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1. Safety

Any person carrying out any of the following instructions shall do so in accordance with United Utilities Ltd. Blue Book and all Generic Risk Assessments (GRAs), details of which are contained in United Utilities Ltd. Health and Safety Policy – Organisations and Arrangements document and available via the UU intranet site.

If in carrying out this instruction, it is not possible to rectify any problem encountered within a reasonable timescale, the Production Manager or senior equivalent person must be contacted.

All other applicable regulatory and statutory requirements shall be observed at all times.

Detailed operating instructions, control philosophies and technical information may be found in the following;

- **Process Loss Contingency Plans**
- **Compliance Action Plans**
- **Environmental Permits**
- **Accident, Incident and Emergency Management Plans**
- **Drainage Plans**
- **Environmental Risk Assessments**
- **O & M Manuals**
- **Control philosophies**


2. Responsibility

All Standard Operating Procedures, Instructions and other documented operational procedures and activities are to be carried out by the Process Controller or other trained person designated by the Production Manager.

If in carrying the instruction it is not possible to rectify any problem encountered within a reasonable timescale the Production Manager or senior equivalent person must be contacted.

Any operational problem that cannot be dealt with by normal operational procedures shall be classed as an INCIDENT and the current issue of UU Incident Management Procedure shall be referred to and SOP (WP/S/001/30/01 Incident Response).

All actions and communications carried out while applying any Standard Operating Procedure, Instruction or other documented operational procedure or activity shall be recorded using form WwP/F/001/31/08 Site Diary Log.

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3. Site Location

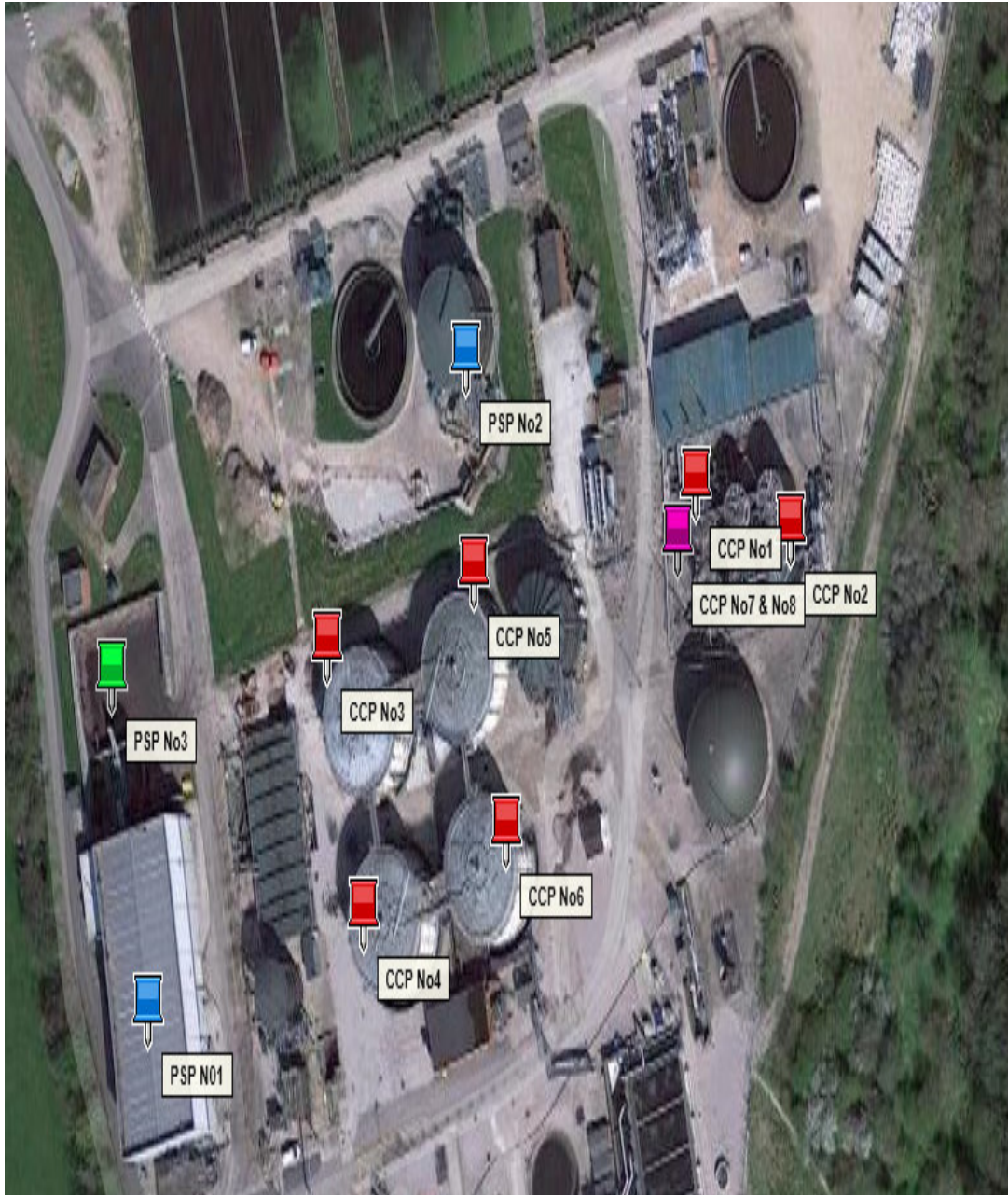
Blackburn WwTW
Cuerdale lane
Samlesbury
PR5 OUY

4. Processes In Use

- The sludge treatment process at Blackburn WwTW comprises 4 No. 500m³ Mixing/Balancing Tanks, followed by 2 no. Gravity Belt Thickeners (Simon Hartley), followed by a Reliquification Plant, followed by 6 No 283m³ Enhanced Enzymic Hydrolysing Vessels followed by 4 No. 2500m³ Mesophilic Anaerobic Digesters (MADs), followed by 2 No. Centrifuges (Alfa-Laval). The digested cake is discharged into the cake bay as a product for recycling to agriculture.
- Pathogen reduction is achieved by the Enzymic Hydrolyser followed by Primary Digestion. The MADs also reduces the fermentability of the sludge by converting a substantial proportion of organic matter to biogas.
- The process produces sludge to the "Conventional" standard as defined by BAS/HACCP standards.
- Untreated sludge is defined as Belt Thickened Sludge and Sludge Feed to the EEH Plant, samples can be taken from the thickened sludge tank underneath the GBT's and the EH Feed Tank. (Belt Thickened Sludge – MPID 202553, Sludge Feed to EEH Plant – MPID 213995)
- Treated sludge is defined as sludge that has been through the process train and have been de-watered via the Centrifuges. Samples can be taken directly from the cake storage bay. (Digested Sludge Cake HACCP - MPID 210897)
- The MADs also reduce the ferment ability of the sludge by converting a substantial proportion of organic matter to biogas.
- Refer to the Primary Digestion (WwP/I/3010/15/01) for a full description.

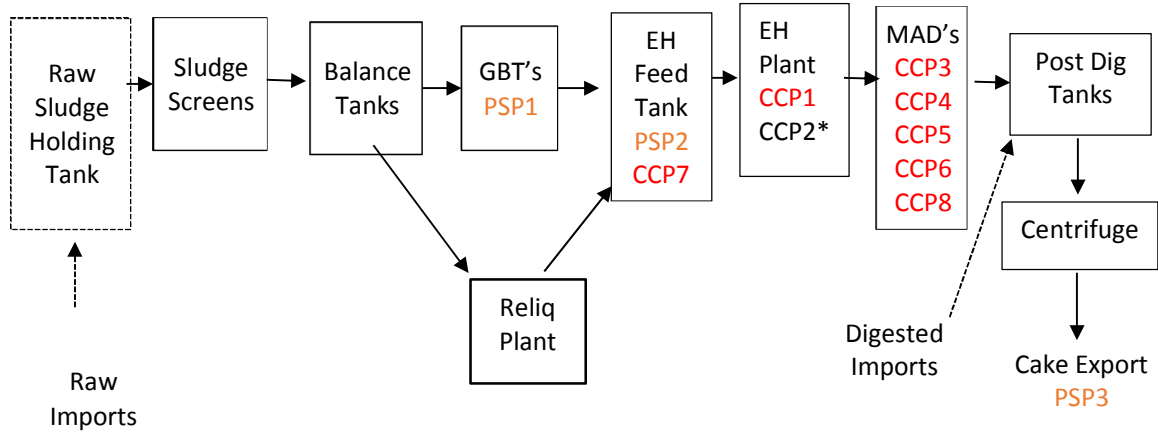
HACCP Plan
Blackburn WwTW

5. Site Plan



HACCP Plan Blackburn WwTW

6. Process Schematic




PSP1 Belt Thickened

PSP2 EEH Feed


PSP3 Treated Sludge

CCP1 EH Reactor Vessel 1 Temp
 CCP2 EH outlet / Digester feed temperature* (not required for conventional product).
 CCP3 MAD No 1 Temp
 CCP4 MAD No 2 Temp
 CCP5 MAD No 3 Temp
 CCP6 MAD No 4 Temp
 CCP7 EEH Feed rate
 CCP8 MAD Feed Rate

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7. Critical Control Points & Process Sampling Points

Critical Control Point (CCP)	Description	Asset Code	Critical Limit	Frequency of monitoring
CCP No1	EEH Plant Reactor No1 Temperature	BLACK-SL1-ST1-AEH01-CX007	>30 degrees C	Daily, Continuous and Automatic
CCP No2 * (Not required for conventional end product).	EEH Plant Digester Sludge Feed Temperature	Not required At Present.	>35 degrees C	Daily, Continuous, Automatic Only required when operating plant to produce an enhanced product.
CCP No3	Digester No1Temperature	BLACK-SL1-ST1-PDI01-CX001	>28 degrees C	Daily, Continuous, Automatic
CCP No4	Digester No2Temperature	BLACK-SL1-ST1-PDI02-CX001	>28 degrees C	Daily, Continuous, Automatic
CCP No5	Digester No3Temperature	BLACK-SL1-ST1-PDI03-CX001	>28 degrees C	Daily, Continuous, Automatic
CCP No6	Digester No4Temperature	BLACK-SL1-ST1-PDI04-CX001	>28 degrees C	Daily, Continuous, Automatic
CCP No7	EEH Maximum Daily Feed	BLACK-SL1-PO1-HEX01-FX001	835 m ³	Daily, Automatic
CCP No8	Primary Digester Maximum Daily Feed	BLACK-SL1-ST1-PDI02-FX001	260 m ³ per Digester	Daily, Automatic

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Process Sampling Point (PSP) Description	MPID	NGR
PSP1 Belt Thickened Sludge – Sample Point located at low level under GBT's (Only used if the Reliq Plant is not in Operation)	202553	SD60299 29517
PSP2 Sludge Feed to EEH Plant – Sample Point located at the EHH Feed Tank – Not required in conventional mode.	213995	SD60386 29602
PSP3 Treated Sludge Cake (End product) – Sample Point located in the Cake Bay as Cake discharges from Conveyor.	210897	SD60290 29561

8. Process Validation Data (Verification)

The table below shows the results of the sampling events of the process validation. It demonstrates that the sludge treatment process at this treatment works achieves a final product which meets the pathogen reduction and Maximum Admissible Concentration requirement of a **Conventionally** Treated biosolids product as defined by the ADAS Safe Sludge Matrix.



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Site	Blackburn								
Process Validation Data									
Sample Event	Date	E.coli					Salmonella	Treated Mean	Kill
		Raw 202553	Raw log10	Raw Mean	Treated 210897	Treated log10			
1	23/11/2016	6680000	6.824776462	6.608403513	4190	3.622214023	N/A	3.527884701	3.080518813
	23/11/2016	7000000	6.845098040		3040	3.482873584	N/A		
	23/11/2016	1430000	6.155336037		3010	3.478566496	N/A		
2	24/11/2016	1280000	6.107209970	6.494305823	4480	3.651278014	N/A	3.678837462	2.81546836
	24/11/2016	4990000	6.698100546		7120	3.852479994	N/A		
	24/11/2016	4760000	6.677606953		3410	3.532754379	N/A		
3	25/11/2016	1010000	6.004321374	5.571911255	1890	3.276461804	N/A	2.710520939	2.861390315
	25/11/2016	8380	3.923244019		37.9	1.578639210	N/A		
	25/11/2016	6140000	6.788168371		1890	3.276461804	N/A		
4	29/11/2016	6900000	6.838849091	6.653341565	1070	3.029383778	N/A	3.143827244	3.509514321
	29/11/2016	1710000	6.232996110		3550	3.550228353	N/A		
	29/11/2016	7730000	6.888179494		711	2.851869601	N/A		
5	01/12/2016	4100000	6.612783857	6.524138877	1430	3.155336037	N/A	3.191697861	3.332441016
	01/12/2016	4180000	6.621176282		1060	3.025305865	N/A		
	01/12/2016	2180000	6.338456494		2480	3.394451681	N/A		

**HACCP Plan
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6	02/12/2016	4510000	6.654176542	6.599654132	25400	4.404833717	N/A	4.330848227	2.268805905
	02/12/2016	4880000	6.688419822		18000	4.255272505	N/A		
	02/12/2016	2860000	6.456366033		21500	4.332438460	N/A		
7	06/12/2016	2140000	6.330413773	6.396349068	4430	3.646403726	N/A	3.426367971	2.969981097
	06/12/2016	4720000	6.673941999		2940	3.468347330	N/A		
	06/12/2016	1530000	6.184691431		1460	3.164352856	N/A		
8	12/12/2016	4230000	6.626340367	6.613312601	1500	3.176091259	N/A	3.886699224	2.726613377
	12/12/2016	3950000	6.596597096		826000	5.916980047	N/A		
	12/12/2016	4140000	6.617000341		369	2.567026366	N/A		
9	14/12/2016	7920000	6.898725182	6.851624092	2830	3.451786436	N/A	3.059667419	3.791956673
	14/12/2016	7090000	6.850646235		1450	3.161368002	N/A		
	14/12/2016	6390000	6.805500858		368	2.565847819	N/A		
10	15/12/2016	1070000	6.029383778	5.808623605	8500	3.929418926	N/A	3.949777802	1.858845803
	15/12/2016	5650000	6.752048448		6300	3.799340549	N/A		
	15/12/2016	44100	4.644438589		13200	4.120573931	N/A		
11	16/12/2016	1210000	6.082785370	6.395762046	3340	3.523746467	N/A	3.247742068	3.148019978
	16/12/2016	4130000	6.615950052		1120	3.049218023	N/A		
	16/12/2016	3080000	6.488550717		1480	3.170261715	N/A		
12	19/12/2016	2840000	6.453318340	6.351531966	1450	3.161368002	N/A	3.22089583	3.130636136
	19/12/2016	2170000	6.336459734		1090	3.037426498	N/A		
	19/12/2016	1840000	6.264817823		2910	3.463892989	N/A		



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13	20/12/2016	5640000	6.751279104	6.683849473	2150	3.332438460	N/A	3.091787922	3.592061551
	20/12/2016	6050000	6.781755375		355	2.550228353	N/A		
	20/12/2016	3300000	6.518513940		2470	3.392696953	N/A		
14	21/12/2016	3410000	6.532754379	6.56505448	1440	3.158362492	N/A	3.015768468	3.549286012
	21/12/2016	4060000	6.608526034		717	2.855519156	N/A		
	21/12/2016	3580000	6.553883027		1080	3.033423755	N/A		
15	22/12/2016	7270000	6.861534411	6.676850049	2520	3.401400541	N/A	3.001353871	3.675496177
	22/12/2016	4290000	6.632457292		578	2.761927838	N/A		
	22/12/2016	3440000	6.536558443		693	2.840733235	N/A		
16	23/12/2016	2280000	6.357934847	6.360057926	702	2.846337112	N/A	2.643160418	3.716897507
	23/12/2016	3360000	6.526339277		350	2.544068044	N/A		
	23/12/2016	1570000	6.195899652		346	2.539076099	N/A		
Duration	30 Days							Validation Mean	3.126745815
								Standard Achieved	Conventional

**HACCP Plan
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Operating conditions during validation process		
Control	Min	Max
EH No1 Temp	30°C	
EH No4 Temp <u>*Not required for conventional mode.</u>	35°C	
Feed Rate EH		835m ³ /d
Digester No 1 Temp	28°C	
Digester No 2 Temp	28°C	
Digester No 3 Temp	28°C	
Digester No 3 Temp	28°C	
Feed Rate Dig 1		260m ³ /d
Feed Rate Dig 2		260m ³ /d
Feed Rate Dig 3		260m ³ /d
Feed Rate Dig 4		260m ³ /d

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Analytical Methods in Use

The isolation and enumeration of Escherichia coli by either a chromogenic membrane filtration technique or defined substrate most probable number technique.

The detection of Salmonella spp. by use of a presence/absence technique.

Calculation of Results

For the method of calculation refer to the “Biosolids Assurance Scheme Standard 2015”, Management Control Method 2.4 parts e-g.

9. Routine Monitoring and Sample Storage


Sludge samples are taken from the designated sample points as marked on the site map, in line with the monitoring schedule. The monitoring schedule can be found in WwP/S/001/18/38 Sludge Process Monitoring.

The UU Laboratory scheduling system holds the sample programme to monitor for pathogen levels. Sampling Round sheets and labels are issued to site on green paper clearly marked Reg Sludge or HACCP. Samples for E.coli/Salmonella must be taken in the appropriate bottle type, which is available from the laboratory and is pre-sterilised to prevent contamination of the sample. Refer to WwP/S/001/18/36 Sludge Process Sampling Procedure.

Where possible the intended schedule date should be followed. However, the schedule date on the roundsheet is not restrictive and samples can be registered if taken earlier, provided that the correct date and time are recorded in the available boxes.

All sludge process monitoring and verification samples are stored in the site sample storage fridge. Refer to WwP/S/001/18/37 Sludge Sample Storage and Transport. Samples are transferred from the storage fridge to standard issue grey lidded waste water crates to ensure minimum exposure to light.

For sampling for a verification or re-verification contact the Regulatory Services (Process) team who will liaise with the laboratory to arrange for roundsheets and labels for the correct analysis.

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10. Record Keeping

The table below details the location of records relating to all aspects of the use of HACCP procedures on site.

Record Type	Storage location	Storage duration
Pathogen daily self-monitoring sheet.	Regulatory Services SharePoint	5 years
Routine sampling results.	Operational Management System (OMS)	20 years
Digester temperature probe maintenance.	MARS	5 years

11. Corrective Action Plan

CCP Critical Limit breach

Inform Bioresource Services of the CCP breach / loss of process immediately. Bioresource Services will assess the impact and implement site specific measures to deal with the potentially non-conforming product on site.

Commence daily sampling immediately following a CCP breach from the appropriate process sampling points to monitor for return to compliance.


Check OMS Daily for sampling results and continue to monitor CCPs until process returns to operating within the Critical Limits.

Routine Monitoring Maximum Allowable Concentration (MAC) Failure

MAC Failures are issued from the Laboratory as DataDesk consent failure notification emails. Check the complete set of results for the sample event in question and confirm that the mean of the log values exceeds the standard to which the site is verified.

Inform Bioresource Services of the MAC Failure / loss of process immediately. Environmental Services will assess the impact and implement site specific measures to deal with the potentially non-conforming product on site.

Commence daily sampling immediately following a MAC failure, from the appropriate process sampling points to monitor for return to compliance.

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Check OMS Daily for sampling results and continue to monitor until process returns to compliance, as indicated by a passing MAC value from the daily sampling.

In all instances where the site is performing in a manner which could potentially negatively impact biosolids conformity, sampling should continue until it can be demonstrated that the site is consistently producing conforming products.

For generic guidance on appropriate action to take in the event of abnormal performance of a sludge treatment process refer to WwP/S/001/18/28 HACCP Sludge Process Contingency Planning Procedure.


After returning the process to operating within the critical limits and obtaining sample passes for the Maximum Allowable Concentration (MAC) for the treatment standard to which the site is verified, update the corrective action log in the HACCP plan to reflect actions taken and the outcome.

12.Site Specific Corrective Actions

- Ensure segregation is maintained on the Cake Bay following a compliance failure.
- Ensure Non-Compliant cake is labelled to avoid export complications.


13.Contacts in Case of Haccp Failure

Bioresource Services Agricultural Advisor: Dave Hindle 07771 598220
 Regulatory Services: Danni Jones 01925 678177

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14. Corrective Action Log

<i>Blackburn WWTW TICK SHEET FOR AUDIT TRAIL IN CASE OF HACCP FAILURE</i>		
Date:	Answer Yes/No	Comment on CCP Failure and Action Taken
Did a CCP fail?		<i>Which one and what did you do</i>
Have you informed the Bioresource Services Team and your Production Manager?		
Are CHU/GDS above 100,000 before transfer to land?		<i>If YES Stop transfer, store and resample</i>
Is it possible to determine which cake is affected?		
Have all other CCP's been checked e.g. MAD Temps, Maximum MAD Feed and Secondary Digester Retention Time?		
Have you had the affected sludge resampled?		<i>If the sludge falls below 100,000 CFU/GDS the sludge can now go to land, If the sample result is above 100,000 CFU/GDS continue to sample.</i>
Have you made actions to bring failed CCP back into compliance?		<i>Total boiler failure consider boiler hire, record actions on HACCP daily monitoring.</i>
Date CCP back in compliance		
Is Reverification required?		
Signature		
Name		

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15. Contacts

- Alarm Management Centre (ICC): 0345 050 9482
- Site Address: Blackburn WwTW, Cuerdale Lane, Samlesbury, PR5 OUY
- Operations Area: Central
- Production Manager: Dan Jones 07717 538972
- Production Engineer: Ashley Bailey 07880 130163
- Technical Officer: Martin Gilday 07713 322798
- Process Controllers : Alan Evenson 07826 539391
Stephen Gilday 07717 200766
- Bioresource Services Agricultural Advisor: Dave Hindle 07771 598220