

**APPENDIX A**

**Construction Plan**



**North End Water Pollution Control Centre  
Rehabilitation of Digester 11 and  
Sludge Holding Tanks No. 5 and 7**

**Construction Plan  
DRAFT – Rev 1  
October 2012**

**Prepared By**

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## **1.0 INTRODUCTION**

### **1.1 Digester 11 Rehabilitation, Sludge Mixing and Gas Collection System Upgrade**

There are currently six (6) anaerobic digesters at the NEWPCC. Digesters No. 9, 10, 11 and 12 were constructed in 1965 and each have a volumetric capacity of 7,200 m<sup>3</sup>. Digesters No. 13 and 14 were added in 1986 and each has a volumetric capacity of 8,000 m<sup>3</sup>. The digesters (except for No. 11 which is not operational) are currently mixed using a confined gas mixing system and the re-circulated sludge passes through a heat exchanger to maintain mesophilic conditions (38°C +/-1 °C) in the digester. The digesters are operated at a solids concentration ranging from 3% to 4% total solids (TS).

Experience at the NEWPCC indicates that the mixing system is not efficient at keeping the digesters completely mixed. There is also substantial grit accumulation in the digesters overtime due to an inefficient grit removal system installed on the liquid streams at the head of the NEWPCC and SEWPCC facilities

The NEWPCC experienced significant foaming in the fall of 2009 resulting in the failure of the Digester No. 11 roofing system due to build-up of excess internal pressure. The City had experienced a similar roof failure for Digester No. 12 in 1979 and the problem was resolved by pouring a reinforced layer of concrete over the damaged roof as a remedial measure.

The intent of Digester 11 rehabilitation construction plan is aimed at:

- The demolition and removal of Digester 11 existing gas mixing system and appurtenances located on Digester 11 roof and in Gallery 5
- The repair of Digester 11 roof
- The restoration of Digester 11 concrete interior walls, roof and columns
- The application of a lining system to the interior wall and underside of the roof
- Re-installation digester observation view port window, dome three way plug valve, flame arresters, pressure relief and dome enclosure.
- The installation of pressure relief manholes, sampling ports, access manhole, roof gas collection pipe from dome, pipe heat tracing, pipe insulation, insulation protective covering
- The installation of a mechanical jet mixing system with mixing pumps, piping, nozzles and foam buster.
- The installation of Gallery 5 Digester 11 gas pipe and ancillary equipment
- The installation of radar foam monitoring instrumentation
- The installation of a new digester 11 roof water proofing membrane.
- The re-installation of the existing roof insulation and roof paving blocks

### **1.2 Sludge Holding Tanks 5 and 7 Rehabilitation and Gas Collection System Upgrade**

There are currently four (4) sludge holding tanks (SHT) at the NEWPCC to store digested sludge before it is dewatered. SHT No. 5, 6, 7 and 8 were originally constructed in 1956 for the purpose of digestion. When anaerobic digesters No. 9 to 12 was constructed in 1965, the SHT tanks, constructed as digesters in 1956, were converted to sludge holding tanks. Each tank has a

volumetric capacity of 3,850 m<sup>3</sup> and the tanks are intermittently mixed prior to dewatering by re-circulating the sludge.

A study initiated by the City titled “North End Water Pollution Control Centre Storage Tank No. # 5 Concrete and Corrosion Assessment” (2010) concluded that there was significant concrete deterioration primarily due to sulphuric acid attack.

Currently methane gas collected in the head space of the existing sludge holding tanks (SHTs) is vented to the atmosphere. Both pressure relief valves of the SHTs have been removed to vent the headspace gas. A heat traced, insulated, aluminum covered gas collection pipe extends from the SHTs gas collection dome to the roof of the old filter building room where an open-type waste gas burner stack is mounted for gas flaring. Currently the waste gas burner stack is not in use. A ball valve, gas moisture sediment tank, back pressure regulator, flame arrestor, waste gas pipe, waste gas burner and wind shield make up the gas flare system.

The intent of Sludge Holding tanks 5 and 6 rehabilitation construction plan is aimed at:

- The restoration of sludge holding tank number 5 and 7 concrete interior walls, u/s of roof and columns
- The application of an interior wall and u/s roof lining
- The replacement of faulty pipe heat tracing from sludge holding tank number 8
- The upgrade of the waste gas burner flare equipment
- Paint the exterior waste gas burner flare infrastructure.

## 2.0 PROJECT CONTACT PERSONNEL

Communication during construction will involve coordination with various personnel from several different organizations within the City of Winnipeg’s Water and Waste Department, along with personnel from Stantec Consulting Ltd., and the successful contractor. Table 2.1 listing personnel that would be involved in the project construction phase are attached. Specific personnel names and contact information will be filled in once the construction phase begins.

**TABLE 2.1 - PERSONNEL**

Title	Name	Office	Cell
<b>Water and Waste Department (WWD)</b>			
North End Water Pollution Control Centre			
Police/Fire/Ambulance		911	
Police Non-emergency		204-986-6222	

<b>Title</b>	<b>Name</b>	<b>Office</b>	<b>Cell</b>
Emergency Services		204-986-2626	
Customer Services – WWD		311	
<b>City of Winnipeg</b>			
City Project Engineer	Jason Shumka, P.Eng.	(204) 986-4076	(204) 330-1367
City Site Representative	Larry Norris		(204) 794-4545
Technical Advisor, Operational Protocol Review	John Amos	(204) 986-4845	
Plant Manager - NEWPCC	Ken Smyrski	(204) 986-4750	
Plant Supervisor – NEWPCC	John Amos	(204) 986-4845	
Senior Plant Operator	Bob Romance	204) 986-3463	(204) 226-2052
Supervisor of Electrical/Instrumentation Maintenance - NEWPCC	Ron Greening	(204) 986-4155	(204) 782-6988
<b>Stantec Consulting Ltd.</b>			
Contract Administrator	Jamie Brewster	(204) 489-5900	(204) 298-0614
Process Mechanical – Gas System	Alfred (AL) Beghin	(204) 489-5900	
Process Mechanical – Mixing System	Scott Bezak, P.Eng.	(204) 489-5900	(204) 226-0683
Electrical/Instrumentation & Controls	Ben Janz, P.Eng.	(204) 489-5900	(204) 292-0379
<b>Contractor</b>			
Site Superintendent			
Site Office			
Office Contact			

### 3.0 Construction Schedule Overview

#### 3.1 General

The Contractor shall prepare a schedule that meets the Substantial and Total Performance dates indicated in the Bid Opportunity.

### 4.0 PROCESS SHUTDOWNS

Each shutdown required is described in written form in this section. The sequence of work is presented in outline form along with the rationale for the approach taken. Detailed work sheets that would be used during construction as a check list to execute each shutdown are found following Section 4.3 of this document. The City of Winnipeg shall be provided notice 24 hours in advance of any shutdowns of active equipment or systems. The following abbreviations will be used to identify the responsible party for the shutdown efforts described in this document.

**OP = Operations**

**ST = Stantec**

**CONT = Contractor**

**COW = City of Winnipeg Representative**

#### 4.1 Shutdown 1 – Demolition of Digester 11 Roof Gas Piping and Gallery 5 Digester 11 Gas Piping (Dwg 1-0101D-M0004-001 and Dwg 1-0101D-M0003-001)

This shutdown will isolate Digester 11 gas piping from Digester 9, 10, and 12 gas piping. Gallery 5 is a gas room so work in and around the digesters must be performed in accordance to CSA Standard B149.6-11, and in addition, appliances, accessories, components, equipment, and materials shall be installed in accordance with the applicable requirements of CAN/CSA-B139, CSA B149.1, CSA B149.2, and the Canadian Electrical Code, Part I, and shall be acceptable to the authority having jurisdiction.

All instruments and electrical systems being removed shall be powered down and grounded prior to disconnection. For systems connected to the plant DCS system, the termination points inside the control cabinets shall be disconnected and isolated prior to disconnection at field device. All control and power cables (conductors) for demolished equipment are to be disconnected and removed. No abandoned cables or conduit shall be permitted.

The isolation of Digester 9, 10, and 12 gas pipes from digester 11 is for demolition of the gas equipment. The following steps are required:

<b>Action/Steps</b>	<b>Responsible Party</b>
1. At motor control center MCC-1D, disconnect the power to gas compressor D410-DR1. Remove lamacoid from MCC bucket and replace with lamacoid indicating that the MCC bucket is now spare. Remove power conductors and conduit between MCC-1D and D410-DR1. Disconnect and remove control conductors and conduit between MCC-1D and field	OP and CONT

Action/Steps	Responsible Party
device panel DFDP-1 located in Gallery 6 digester control room, ensure leads in field device panel are disconnected and isolated prior to disconnecting in the MCC. Disconnect and remove field control wiring and conduit between field device panel DFDP-1 and gas compressor D410-DR1.	
2. At motor control center MCC-1D, de-energize power to sludge recirculation pump D111-DP8. NEWPCC is to lockout motor starter with padlock and place a red safety tag on the starter stating "Do not energize".	OP and CONT
3. At motor control center MCC-1D, de-energize power to sludge heating water recirculation pump D177-DP14 and lockout motor starter with padlock. A red safety tag is to be placed on the starter stating "Do not energize".	OP and CONT
4. De-energize power to Digester 11 gas pipe heat tracing. Disconnect and remove control conductors and conduit up to distribution panel. Remove pipe heat tracing after the removal of the pipe insulation.	CONT
5. De-energize Digester 11 primary sludge feed valve D101-HV (DV58A). Close primary sludge feed plug valves DV52A and DV52B. A valve handle lockout with padlock is to be locked out so it cannot be operated. A red safety tag is to be placed on the valve stating "Do not open".	OP and CONT
6. Close the 50 mm hot water supply and 50 mm hot water return of the hot water recirculating pump D177-DP14. A valve handle lockout with padlock is to be locked out so it cannot be operated. A red safety tag is to be placed on the valve stating "Do not open".	OP and CONT
7. Close Digester 11 suction header plug valves DV53A and DV53B. A valve handle lockout with padlock is to be locked out so it cannot be operated. A red safety tag is to be placed on the valve stating "Do not open".	CONT
8. Close Digester 11 sludge withdrawal pipe valves, DV71A, DV71B, DV71C, and DV71D. A valve handle lockout with padlock is to be locked out so it cannot be operated. A red safety tag is to be placed on the valve stating "Do not open".	CONT
9. Close Digester 11 supernatant valves DV67B, DV67D, and DV57A. A valve handle lockout with padlock is to be locked out so it cannot be operated. A red safety tag is to be placed on the valves stating "Do not open".	CONT
10. Close Digester 11 recirculation valve DV69A, DV69B, DV69C, and recirculation pipe 50 mm flushing water line valve. A valve handle	OP and CONT



Action/Steps	Responsible Party
lockout with padlock is to be locked out so it cannot be operated. A red safety tag is to be placed on the valve stating "Do not open".	
11. Close two Digester 11 75 mm flushing water valves. A valve handle lockout with padlock is to be locked out so it cannot be operated. A red safety tag is to be placed on the valve stating "Do not open".	CONT
12. Close primary scum pipe valve and secondary scum pipe valve S405-HV5. A valve handle lockout with padlock is to be locked out so it cannot be operated. A red safety tag is to be placed on the valves stating "Do not open".	OP and CONT
13. Close Digester 11 Weir box valves D808-HV3 and D808-HV4. A valve handle lockout with padlock is to be locked out so it cannot be operated. A red safety tag is to be placed on the valves stating "Do not open".	OP
14. The entire Digester 11 gas piping system shall be purged of methane gas using carbon dioxide or nitrogen gas prior to demolition. Purge gas pipe work involving gas piping for other digesters. Abide by Canadian Standards Association (CSA) standard CSA B149.6-11 " <u>Code for digester gas and landfill gas installations</u> ," and CSA B149.1-10 " <u>Natural gas and propane installation code</u> ", Clause 6.23 Purging of piping and tubing systems and hose after leak testing and Clause 6.24 Purging gas from a piping or tubing system.	OP and CONT
15. Prior to demolition, erect a dust containment area around the work zone in Gallery 5 to contain dust and debris resulting from demolition.	CONT
16. The area in Gallery 5 at floor elevation 237.000 meters (old elev. 40.0 ft.) is designated a hazardous area under CSA B149.6-11 "Code for digester gas and landfill gas installations." Construction is to eliminate all sources of ignition. Electrical apparatus and equipment installed in this area shall be acceptable for use in hazardous locations as defined in the Canadian Electrical Code, Part I.	CONT
17. The contractor shall take precautions when performing pipe demolition. The interior of the digester biogas pipes and equipment may contain a layer of carbon residual that may be a pyrophoric dust. Due to the complex interrelations between, moisture, oxygen, volatile material, and carbon, the carbon may self-ignite. Take precautions to prevent ignition from heat sources such as work lights, electrical equipment, welding, torches, hammer impacts, etc.	CONT
18. The first item for demolition and removal is the asbestos pipe insulation and non-asbestos pipe insulation. The Workplace Safety and Health Act (W210), and Parts 36 & 37 of the Workplace Safety and Health Regulation (M.R. 217/2006) require employers and workplace parties to take specific actions when a potential health risk is present in the workplace. The	CONT COW ST OP

Action/Steps	Responsible Party
<p>asbestos removal work shall conform to the Manitoba Workplace Safety &amp; Health Division "Guidelines for Working with Asbestos." NEWPCC, Stantec, and COW shall be provided with a written notification a minimum of 48 hours before the beginning asbestos removal.</p>	
<p>19. NEWPCC is to close plug valve DV116-D on gas compressor common suction line. The contractor is to provide a valve handle lockout with padlock is to be locked out so it cannot be operated. Both the Contractor and NEWPCC are to attach a lock to the lock out device. A red safety tag is to be placed on the valve stating "Do not open". Immediately after gas pipe at valve DV118-C is removed, the Contractor is to install a temporary blind flange with gasket on the valve.</p>	OP and CONT
<p>20. NEWPCC is to close plug valve DV116-B on gas compressor common discharge line. The contractor is to provide a valve handle lockout with padlock is to be locked out so it cannot be operated. Both the Contractor and NEWPCC are to attach a lock to the lock out device. A red safety tag is to be placed on the valve stating "Do not open". Immediately after gas pipe at valve DV118-C is removed, the Contractor is to provide a temporary blind flange with gasket is to be installed on the valve.</p>	OP and CONT
<p>21. NEWPCC is to close 150 mm diameter hand operated plug valve DV118-C located on the branch line to the 250 mm diameter waste gas pipe. The contractor is to provide a valve handle lockout with padlock is to be locked out so it cannot be operated. Both the Contractor and NEWPCC are to attach a lock to the lock out device. A red safety tag is to be placed on the valve stating "Do not open".</p>	OP and CONT
<p>22. The removal of valve DV116-B and capping of the branch pipe at the common discharge line requires the shut-down of gas pipe from digester 9 and 12. Prearrange work with NEWPCC and provide 48 hours advance notice. NEWPCC will shut down gas compressor D420-DR2. NEWPCC will close valves DV116-W and DV116-C. The contractor is to provide a valve handle lockout with padlock is to be locked out so it cannot be operated. Both the Contractor and NEWPCC are to attach a lock to the lock out device. A red safety tag is to be placed on the valve stating "Do not open". After installation of the branch cap, the Contractor and City will open valves DV116-W and DV116-C.</p>	OP and CONT
<p>23. The removal of valve DV116-B and installation of a blind flange with gasket and drip trap requires the shut-down of gas common suction pipe from digester 9 and 12. Prearrange work with NEWPCC and provide 48 hours advance notice. NEWPCC will shut down gas compressor D420-DR2. NEWPCC will close valves DV116-J and DV116-I. The contractor is to provide a valve handle lockout with padlock is to be locked out so it cannot be operated. Both the Contractor and NEWPCC are to attach a lock to the lock out device. A red safety tag is to be placed on the valve stating "Do not open". After installation of blind flange and completion of drip trap, the Contractor and City will open valves DV116-J and DV116-I.</p>	OP and CONT

Action/Steps	Responsible Party
24. NEWPCC will start D420-DR2, after the completion of tasks 17 and 18 above.	OP
25. As a minimum, provide one - 150 lb. steel wheeled unit fire extinguisher with potassium bicarbonate (purple K) fire suppression agent specifically designed and built for the protection of hazardous areas where large fires could occur. The contractor shall determine whether or not additional firefighting equipment is required. Fire extinguisher shall be kept at full operating capacity at all times during construction.	CONT
26. Remove Digester 11 gas withdrawal pipe heat tracing cables, disconnect and remove heat trace power feed to source power panel.	CONT
27. Demolition and remove roof gas mixing pipe. The following items are to be salvaged for reinstallation: a. Digester 11 dome 150 mm diameter pressure relief/vacuum breaker, b. Digester 11 dome 150 mm diameter flame arresters c. Digester 11 dome 150 mm diameter three way plug valve D132-HV1 and pipe d. Digester 11 dome steel floor platform e. Digester 11 dome pressure relief/vacuum breaker insulated steel building enclosure. f. Digester 11 view port with metal corrugated building enclosure g. Pressure sensor and transmitter h. Radar level sensor	CONT COW OP
28. Demolition and remove Gallery 5 digester 11 gas mixing pipe. The following items are to be turned over to the City and transported to an on-site area designated by NEWPCC representative. a. Gas compressor DR410-DR1 b. DR410-DR1 bypass pressure relief valve c. D410-DR1 sediment & moisture trap with stainless drip d. Plug valve D410-HV1 e. 300 mm long stainless steel spool piece with purge isolation valve f. 838 mm long stainless spool piece g. Stainless steel gas compressor DR410-DR1 branch suction tee h. Gas compressor DR410-DR1 Varec flame arrestor with condensate trap i. Motorized valve DV415-HV j. DR410-DR1 bypass plug valve DV138-A k. Gas compressor DR410-D1 suction Ashcroft pressure switch D411-PSL, and discharge Ashcroft pressure switch D412-PSH. l. 300 mm long stainless steel Ashcroft pressure switch spool piece m. Plug Valves DV117A, DV117B, DV117C, DV117D, and DV117E n. Snubber valve DV147A o. Motorized valve D415-HV1 p. Digester 11 supply pipe sediment & moisture trap q. Digester 11 supply pipe sediment & moisture trap isolation and	CONT COW OP

Action/Steps	Responsible Party
bypass ball valves D117C r. Branch valve DV116-E s. 250 mm diameter digester 11 gas withdrawal stainless steel foam collector with stainless steel drip and drip piping. t. 200 diameter digester gas supply Varec flame arrestor with stainless steel drip. u. All 12 mm diameter plug valves v. Snubber high pressure stainless steel drip with plug valves	
29. Demolition gas compressor DR410-DR1 concrete pad. a) Rubble is to be removed from site. b) Contractor is to re-finish floor to a smooth finish. Stantec to inspect concrete surface finish after repair.	CONT and ST
30. After completion of gas pipe works, test all pipe in accordance with Canadian Standards Association (CSA) standard CSA B149.6-11 "Code for digester gas and landfill gas installations", Sections 11.5.	ST COW OP CONT
31. After completion of all concrete repair works to Digester 11, the digester is to be pressure/vacuum tested in accordance with Canadian Standards Association (CSA) standard CSA B149.6-11 "Code for digester gas and landfill gas installations", Sections 11.2, 11.3, and 11.4	ST COW OP CONT

**4.2 Upgrade of Sludge Holding Tanks 5 and 7 Waste Gas Burner Equipment (Dwg 1-0101D-M0006-001)**

Most of the work for the upgrade of the sludge holding tanks 5 and 7 waste gas burner equipment will take place at the old filtration building located south of the boiler room. The waste gas burner is mounted on the roof of the old filtration building. Control equipment for the waste gas burner is located below the waste gas burner either inside the building in the Waste gas Burner Room or surface mounted on the outside north wall surface of the Waste Gas Burner Room.

Waste gas burner equipment is a gas room so work must be performed in accordance to CSA Standard B149.6-11, and in addition, appliances, accessories, components, equipment, and materials shall be installed in accordance with the applicable requirements of CAN/CSA-B139, CSA B149.1, CSA B149.2, and the Canadian Electrical Code, Part I, and shall be acceptable to the authority having jurisdiction.

The upgrade to the waste gas burner will require the following steps:

Action/Steps	Responsible Party
1. NEWPCC will close sludge holding tanks 5, 6, 7, and 8 valves D240-HV1, D240-HV2, D240-HV3, and D240-HV4. The contractor is to provide valve handle lockouts with padlock capability. Both the Contractor and NEWPCC are to attach a lock to the lock out device. A red safety tag is to be placed on the valve stating "Do not open".	OP CONT

Action/Steps	Responsible Party
2. NEWPCC will close the low pressure padding gas valve D240-HV6 located in gallery 5 level and accessed from elevation 228.92. The contractor is to provide valve handle lockouts with padlock capability. Both the Contractor and NEWPCC are to attach a lock to the lock out device. A red safety tag is to be placed on the valve stating "Do not open".	OP  CONT
3. Close and lock out isolation valves DV135A, DV135B, DV135C, and DV135D for pressure regulating isolation valves	OP  CONT
4. NEWCC is to close the natural gas supply to the waste gas burner control panel. The contractor is to provide valve handle lockouts with padlock capability. Both the Contractor and NEWPCC are to attach a lock to the lock out device. A red safety tag is to be placed on the valve stating "Do not open".	OP  CONT
5. The entire waste gas burner gas piping system shall be purged of methane gas using carbon dioxide or nitrogen gas prior to dismantling. Abide by Canadian Standards Association (CSA) standard CSA B149.6-11 "Code for digester gas and landfill gas installations," and CSA B149.1-10 "Natural gas and propane installation code", Clause 6.23 Purging of piping and tubing systems and hose after leak testing and Clause 6.24 Purging gas from a piping or tubing system.	CONT  COW  OP
6. Disconnect power to gas control panel at waster gas burner control panel number 4. Disconnect gas control panel. Turn over gas panel to NEWPCC. No work is being done on waste gas burner electrical control panel.	CONT
7. Replace the following items: <ul style="list-style-type: none"> <li>• Entire gas control panel</li> <li>• 12 mm diameter natural gas flame check</li> <li>• External Fisher controls natural gas pressure regulator</li> <li>• 150 mm diameter plug valve</li> <li>• 100 mm diameter gas back pressure regulator</li> <li>• 12 mm diameter manometer plug valve</li> <li>• 2 - 12 mm diameter Ashcroft pressure switches with diaphragms</li> <li>• 2 - 12 mm diameter pressure switches isolation plug valves</li> <li>• 22.7 litre drip trap and drip trap isolation plug valve</li> <li>• 100 mm Varec flame arrestor</li> <li>• 12 mm flame retention line flame check</li> </ul>	CONT

Action/Steps	Responsible Party
8. The following item is to be added <ul style="list-style-type: none"> <li>• Thermal shut-off valve</li> </ul>	CONT
9. De-energize the high and high-high pressure switches. Disconnect instrument conductors and remove the two pressure switches (2) with 12 mm diameter isolation plug valves. Install new 12 mm diameter plug valves and new pressure switches. Reconnect conductors.	CONT and OP
10. Roof work shall conform to the Manitoba Workplace Safety & Health Division “Fall Protection Guidelines.”	CONT
11. Paint gas flare pipe and structural steel. Provide protective plywood sheeting to protect roof membrane from damage that may be caused by ladders, scaffolding, pedestrian traffic, etc. Refer to specifications for details.	CONT
12. After completion of sludge holding tank gas pipe works, test all pipe in accordance with Canadian Standards Association (CSA) standard CSA B149.6-11 “Code for digester gas and landfill gas installations”, Sections 11.5.	ST COW OP CONT
13. After completion of all concrete repair works to sludge holding tanks 5 and 7, the sludge holding tanks are to be pressure/vacuum tested in accordance with Canadian Standards Association (CSA) standard CSA B149.6-11 “Code for digester gas and landfill gas installations”, Sections 11.2, 11.3, and 11.4	ST COW OP CONT

**4.3 Shutdown – Digester 11 Siphon Lines / Drain Connection (Dwg 1-0101D-M0008-001 and Dwg 1-0101D-M0009-001)**

This shutdown sequence involves the following:

Action/Steps	Responsible Party
1. Confirm that Digester 11 has been completely drained and then temporarily remove the floor grating covering the siphon lines in the area of the work. The existing valves DV53A and B, DV57A, DV68A, and DV71 A, B, C, and D, all surrounding the proposed tie in location, would then be closed. A valve handle lockout should be installed on DV53A and B and DV68A to lock these valves in the closed position.	OP and CONT
2. Isolate the existing siphon piping below Digester Gallery 5 to allow installation of new Digester 11 drain piping connected to the rotary mixing system.	OP and CONT
3. Ensure all applicable pipe and valve material is ready for install inside	CONT

Action/Steps	Responsible Party
Gallery 5, coring a penetration through the concrete floor, and cutting the metal floor grating section covering the tie in location into two pieces, with the cut centered on the proposed 200ø pipe.	
4. The now isolated siphon piping between the two tees bracketing the proposed tie in location would be removed. A replacement pipe section including tee and new flange nuts and bolts would then be installed to take its place. The pipe length required to bring the piping above floor level would next be installed, allowing the floor grating sections to be put back in place.	CONT
5. The remainder of the proposed digester drain piping could then be installed, with the pipe penetrating through the previously cored hole in the concrete floor above and connecting to the mixing pump discharge header.	CONT
6. Once all connections are completed, a hydrostatic test can be conducted on the new mixing system and digester drain pipes. Any observed leaks in the newly installed pipes and valves would be corrected by the contractor, and leaks located on previously existing piping would be marked by the contractor for subsequent repair by plant operators. Once hydrostatic testing is successfully completed, the isolated siphon piping and pump headers could be drained by opening valve DV53A and allowing the liquid to drain by gravity into the downstream siphon pipe.	CONT COW OP
7. After the siphon line and connected drain line have been drained, existing valves DV53A and B, DV57A, DV68A, and DV71 A, B, C, and D would be returned to their normal operating position.	OP and CONT

**4.4 Shutdown – Rotary Mixing System Suction and Discharge Headers Flushing Water Connection (Dwg 1-0101D-M0009-001 and Dwg 1-0101D-A0082-001)**

This shutdown sequence involves the following:

Action/Steps	Responsible Party
1. Isolate the existing flushing water piping in Digester Gallery 5 to allow installation of new flushing water connections into the proposed suction and discharge headers of the proposed rotary mixing system. Preparations for this shutdown include ensuring all applicable pipes and valve material is ready for install inside Gallery 5 and installation of additional pipe supports that the existing flushing water line may require during implementation of the modifications depicted in the construction drawings.	OP and CONT
2. Close the existing Valve 1 with green tag on the 50ø flushing water line	OP and CONT

<b>Action/Steps</b>	<b>Responsible Party</b>
upstream of the proposed connections to the rotary mixing system. A valve handle lockout should be installed to lock this valve in the closed position.	
3. The isolated flushing water system would next be drained by opening the Valve 2 allowing the line to drain into the sample sink. Once drained, the section of copper pipe located where the proposed tee connections to the headers is, could be disassembled, allowing installation of the required tees. The SS flushing water lines and isolation valves connecting the existing flushing water system to the rotary mix pump headers would then be installed.	CONT
4. Once all connections are completed, a hydrostatic test can be conducted on the new flushing water pipes. Any observed leaks in the newly installed pipes and valves would be corrected by the contractor, and leaks located on previously existing piping would be marked by the contractor for subsequent repair by plant operators.	ST COW OP CONT
5. Once hydrostatic testing is successfully completed, the isolated flushing water piping and pump headers could be drained through the drains on the pump headers. After draining the lines, they should be flushed by opening the upstream Valve 1 with green tag on the flushing water system (after removing the valve lockout), while opening Valve 2 at the sample sink, Valve D392 HV1 at the suction header, Valve D388 HV1 at the discharge header, and Valve D387 HV1 at the discharge pressure transmitter one at a time and while keeping each of the other three valves closed.	ST COW OP CONT
6. Subsequent to flushing, the Contractor will close the Valve 2 at the sample sink and Valves D387 HV1, D388 HV1, and D392 HV1 at the pump headers. The Valve 1 with green tag upstream of the pump header flushing connection will be confirmed open and the existing flushing water system can be put back into service.	OP CONT





If this document is a hard copy it is uncontrolled and may not be the current version.  
 Check the Standard Operating Procedure located in the N:\Synergen Attachments\Wastewater\Facility Name Acronym\LOTO folder

### Lock-Out Tag-Out Procedure (LOTO)

Date:	Person Completing Form (print):	WO #			
Equipment Name:		Tag ID:			
Drawing / P&ID Number:		Synergen Asset ID:			
Equipment Location:					
Personnel to be informed?	Personnel required to turn off the equipment?	Is person required also to lock out equipment?			
<b>Use the following codes to identify the energy source:</b> FW - Flushing Water; PW – Potable Water; EL – Electrical; HW – Hot Water; PN – Pneumatic; HD – Hydraulic; HC – Hazardous Chemical; BH – Bio-Hazardous; NG – Natural Gas; BG – Bio-Gas					
<b>Use the following codes to identify the crew:</b> NEODA – Operations; NEMM – Maintenance; NEEI – Electrical Instrumentation;					
Energy Source	Electrical Hazard/Risk Category	Isolation Point (TAG), Location and Synergen Asset ID	Description of how to turn off equipment and remove residual energy	Crew	Initials
<b>Additional Comments:</b>					
<b>Describe test to confirm equipment will not start:</b>					
<b>Feedback Comments:</b>					
<b>Signature of Authorized Employee:</b> _____					