully close the action.

Action 5

Action 5 was associated with high noise levels in the Reception Hall.

The response provided states that a noise assessment has been carried out which needs to be reviewed again once the second Tiger is installed however further information is required on any protection measures that may be required in the interim period. Therefore the action is still considered open.

Action 6

Action 6 was associated with potentially inhibiting the Odour Control System in the event of a fire in the Reception Hall

The response states this is to be reviewed subject to further design development and a fire risk assessment being carried out and is still considered to be open.

Action 20

Action 20 was associated with the zonal classification of the drainage sumps in the Reception Hall.

The response states the sumps shall be fitted with intrinsically safe electrical equipment however this could be reviewed in conjunction with the DSEAR Assessment (Action 19) to confirm this is absolutely necessary.

Action 22

Action 22 was associated with the inlet arrangements to the Rainwater Harvesting / Dilution Water Tanks.

The response states that the inlet shall be via ball valve but does not detail the source of the various supplies to these tanks and is not considered closed (Also see Action 25).

Action 25

Action 25 was associated with identifying the various sources of fluid that would be discharged into the Rainwater Harvesting / Dilution Tanks i.e. sludge or other process material that may impact on zonal classification.

The response states that dilution liquids may be added however does not identify what these are and thus the action remains open.

Action 26

Action 27 was associated with reviewing the DSEAR Assessment once the source of the fluids being discharged into the Rainwater Harvesting / Dilution Water Tanks was confirmed. As this has not been confirmed (see Action 25) then this action has not been able to be completed.

Action 27

Action 27 was associated with providing details of the proposed Rainwater Harvesting / Dilution Water Tanks. No response has been provided.

Action 28

Action 28 was associated with reviewing the requirement for an oil interceptor on the surface water system. No response has been provided.

Action 30

Action 30 was associated with providing the number and details of the Rainwater Harvesting / Dilution Tanks. No response has been provided.

Action 36

Action 36 was associated with confirming how any spillages from the Depack Reception Tank were to be contained. No response has been provided.

Action 37

Action 37 was associated with advising the Client of using existing tanks for the Depack Reception Tank. No response has been provided.

Actions 56 to 59

Actions 56 to 59 were associated with confirming details of the proposals for using the existing steam boiler. No response has been provided for any of these actions.

Action 60

Action 60 was associated with advising the Client of the performance risk of using the existing steam boiler. No response has been provided.

Action 63

Action 63 was associated with confirming the power supply source for the new borehole pumps that is required to provide water to the existing steam boiler. No response has been provided.

Action 66

Action 66 was associated with confirming the details of the Buffer Tank. No response has been provided.

Actions 73 to 76, 78 & 79

Actions 73 to 76, 78 & 79 were associated with confirming the details of the Odour Control Plant and Extract arrangements. No response has been provided for any of these actions.

Action 80

Action 80 was associated with considering how using the existing Odour Control System would impact on the DSEAR Assessment / Zonal Classification of the plan. As detail of the existing or any new Odour Control Plan has not been provided then it has not been possible to complete this action.

Action 82

Action 82 was associated with considering the requirement for antifoam dosing into the digesters.

The response states that this will be installed on site as soon as possible however consideration should be given to mitigation measures in the interim period.

Action 83

Action 83 was associated with considering the requirement for a boxed spare digester mixer stored on site.

The response states that this is possible but does not confirm what is going to be provided and thus the action is still deemed to be open.

Action 89

Action 89 was associated with considering the what critical equipment needs to be kept energised in the event of a power failure.

The response states that whilst there is a power failure alarm there is no assessment of critical equipment and whether that would necessitate standby power arrangements and thus the action is still open.

Actions 92 to 95

Actions 92 to 95 are associated with the discharge arrangements from the Leachate Pit, Gas Upgrader Condensate Pit and CHP Condensate Pit and that the failure of the NRV on the pump discharge could allow digestate or gas back into the relevant pit.

The action was to consider a swan neck arrangement however the response states that non-return valves are provided. This does not address the cause of the action which is failure of said non-return valve therefore the action is still open.

5.0 MINUTES OF HAZOP MEETING

BIO DYNAMIC
NOTTINGHAM
HAZOP

CLIENT: Anaergia

PROJECT NO: 1170

PROJECT: Bio Dynamic - Nottingham

DETAILS: The plant at Biodynamic is a waste processing facility which primarily treats food waste along with other variants including liquid slurry imports. Depackaged food waste and the liquid imports are first pasteurised prior to being passed to 2 No. digesters and a post digester with treated digestate removed from site.

Biogas generated from the digestion process is treated prior to suppling 2 No. CHP Engines which produce heat for the process and electricity which can be used on site and exported to the grid. Treated biogas is also supplied to a proprietary gas clean-up process to facilitate export to the gas network.

MEETING DATES: Friday 1st and Tuesday 5th October 2021 via MS Teams

TEAM MEMBERS

Martin Bleasdale - Chairman (FBW Engineering)
Ian Hampson - Scribe (FBW Engineering)
Mike Dawber - Project Engineer (FBW Engineering)
Ben Jobling Purser - Technical Manager (Anaergia)
Andy Clark - Operations Manager (Anaergia)
Nick McGowan - Commissioning Lead (Anaergia) - Not present on Tues 05/10/21

ACTION RESPONSES TO: ihampson@fbweng.co.uk

DOCUMENTS STUDIED

125 A01 01 Sheet 0 of 26 Rev A - Sheet Numbering
125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID
125 A01 01 Sheet 2 of 26 Rev C - Filtrate Tank & Dilution Water P&ID
125 A01 01 Sheet 3 of 26 Rev B - Depack System P&ID
125 A01 01 Sheet 4 of 26 Rev C - Liquid Tank No.1 P&ID
125 A01 01 Sheet 5 of 26 Rev B - Liquid Tank No.2 P&ID
125 A01 01 Sheet 6 of 26 Rev B - Liquid Tank No.3 P&ID
125 A01 01 Sheet 7 of 26 Rev B - Pasteuriser No.1 P&ID
125 A01 01 Sheet 8 of 26 Rev B - Pasteuriser No.2 P&ID
125 A01 01 Sheet 9 of 26 Rev B - Hot Water Distribution & Heat Exchanger P&ID
125 A01 01 Sheet 10 of 26 Rev B - Existing Boiler System P&ID
125 A01 01 Sheet 11 of 26 Rev C - Pasteuriser Discharge System & Buffer Tank P&ID
125 A01 01 Sheet 12 of 26 Rev B - Odour Extract & Control System P&ID
125 A01 01 Sheet 13 of 26 Rev B - Tanker Offloading P&ID

DOCUMENTS STUDIED (continued)

125 A01 01 Sheet 14 of 26 Rev A - Pre-Treatment P&ID
125 A01 01 Sheet 15 of 26 Rev A - Digester 1 P&ID
125 A01 01 Sheet 16 of 26 Rev B - Digester 2 P&ID
125 A01 01 Sheet 17 of 26 Rev A - Pumping Room P&ID
125 A01 01 Sheet 18 of 26 Rev C - Post Digester P&ID
125 A01 01 Sheet 19 of 26 Rev A - Biogas Treatment Gas Upgrading P&ID
125 A01 01 Sheet 20 of 26 Rev B - Biogas Treatment CHP/Flare P&ID
125 A01 01 Sheet 21 of 26 Rev A - Desulphurisation P&ID
125 A01 01 Sheet 22 of 26 Rev A - Gas Analysis P&ID
125 A01 01 Sheet 23 of 26 Rev A - Heating System P&ID
125 A01 01 Sheet 24 of 26 Rev A - Service Water P&ID
125 A01 01 Sheet 25 of 26 Rev A - Spare Sheet P&ID
125 A01 01 Sheet 26 of 26 Rev A - Air Compressor P&ID

PRIMARY KEYWORDS

Flow	Level	Pressure	Temperature	Concentration
Contamination	Services	Sampling	Ventilation	Odours
Noise	Security	Impact	Fire/Explosion	Confined Spaces
Haz.Substance	Control	HSE	Design	

SECONDARY KEYWORDS

No	Less than	More than	Reverse	Problems with
Other				

NODE: 1			DATE REVIEWED: Friday, 01 October 2021		
ITEM: Material Feed & Tiger Units DRAWINGS AND DOCUMENTS 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID					
	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
1	Flow Less than	Blockages in liquid hopper outlet pipework.	Loss of flow to the downstream macerators / pumps. Overflow from the liquid hopper	Hopper is provided with a baffle plate designed to prevent sediment from passing from the main section of the hopper to the pump suction section. Main section of the hopper is provided with a door / hatch which allows any sediment to be regularly removed.	Existing safeguards considered adequate.
2	Level More than	High level in liquid fraction hopper below Tiger unit	Spillage of liquid fraction onto Reception Hall floor	High Level Alarm provided in hopper	[1] Consider the need to inhibit the Tiger on High Level in the liquid hopper [2] Consider the need to inhibit the Dilution Water Pumps on High Level in the liquid hopper [3] Consider the need to inhibit the Reception Hall Sump Pumps on High Level in the liquid hopper
	ACTION NO: 1 ASSIGNED TO: Mike Dawber REF: [1] ACTION NO: 2 ASSIGNED TO: Mike Dawber REF: [2] ACTION NO: 3 ASSIGNED TO: Mike Dawber REF: [3]				
3	Contamination Problems with	Foreign objects delivered to site e.g. fire extinguishers	Injury to personnel / damage to plant should such objects enter the Tiger unit	Visual Screening of incoming waste	Confirm if additional measures to protect personnel and plant from foreign objects are required
	ACTION NO: 4 ASSIGNED TO: Ben Jobling Purser				
4	Noise Problems with	Potential high noise levels when equipment is running	Injury to personnel (i.e. hearing loss)	None	Noise assessment to be carried out when plant is operational and appropriate measures incorporated
	ACTION NO: 5 ASSIGNED TO: Ben Jobling Purser				

NODE: 1 (continued) DATE REVIEWED: Friday, 01 October 2021
ITEM: Material Feed & Tiger Units

	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
5	Fire/Explosion Problems with	Odour control provided to Reception Hall	Odour Control System may continue to bring air into the Reception Hall and fuel any fire	Fire Detection System provided	Consider the requirement to inhibit the Odour Control System in the event of a fire
	ACTION NO: 6 ASSIGNED TO: Ben Jobling Purser				
6	Fire/Explosion Problems with	Fire in Reception Hall	Damage to plant / serious injury to personnel	Fire Detection System provided	Consider the need for a fire suppression system
	ACTION NO: 7 ASSIGNED TO: Ben Jobling Purser				
7	Confined Spaces Problems with	Need to enter confined space e.g. Tiger unit	Currently no register on site to identify confined spaces on site	None	Ensure that a Confined Space Register is produced for the site
	ACTION NO: 8 ASSIGNED TO: Ben Jobling Purser				
8	Control Problems with	Abnormal operation of Tiger unit	Damage to plant / Injury to personnel	None	Confirm how the Tiger unit is stopped in an emergency
	ACTION NO: 9 ASSIGNED TO: Ben Jobling Purser				
9	HSE Problems with	Tiger is an existing unit which is being refurbished and there is little detail of this plant	Potential problems with operation and injury to personnel	None	Confirm that the refurbishment of the Tiger will take into consideration latest HSE regulations.
	ACTION NO: 10 ASSIGNED TO: Ben Jobling Purser				

NODE: 2			DATE REVIEWED: Friday, 01 October 2021		
ITEM: Reception Hall Sumps/Pumps DRAWINGS AND DOCUMENTS 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID					
	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
10	Flow Problems with	The sump that feeds the pumps is covered with a solid manhole cover	Potential problems in connecting the pumps suction pipe into the sump	None	Confirm how the suction pipes are to be routed / connected into the sump.
	ACTION NO: 11 ASSIGNED TO: Ben Jobling Purser				
11	Flow Problems with	Solids in pump suction pipe may hold open the non-return valve that is integral to the pump operation	Pump will not operate correctly	None	[1] Need to add isolation valves upstream of the pump which will allow main flow to be isolated and the pump suction flushed with water to clear the NRV. [2] Consider ensuring pipework is flanged in appropriate sections to allow periodical rodding / clearance when required.
	ACTION NO: 12 ASSIGNED TO: Ben Jobling Purser REF: [1] ACTION NO: 13 ASSIGNED TO: Ben Jobling Purser REF: [2]				
12	Level Problems with	The sump that feeds the pumps is covered with a solid manhole cover	Potential problems in installing the level instruments in the sump	None	Confirm how the level instruments are to be installed in the sump
	ACTION NO: 14 ASSIGNED TO: Ben Jobling Purser				
13	Level Problems with	Balance pipe between the "upstream" sump and the downstream sump is located at high level (i.e. acts as an overflow pipe)	The upstream sump will be permanently filled with liquid causing potential issues with DSEAR and odours	None	[1] Confirm details of sump and level of hydraulic connection between sumps [2] Based on investigation consider what measures are required to minimise issues with zoning / odour
	ACTION NO: 15 ASSIGNED TO: Andrew Clark REF: [1] ACTION NO: 16 ASSIGNED TO: Mike Dawber REF: [2]				

NODE: 2 (continued) ITEM: Reception Hall Sumps/Pumps				DATE REVIEWED: Friday, 01 October 2021	
	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
14	Pressure Problems with	Pressure switch provided with the pump	Function of this switch currently unknown	None	[1]Confirm function of pressure switch. [2]Confirm pressure switch location is correct i.e. should this be between the pump and NRV
	ACTION NO: 17 ASSIGNED TO: Mike Dawber REF: [1] ACTION NO: 18 ASSIGNED TO: Mike Dawber REF: [2]				
15	Fire/Explosion Problems with	Modifications are required to sump cover to accommodate suctions pipes / level instruments	Potential to expose area around the sump to explosive atmosphere	None	[1]Confirm zonal classification of sumps as detailed in DSEAR Assessment [2]Consider what measures are required once zonal classification is known and details of cover modifications are finalised
	ACTION NO: 19 ASSIGNED TO: Mike Dawber REF: [1] ACTION NO: 20 ASSIGNED TO: Ben Jobling Purser REF: [2]				
16	HSE Problems with	Potential for explosive or hazardous atmospheres generated in sumps e.g. methane, H2S	Injury to personnel / fire / explosion	None	Procedures to be developed to carry out regular gas monitoring
	ACTION NO: 21 ASSIGNED TO: Andrew Clark				

NODE: 3 DATE REVIEWED: Friday, 01 October 2021

ITEM: Rainwater Harvesting/Dilution Water

DRAWINGS AND DOCUMENTS
125 A01 01 Sheet 2 of 26 Rev C - Filtrate Tank & Dilution Water P&ID

	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
17	Flow No	Pump suction valve inadvertently left closed	Damage to pump due to dry running	Low suction pressure switch provided which will inhibit pump High stator temperature switch which will trip pump	Existing safeguards considered adequate
18	Flow Problems with	Inlet flows to the rainwater harvesting tanks not shown on P&ID	It is not possible to understand the full configuration and assess any interface requirements	None	[1]Need to develop the inlet configuration and add to P&ID [2]Once configuration is known need to confirm what interlocks are required between the rainwater tanks and the source supplies
	ACTION NO: 22 ASSIGNED TO: Ben Jobling Purser REF: [1] ACTION NO: 23 ASSIGNED TO: Ben Jobling Purser REF: [2]				
19	Flow Problems with	Flow to the rainwater harvesting tanks is via existing pumps (i.e. from bund) around site which may not be designed for the duty	Unable to transfer fluid into the tanks	None	Confirm that the source pumps are suitable for pumping into the tanks
	ACTION NO: 24 ASSIGNED TO: Andrew Clark				
20	Pressure More than	Pump discharge pipework blocked / valve inadvertently closed	Loss of process / potential failure of pipework	High pressure switch provided which will inhibit pump	Existing safeguards considered adequate
21	Concentration Problems with	Input to the tanks may not just be rainwater i.e. possible to route water from the site bund	Potential for sludge or other process material to be discharged into tanks and generation of explosive atmosphere	None	[1]Confirm exactly what material can be discharge into rainwater harvesting tanks [2]Once input material is known assess if there is an impact on the DSEAR Assessment
	ACTION NO: 25 ASSIGNED TO: Ben Jobling Purser REF: [1] ACTION NO: 26 ASSIGNED TO: Mike Dawber REF: [2]				

NODE: 3 (continued) DATE REVIEWED: Friday, 01 October 2021
ITEM: Rainwater Harvesting/Dilution Water

	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
22	Contamination Problems with	Input to the tanks may not just be rainwater i.e. possible to route water from the site bund	Potential for solids settlement and build up within the tank	None.	Confirm details of the tanks being provided and facilities for access, draining and cleaning
	ACTION NO: 27 ASSIGNED TO: Ben Jobling Purser				
23	Contamination Problems with	Oil / fuel spillage on site which is captured in surface water system	This could be transferred to the rainwater harvesting tanks via the existing drainage pumps and thus transferred onto the Tiger hopper and into the process	Regular inspection of site to detect spillages	Consider the impact of an oil / fuel spillage and whether there is a need for oil interceptor on the surface water system(s)
	ACTION NO: 28 ASSIGNED TO: Andrew Clark				
24	Control Problems with	No electrical infrastructure (i.e. starters, I/O) provided for the rainwater harvesting system	Currently unable to operate this system	None	Need to confirm electrical infrastructure requirements for the system
	ACTION NO: 29 ASSIGNED TO: Mike Dawber				
25	Design Problems with	There are no details of the existing tanks or tank that are going to be used for the Rainwater Harvesting System	Difficult to confirm design configuration / requirements e.g. instrumentation required, pipework and valve requirements	None	Confirm how many tanks are proposed and provide full details of tanks
	ACTION NO: 30 ASSIGNED TO: Andrew Clark				

NODE: 4 DATE REVIEWED: Friday, 01 October 2021

ITEM: Tiger Macerators/Discharge Pumps

DRAWINGS AND DOCUMENTS
125 A01 01 Sheet 3 of 26 Rev B - Depack System P&ID

	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
26	Flow No	Pump suction valve inadvertently left closed	Damage to pump due to dry running	Pressure transmitter provided which will inhibit pump on low pressure High stator temperature switch which will trip pump	Existing safeguards considered adequate
27	Flow More than	Limited volume of suction section of Tiger Hopper	Potential for excessive pump starts per hour	None	Confirm volume of suction section of the hopper and that the maximum number of pump starts per hour is not excessive.
	ACTION NO: 31 ASSIGNED TO: Ben Jobling Purser				
28	Pressure More than	Pump discharge pipework blocked / valve inadvertently closed	Loss of process / potential failure of pipework	High pressure switch provided which will inhibit pump	Existing safeguards considered adequate
29	Contamination Problems with	Stones or similar objects in fluid	Potential blockage / damage to macerator and downstream pumps	Stone trap integral to macerator	Ensure that a facility to empty the stone trap on a regular basis is provided.
	ACTION NO: 32 ASSIGNED TO: Mike Dawber				
30	Sampling Problems with	Use of drains as sample points	Drains will be on bottom of pipe and are likely to collect grit	None	Separate valved sample points to be provided connected horizontally of the pipes with a downwards tap / spout
	ACTION NO: 33 ASSIGNED TO: Ben Jobling Purser				

NODE: 5			DATE REVIEWED: Friday, 01 October 2021		
ITEM: Depack Reception Tank/Mixing Pump DRAWINGS AND DOCUMENTS 125 A01 01 Sheet 3 of 26 Rev B - Depack System P&ID					
	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
31	Flow No	Mixing pump suction valve inadvertently left closed	Damage to pump due to dry running	Low suction pressure switch provided which will inhibit pump High stator temperature switch which will trip pump	Existing safeguards considered adequate
32	Pressure More than	Pump discharge pipework blocked / valve inadvertently closed	Loss of process / potential failure of pipework	High pressure switch provided which will inhibit pump	Existing safeguards considered adequate
33	Pressure Problems with	Potential lack of vent on the existing tank that is being re-used	Vacuum created when pumping out of the tank causing implosion	None	Confirm if a vent is provided or if one needs to be incorporated.
	ACTION NO: 34 ASSIGNED TO: Ben Jobling Purser				
34	Concentration Problems with	Failure of mixing pump	Loss of mixing and potential settlement of solids that may be struggle to be re-suspended.	Primary purpose of pump is for organic suspension not to prevent solids settlement and risk of settlement is considered minimal If there is some settlement an access hatch is provided to allow manual cleaning. Upstream solids screening / protection. Commonality of spares held on site.	Safeguards considered adequate

NODE: 5 (continued)				DATE REVIEWED: Friday, 01 October 2021	
ITEM: Depack Reception Tank/Mixing Pump					
	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
35	Impact Problems with	Tank is located near road	Potential damage and spillage caused by vehicle impact	None	[1]Confirm what measures are being provided to protect tank from vehicle impact [2]Confirm what measures are being provided to contain any spillages from this tank
	ACTION NO: 35 ASSIGNED TO: Ben Jobling Purser REF: [1] ACTION NO: 36 ASSIGNED TO: Ben Jobling Purser REF: [2]				
36	HSE Problems with	Unknown condition of existing tank that is being re-used on instruction of the Client	Potential Health & Safety issues with failure when filled, creating new nozzles etc.	None	To advise Client of the concerns regarding the risk of re-using existing tanks and the H&S consequences
	ACTION NO: 37 ASSIGNED TO: Ben Jobling Purser				

NODE: 6				DATE REVIEWED: Friday, 01 October 2021	
ITEM: Tanker Offloading System DRAWINGS AND DOCUMENTS 125 A01 01 Sheet 13 of 26 Rev B - Tanker Offloading P&ID					
	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
37	Flow No	Pump suction valve inadvertently left closed	Damage to pump due to dry running	Pressure transmitter provided which will inhibit pump on low pressure High stator temperature switch which will trip pump	Existing safeguards considered adequate
38	Flow Problems with	Tanker off-loading to 3 No. liquid tanks is manually selected via manual valves.	Potential to open incorrect valve and deliver into wrong tank and cause an overflow	None	Ensure that valves are clearly labelled with the tank they are associated with.
	ACTION NO: 38 ASSIGNED TO: Andrew Clark				

NODE: 6 (continued) DATE REVIEWED: Friday, 01 October 2021
ITEM: Tanker Offloading System

	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
39	Level Problems with	Single pump with potential to discharge into 3 different tanks	Tanker off-loading panel is not looking at correct tank level instrument causing overflow	None	Review and develop the level control / interface between tank level and tanker off-loading panel
	ACTION NO: 39 ASSIGNED TO: Mike Dawber				
40	Contamination Problems with	Stones or similar objects in fluid	Potential blockage / damage to macerator and downstream pumps	Stone trap integral to macerator	Ensure that a facility to empty the stone trap on a regular basis is provided.
	ACTION NO: 40 ASSIGNED TO: Mike Dawber				
41	Contamination Problems with	Macerator is provided with a stone trap which requires draining and there will be spillages from tanker disconnection	Spillages could be discharged into surface water system	None	[1]Consider the need for segregating the tanker offload area from the surface water system [2]Review height of macerator to facilitate access to drain point
	ACTION NO: 41 ASSIGNED TO: Ben Jobling Purser REF: [1] ACTION NO: 42 ASSIGNED TO: Ben Jobling Purser REF: [2]				
42	Contamination Problems with	Tanker off-loading hose failure / disconnection	Major spillage that would access various areas of site including Air Liquide compound.	None	Consider the need for containment wall to protect the Air Liquide compound.
	ACTION NO: 43 ASSIGNED TO: Ben Jobling Purser				
43	Services Problems with	Tanker off-loading during winter months	Poor visibility and injury to personnel	None	Review provision of adequate lighting to facilitate safe off-loading
	ACTION NO: 44 ASSIGNED TO: Ben Jobling Purser				
44	Services Problems with	Spillages from tanker off-loading / macerator	Need to clean up spillages	None	Review the requirement for washdown water to the area and confirm from where this is to be sourced.
	ACTION NO: 45 ASSIGNED TO: Ben Jobling Purser				

NODE: 6 (continued)				DATE REVIEWED: Friday, 01 October 2021	
ITEM: Tanker Offloading System					
	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
45	Odours Problems with	Discharge of air from tankers during delivery	Release of odours	None	Confirm EA requirements with regards to connecting tankers to Odour Control System
	ACTION NO: 46 ASSIGNED TO: Andrew Clark				

NODE: 7				DATE REVIEWED: Friday, 01 October 2021	
ITEM: Liquid Reception Tanks & Mixers DRAWINGS AND DOCUMENTS 125 A01 01 Sheet 4 of 26 Rev C - Liquid Tank No.1 P&ID 125 A01 01 Sheet 5 of 26 Rev B - Liquid Tank No.2 P&ID 125 A01 01 Sheet 6 of 26 Rev B - Liquid Tank No.3 P&ID					
	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
46	Level More than	Lack of overflow on tanks	If inflow does not stop on high level, then tank will become pressurised with potential damage to tank	None	Ensure overflow is provided on tanks
	ACTION NO: 47 ASSIGNED TO: Ben Jobling Purser				
47	Pressure More than	No vents shown on roof	Can over-pressurise tank on filling or pulling a vacuum when emptying tank (either via normal route or tanker connection)	None	Ensure that adequate over / under pressure protection is provided on the tank roofs
	ACTION NO: 48 ASSIGNED TO: Ben Jobling Purser				
48	Concentration Problems with	Mixer failure	Unable to adequately mix tank potentially causing process problems	Mixer have been sized / selected such that one of the two mixers can provide the required mixing	Existing safeguards considered adequate
49	Contamination Problems with	No drain or tanker outlet connection on tanks	Unable to empty tank of rogue or contaminated batch	None	Ensure that a drain / tanker outlet connection is provided on the tank
	ACTION NO: 49 ASSIGNED TO: Ben Jobling Purser				

NODE: 7 (continued)				DATE REVIEWED: Friday, 01 October 2021	
ITEM: Liquid Reception Tanks & Mixers					
	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
50	Sampling Problems with	No sample points or recirculation line shown on the tanks	Unable to take representative samples of the tank's contents	None	Review requirements for sampling arrangements for the tanks
	ACTION NO: 50 ASSIGNED TO: Ben Jobling Purser				

NODE: 8				DATE REVIEWED: Friday, 01 October 2021	
ITEM: Pasteuriser Feed Macerators/Pumps DRAWINGS AND DOCUMENTS 125 A01 01 Sheet 4 of 26 Rev C - Liquid Tank No.1 P&ID					
	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
51	Flow No	Pump suction valve inadvertently left closed	Damage to pump due to dry running	Pressure transmitter provided which will inhibit pump on low pressure High stator temperature switch which will trip pump	Existing safeguards considered adequate
52	Flow Problems with	Actuated valves on liquid tanks fail to close	Pasteurisation Feed Pumps may draw off incorrect tank	Limit switches provided on valves.	Confirm control action in the event of valve failed to close.
	ACTION NO: 51 ASSIGNED TO: Mike Dawber				
53	Pressure More than	Pump discharge pipework blocked / valve inadvertently closed	Loss of process / potential failure of pipework	High pressure switch provided which will inhibit pump	Existing safeguards considered adequate
54	Contamination Problems with	Stones or similar objects in fluid	Potential blockage / damage to macerator and downstream pumps	Stone trap integral to macerator	Ensure that a facility to empty the stone trap on a regular basis is provided.
	ACTION NO: 52 ASSIGNED TO: Mike Dawber				
55	Sampling Problems with	Use of drains as sample points	Drains will be on bottom of pipe and are likely to collect grit	None	Separate valved sample points to be provided connected horizontally of the pipes with a downwards tap / spout
	ACTION NO: 53 ASSIGNED TO: Ben Jobling Purser				

NODE: 9			DATE REVIEWED: Friday, 01 October 2021		
ITEM: Pasteurisation System (Inc Mixing & Discharge) DRAWINGS AND DOCUMENTS 125 A01 01 Sheet 7 of 26 Rev B - Pasteuriser No.1 P&ID 125 A01 01 Sheet 8 of 26 Rev B - Pasteuriser No.2 P&ID					
	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
56	Flow No	Pump suction valve inadvertently left closed	Damage to pump due to dry running	Low suction pressure switch provided which will inhibit pump High stator temperature switch which will trip pump	Existing safeguards considered adequate
57	Flow Problems with	Only two pasteurisers are provided (as instructed by the Client)	In the event of a failed pasteurisation batch then need to re-heat the failed batch which will reduce the plant throughput	None	Client needs to be advised of the risk to throughput during Phase 1
	ACTION NO: 54 ASSIGNED TO: Ben Jobling Purser				
58	Pressure More than	Pump discharge pipework blocked / valve inadvertently closed	Loss of process / potential failure of pipework	High pressure switch provided which will inhibit pump	Existing safeguards considered adequate
59	Pressure Problems with	Steam injected into pasteuriser for heating	Potential build-up of pressure in tank and damage to tank	None	Review the requirement for tank over pressure protection.
	ACTION NO: 55 ASSIGNED TO: Mike Dawber				

NODE: 10			DATE REVIEWED: Friday, 01 October 2021		
ITEM: Steam Boiler DRAWINGS AND DOCUMENTS 125 A01 01 Sheet 10 of 26 Rev B - Existing Boiler System P&ID					
	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
60	Flow Problems with	High total dissolved solids in feed water	Increased blowdown frequency from boiler	None	[1]Confirm where blowdown is routed [2]Confirm how the increased blowdown volumes will impact on stream output and thus heating cycle for the pasteurisers
	ACTION NO: 56 ASSIGNED TO: Andrew Clark REF: [1] ACTION NO: 57 ASSIGNED TO: Andrew Clark REF: [2]				
61	Pressure Problems with	Boiler pressure will be much higher than process requirements	Unnecessarily high pressure in steam pipework to pasteuriser	Regulation valves provided on boiler	Review and confirm process pressure requirements and ensure valves are set appropriately
	ACTION NO: 58 ASSIGNED TO: Andrew Clark				
62	Temperature Less than	Insufficient temperature in hot well	Inefficient operation of the boiler	None	Consider if there is a need to provide a heat supply to the hot well from the CHPs
	ACTION NO: 59 ASSIGNED TO: Andrew Clark				
63	Temperature Problems with	Concerns existing steam boiler cannot provide sufficient heat transfer	Unable to achieve plant throughput	None	Client to be advised of the risk associated with performance of existing steam boiler
	ACTION NO: 60 ASSIGNED TO: Ben Jobling Purser				
64	Temperature Problems with	High temperature steam pipework being installed	Potential issues with expansion / contraction and imposition of stresses on pipework causing failure	None	Confirm that expansion / contraction is being considered as part of the pipework design.
	ACTION NO: 61 ASSIGNED TO: Ben Jobling Purser				
65	Temperature Problems with	High temperature pipework	Injury to personnel / Loss of heat	None	Ensure sufficient lagging / personnel protection is provided on all steam pipework
	ACTION NO: 62 ASSIGNED TO: Andrew Clark				

NODE: 10 (continued) ITEM: Steam Boiler				DATE REVIEWED: Friday, 01 October 2021	
DEVIATION		CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
66	Services Problems with	New borehole required for water supply to steam boiler	Need a power supply for the pump	None	Review and determine from where new power supply for pump is to be obtained (to be reviewed in conjunction with overall power supply issues)
	ACTION NO: 63 ASSIGNED TO: Ben Jobling Purser				
67	Services Problems with	Lack of lighting in boiler room	Difficulties with access and maintenance with potential injury to personnel	None	Review lighting provisions in boiler room.
	ACTION NO: 64 ASSIGNED TO: Andrew Clark				
68	Services Problems with	All actuated valves around the pasteurisers and steam plan are pneumatic type	Need an air supply to the actuators	Compressor system provided on site	Confirm how air pipework is to be routed from the compressors to the process area
	ACTION NO: 65 ASSIGNED TO: Ben Jobling Purser				

NODE: 11	DATE REVIEWED:
ITEM: Hot Water Distribution/Heat Exchanger DRAWINGS AND DOCUMENTS 125 A01 01 Sheet 9 of 26 Rev B - Hot Water Distribution & Heat Exchanger P&ID	
No significant deviations identified for this Item	

NODE: 12 DATE REVIEWED: Friday, 01 October 2021

ITEM: Buffer Tank (Mixing & Digester Feed)

DRAWINGS AND DOCUMENTS
125 A01 01 Sheet 11 of 26 Rev C - Pasteuriser Discharge System & Buffer Tank P&ID

	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
69	Flow No	Pump suction valve inadvertently left closed	Damage to pump due to dry running	Low suction pressure switch provided which will inhibit pump High stator temperature switch which will trip pump	Existing safeguards considered adequate
70	Level Problems with	Change in the second-hand tank to be used with new proposed tank having different dimensions	Selected instruments are not suitable for new dimensions	None	[1]Provide confirmed details of selected tank [2]Review instrument selection once tank details are knowing
	ACTION NO: 66 ASSIGNED TO: Ben Jobling Purser REF: [1] ACTION NO: 67 ASSIGNED TO: Mike Dawber REF: [2]				
71	Pressure More than	Unclear if vents are provided on proposed tank	Can over-pressurise tank on filling or pulling a vacuum when emptying tank (either via normal route or tanker connection)	None	Ensure that adequate over / under pressure protection is provided on the tank roofs
	ACTION NO: 68 ASSIGNED TO: Ben Jobling Purser				
72	Temperature Problems with	Unclear if tank being used is coming with lagging or not	Preference is for tank to be unlagged to allow heat loss	None	Confirm if lagging is provided and need to remove this
	ACTION NO: 69 ASSIGNED TO: Ben Jobling Purser				
73	Services Problems with	Increased height of changed tank	Difficulties in routeing cable to high level instrument	None	Review of how cable is to be routed to level instrument
	ACTION NO: 70 ASSIGNED TO: Ben Jobling Purser				
74	Impact Problems with	Increased height of changed tank	Lightning strike and damage to tank		Check requirement and provisions for lightning protection
	ACTION NO: 71 ASSIGNED TO: Ben Jobling Purser				

NODE: 12 (continued) DATE REVIEWED: Friday, 01 October 2021
ITEM: Buffer Tank (Mixing & Digester Feed)

	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
75	Design Problems with	Increased height of changed tank	Potential wind loading issues	None	Confirm that the increased height will not cause any issues with regards to wind loading
	ACTION NO: 72 ASSIGNED TO: Ben Jobling Purser				

NODE: 13 DATE REVIEWED: Tuesday, 05 October 2021

ITEM: Odour Extract & Control

DRAWINGS AND DOCUMENTS
125 A01 01 Sheet 12 of 26 Rev B - Odour Extract & Control System P&ID

	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
76	Flow Problems with	Unbalanced flows from each extraction point	Insufficient extract rates from particular individual sources	Dampers provided on each extract point	Consider the need for facilities to measure and balance extract rates
	ACTION NO: 73 ASSIGNED TO: Ben Jobling Purser				
77	Flow Problems with	P&ID shows 3 No. fans but there are only 2 No. fans on site	System won't operate as shown on P&ID	None	Confirm exactly what configuration is proposed for the odour control / ventilation system
	ACTION NO: 74 ASSIGNED TO: Ben Jobling Purser				
78	Services Problems with	No electrical infrastructure in place for odour control plant (i.e. starters / control)	Unable to operate odour control plant	None	Confirm how electrical infrastructure for odour control plant is to be provided
	ACTION NO: 75 ASSIGNED TO: Ben Jobling Purser				
79	Odours Problems with	Existing biofilter not operational	Odour releases / potential breach of permit	None	Confirm permit stipulations and requirements with regards to odour control whilst new system is being specified /procured.
	ACTION NO: 76 ASSIGNED TO: Ben Jobling Purser				

NODE: 13 (continued) DATE REVIEWED: Tuesday, 05 October 2021
ITEM: Odour Extract & Control

	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
80	Fire/Explosion Problems with	Unknow if current odour control system / fans can satisfy the extract rates specified in the DSEAR Assessment (not currently issued)	Unable to mitigate hazardous zone classifications as specified in DSEAR	None	[1]Issue DSEAR Assessment [2]Review and confirm that the existing system can satisfy the DSEAR requirements [3]If existing system is not suitable consider options for providing a compliant system [4]If existing system is not suitable then advise impact on zonal classification

ACTION NO: 77 ASSIGNED TO: Mike Dawber REF: [1]
ACTION NO: 78 ASSIGNED TO: Ben Jobling Purser REF: [2]
ACTION NO: 79 ASSIGNED TO: Ben Jobling Purser REF: [3]
ACTION NO: 80 ASSIGNED TO: Mike Dawber REF: [4]

NODE: 14 DATE REVIEWED: Tuesday, 05 October 2021

ITEM: Main Pump

DRAWINGS AND DOCUMENTS
125 A01 01 Sheet 17 of 26 Rev A - Pumping Room P&ID

	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
81	Flow Problems with	Duty pump only provided	Pump failure will mean loss of system	None	Consider the need for boxed spare stored on site

ACTION NO: 81 ASSIGNED TO: Ben Jobling Purser

NODE: 15 DATE REVIEWED: Tuesday, 05 October 2021

ITEM: Digesters/Post Digester & Mixing (Inc Blowers)

DRAWINGS AND DOCUMENTS
125 A01 01 Sheet 15 of 26 Rev A - Digester 1 P&ID
125 A01 01 Sheet 16 of 26 Rev B - Digester 2 P&ID
125 A01 01 Sheet 18 of 26 Rev C - Post Digester P&ID

	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
82	Level Problems with	Foaming in digester	Increase in level in digester with potential compromise of PRVs and consequential over-pressurisation of gas membrane	High level alarm in digester	Consider the need for anti-foaming dosing system
	ACTION NO: 82 ASSIGNED TO: Ben Jobling Purser				
83	Concentration Problems with	Digester mixer failure	Loss of mixing / solids settlement	One mixer can service tank for nominally 2 weeks. Mixers can be replaced from top of digester without need to drain tank. Generally replacement mixers will be in stock	Consider the need for a boxed unit stored on site as essential spare
	ACTION NO: 83 ASSIGNED TO: Ben Jobling Purser				
84	Haz.Substance Problems with	Large volumes of biogas stored onsite as well as the propane associated with the Gas to Grid plant	The site may fall under the COMAH Regulations	None	Review and confirm if the site falls within the COMAH Regulations
	ACTION NO: 84 ASSIGNED TO: Ben Jobling Purser				

NODE: 16	DATE REVIEWED: Tuesday, 05 October 2021

ITEM: Digester Heating System

DRAWINGS AND DOCUMENTS
125 A01 01 Sheet 23 of 26 Rev A - Heating System P&ID

	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
85	Services Problems with	Temporary chillers may be required to cool digesters	Any chilling equipment will require a power supply	None	Review and confirm proposed source of power supply for temporary chillers
	ACTION NO: 85 ASSIGNED TO: Ben Jobling Purser				

NODE: 17	DATE REVIEWED:

ITEM: Desulphurisation System

DRAWINGS AND DOCUMENTS
125 A01 01 Sheet 21 of 26 Rev A - Desulphurisation P&ID

No significant deviations identified for this Item

NODE: 18	DATE REVIEWED: Tuesday, 05 October 2021

ITEM: Biogas to CHPs (Inc Booster, Chiller & CHPs)

DRAWINGS AND DOCUMENTS
125 A01 01 Sheet 20 of 26 Rev B - Biogas Treatment CHP/Flare P&ID

	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
86	Impact Problems with	One section of biogas pipework subject to potential vehicle impact	Pipework failure causing biogas leak / potential explosion	None	Review and confirm vehicle protection measures to guard this section of pipework
	ACTION NO: 86 ASSIGNED TO: Andrew Clark				

NODE: 19	DATE REVIEWED:
ITEM: Flare DRAWINGS AND DOCUMENTS 125 A01 01 Sheet 20 of 26 Rev B - Biogas Treatment CHP/Flare P&ID	
No significant deviations identified for this Item	

NODE: 20		DATE REVIEWED: Tuesday, 05 October 2021			
ITEM: Gas Upgrader DRAWINGS AND DOCUMENTS 125 A01 01 Sheet 19 of 26 Rev A - Biogas Treatment Gas Upgrading P&ID					
	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
87	Temperature Problems with	High biogas temperatures off the digesters	Exceed temperature limits for gas being delivered to Gas Upgrade Plant	Connections provided to add a chiller unit as an option	Review and confirm is a permanent chiller system needs to be provided to meet gas temperature limits.
	ACTION NO: 87 ASSIGNED TO: Ben Jobling Purser				
88	Services Problems with	Temporary or permanent chillers may be required to cool gas to Gas Upgrade Plant	Any chilling equipment will require a power supply	None	Review and confirm proposed source of power supply for any chilling equipment
	ACTION NO: 88 ASSIGNED TO: Ben Jobling Purser				
89	Services Problems with	Main power supply failure	Loss of plant / process (note this is a site wide issue not just Gas Upgrade)	None	Consider what critical equipment needs to remain energised on power failure and confirm how this is to be achieved
	ACTION NO: 89 ASSIGNED TO: Ben Jobling Purser				
90	Impact Problems with	Digestate off-loading vehicle movement in the area	Potential damage to plant	None	Consider vehicle protection requirements in this area
	ACTION NO: 90 ASSIGNED TO: Andrew Clark				

NODE: 21			DATE REVIEWED: Tuesday, 05 October 2021		
ITEM: Leachate Pit DRAWINGS AND DOCUMENTS 125 A01 01 Sheet 17 of 26 Rev A - Pumping Room P&ID					
	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
91	Flow Problems with	Line to a particular digester not used for a lengthy period of time	Settlement / blockage of line making it un-usable when required	None	Consider frequent change-over of lines between the 2 digesters or add provision for flushing water
	ACTION NO: 91 ASSIGNED TO: Ben Jobling Purser				
92	Flow Problems with	Failure of non-return valve	Back-flow of digestate or gas route back to pit	None	Confirm discharge arrangement will prevent back-flow e.g. swan neck
	ACTION NO: 92 ASSIGNED TO: Ben Jobling Purser				

NODE: 22			DATE REVIEWED: Tuesday, 05 October 2021		
ITEM: Gas Upgrader Condensate Pit DRAWINGS AND DOCUMENTS 125 A01 01 Sheet 19 of 26 Rev A - Biogas Treatment Gas Upgrading P&ID					
	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
93	Flow Problems with	Failure of non-return valve	Back-flow of digestate or gas route back to pit	None	Confirm discharge arrangement will prevent back-flow e.g. swan neck
	ACTION NO: 93 ASSIGNED TO: Ben Jobling Purser				

NODE: 23		DATE REVIEWED: Tuesday, 05 October 2021			
ITEM: CHP Condensate Pit DRAWINGS AND DOCUMENTS 125 A01 01 Sheet 20 of 26 Rev B - Biogas Treatment CHP/Flare P&ID					
	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
94	Flow Problems with	Failure of non-return valve	Back-flow of digestate or gas route back to pit	None	Confirm discharge arrangement will prevent back-flow e.g. swan neck
	ACTION NO: 94 ASSIGNED TO: Ben Jobling Purser				

NODE: 24		DATE REVIEWED: Tuesday, 05 October 2021			
ITEM: Surface Pit DRAWINGS AND DOCUMENTS 125 A01 01 Sheet 20 of 26 Rev B - Biogas Treatment CHP/Flare P&ID					
	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
95	Flow Problems with	Failure of non-return valve	Back-flow of digestate or gas route back to pit	None	Confirm discharge arrangement will prevent back-flow e.g. swan neck
	ACTION NO: 95 ASSIGNED TO: Ben Jobling Purser				
96	Contamination Problems with	Potential for contamination of surface pit	Process upset if contaminated fluid is transferred to digesters	None	Site procedures to be produced and training provided detailing how contamination events should be managed
	ACTION NO: 96 ASSIGNED TO: Andrew Clark				
97	Contamination Problems with	Contamination of surface pit	Unable to transfer water to digesters	None	Consider the need for a tanker connection on the discharge pipework to allow pit contents to be transferred to tanker / container
	ACTION NO: 97 ASSIGNED TO: Ben Jobling Purser				

NODE: 24 (continued) DATE REVIEWED: Tuesday, 05 October 2021
ITEM: Surface Pit

	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
98	Haz.Substance Problems with	Collection / presence of harmful gasses in sump	Injury to personnel	None	Warnings / identification of hazards to be highlighted during training
	ACTION NO: 98 ASSIGNED TO: Ben Jobling Purser				

NODE: 25 DATE REVIEWED:

ITEM: Pump Room Ventilation

DRAWINGS AND DOCUMENTS
125 A01 01 Sheet 21 of 26 Rev A - Desulphurisation P&ID

No significant deviations identified for this Item

NODE: 26 DATE REVIEWED:

ITEM: Biogas Analyser

DRAWINGS AND DOCUMENTS
125 A01 01 Sheet 22 of 26 Rev A - Gas Analysis P&ID

No significant deviations identified for this Item

NODE: 27 DATE REVIEWED: Tuesday, 05 October 2021

ITEM: Service Water

DRAWINGS AND DOCUMENTS
125 A01 01 Sheet 24 of 26 Rev A - Service Water P&ID

	DEVIATION	CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
99	Level Less than	Low level in either of the break tanks	Loss of service water / dry running of pump	None	Confirm if low level interlock / alarm to protect pump / indicate loss of service water
	ACTION NO: 99 ASSIGNED TO: Ben Jobling Purser				

NODE: 27 (continued) ITEM: Service Water			DATE REVIEWED: Tuesday, 05 October 2021		
DEVIATION		CAUSE	CONSEQUENCE	SAFEGUARDS	ACTION
100	Pressure Problems with	Pump failure	Loss of service water to consumers in particular the under / over pressure valves	None	Consider the need for pressure instrument of service water system to indicate loss of pressure
	ACTION NO: 100 ASSIGNED TO: Ben Jobling Purser				

NODE: 28	DATE REVIEWED:
ITEM: Air Compressors DRAWINGS AND DOCUMENTS 125 A01 01 Sheet 26 of 26 Rev A - Air Compressor P&ID	
No significant deviations identified for this Item	

6.0 COMPLETED ACTION RESPONSE SHEETS

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Mike Dawber	RESPOND BY: 19 OCT 2021
ACTION NO: 1	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID	
ITEM: (Hazop Node 1) Material Feed & Tiger Units	
CAUSE: (Level More than) High level in liquid fraction hopper below Tiger unit	
CONSEQUENCE: Spillage of liquid fraction onto Reception Hall floor	
SAFEGUARDS: High Level Alarm provided in hopper	
ACTION: YOUR REFERENCE BELOW: [1] [1]Consider the need to inhibit the Tiger on High Level in the liquid hopper [2]Consider the need to inhibit the Dilution Water Pumps on High Level in the liquid hopper [3]Consider the need to inhibit the Reception Hall Sump Pumps on High Level in the liquid hopper	
RESPONSE TO REFERENCE [1]: (Action 1) DATED: 12/10/21	
In the event of a high level within Tiger No.1 liquid hopper as detected by LSH13103 a signal shall be transmitted from CP02 (Pasteuriser MCC) to the tiger control panel to inhibit operation of the associated Tiger. The Tiger control panel will require modification (by Anaergia/others) to accommodate this inhibit signal. Following the high-level event being cleared operations personnel will need to reset the Tiger and manually restart its operation.	
SIGNED: Mike Dawber	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Mike Dawber	RESPOND BY: 19 OCT 2021
ACTION NO: 2	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID	
ITEM: (Hazop Node 1) Material Feed & Tiger Units	
CAUSE: (Level More than) High level in liquid fraction hopper below Tiger unit	
CONSEQUENCE: Spillage of liquid fraction onto Reception Hall floor	
SAFEGUARDS: High Level Alarm provided in hopper	
ACTION: YOUR REFERENCE BELOW: [2] [1]Consider the need to inhibit the Tiger on High Level in the liquid hopper [2]Consider the need to inhibit the Dilution Water Pumps on High Level in the liquid hopper [3]Consider the need to inhibit the Reception Hall Sump Pumps on High Level in the liquid hopper	
RESPONSE TO REFERENCE [2]: (Action 2) DATED: 12/10/21k	
In the event of a high level within Tiger No.1 liquid hopper as detected by LSH13103 a signal shall be transmitted from CP02 (Pasteuriser MCC) to the dilution water starters/control panel (location tbc) to inhibit operation of the pumps. The dilution water starters are yet to be designed but there will be a need to reset at SCADA and re-enable the dilution pumps.	
SIGNED: Mike Dawber	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Mike Dawber	RESPOND BY: 19 OCT 2021
ACTION NO: 3	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID	
ITEM: (Hazop Node 1) Material Feed & Tiger Units	
CAUSE: (Level More than) High level in liquid fraction hopper below Tiger unit	
CONSEQUENCE: Spillage of liquid fraction onto Reception Hall floor	
SAFEGUARDS: High Level Alarm provided in hopper	
ACTION: YOUR REFERENCE BELOW: [3] [1]Consider the need to inhibit the Tiger on High Level in the liquid hopper [2]Consider the need to inhibit the Dilution Water Pumps on High Level in the liquid hopper [3]Consider the need to inhibit the Reception Hall Sump Pumps on High Level in the liquid hopper	
RESPONSE TO REFERENCE [3]: (Action 3) DATED: 12/10/21	
In the event of a high level within Tiger No.1 liquid hopper as detected by LSH13103 a signal shall be transmitted from CP02 (Pasteuriser MCC) to the reception hall sump pump starters (within CP02) to inhibit operation of the pumps. The reception hall sump pump starters (within CP02) will require a reset at SCADA and re-enable the sump pumps.	
SIGNED: Mike Dawber	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 4	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID	
ITEM: (Hazop Node 1) Material Feed & Tiger Units	
CAUSE: (Contamination Problems with) Foreign objects delivered to site e.g. fire extinguishers	
CONSEQUENCE: Injury to personnel / damage to plant should such objects enter the Tiger unit	
SAFEGUARDS: Visual Screening of incoming waste	
ACTION: Confirm if additional measures to protect personnel and plant from foreign objects are required	
RESPONSE: (Action 4) DATED: 4/11/21	
SOP in place with the operations team.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 5	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID	
ITEM: (Hazop Node 1) Material Feed & Tiger Units	
CAUSE: (Noise Problems with) Potential high noise levels when equipment is running	
CONSEQUENCE: Injury to personnel (i.e. hearing loss)	
SAFEGUARDS: None	
ACTION: Noise assessment to be carried out when plant is operational and appropriate measures incorporated	
RESPONSE: (Action 5) DATED: 4/11/2021	
Noise assessment has already been done, when the second Tiger is installed this will need to be reviewed.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 6	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID	
ITEM: (Hazop Node 1) Material Feed & Tiger Units	
CAUSE: (Fire/Explosion Problems with) Odour control provided to Reception Hall	
CONSEQUENCE: Odour Control System may continue to bring air into the Reception Hall and fuel any fire	
SAFEGUARDS: Fire Detection System provided	
ACTION: Consider the requirement to inhibit the Odour Control System in the event of a fire	
RESPONSE: (Action 6) DATED: 4/11/2021	
Not installed in current system but will be reviewed again with the updated designed system and fire risk assessment.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 7	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID	
ITEM: (Hazop Node 1) Material Feed & Tiger Units	
CAUSE: (Fire/Explosion Problems with) Fire in Reception Hall	
CONSEQUENCE: Damage to plant / serious injury to personnel	
SAFEGUARDS: Fire Detection System provided	
ACTION: Consider the need for a fire suppression system	
RESPONSE: (Action 7) DATED: 4/11/2021	
Notts Fire Rescue service have completed a fire assessment of the site along with our own fire survey and it is not required.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 8	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID	
ITEM: (Hazop Node 1) Material Feed & Tiger Units	
CAUSE: (Confined Spaces Problems with) Need to enter confined space e.g. Tiger unit	
CONSEQUENCE: Currently no register on site to identify confined spaces on site	
SAFEGUARDS: None	
ACTION: Ensure that a Confined Space Register is produced for the site	
RESPONSE: (Action 8) DATED: 4/11/2021	
The site ops team are preparing a confined space register for the site which will be managed by them.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 9	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID	
ITEM: (Hazop Node 1) Material Feed & Tiger Units	
CAUSE: (Control Problems with) Abnormal operation of Tiger unit	
CONSEQUENCE: Damage to plant / Injury to personnel	
SAFEGUARDS: None	
ACTION: Confirm how the Tiger unit is stopped in an emergency	
RESPONSE: (Action 9) DATED: 4/11/2021	
The tiger can be stopped in an emergency using the estops located around the system. Several of these have been replaced to bring the machine back to working condition with the correct number of units.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 10	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID	
ITEM: (Hazop Node 1) Material Feed & Tiger Units	
CAUSE: (HSE Problems with) Tiger is an existing unit which is being refurbished and there is little detail of this plant	
CONSEQUENCE: Potential problems with operation and injury to personnel	
SAFEGUARDS: None	
ACTION: Confirm that the refurbishment of the Tiger will take into consideration latest HSE regulations.	
RESPONSE: (Action 10) DATED: 4/11/2021	
The Tiger has been repaired to manufacturers spec, so is approved for HSE.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 11	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID	
ITEM: (Hazop Node 2) Reception Hall Sumps/Pumps	
CAUSE: (Flow Problems with) The sump that feeds the pumps is covered with a solid manhole cover	
CONSEQUENCE: Potential problems in connecting the pumps suction pipe into the sump	
SAFEGUARDS: None	
ACTION: Confirm how the suction pipes are to be routed / connected into the sump.	
RESPONSE: (Action 11) DATED: 4/11/2021	
Cores will be added to the biscuit if requried.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 12	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID	
ITEM: (Hazop Node 2) Reception Hall Sumps/Pumps	
CAUSE: (Flow Problems with) Solids in pump suction pipe may hold open the non-return valve that is integral to the pump operation	
CONSEQUENCE: Pump will not operate correctly	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [1] [1]Need to add isolation valves upstream of the pump which will allow main flow to be isolated and the pump suction flushed with water to clear the NRV. [2]Consider ensuring pipework is flanged in appropriate sections to allow periodical rodding / clearance when required.	
RESPONSE TO REFERENCE [1]: (Action 12) DATED: 4/11/2021	
Flusing points have been added to the pipework to clear the system correclty.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 13	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID	
ITEM: (Hazop Node 2) Reception Hall Sumps/Pumps	
CAUSE: (Flow Problems with) Solids in pump suction pipe may hold open the non-return valve that is integral to the pump operation	
CONSEQUENCE: Pump will not operate correctly	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [2] [1]Need to add isolation valves upstream of the pump which will allow main flow to be isolated and the pump suction flushed with water to clear the NRV. [2]Consider ensuring pipework is flanged in appropriate sections to allow periodical rodding / clearance when required.	
RESPONSE TO REFERENCE [2]: (Action 13) DATED: 4/11/2021	
Pipework is flanged between isolation valves and the pump so pipe section removal will be possible to ensure cleaning can be performed on pipework.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 14	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID	
ITEM: (Hazop Node 2) Reception Hall Sumps/Pumps	
CAUSE: (Level Problems with) The sump that feeds the pumps is covered with a solid manhole cover	
CONSEQUENCE: Potential problems in installing the level instruments in the sump	
SAFEGUARDS: None	
ACTION: Confirm how the level instruments are to be installed in the sump	
RESPONSE: (Action 14) DATED: 4/11/2021	
Instruments will be installed using the cable ducting and additional cores can be drilled in the biscuit if required.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Andrew Clark	RESPOND BY: 19 OCT 2021
ACTION NO: 15	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID	
ITEM: (Hazop Node 2) Reception Hall Sumps/Pumps	
CAUSE: (Level Problems with) Balance pipe between the "upstream" sump and the downstream sump is located at high level (i.e. acts as an overflow pipe)	
CONSEQUENCE: The upstream sump will be permanently filled with liquid causing potential issues with DSEAR and odours	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [1] [1]Confirm details of sump and level of hydraulic connection between sumps [2]Based on investigation consider what measures are required to minimise issues with zoning / odour	
RESPONSE TO REFERENCE [1]: (Action 15) DATED: 4/11/2021	
Sumps are going to be controlled independently using a single duty pump only.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Mike Dawber	RESPOND BY: 19 OCT 2021
ACTION NO: 16	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID	
ITEM: (Hazop Node 2) Reception Hall Sumps/Pumps	
CAUSE: (Level Problems with) Balance pipe between the "upstream" sump and the downstream sump is located at high level (i.e. acts as an overflow pipe)	
CONSEQUENCE: The upstream sump will be permanently filled with liquid causing potential issues with DSEAR and odours	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [2] [1]Confirm details of sump and level of hydraulic connection between sumps [2]Based on investigation consider what measures are required to minimise issues with zoning / odour	
RESPONSE TO REFERENCE [2]: (Action 16) DATED: 12/10/21	
With the current proposal, due to the level of the sump cross connection (high level) there is a risk of stagnation within one of the reception hall sumps. This could lead to stagnation, malodour and H2S generation. One of the two reception hall sump pumps will be relocated to ensure that each pump draws from a dedicated sump. This will require an additional radar and high-level probe to control the pump. P&ID and URS will be updated to reflect this.	
SIGNED: Mike Dawber	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Mike Dawber	RESPOND BY: 19 OCT 2021
ACTION NO: 17	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID	
ITEM: (Hazop Node 2) Reception Hall Sumps/Pumps	
CAUSE: (Pressure Problems with) Pressure switch provided with the pump	
CONSEQUENCE: Function of this switch currently unknown	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [1] [1]Confirm function of pressure switch. [2]Confirm pressure switch location is correct i.e. should this be between the pump and NRV	
RESPONSE TO REFERENCE [1]: (Action 17) DATED:	
The pressure switch provides a high discharge pressure signal to the PLC via remote I/O within CP02. In the event of a high pressure the associated pump will be inhibited.	
SIGNED: Mike Dawber	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Mike Dawber	RESPOND BY: 19 OCT 2021
ACTION NO: 18	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID	
ITEM: (Hazop Node 2) Reception Hall Sumps/Pumps	
CAUSE: (Pressure Problems with) Pressure switch provided with the pump	
CONSEQUENCE: Function of this switch currently unknown	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [2] [1]Confirm function of pressure switch. [2]Confirm pressure switch location is correct i.e. should this be between the pump and NRV	
RESPONSE TO REFERENCE [2]: (Action 18) DATED:	
The pressure switch is mounted on the downstream surge vessel. The P&ID has been updated to reflect this.	
SIGNED: Mike Dawber	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Mike Dawber	RESPOND BY: 19 OCT 2021
ACTION NO: 19	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID	
ITEM: (Hazop Node 2) Reception Hall Sumps/Pumps	
CAUSE: (Fire/Explosion Problems with) Modifications are required to sump cover to accommodate suctions pipes / level instruments	
CONSEQUENCE: Potential to expose area around the sump to explosive atmosphere	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [1] [1]Confirm zonal classification of sumps as detailed in DSEAR Assessment [2]Consider what measures are required once zonal classification is known and details of cover modifications are finalised	
RESPONSE TO REFERENCE [1]: (Action 19) DATED: 12/01/21	
The draft DSEAR has now been completed and classifies reception hall pits as non-hazardous. This does require regular clean out and flushes of the pits to prevent anaerobic species, H2S and malodour forming. Daily emptying of the pits is also required.	
SIGNED: Mike Dawber	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 20	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID	
ITEM: (Hazop Node 2) Reception Hall Sumps/Pumps	
CAUSE: (Fire/Explosion Problems with) Modifications are required to sump cover to accommodate suctions pipes / level instruments	
CONSEQUENCE: Potential to expose area around the sump to explosive atmosphere	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [2] [1]Confirm zonal classification of sumps as detailed in DSEAR Assessment [2]Consider what measures are required once zonal classification is known and details of cover modifications are finalised	
RESPONSE TO REFERENCE [2]: (Action 20)	DATED: 4/11/2021
All sumps will be fitted with intinsically safe electrical eqiupment and an SOP will be created for access to chambers.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Andrew Clark	RESPOND BY: 19 OCT 2021
ACTION NO: 21	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 1 of 26 Rev C - Tiger & Hopper System P&ID	
ITEM: (Hazop Node 2) Reception Hall Sumps/Pumps	
CAUSE: (HSE Problems with) Potential for explosive or hazardous atmospheres generated in sumps e.g. methane, H2S	
CONSEQUENCE: Injury to personnel / fire / explosion	
SAFEGUARDS: None	
ACTION: Procedures to be developed to carry out regular gas monitoring	
RESPONSE: (Action 21) DATED: 4/11/2021	
All sumps will be fitted with intinsically safe electrical eqiupment and an SOP will be created for access to chambers.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 22	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 2 of 26 Rev C - Filtrate Tank & Dilution Water P&ID	
ITEM: (Hazop Node 3) Rainwater Harvesting/Dilution Water	
CAUSE: (Flow Problems with) Inlet flows to the rainwater harvesting tanks not shown on P&ID	
CONSEQUENCE: It is not possible to understand the full configuration and assess any interface requirements	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [1] [1]Need to develop the inlet configuration and add to P&ID [2]Once configuration is known need to confirm what interlocks are required between the rainwater tanks and the source supplies	
RESPONSE TO REFERENCE [1]: (Action 22) DATED: 4/11/2021	
Operator controlled ball valves will be used to control which inlets are filled with this water.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 23	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 2 of 26 Rev C - Filtrate Tank & Dilution Water P&ID	
ITEM: (Hazop Node 3) Rainwater Harvesting/Dilution Water	
CAUSE: (Flow Problems with) Inlet flows to the rainwater harvesting tanks not shown on P&ID	
CONSEQUENCE: It is not possible to understand the full configuration and assess any interface requirements	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [2] [1]Need to develop the inlet configuration and add to P&ID [2]Once configuration is known need to confirm what interlocks are required between the rainwater tanks and the source supplies	
RESPONSE TO REFERENCE [2]: (Action 23) DATED: 4/11/2021	
No interlocks are required for this process it will be an operational controlled configuration only using a site controlled SOP.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Andrew Clark	RESPOND BY: 19 OCT 2021
ACTION NO: 24	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 2 of 26 Rev C - Filtrate Tank & Dilution Water P&ID	
ITEM: (Hazop Node 3) Rainwater Harvesting/Dilution Water	
CAUSE: (Flow Problems with) Flow to the rainwater harvesting tanks is via existing pumps (i.e. from bund) around site which may not be designed for the duty	
CONSEQUENCE: Unable to transfer fluid into the tanks	
SAFEGUARDS: None	
ACTION: Confirm that the source pumps are suitable for pumping into the tanks	
RESPONSE: (Action 24) DATED: 4/11/2021	
Confirmed JST-22SKSS - ALL 316 STAINLESS STEEL SUBMERSIBLE SINGLE CHANNEL CUTTER PUMP 415V	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 25	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 2 of 26 Rev C - Filtrate Tank & Dilution Water P&ID	
ITEM: (Hazop Node 3) Rainwater Harvesting/Dilution Water	
CAUSE: (Concentration Problems with) Input to the tanks may not just be rainwater i.e. possible to route water from the site bund	
CONSEQUENCE: Potential for sludge or other process material to be discharged into tanks and generation of explosive atmosphere	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [1] [1]Confirm exactly what material can be discharge into rainwater harvesting tanks [2]Once input material is known assess if there is an impact on the DSEAR Assessment	
RESPONSE TO REFERENCE [1]: (Action 25) DATED: 4/11/2021	
Rainwater harvest tank can also have dilution liquids within it to assist with process dilution volumes required.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Mike Dawber	RESPOND BY: 19 OCT 2021
ACTION NO: 26	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 2 of 26 Rev C - Filtrate Tank & Dilution Water P&ID	
ITEM: (Hazop Node 3) Rainwater Harvesting/Dilution Water	
CAUSE: (Concentration Problems with) Input to the tanks may not just be rainwater i.e. possible to route water from the site bund	
CONSEQUENCE: Potential for sludge or other process material to be discharged into tanks and generation of explosive atmosphere	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [2] [1]Confirm exactly what material can be discharge into rainwater harvesting tanks [2]Once input material is known assess if there is an impact on the DSEAR Assessment	
RESPONSE TO REFERENCE [2]: (Action 26) DATED: 22/10/21	
A response to part 1 of this action has not yet been received therefore we have been unable to assess. The current DSEAR is based upon this tank being filled with rainwater only. Should this change then Anaergia will need to advise and the assessment will need to be updated.	
SIGNED: Mike Dawber	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 27	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 2 of 26 Rev C - Filtrate Tank & Dilution Water P&ID	
ITEM: (Hazop Node 3) Rainwater Harvesting/Dilution Water	
CAUSE: (Contamination Problems with) Input to the tanks may not just be rainwater i.e. possible to route water from the site bund	
CONSEQUENCE: Potential for solids settlement and build up within the tank	
SAFEGUARDS: None.	
ACTION: Confirm details of the tanks being provided and facilities for access, draining and cleaning	
RESPONSE: (Action 27) DATED:	
tbc	
SIGNED:	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Andrew Clark	RESPOND BY: 19 OCT 2021
ACTION NO: 28	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 2 of 26 Rev C - Filtrate Tank & Dilution Water P&ID	
ITEM: (Hazop Node 3) Rainwater Harvesting/Dilution Water	
CAUSE: (Contamination Problems with) Oil / fuel spillage on site which is captured in surface water system	
CONSEQUENCE: This could be transferred to the rainwater harvesting tanks via the existing drainage pumps and thus transferred onto the Tiger hopper and into the process	
SAFEGUARDS: Regular inspection of site to detect spillages	
ACTION: Consider the impact of an oil / fuel spillage and whether there is a need for oil interceptor on the surface water system(s)	
RESPONSE: (Action 28) DATED:	
tbc	
SIGNED:	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Mike Dawber	RESPOND BY: 19 OCT 2021
ACTION NO: 29	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 2 of 26 Rev C - Filtrate Tank & Dilution Water P&ID	
ITEM: (Hazop Node 3) Rainwater Harvesting/Dilution Water	
CAUSE: (Control Problems with) No electrical infrastructure (i.e. starters, I/O) provided for the rainwater harvesting system	
CONSEQUENCE: Currently unable to operate this system	
SAFEGUARDS: None	
ACTION: Need to confirm electrical infrastructure requirements for the system	
RESPONSE: (Action 29) DATED: 22/10/21	
I have requested that Blackburn Starling provide a wall mountable starter to accommodate the dilution pumps and association I/O.	
SIGNED: Mike Dawber	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Andrew Clark	RESPOND BY: 19 OCT 2021
ACTION NO: 30	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 2 of 26 Rev C - Filtrate Tank & Dilution Water P&ID	
ITEM: (Hazop Node 3) Rainwater Harvesting/Dilution Water	
CAUSE: (Design Problems with) There are no details of the existing tanks or tank that are going to be used for the Rainwater Harvesting System	
CONSEQUENCE: Difficult to confirm design configuration / requirements e.g. instrumentation required, pipework and valve requirements	
SAFEGUARDS: None	
ACTION: Confirm how many tanks are proposed and provide full details of tanks	
RESPONSE: (Action 30) DATED:	
tbc	
SIGNED:	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 31	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 3 of 26 Rev B - Depack System P&ID	
ITEM: (Hazop Node 4) Tiger Macerators/Discharge Pumps	
CAUSE: (Flow More than) Limited volume of suction section of Tiger Hopper	
CONSEQUENCE: Potential for excessive pump starts per hour	
SAFEGUARDS: None	
ACTION: Confirm volume of suction section of the hopper and that the maximum number of pump starts per hour is not excessive.	
RESPONSE: (Action 31) DATED: 4/11/2021	
Netzsch do not prescribe a fixed limit in their manual. However talking to Simon Williams at Netzschon know of many pumps working with 50 - 60 starts per hour sucsefully but he recommends a limit of 20 - 30 starts per hour. This pump is expected to start 10 - 20 times per hour depeding on throughput and dilution flows.	
SIGNED: Ben Jobling Purser	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Mike Dawber	RESPOND BY: 19 OCT 2021
ACTION NO: 32	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 3 of 26 Rev B - Depack System P&ID	
ITEM: (Hazop Node 4) Tiger Macerators/Discharge Pumps	
CAUSE: (Contamination Problems with) Stones or similar objects in fluid	
CONSEQUENCE: Potential blockage / damage to macerator and downstream pumps	
SAFEGUARDS: Stone trap integral to macerator	
ACTION: Ensure that a facility to empty the stone trap on a regular basis is provided.	
RESPONSE: (Action 32) DATED: 12/10/21	
A hand lever operated knife gate valve will be provided and fitted to the macerator body.	
SIGNED: Mike Dawber	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 33	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 3 of 26 Rev B - Depack System P&ID	
ITEM: (Hazop Node 4) Tiger Macerators/Discharge Pumps	
CAUSE: (Sampling Problems with) Use of drains as sample points	
CONSEQUENCE: Drains will be on bottom of pipe and are likely to collect grit	
SAFEGUARDS: None	
ACTION: Separate valved sample points to be provided connected horizontally of the pipes with a downwards tap / spout	
RESPONSE: (Action 33) DATED: 4/11/2021	
No additional sample points required. Samples can be taken from the bath.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 34	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 3 of 26 Rev B - Depack System P&ID	
ITEM: (Hazop Node 5) Depack Reception Tank/Mixing Pump	
CAUSE: (Pressure Problems with) Potential lack of vent on the existing tank that is being re-used	
CONSEQUENCE: Vacuum created when pumping out of the tank causing implosion	
SAFEGUARDS: None	
ACTION: Confirm if a vent is provided or if one needs to be incorporated.	
RESPONSE: (Action 34) DATED: 4/11/2021	
The tank has a vent which is sufficnet for o/u pressure relief.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 35	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 3 of 26 Rev B - Depack System P&ID	
ITEM: (Hazop Node 5) Depack Reception Tank/Mixing Pump	
CAUSE: (Impact Problems with) Tank is located near road	
CONSEQUENCE: Potential damage and spillage caused by vehicle impact	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [1] [1]Confirm what measures are being provided to protect tank from vehicle impact [2]Confirm what measures are being provided to contain any spillages from this tank	
RESPONSE TO REFERENCE [1]: (Action 35) DATED: 4/11/2021	
ARMCO barriers are need where there is likelyhood a vehicle hitting any part of the buildings/Plant/Equipment.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 36	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 3 of 26 Rev B - Depack System P&ID	
ITEM: (Hazop Node 5) Depack Reception Tank/Mixing Pump	
CAUSE: (Impact Problems with) Tank is located near road	
CONSEQUENCE: Potential damage and spillage caused by vehicle impact	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [2] [1]Confirm what measures are being provided to protect tank from vehicle impact [2]Confirm what measures are being provided to contain any spillages from this tank	
RESPONSE TO REFERENCE [2]: (Action 36) DATED:	
tbc	
SIGNED:	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 37	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 3 of 26 Rev B - Depack System P&ID	
ITEM: (Hazop Node 5) Depack Reception Tank/Mixing Pump	
CAUSE: (HSE Problems with) Unknown condition of existing tank that is being re-used on instruction of the Client	
CONSEQUENCE: Potential Health & Safety issues with failure when filled, creating new nozzles etc.	
SAFEGUARDS: None	
ACTION: To advise Client of the concerns regarding the risk of re-using existing tanks and the H&S consequences	
RESPONSE: (Action 37) DATED:	
tbc	
SIGNED:	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Andrew Clark	RESPOND BY: 19 OCT 2021
ACTION NO: 38	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 13 of 26 Rev B - Tanker Offloading P&ID	
ITEM: (Hazop Node 6) Tanker Offloading System	
CAUSE: (Flow Problems with) Tanker off-loading to 3 No. liquid tanks is manually selected via manual valves.	
CONSEQUENCE: Potential to open incorrect valve and deliver into wrong tank and cause an overflow	
SAFEGUARDS: None	
ACTION: Ensure that valves are clearly labelled with the tank they are associated with.	
RESPONSE: (Action 38) DATED: 4/11/2021	
SOP to be formulated and additional training to be given. C/o ops team	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Mike Dawber	RESPOND BY: 19 OCT 2021
ACTION NO: 39	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 13 of 26 Rev B - Tanker Offloading P&ID	
ITEM: (Hazop Node 6) Tanker Offloading System	
CAUSE: (Level Problems with) Single pump with potential to discharge into 3 different tanks	
CONSEQUENCE: Tanker off-loading panel is not looking at correct tank level instrument causing overflow	
SAFEGUARDS: None	
ACTION: Review and develop the level control / interface between tank level and tanker off-loading panel	
RESPONSE: (Action 39) DATED: 22/10/21	
A local control panel will be provided at the tanker offloading point. The operator will need to select the tank which is to be utilised and then select this at the local control panel via a selector switch. Once the tanker of connected the operator shall start the offloading pump and macerator. The tank level will be displayed at the local control panel. Offloading shall cease ether when the tanker is empty or the liquid tank reaches a high level.	
SIGNED: Mike Dawber	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Mike Dawber	RESPOND BY: 19 OCT 2021
ACTION NO: 40	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 13 of 26 Rev B - Tanker Offloading P&ID	
ITEM: (Hazop Node 6) Tanker Offloading System	
CAUSE: (Contamination Problems with) Stones or similar objects in fluid	
CONSEQUENCE: Potential blockage / damage to macerator and downstream pumps	
SAFEGUARDS: Stone trap integral to macerator	
ACTION: Ensure that a facility to empty the stone trap on a regular basis is provided.	
RESPONSE: (Action 40) DATED: 12/10/21	
A hand lever operated knife gate valve will be provided and fitted to the macerator body.	
SIGNED: Mike Dawber	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 41	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 13 of 26 Rev B - Tanker Offloading P&ID	
ITEM: (Hazop Node 6) Tanker Offloading System	
CAUSE: (Contamination Problems with) Macerator is provided with a stone trap which requires draining and there will be spillages from tanker disconnection	
CONSEQUENCE: Spillages could be discharged into surface water system	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [1] [1]Consider the need for segregating the tanker offload area from the surface water system [2]Review height of macerator to facilitate access to drain point	
RESPONSE TO REFERENCE [1]: (Action 41) DATED: 4/11/2021	
The drain age system will not be segregated as the tanker offloading and loading are manned operations and will have personal present for all operations. If a major spill does occur the operations team have SOPs in place to deal with the spills.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 42	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 13 of 26 Rev B - Tanker Offloading P&ID	
ITEM: (Hazop Node 6) Tanker Offloading System	
CAUSE: (Contamination Problems with) Macerator is provided with a stone trap which requires draining and there will be spillages from tanker disconnection	
CONSEQUENCE: Spillages could be discharged into surface water system	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [2] [1]Consider the need for segregating the tanker offload area from the surface water system [2]Review height of macerator to facilitate access to drain point	
RESPONSE TO REFERENCE [2]: (Action 42)	DATED: 4/11/2021
Macerator is located at a height where the stone trap can be enptied and cleaned.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 43	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 13 of 26 Rev B - Tanker Offloading P&ID	
ITEM: (Hazop Node 6) Tanker Offloading System	
CAUSE: (Contamination Problems with) Tanker off-loading hose failure / disconnection	
CONSEQUENCE: Major spillage that would access various areas of site including Air Liquide compound.	
SAFEGUARDS: None	
ACTION: Consider the need for containment wall to protect the Air Liquide compound.	
RESPONSE: (Action 43) DATED: 04/11/2021	
The drainage system will contain any normal spilage from burst pipes and broken	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 44	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 13 of 26 Rev B - Tanker Offloading P&ID	
ITEM: (Hazop Node 6) Tanker Offloading System	
CAUSE: (Services Problems with) Tanker off-loading during winter months	
CONSEQUENCE: Poor visibility and injury to personnel	
SAFEGUARDS: None	
ACTION: Review provision of adequate lighting to facilitate safe off-loading	
RESPONSE: (Action 44) DATED: 4/11/2021	
Site lighting will be reviewed by the ops team and any additioanl required lighting will be added as soon as possible.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 45	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 13 of 26 Rev B - Tanker Offloading P&ID	
ITEM: (Hazop Node 6) Tanker Offloading System	
CAUSE: (Services Problems with) Spillages from tanker off-loading / macerator	
CONSEQUENCE: Need to clean up spillages	
SAFEGUARDS: None	
ACTION: Review the requirement for washdown water to the area and confirm from where this is to be sourced.	
RESPONSE: (Action 45) DATED: 4/11/2021	
A low pressure hose will be used for miniaml spills washdown and if necessary the high pressure system for the wheel wash will be used for deep cleaning.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Andrew Clark	RESPOND BY: 19 OCT 2021
ACTION NO: 46	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 13 of 26 Rev B - Tanker Offloading P&ID	
ITEM: (Hazop Node 6) Tanker Offloading System	
CAUSE: (Odours Problems with) Discharge of air from tankers during delivery	
CONSEQUENCE: Release of odours	
SAFEGUARDS: None	
ACTION: Confirm EA requirements with regards to connecting tankers to Odour Control System	
RESPONSE: (Action 46)	DATED: 4/11/2021
Connecton to an odour control system is needed, whether a carbon/perfume vessel. C/o ops team	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 47	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 4 of 26 Rev C - Liquid Tank No.1 P&ID 125 A01 01 Sheet 5 of 26 Rev B - Liquid Tank No.2 P&ID 125 A01 01 Sheet 6 of 26 Rev B - Liquid Tank No.3 P&ID	
ITEM: (Hazop Node 7) Liquid Reception Tanks & Mixers	
CAUSE: (Level More than) Lack of overflow on tanks	
CONSEQUENCE: If inflow does not stop on high level, then tank will become pressurised with potential damage to tank	
SAFEGUARDS: None	
ACTION: Ensure overflow is provided on tanks	
RESPONSE: (Action 47) DATED: 4/11/2021	
All tanks will have the necessary overflow vents.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 48	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 4 of 26 Rev C - Liquid Tank No.1 P&ID 125 A01 01 Sheet 5 of 26 Rev B - Liquid Tank No.2 P&ID 125 A01 01 Sheet 6 of 26 Rev B - Liquid Tank No.3 P&ID	
ITEM: (Hazop Node 7) Liquid Reception Tanks & Mixers	
CAUSE: (Pressure More than) No vents shown on roof	
CONSEQUENCE: Can over-pressurise tank on filling or pulling a vacuum when emptying tank (either via normal route or tanker connection)	
SAFEGUARDS: None	
ACTION: Ensure that adequate over / under pressure protection is provided on the tank roofs	
RESPONSE: (Action 48)	DATED: 4/11/2021
All tanks will have the necessary o/u vents if different from overflows.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 49	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 4 of 26 Rev C - Liquid Tank No.1 P&ID 125 A01 01 Sheet 5 of 26 Rev B - Liquid Tank No.2 P&ID 125 A01 01 Sheet 6 of 26 Rev B - Liquid Tank No.3 P&ID	
ITEM: (Hazop Node 7) Liquid Reception Tanks & Mixers	
CAUSE: (Contamination Problems with) No drain or tanker outlet connection on tanks	
CONSEQUENCE: Unable to empty tank of rogue or contaminated batch	
SAFEGUARDS: None	
ACTION: Ensure that a drain / tanker outlet connection is provided on the tank	
RESPONSE: (Action 49) DATED: 4/11/2021	
Added to drawings and design document set.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 50	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 4 of 26 Rev C - Liquid Tank No.1 P&ID 125 A01 01 Sheet 5 of 26 Rev B - Liquid Tank No.2 P&ID 125 A01 01 Sheet 6 of 26 Rev B - Liquid Tank No.3 P&ID	
ITEM: (Hazop Node 7) Liquid Reception Tanks & Mixers	
CAUSE: (Sampling Problems with) No sample points or recirculation line shown on the tanks	
CONSEQUENCE: Unable to take representative samples of the tank's contents	
SAFEGUARDS: None	
ACTION: Review requirements for sampling arrangements for the tanks	
RESPONSE: (Action 50)	DATED: 4/11/2021
Sample point already included on tank.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Mike Dawber	RESPOND BY: 19 OCT 2021
ACTION NO: 51	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 4 of 26 Rev C - Liquid Tank No.1 P&ID	
ITEM: (Hazop Node 8) Pasteuriser Feed Macerators/Pumps	
CAUSE: (Flow Problems with) Actuated valves on liquid tanks fail to close	
CONSEQUENCE: Pasteurisation Feed Pumps may draw off incorrect tank	
SAFEGUARDS: Limit switches provided on valves.	
ACTION: Confirm control action in the event of valve failed to close.	
RESPONSE: (Action 51) DATED: 12/10/21	
In the event that any of the outlet valves of the liquid tanks fail to close then the pasteurisation feed sequence will cease and an alarm shall be raised at SCADA. Only when the fault has been addressed and rectified will the system be able to be brough back into operation.	
SIGNED: Mike Dawber	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Mike Dawber	RESPOND BY: 19 OCT 2021
ACTION NO: 52	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 4 of 26 Rev C - Liquid Tank No.1 P&ID	
ITEM: (Hazop Node 8) Pasteuriser Feed Macerators/Pumps	
CAUSE: (Contamination Problems with) Stones or similar objects in fluid	
CONSEQUENCE: Potential blockage / damage to macerator and downstream pumps	
SAFEGUARDS: Stone trap integral to macerator	
ACTION: Ensure that a facility to empty the stone trap on a regular basis is provided.	
RESPONSE: (Action 52) DATED: 12/10/21	
A hand lever operated knife gate valve will be provided and fitted to the macerator body.	
SIGNED: Mike Dawber	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 53	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 4 of 26 Rev C - Liquid Tank No.1 P&ID	
ITEM: (Hazop Node 8) Pasteuriser Feed Macerators/Pumps	
CAUSE: (Sampling Problems with) Use of drains as sample points	
CONSEQUENCE: Drains will be on bottom of pipe and are likely to collect grit	
SAFEGUARDS: None	
ACTION: Separate valved sample points to be provided connected horizontally of the pipes with a downwards tap / spout	
RESPONSE: (Action 53) DATED: 4/11/2021	
Already included on system.	
SIGNED: Ben Jobling Purser	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 54	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 7 of 26 Rev B - Pasteuriser No.1 P&ID 125 A01 01 Sheet 8 of 26 Rev B - Pasteuriser No.2 P&ID	
ITEM: (Hazop Node 9) Pasteurisation System (Inc Mixing & Discharge)	
CAUSE: (Flow Problems with) Only two pasteurisers are provided (as instructed by the Client)	
CONSEQUENCE: In the event of a failed pasteurisation batch then need to re-heat the failed batch which will reduce the plant throughput	
SAFEGUARDS: None	
ACTION: Client needs to be advised of the risk to throughput during Phase 1	
RESPONSE: (Action 54)	DATED: 4/11/2021
Information to be shared with client.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Mike Dawber	RESPOND BY: 19 OCT 2021
ACTION NO: 55	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 7 of 26 Rev B - Pasteuriser No.1 P&ID 125 A01 01 Sheet 8 of 26 Rev B - Pasteuriser No.2 P&ID	
ITEM: (Hazop Node 9) Pasteurisation System (Inc Mixing & Discharge)	
CAUSE: (Pressure Problems with) Steam injected into pasteuriser for heating	
CONSEQUENCE: Potential build-up of pressure in tank and damage to tank	
SAFEGUARDS: None	
ACTION: Review the requirement for tank over pressure protection.	
RESPONSE: (Action 55)	DATED: 22/10/21
A vent is provided to the pasteurisers to prevent any pressure build up.	
SIGNED: Mike Dawber	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Andrew Clark	RESPOND BY: 19 OCT 2021
ACTION NO: 56	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 10 of 26 Rev B - Existing Boiler System P&ID	
ITEM: (Hazop Node 10) Steam Boiler	
CAUSE: (Flow Problems with) High total dissolved solids in feed water	
CONSEQUENCE: Increased blowdown frequency from boiler	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [1] [1]Confirm where blowdown is routed [2]Confirm how the increased blowdown volumes will impact on stream output and thus heating cycle for the pasteurisers	
RESPONSE TO REFERENCE [1]: (Action 56)	DATED:
tbc	
SIGNED:	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Andrew Clark	RESPOND BY: 19 OCT 2021
ACTION NO: 57	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 10 of 26 Rev B - Existing Boiler System P&ID	
ITEM: (Hazop Node 10) Steam Boiler	
CAUSE: (Flow Problems with) High total dissolved solids in feed water	
CONSEQUENCE: Increased blowdown frequency from boiler	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [2] [1]Confirm where blowdown is routed [2]Confirm how the increased blowdown volumes will impact on stream output and thus heating cycle for the pasteurisers	
RESPONSE TO REFERENCE [2]: (Action 57)	DATED:
tbc	
SIGNED:	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Andrew Clark	RESPOND BY: 19 OCT 2021
ACTION NO: 58	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 10 of 26 Rev B - Existing Boiler System P&ID	
ITEM: (Hazop Node 10) Steam Boiler	
CAUSE: (Pressure Problems with) Boiler pressure will be much higher than process requirements	
CONSEQUENCE: Unnecessarily high pressure in steam pipework to pasteuriser	
SAFEGUARDS: Regulation valves provided on boiler	
ACTION: Review and confirm process pressure requirements and ensure valves are set appropriately	
RESPONSE: (Action 58) DATED:	
tbc	
SIGNED:	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Andrew Clark	RESPOND BY: 19 OCT 2021
ACTION NO: 59	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 10 of 26 Rev B - Existing Boiler System P&ID	
ITEM: (Hazop Node 10) Steam Boiler	
CAUSE: (Temperature Less than) Insufficient temperature in hot well	
CONSEQUENCE: Inefficient operation of the boiler	
SAFEGUARDS: None	
ACTION: Consider if there is a need to provide a heat supply to the hot well from the CHPs	
RESPONSE: (Action 59) DATED:	
tbc	
SIGNED:	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 60	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 10 of 26 Rev B - Existing Boiler System P&ID	
ITEM: (Hazop Node 10) Steam Boiler	
CAUSE: (Temperature Problems with) Concerns existing steam boiler cannot provide sufficient heat transfer	
CONSEQUENCE: Unable to achieve plant throughput	
SAFEGUARDS: None	
ACTION: Client to be advised of the risk associated with performance of existing steam boiler	
RESPONSE: (Action 60) DATED:	
tbc	
SIGNED:	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 61	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 10 of 26 Rev B - Existing Boiler System P&ID	
ITEM: (Hazop Node 10) Steam Boiler	
CAUSE: (Temperature Problems with) High temperature steam pipework being installed	
CONSEQUENCE: Potential issues with expansion / contraction and imposition of stresses on pipework causing failure	
SAFEGUARDS: None	
ACTION: Confirm that expansion / contraction is being considered as part of the pipework design.	
RESPONSE: (Action 61) DATED: 4/11/2021	
DN100 Line will have suitable expansion and flexible connections to steam lances.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Andrew Clark	RESPOND BY: 19 OCT 2021
ACTION NO: 62	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 10 of 26 Rev B - Existing Boiler System P&ID	
ITEM: (Hazop Node 10) Steam Boiler	
CAUSE: (Temperature Problems with) High temperature pipework	
CONSEQUENCE: Injury to personnel / Loss of heat	
SAFEGUARDS: None	
ACTION: Ensure sufficient lagging / personnel protection is provided on all steam pipework	
RESPONSE: (Action 62) DATED: 4/11/2021	
Steam pipes will be lagged and insulated to current regulations	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 63	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 10 of 26 Rev B - Existing Boiler System P&ID	
ITEM: (Hazop Node 10) Steam Boiler	
CAUSE: (Services Problems with) New borehole required for water supply to steam boiler	
CONSEQUENCE: Need a power supply for the pump	
SAFEGUARDS: None	
ACTION: Review and determine from where new power supply for pump is to be obtained (to be reviewed in conjunction with overall power supply issues)	
RESPONSE: (Action 63) DATED:	
tbc	
SIGNED:	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Andrew Clark	RESPOND BY: 19 OCT 2021
ACTION NO: 64	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 10 of 26 Rev B - Existing Boiler System P&ID	
ITEM: (Hazop Node 10) Steam Boiler	
CAUSE: (Services Problems with) Lack of lighting in boiler room	
CONSEQUENCE: Difficulties with access and maintenance with potential injury to personnel	
SAFEGUARDS: None	
ACTION: Review lighting provisions in boiler room.	
RESPONSE: (Action 64) DATED: 4/11/2021	
The lighting has been installed and requires wiring to a DB as soon as possible.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 65	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 10 of 26 Rev B - Existing Boiler System P&ID	
ITEM: (Hazop Node 10) Steam Boiler	
CAUSE: (Services Problems with) All actuated valves around the pasteurisers and steam plan are pneumatic type	
CONSEQUENCE: Need an air supply to the actuators	
SAFEGUARDS: Compressor system provided on site	
ACTION: Confirm how air pipework is to be routed from the compressors to the process area	
RESPONSE: (Action 65) DATED: 4/11/2021	
A local expansion vessel will be supplied to distribute the supply of air from the central pumping room air supply. The expansion vessel will distribute to individual valves form a supply manifold.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 66	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 11 of 26 Rev C - Pasteuriser Discharge System & Buffer Tank P&ID	
ITEM: (Hazop Node 12) Buffer Tank (Mixing & Digester Feed)	
CAUSE: (Level Problems with) Change in the second-hand tank to be used with new proposed tank having different dimensions	
CONSEQUENCE: Selected instruments are not suitable for new dimensions	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [1] [1]Provide confirmed details of selected tank [2]Review instrument selection once tank details are known	
RESPONSE TO REFERENCE [1]: (Action 66) DATED:	
tbc	
SIGNED:	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Mike Dawber	RESPOND BY: 19 OCT 2021
ACTION NO: 67	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 11 of 26 Rev C - Pasteuriser Discharge System & Buffer Tank P&ID	
ITEM: (Hazop Node 12) Buffer Tank (Mixing & Digester Feed)	
CAUSE: (Level Problems with) Change in the second-hand tank to be used with new proposed tank having different dimensions	
CONSEQUENCE: Selected instruments are not suitable for new dimensions	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [2] [1]Provide confirmed details of selected tank [2]Review instrument selection once tank details are known	
RESPONSE TO REFERENCE [2]: (Action 67) DATED: 12/10/21	
The instrument currently on order is not suitable as the tank height has increased by some 7 metres. A new instrument with a suitable range (20 metres) will be provided.	
SIGNED: Mike Dawber	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 68	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 11 of 26 Rev C - Pasteuriser Discharge System & Buffer Tank P&ID	
ITEM: (Hazop Node 12) Buffer Tank (Mixing & Digester Feed)	
CAUSE: (Pressure More than) Unclear if vents are provided on proposed tank	
CONSEQUENCE: Can over-pressurise tank on filling or pulling a vacuum when emptying tank (either via normal route or tanker connection)	
SAFEGUARDS: None	
ACTION: Ensure that adequate over / under pressure protection is provided on the tank roofs	
RESPONSE: (Action 68) DATED: 4/11/2021	
All tanks will have the necessary o/u vents if different from overflows.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 69	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 11 of 26 Rev C - Pasteuriser Discharge System & Buffer Tank P&ID	
ITEM: (Hazop Node 12) Buffer Tank (Mixing & Digester Feed)	
CAUSE: (Temperature Problems with) Unclear if tank being used is coming with lagging or not	
CONSEQUENCE: Preference is for tank to be unlagged to allow heat loss	
SAFEGUARDS: None	
ACTION: Confirm if lagging is provided and need to remove this	
RESPONSE: (Action 69) DATED: 4/11/2021	
Tank Not Lagged	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 70	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 11 of 26 Rev C - Pasteuriser Discharge System & Buffer Tank P&ID	
ITEM: (Hazop Node 12) Buffer Tank (Mixing & Digester Feed)	
CAUSE: (Services Problems with) Increased height of changed tank	
CONSEQUENCE: Difficulties in routeing cable to high level instrument	
SAFEGUARDS: None	
ACTION: Review of how cable is to be routed to level instrument	
RESPONSE: (Action 70) DATED: 4/11/2021	
This has been installed in the roof and the cable will be routed through cable ducting.	
SIGNED: Ben Jobling Purser	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 71	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 11 of 26 Rev C - Pasteuriser Discharge System & Buffer Tank P&ID	
ITEM: (Hazop Node 12) Buffer Tank (Mixing & Digester Feed)	
CAUSE: (Impact Problems with) Increased height of changed tank	
CONSEQUENCE: Lightning strike and damage to tank	
SAFEGUARDS: None	
ACTION: Check requirement and provisions for lightning protection	
RESPONSE: (Action 71) DATED: 4/11/2021	
Lightning protection is being updated to accommodate the new tank. Under taken by Steve Gibson	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 72	MEETING DATES: Friday, 01 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 11 of 26 Rev C - Pasteuriser Discharge System & Buffer Tank P&ID	
ITEM: (Hazop Node 12) Buffer Tank (Mixing & Digester Feed)	
CAUSE: (Design Problems with) Increased height of changed tank	
CONSEQUENCE: Potential wind loading issues	
SAFEGUARDS: None	
ACTION: Confirm that the increased height will not cause any issues with regards to wind loading	
RESPONSE: (Action 72) DATED: 4/11/2021	
Wind loading has been considered with the foundation base and meets the requriements of the civil designers. Under taken by Steve Gibson	
SIGNED: Ben Jobling Purser	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 73	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 12 of 26 Rev B - Odour Extract & Control System P&ID	
ITEM: (Hazop Node 13) Odour Extract & Control	
CAUSE: (Flow Problems with) Unbalanced flows from each extraction point	
CONSEQUENCE: Insufficient extract rates from particular individual sources	
SAFEGUARDS: Dampers provided on each extract point	
ACTION: Consider the need for facilities to measure and balance extract rates	
RESPONSE: (Action 73) DATED:	
tbc	
SIGNED:	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 74	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 12 of 26 Rev B - Odour Extract & Control System P&ID	
ITEM: (Hazop Node 13) Odour Extract & Control	
CAUSE: (Flow Problems with) P&ID shows 3 No. fans but there are only 2 No. fans on site	
CONSEQUENCE: System won't operate as shown on P&ID	
SAFEGUARDS: None	
ACTION: Confirm exactly what configuration is proposed for the odour control / ventilation system	
RESPONSE: (Action 74) DATED:	
tbc	
SIGNED:	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 75	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 12 of 26 Rev B - Odour Extract & Control System P&ID	
ITEM: (Hazop Node 13) Odour Extract & Control	
CAUSE: (Services Problems with) No electrical infrastructure in place for odour control plant (i.e. starters / control)	
CONSEQUENCE: Unable to operate odour control plant	
SAFEGUARDS: None	
ACTION: Confirm how electrical infrastructure for odour control plant is to be provided	
RESPONSE: (Action 75) DATED:	
tbc	
SIGNED:	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 76	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 12 of 26 Rev B - Odour Extract & Control System P&ID	
ITEM: (Hazop Node 13) Odour Extract & Control	
CAUSE: (Odours Problems with) Existing biofilter not operational	
CONSEQUENCE: Odour releases / potential breach of permit	
SAFEGUARDS: None	
ACTION: Confirm permit stipulations and requirements with regards to odour control whilst new system is being specified /procured.	
RESPONSE: (Action 76) DATED:	
tbc	
SIGNED:	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Mike Dawber	RESPOND BY: 19 OCT 2021
ACTION NO: 77	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 12 of 26 Rev B - Odour Extract & Control System P&ID	
ITEM: (Hazop Node 13) Odour Extract & Control	
CAUSE: (Fire/Explosion Problems with) Unknow if current odour control system / fans can satisfy the extract rates specified in the DSEAR Assessment (not currently issued)	
CONSEQUENCE: Unable to mitigate hazardous zone classifications as specified in DSEAR	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [1] [1]Issue DSEAR Assessment [2]Review and confirm that the existing system can satisfy the DSEAR requirements [3]If existing system is not suitable consider options for providing a compliant system [4]If existing system is not suitable advise impact on zonal classification	
RESPONSE TO REFERENCE [1]: (Action 77) DATED: 12/10/21	
DSEAR assessment issued at Rev A 12th October 2021.	
SIGNED: Mike Dawber	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 78	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 12 of 26 Rev B - Odour Extract & Control System P&ID	
ITEM: (Hazop Node 13) Odour Extract & Control	
CAUSE: (Fire/Explosion Problems with) Unknow if current odour control system / fans can satisfy the extract rates specified in the DSEAR Assessment (not currently issued)	
CONSEQUENCE: Unable to mitigate hazardous zone classifications as specified in DSEAR	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [2] [1]Issue DSEAR Assessment [2]Review and confirm that the existing system can satisfy the DSEAR requirements [3]If existing system is not suitable consider options for providing a compliant system [4]If existing system is not suitable advise impact on zonal classification	
RESPONSE TO REFERENCE [2]: (Action 78) DATED:	
tbc	
SIGNED:	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 79	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 12 of 26 Rev B - Odour Extract & Control System P&ID	
ITEM: (Hazop Node 13) Odour Extract & Control	
CAUSE: (Fire/Explosion Problems with) Unknow if current odour control system / fans can satisfy the extract rates specified in the DSEAR Assessment (not currently issued)	
CONSEQUENCE: Unable to mitigate hazardous zone classifications as specified in DSEAR	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [3] [1]Issue DSEAR Assessment [2]Review and confirm that the existing system can satisfy the DSEAR requirements [3]If existing system is not suitable consider options for providing a compliant system [4]If existing system is not suitable advise impact on zonal classification	
RESPONSE TO REFERENCE [3]: (Action 79) DATED:	
tbc	
SIGNED:	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Mike Dawber	RESPOND BY: 19 OCT 2021
ACTION NO: 80	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 12 of 26 Rev B - Odour Extract & Control System P&ID	
ITEM: (Hazop Node 13) Odour Extract & Control	
CAUSE: (Fire/Explosion Problems with) Unknow if current odour control system / fans can satisfy the extract rates specified in the DSEAR Assessment (not currently issued)	
CONSEQUENCE: Unable to mitigate hazardous zone classifications as specified in DSEAR	
SAFEGUARDS: None	
ACTION: YOUR REFERENCE BELOW: [4] [1]Issue DSEAR Assessment [2]Review and confirm that the existing system can satisfy the DSEAR requirements [3]If existing system is not suitable consider options for providing a compliant system [4]If existing system is not suitable advise impact on zonal classification	
RESPONSE TO REFERENCE [4]: (Action 80) DATED: 22/10/21	
A response to part 3 and 4 of this action has not yet been received therefore we have been unable to assess. Currently there is an indicative odour control/extract system on the P&IDs. There is no order placed for a new system and it remains unclear if the existing extract system will be reused. It is imperative that this is resolved PRIOR to any of the tanks or systems being brought into operation as the electrical equipment may not be adequately rated and therefore the risk of explosion cannot be properly assessed.	
SIGNED: Mike Dawber	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 81	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 17 of 26 Rev A - Pumping Room P&ID	
ITEM: (Hazop Node 14) Main Pump	
CAUSE: (Flow Problems with) Duty pump only provided	
CONSEQUENCE: Pump failure will mean loss of system	
SAFEGUARDS: None	
ACTION: Consider the need for boxed spare stored on site	
RESPONSE: (Action 81) DATED: 4/11/2021	
Spare pumps/parts will be ordered as part of operational spares by the site team.	
SIGNED: Ben Jobling Purser	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 82	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 15 of 26 Rev A - Digester 1 P&ID 125 A01 01 Sheet 16 of 26 Rev B - Digester 2 P&ID 125 A01 01 Sheet 18 of 26 Rev C - Post Digester P&ID	
ITEM: (Hazop Node 15) Digesters/Post Digester & Mixing (Inc Blowers)	
CAUSE: (Level Problems with) Foaming in digester	
CONSEQUENCE: Increase in level in digester with potential compromise of PRVs and consequential over-pressurisation of gas membrane	
SAFEGUARDS: High level alarm in digester	
ACTION: Consider the need for anti-foaming dosing system	
RESPONSE: (Action 82) DATED: 4/11/2021	
An antifoam dosing system will be installed on site as soon as possible.	
SIGNED: Ben Jobling Purser	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 83	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 15 of 26 Rev A - Digester 1 P&ID 125 A01 01 Sheet 16 of 26 Rev B - Digester 2 P&ID 125 A01 01 Sheet 18 of 26 Rev C - Post Digester P&ID	
ITEM: (Hazop Node 15) Digesters/Post Digester & Mixing (Inc Blowers)	
CAUSE: (Concentration Problems with) Digester mixer failure	
CONSEQUENCE: Loss of mixing / solids settlement	
SAFEGUARDS: One mixer can service tank for nominally 2 weeks. Mixers can be replaced from top of digester without need to drain tank. Generally replacement mixers will be in stock	
ACTION: Consider the need for a boxed unit stored on site as essential spare	
RESPONSE: (Action 83)	DATED: 4/11/2021
Possibility to have a spare on site. SOP in place for no mixing in the digesters.	
SIGNED: Ben Jobling Purser	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 84	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 15 of 26 Rev A - Digester 1 P&ID 125 A01 01 Sheet 16 of 26 Rev B - Digester 2 P&ID 125 A01 01 Sheet 18 of 26 Rev C - Post Digester P&ID	
ITEM: (Hazop Node 15) Digesters/Post Digester & Mixing (Inc Blowers)	
CAUSE: (Haz.Subtance Problems with) Large volumes of biogas stored onsite as well as the propane associated with the Gas to Grid plant	
CONSEQUENCE: The site may fall under the COMAH Regulations	
SAFEGUARDS: None	
ACTION: Review and confirm if the site falls within the COMAH Regulations	
RESPONSE: (Action 84) DATED: 4/11/2021	
The site does not fall within the COMAH Regulations.	
SIGNED: Ben Jobling Purser	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 85	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 23 of 26 Rev A - Heating System P&ID	
ITEM: (Hazop Node 16) Digester Heating System	
CAUSE: (Services Problems with) Temporary chillers may be required to cool digesters	
CONSEQUENCE: Any chilling equipment will require a power supply	
SAFEGUARDS: None	
ACTION: Review and confirm proposed source of power supply for temporary chillers	
RESPONSE: (Action 85) DATED: 4/11/2021	
A temporary supply will be made avaible for the chiller. This can be either from a generator or when the site power supply has been upgraded it will be from a temporary hook up from the new DB.	
SIGNED: Ben Jobling Purser	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Andrew Clark	RESPOND BY: 19 OCT 2021
ACTION NO: 86	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 20 of 26 Rev B - Biogas Treatment CHP/Flare P&ID	
ITEM: (Hazop Node 18) Biogas to CHPs (Inc Booster, Chiller & CHPs)	
CAUSE: (Impact Problems with) One section of biogas pipework subject to potential vehicle impact	
CONSEQUENCE: Pipework failure causing biogas leak / potential explosion	
SAFEGUARDS: None	
ACTION: Review and confirm vehicle protection measures to guard this section of pipework	
RESPONSE: (Action 86) DATED: 4/11/2021	
All pipework on the road is above the recommended vehicle hieght.	
SIGNED: Ben Jobling Purser	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 87	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 19 of 26 Rev A - Biogas Treatment Gas Upgrading P&ID	
ITEM: (Hazop Node 20) Gas Upgrader	
CAUSE: (Temperature Problems with) High biogas temperatures off the digesters	
CONSEQUENCE: Exceed temperature limits for gas being delivered to Gas Upgrade Plant	
SAFEGUARDS: Connections provided to add a chiller unit as an option	
ACTION: Review and confirm is a permanent chiller system needs to be provided to meet gas temperature limits.	
RESPONSE: (Action 87) DATED: 4/11/2021	
This will be addressed as and when the issue arrises. The client decided to exclude this from their scope of delivery of biogas.	
SIGNED: Ben Jobling Purser	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 88	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 19 of 26 Rev A - Biogas Treatment Gas Upgrading P&ID	
ITEM: (Hazop Node 20) Gas Upgrader	
CAUSE: (Services Problems with) Temporary or permanent chillers may be required to cool gas to Gas Upgrade Plant	
CONSEQUENCE: Any chilling equipment will require a power supply	
SAFEGUARDS: None	
ACTION: Review and confirm proposed source of power supply for any chilling equipment	
RESPONSE: (Action 88) DATED: 4/11/2021	
A temporary supply will be made avaible for the chiller. This can be either from a generator or when the site power supply has been upgraded it will be from a temporary hook up from the new DB.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 89	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 19 of 26 Rev A - Biogas Treatment Gas Upgrading P&ID	
ITEM: (Hazop Node 20) Gas Upgrader	
CAUSE: (Services Problems with) Main power supply failure	
CONSEQUENCE: Loss of plant / process (note this is a site wide issue not just Gas Upgrade)	
SAFEGUARDS: None	
ACTION: Consider what critical equipment needs to remain energised on power failure and confirm how this is to be achieved	
RESPONSE: (Action 89) DATED: 4/11/2021	
An ICA CPU is supplied within the panel to alarm the operators of a power failure. No additional power supply has been installed and a temporary system is not yet considered within the scope of the site supply.	
SIGNED: Ben Jobling Purser	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Andrew Clark	RESPOND BY: 19 OCT 2021
ACTION NO: 90	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 19 of 26 Rev A - Biogas Treatment Gas Upgrading P&ID	
ITEM: (Hazop Node 20) Gas Upgrader	
CAUSE: (Impact Problems with) Digestate off-loading vehicle movement in the area	
CONSEQUENCE: Potential damage to plant	
SAFEGUARDS: None	
ACTION: Consider vehicle protection requirements in this area	
RESPONSE: (Action 90) DATED: 4/11/2021	
ARMCO barriers are need where there is likelyhood a vehicle hitting any part of the buildings/Plant/Equipment.	
SIGNED: Ben Jobling Purser	
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HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 91	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 17 of 26 Rev A - Pumping Room P&ID	
ITEM: (Hazop Node 21) Leachate Pit	
CAUSE: (Flow Problems with) Line to a particular digester not used for a lengthy period of time	
CONSEQUENCE: Settlement / blockage of line making it un-usable when required	
SAFEGUARDS: None	
ACTION: Consider frequent change-over of lines between the 2 digesters or add provision for flushing water	
RESPONSE: (Action 91) DATED: 4/11/2021	
This has been added to the SOP for site operations as a weekly change over.	
SIGNED: Ben Jobling Purser	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 92	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 17 of 26 Rev A - Pumping Room P&ID	
ITEM: (Hazop Node 21) Leachate Pit	
CAUSE: (Flow Problems with) Failure of non-return valve	
CONSEQUENCE: Back-flow of digestate or gas route back to pit	
SAFEGUARDS: None	
ACTION: Confirm discharge arrangement will prevent back-flow e.g. swan neck	
RESPONSE: (Action 92) DATED: 4/11/2021	
Non-return valve installed on discharge line, no swan neck requried.	
SIGNED: Ben Jobling Purser	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 93	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 19 of 26 Rev A - Biogas Treatment Gas Upgrading P&ID	
ITEM: (Hazop Node 22) Gas Upgrader Condensate Pit	
CAUSE: (Flow Problems with) Failure of non-return valve	
CONSEQUENCE: Back-flow of digestate or gas route back to pit	
SAFEGUARDS: None	
ACTION: Confirm discharge arrangement will prevent back-flow e.g. swan neck	
RESPONSE: (Action 93) DATED: 4/11/2021	
Non-return valve installed on discharge line, no swan neck requried.	
SIGNED: Ben Jobling Purser	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 94	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 20 of 26 Rev B - Biogas Treatment CHP/Flare P&ID	
ITEM: (Hazop Node 23) CHP Condensate Pit	
CAUSE: (Flow Problems with) Failure of non-return valve	
CONSEQUENCE: Back-flow of digestate or gas route back to pit	
SAFEGUARDS: None	
ACTION: Confirm discharge arrangement will prevent back-flow e.g. swan neck	
RESPONSE: (Action 94) DATED: 4/11/2021	
Non-return valve installed on discharge line, no swan neck requried.	
SIGNED: Ben Jobling Purser	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 95	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 20 of 26 Rev B - Biogas Treatment CHP/Flare P&ID	
ITEM: (Hazop Node 24) Surface Pit	
CAUSE: (Flow Problems with) Failure of non-return valve	
CONSEQUENCE: Back-flow of digestate or gas route back to pit	
SAFEGUARDS: None	
ACTION: Confirm discharge arrangement will prevent back-flow e.g. swan neck	
RESPONSE: (Action 95) DATED: 4/11/2021	
Non-return valve installed on discharge line, no swan neck requried.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Andrew Clark	RESPOND BY: 19 OCT 2021
ACTION NO: 96	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 20 of 26 Rev B - Biogas Treatment CHP/Flare P&ID	
ITEM: (Hazop Node 24) Surface Pit	
CAUSE: (Contamination Problems with) Potential for contamination of surface pit	
CONSEQUENCE: Process upset if contaminated fluid is transferred to digesters	
SAFEGUARDS: None	
ACTION: Site procedures to be produced and training provided detailing how contamination events should be managed	
RESPONSE: (Action 96) DATED: 4/11/2021	
Emergency Operation Procedures are in place and require updating when O&M manuals are issued.	
SIGNED: Ben Jobling Purser	
ENTER YOUR RESPONSE IN THE BOX ABOVE, THEN SIGN AND RETURN TO: ihampson@fbweng.co.uk	
NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 97	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 20 of 26 Rev B - Biogas Treatment CHP/Flare P&ID	
ITEM: (Hazop Node 24) Surface Pit	
CAUSE: (Contamination Problems with) Contamination of surface pit	
CONSEQUENCE: Unable to transfer water to digesters	
SAFEGUARDS: None	
ACTION: Consider the need for a tanker connection on the discharge pipework to allow pit contents to be transferred to tanker / container	
RESPONSE: (Action 97) DATED: 4/11/2021	
The pit has a man hole within it which can be lifted if its requried to be emptied. This will not be a regular operation.	
SIGNED: Ben Jobling Purser	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 98	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 20 of 26 Rev B - Biogas Treatment CHP/Flare P&ID	
ITEM: (Hazop Node 24) Surface Pit	
CAUSE: (Haz.Subtance Problems with) Collection / presence of harmful gasses in sump	
CONSEQUENCE: Injury to personnel	
SAFEGUARDS: None	
ACTION: Warnings / identification of hazards to be highlighted during training	
RESPONSE: (Action 98) DATED: 4/11/2021	
This has been added to the site training and will be delivered as part of the package.	
SIGNED: Ben Jobling Purser	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 99	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 24 of 26 Rev A - Service Water P&ID	
ITEM: (Hazop Node 27) Service Water	
CAUSE: (Level Less than) Low level in either of the break tanks	
CONSEQUENCE: Loss of service water / dry running of pump	
SAFEGUARDS: None	
ACTION: Confirm if low level interlock / alarm to protect pump / indicate loss of service water	
RESPONSE: (Action 99) DATED: 4/11/2021	
A low pressure swith will be supplied for the CP01 system to notify operators of a lack of water on site for surface water equipment.	
SIGNED: Ben Jobling Purser	
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NOTES (for use of Hazop Secretary only)	

HAZOP STUDY ACTION AND RESPONSE SHEET

ACTION ON: Ben Jobling Purser	RESPOND BY: 19 OCT 2021
ACTION NO: 100	MEETING DATES: Tuesday, 05 October 2021
DRAWINGS AND DOCUMENTS: 125 A01 01 Sheet 24 of 26 Rev A - Service Water P&ID	
ITEM: (Hazop Node 27) Service Water	
CAUSE: (Pressure Problems with) Pump failure	
CONSEQUENCE: Loss of service water to consumers in particular the under / over pressure valves	
SAFEGUARDS: None	
ACTION: Consider the need for pressure instrument of service water system to indicate loss of pressure	
RESPONSE: (Action 100) DATED: 4/11/2021	
This item will be picked up by item action 99 and can text the operators to notify them of any failures on site.	
SIGNED: Ben Jobling Purser	
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NOTES (for use of Hazop Secretary only)	