APPENDIX A

Unit Process Condition Assessment

Unit Process Condition Assessment

Unit Process or Facility	General Description	Reported Design Criteria or Capacity	Condition Assessment	General Comments	Structural Components	Mechanical Components	Electrical Components
	The information in this column is a general description of the facility or unit process.	The information in this column describes the design criteria and capacities as reported in design documents prepared by others.	This column provides a separate condition assessment numerical rating for structural, mechanical and electrical components, and an overall assessment rating. See footnote 1 at the bottom of the last page.	General Comments may address such topics as redundancy, bypass capabilities, specific items of deficiency that don't fall into other categories, comments received from District personnel, etc.	Evaluation of structural components may address such topics as overall physical condition of the structure and should provide a listing of known or observed problem areas. Our assessment should focus on the condition of concrete, steel, and other materials of construction, evaluation of coating systems and roofing systems, observations at pipe penetrations, pipe supports, seismic bracing, etc.	Evaluation of mechanical components should address the overall mechanical/operational condition of equipment. Obvious lack of compliance with NFPA 820 requirements, and other applicable Code requirements should be noted. Staff input of maintenance requirements is included, e.g. differences between similar pieces of equipment or physical constraints, such as lack of accessibility, may mean that maintenance tasks are not completed at the recommended frequency.	Evaluation of electrical components should include power distribution equipment as well as instrumentation and control systems. Obvious non-compliance with NEC requirements should be noted.
Raw Sewage Pump Station	Non-clog Centrifugal	Number: 2 Capacity, each, mgd: 8 Horsepower, each: 350 Number: 3 Capacity, each, mgd: 12.6 Horsepower, each: 400	Structural = 3 Mechanical = 3 E & IC =3	• Pumps have uneven run times due to capacity differences. • Isolation valves on pump suction piping are difficult to maintain. • Hydrogen Sulfide is created in the force main. Adding sodium nitrate at the pump station may minimize hydrogen sulfide. • The wet well is undersized to provide adequate time to respond to control system or pump problems. • The ARVs plug with grease. Filling the line with clean water, when the line is out of service a possible solution.	• Some cracks and calcification stains were observed in pump station floor and walls. City staff stated that the cracks appeared after initial construction and that leakage of water through the cracks occurred at that time. No leakage was	• Staff is not satisfied with the vertical shaft configuration and suspect that vibration has caused damage to the pumps. Vibration is usually worse at higher pumped flows. Large Pump-3 has been locked out of an rpm band to avoid vibration. Pump-5 discharge pier vibrates visibly. • Sump pumps are not submersible and would be disabled if pump station floods.	GE automatic switchgear only switches one way. The switchgear is configured so that it will function, but McMinnville Water and Light prefers that the other source be used as the primary source. • As currently configured, if a pump fails staff needs to drive over to manually restart the pump. Staff prefers the capability to restart the ASDs from the WRF control room. • The automatic transfer scheme does not function

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				• The pumps react to screen rake operation and cause a surge to the downstream processes.	observed indicating that the cracks have apparently healed over time. • Lateral pipe support for main header that spans above the stair has sheared off due to thrust created by unrestrained pipes. At a minimum, joints should be restrained and the base plate should be replaced, possibly requiring replacement of the entire brace. • Recommend further evaluation of the piping/pump system to determine ways that vibrations and deflections can be minimized. Options include adding additional supports/braces to header pipe and possibly other areas to add stiffness to		reliably. • The multifunction meters installed on each of the two incoming lines do not function at all. • The location where the switchgear is installed does not provide a good operating environment. The switchgear (and other electrical equipment in the room, for that matter) was covered with a layer of gritty, sandy dirt. • Possible that some of the issues related to the findings could be resolved by a thorough cleaning of the switchgear. Recommendation: • The plant should contract with a switchgear services company to evaluate the root cause(s) of the failures of the multifunction meters and the automatic transfer scheme and to recommend a course of repair.

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					the system or inserting flexible couplings in the pipe system to isolate the piping from the pumps.		
Grit Removal Grit Basin Grit Pump Grit Cyclone/Classifier	Vortex Chamber Recessed Impeller Centrifugal Conventional	Number: 1 Diameter, ft: 16 Capacity, each, mgd: Peak Hydraulic Capacity, mgd: 32.2 Number: 1 Capacity, each, gpm: 200 Horsepower, each: 5 Number: 1 Capacity, each, gpm: Underflow, each, gpm:	Structural = 2 / 4 (see comments) Mechanical = 3 E & IC =2 Structural = NA Mechanical = 4 E & IC =2 Structural = NA Mechanical = 4 E & IC =2	• The true water level is off by a foot when compared to the hydraulic profile. • The exit of the Pista is one foot higher than it is supposed to be. • Staff have installed pinch valves in the upstream channel to remove grit that settles upstream of the grit chamber. • Grit removal is not effective • Because the fine screens take out particles larger that 6 mm, the grit must be smaller than 6 mm. Grit builds up in the Orbals as well. • Grit removal seems to be related to velocity and channel depth at maximum even at low flow conditions. • An exit at the south end of the headworks building would be beneficial. • The copper air line is corroded. Some plumbing valves are corroded. The tie in for grating support I-beam is corroded. • High level in screen channel was shutting off the RSPS. Staff changed out floats and it seems to have corrected the problem. A bypass channel around fine screens would also alleviate this.	Ratings and comments: • 2 – General structure, some minor cracking observed in concrete walls. • 4 – Support beam connection under floor plates in grit basin is seriously corroded and needs to be replaced or repaired	• There is a leak in the air handling ductwork. • Headworks Building- HVAC the northeast corner of the upper level of the headworks building (Room 30208) is occupied by HVAC and mechanical equipment, most of which is associated with odor control systems. The discharge ductwork from the fans leaks into the room. The vapors are heavy with ammonia, which may have an effect on electrical equipment in the room. Ammonia will corrode copper. • Recommendation: The city should investigate the source of leaks in the ductwork and repair them. Additional fresh air should be delivered to the room to ensure that it provides a less unpleasant working environment.	
Orbal	BNR Oxidation Ditch	Number: 2		• Flow split was uneven but staff offset weir elevations in the tanks	• There is a crack with weeping in		Staff would like to add VFDs or soft starts and high

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Aeration Equipment	Surface Disk	Volume, each, mg: 3.1 Number: 8 Capacity lbs O_2/day: 16,500 Total Connected Horsepower: 200	Structural = 2 Mechanical = 4 E & IC = 3	and that seems to have evened the split. • Explore modifications to controlling the Orbals… DO control to adjust aerators in channels would be preferred. More control on level of treatment. • Staff added an aeration disk which has improved aeration. However, balancing N and P is a challenge. • Preferable to allow taking one ditch out of service. • Staff states that solids are not being not washed out now so peak flows are not that big of a problem. • Stress testing was discussed. Staff states that to do the testing should be done after other changes to the ditch have been completed because changes will affect capacity of the ditches. At some point tank volume will limit treatment capacity. Can calculate the limiting volume and then figure out what the aeration capacity needs to be to determine what size drives are needed. • Staff doesn't use variable water level. It was hard to manage. They tried to keep it at a higher level and bearings got submerged when surges came through. The bumps in flow moved to down stream processes (UV) and caused gates and valves to adjust constantly causing wear. • MLR pumps could be added – conceivably could pump over a wall. This may increase capacity provide DO and alkalinity recovery therefore increasing capacity. • Staff is adding alkalinity (NaOH)	the SE side of Ditch 1. • Several minor to moderate cracks observed in exterior face of oxidation ditch walls. One crack was actively leaking water and was observed to have significant algae/moss growth on the side of the wall.		efficiency motors for the drives. One high efficiency motor has been added. Staff has had good luck with Robicons, Satron and Alliance, although Alliance is hard to program.

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				at headworks. Currently alkalinity runs at about 60 mg/l.			
Filters Filters	Continuous Upflow Blowers Pumps	Number: 6 Surface Area, ea, sf: 200 Loading rate, ea, gpm/SF: 3.8 6.6 mgd, 6 filters operating Air requirements, scfm/filter module: 2.5 Min Backwash surface loading rate, gpm/SF: 50	Structural = 1 Mechanical = 4 E & IC = 2	• Filter performance is poor. Typically if there is 1.5 ppm TSS is into the filters then the effluent is 1 ppm TSS. Similarly, if influent is 8 ppm, then effluent is 5 ppm. Staff has tried polymer. It helped but caused blinding. Staff is putting turbidity meters on line so can better check performance. • Staff would like filters to act as back up if effluent solids or P are high. • Media is original. Staff thinks that the media design is for 10 micron particles but their particles are smaller. There is concern that finer media would cause plugging. • When new filter is put on line, solids are so high that effluent needs to be sent to the head of the plant for a day or so. • Automate filters to bring another filter on line automatically. They would like to be able to read headloss from the SCADA screen. • When the filters are off line in the winter, solids build up in the filter head box and it can't be drained. • Schedule 40 SST air lift pipes have excessive wear and staff has replaced them with PVC pipe. The new Parkson design is now plastic.	• Minor cracking of concrete walls was observed. Beams supporting checker plating appear to be holding up well and little to no corrosion was observed.		
ATAD	Tanks	Number of Tanks: 3 Diameter, ea, ft: 35 Depth, ea, ft: 13 Total Digestion Detention Time, days: 8 Design Temperature, °C: 60	Structural = 2 Mechanical = 4 E & IC = 2	• Staff purchased two variable speed Turberators for mixing and are happy with them. They are being used on Tank 1. Alternative orifices were not included are not currently available. They operate with wide open pipe size at 83%	• Some corrosion observed on roof, mostly originating from equipment bases and supports.		

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	Aerators Foam Cutters	Volatile Loading, LBPCF: 0.72 Minimum Volatile Solids, %: 54 Solids Reduction, %: 38		speed. • Winter VS are low so molasses is added. • Foam cutters and aerators require maintenance. • Tanks currently operate at 4% solids. Staff would like to try Turberators at 6% solids. • Foam detectors could be installed in tanks. Foam cutters would just come on when there is foam and would save energy. Now foam cutters operate constantly and alarm if foam cutters fail. • Batch filling Tank 1 may interrupt biological evolution that seems to occur. • Maintaining valves between tanks requires taking two tanks down. This is not a high priority item. • Storm containment is needed near ATADs. • There is a question as to the capacity of the ATAD system. Capacity is a function of volatility. • If aerators were changed out to mixers, level of mixer could be adjusted and solids accumulation could be reduced. • There was some corrosion in the tanks but the tanks were coated and except for minor corrosion around the hatches, the tanks seem to be in good condition. Tank 1 was coated three years ago and should be checked. • Speed of the Turberator should be tied to temperature and time. Staff have been operating Tank 1 at 40C. Staff prefers not to use ORP			

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				control. WYA to check on temperature recommendation.			
Biosolids Storage	Covered Digested Biosolid Storage	Number: 1 Size, diameter x height, ft: 160 x 20 Volume, cf: 380,000 Design solids conc, %: 6 Detention time, days: 210 Air mix, no diffusers: 40 Odor scrubber system: 1	Structural = 1 Mechanical = 3 E & IC = 1	• Decanting is done with a telescoping valve. Quantity of decant is significant. 3 MG was decanted last year. Staff would like to meter it and would like to be able to control it and only decant what is needed. Staff wants to decant above a certain level – 10 FT or so. Decant contains alkalinity but also adds more ammonia to treat. • Consistent flow to plant is important for plant performance. SBR decant floats with process then draws the top off. • Staff has been siphoning and pumping decant. Pumping worked well but if pumped too much at night, pump burnt out. • Solids build up to about a foot in the bottom of the tank then sloughs to the bottom draw. • Mixing could be added for a more homogenous product. Some thought has been given to adding a Turberator without air as an experiment. • Farmers seem to like the thicker fall product, but also prefer a more homogeneous product. • It is not possible to do recuperative thickening due to short circuiting in the tank.	• Very minor cracking observed in exterior shotcrete.		

1) Overall Rating System
1 Lowest priority for replacement – New or like new condition; will satisfy the intended function.
2 Low priority for replacement – Signs of moderate wear; will provide service life with preventative maintenance.
3 Medium priority for replacement – Serviceable but worn; should provide additional service life with maintenance, repair, or replacement of components.
4 High priority for replacement – Serviceable but heavily worn; requires extensive rebuild, upgrade, or replacement for extended service life.

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5 Highest priority for replacement – Unit includes heavily worn or outdated equipment; service life is limited without replacement.							