APPENDIX A

I&C Risk Assessment Information Provided by BES

The following work-in-progress information was received from BES on 5/4/2012

INSTRUMENTATION /AST CONDITION ASSESSMENT

VERY GOOD = no corrective maintenance needed
GOOD = few minor deficiencies
MODERATE = several minor deficiencies
POOR = major deficiencies, requires significant repairs
VERY POOR = rehabilitation or replacement necessary

PROCESS AREA & MAJOR COMPONENTS CONDITION ASSESSMENT SUMMARY		CRITICALITY	VERY GOOD	GOOD	MODERATE	POOR	VERY POOR
ADMINISTRATION							
1527	TOTAL INFLUENT FLOW	**7**			**X**		
1533	PLC, SQD, ADMINISTRATION	**9**					**X**
17171	IFIX SCADA MODE	**7**					
AERATION							
1632	PLC MOMENTUM, BLOWER #3	**5**		**X**			
17166	PLC MOMENTUM, BLOWER #2	**5**		**X**			
17477	PRIMARY EFFLUENT BYPASS GATE CONTROL	**9**		**X**			
AERATION BASINS							
17477	PRIMARY EFFLUENT BYPASS GATE CONTROL	**9**		**X**			
AERATION BLOWER BLDG							
17377	BLOWER HEADER PRESSURE	**7**		**X**			
17492	BLOWER CONTROL	**7**		**X**			
CONTACT BASIN							
4014	PLANT FINAL EFFLUENT CHLORINE RESIDUAL ANALYZER TC, CONTACT BASIN #3	**9**		**X**			
4054	SAMPLER, FINAL CHLORINATED EFFLUENT	**9**			**X**		
DIGESTER PUMP HOUSE							
18782	PLC SQD	**9**					**X**
2705	COMPRESSOR ROOM GAS DETECTOR	**7**			**X**		
2706	BOILER ROOM GAS DETECTOR	**7**			**X**		
20382	BOILER PRESSURE	**7**			**?**		
20636	BOILER SEWER GAS #1 BLOCK VALVE	**7**			**?**		
20637	BOILER NATURAL GAS #1 BLOCK VALVE	**7**			**?**		
20638	BOILER SEWER/NATURAL GAS #2 BLOCK VALVE	**7**			**?**		
EFFLUENT PUMP HOUSE							
3053	PLCA SQD	**9**					**X**

PROCESS AREA & MAJOR COMPONENTS CONDITION ASSESSMENT SUMMARY		CRITICALITY	VERY GOOD	GOOD	MODERATE	POOR	VERY POOR
19705	PLCB SQD						X
3058	PRIMARY EFFLUENT PIT LEVEL B	7				x	
3059	PRIMARY EFFLUENT PIT LEVEL A	7				X	
3083	SAMPLER, TC	7				X	
FINAL CLARIFIERS							
18835	SECONDARY EFFLUENT CHANNEL TEMPERATURE	7	x				
GROUNDS							
19607	TRUCK LOADING STATION BAY #3 DRAIN VALVE	7				X	
HEADWORKS							
3856	PORTLAND INFLUENT FLOW METER	9	X				
3859	LAKE OSWEGO INFLUENT FLOW METER	9	X				
3868	SAMPLER #1 NORTH CHANNEL PORTLAND FLOW	9			X		
18856	SAMPLER #2 SOUTH CHANNEL LAKE OSWEGO INFLUENT FLOW METER	9			X		
18803	LAKE OSWEGO INFLUENT CHANNEL #1 PH METER	7		X			
18804	PORTLAND INFLUENT CHANNEL #2 PH METER	7		X			
HYPOCHLORITE BUILDING							
4097	HYPOCHLORITE FEED PUMP #1	9		X			
4100	HYPOCHLORITE FEED PUMP #2	9		X			
4101	HYPOCHLORITE FEED PUMP #3	9		X			
HYPOCHLORITE CONTACT BUILDING							
4017	CHLORINE RESIDUAL ANALYZER #1	7			X		
4018	CHLORINE RESIDUAL ANALYZER #2	7			X		
4021	CHLORINE RESIDUAL ANALYZER #3	7			X		
17447	CHLORINE ANALYZER SAMPLER FLOW	7			X		
METERING VAULT							
4405	TURBIDITY METER	7			X		
18829	SECONDARY EFFLUENT FLOW METER	7				X	
19013	SECONDARY EFFLUENT TURBIDITY PUMP #1	7				?	
19014	SECONDARY EFFLUENT TURBIDITY PUMP #2	7				?	
PRIMARY SLUDGE BUILDING							
4830	PLC SQD	9					X
4872	DIGESTER THICKENED PRIMARY SLUDGE FLOW	7			X		
4878	THICKENED PRI SLUDGE PUMP DISCHARGE PSI				X		
RETURN SLUDGE BUILDING							
4961	RETURN SLUDGE PUMP #1 CHLORINATION VALVE	7			?		
SLUDGE PROCESSING BUILDING							
5587	PLC SQD	7					X
5610	POLYMER TANK LEVEL	7			X		
5612	THICKENED WASTE ACTIVATED SLUDGE FLOW	7			X		
TRUCK LOADING							

PROCESS AREA & MAJOR COMPONENTS CONDITION ASSESSMENT SUMMARY		CRITICALITY	VERY GOOD	GOOD	MODERATE	POOR	VERY POOR
18783	PLC, SQD	**9**				**X**	
5384	TRUCK LOADING STATION MAIN FLUSHING VALVE						**X**
TRYON CREEK PUMP STATION							
5793	PLC, MOMENTUM	**9**					
5787	HYDRA	**9**					**?**
19966	SMALL STATION PUMP CONTROLLER	**7**		**X**			

INSTRUMENTATION/AST CONDITION ASSESSMENT NARRATIVE

Project Work Automation Support Team concerns:

Project Work is improperly Checked Out and Problems Resolved:
Projects have been put in at such a rapid rate they have not been properly checked out and issues resolved. Which results in longer troubleshooting time to resolve issues and maintenance is absorbing cost of completing projects?

Project Work Narratives are not being provided:
Complete narratives are not being provided to AST. The result of this is additional time is needed for AST to rework the programs. They are never done correctly the first time and are continuously modified prior, during, and after start-up. Without the narratives the programs are never very well documented on how they are suppose to operate and troubleshooting time is extended.

Aeration PLC Program:
Program was not written to our standards and is very time consuming and difficult to troubleshoot. This program needs to be rewritten to our standards to help expedite troubleshooting.

Facility PLCs:
Square D PLC are used there and Square D PLCs are obsolete, not very well supported and our current laptops have trouble communicating with them. These PLCs are past their life span and it is time to upgrade.

Facility PLC Power:
PLC often fail due to poor power conditions. Undisrupted Power Supplies (UPS) need to be installed to resolve these issues and reduce any possible permit violations.

CONDITION ASSESSMENT "condition scale 1 – 9"
1 = very good, no corrective maintenance needed
3 = good, few minor deficiencies
5 = moderate, several minor deficiencies
7 = poor, major deficiencies, requires significant repairs
9 = very poor, rehabilitation or replacement necessary

RISK ASSESSMENT RATING (LoF/CoF)
Scale: High; medium or low

Aeration Tanks (4) Air Flow Control Valves #1:

- Original installation: 2002
- Major upgrades/modifications: none
- Life expectancy: 25 years
- Remaining useful life: 0 years
- Condition rating: 9
- Likelihood of failure rating: low
- Consequence of failure rating: medium

Aeration Tanks (4) Air Flow Control Valves #2:

- Original installation: 2002
- Major upgrades/modifications: none
- Life expectancy: 25 years
- Remaining useful life: 15years
- Condition rating: 9
- Likelihood of failure rating: low
- Consequence of failure rating: medium

Aeration Tanks (4) Air Flow Control Valves #3:

- Original installation: 2002
- Major upgrades/modifications: 2008
- Life expectancy: 25 years
- Remaining useful life: 21 years
- Condition rating: 1
- Likelihood of failure rating: low
- Consequence of failure rating: medium

Aeration Tanks (4) Air Flow Control Valves #4:

- Original installation: 2002
- Major upgrades/modifications: none
- Life expectancy: 25 years
- Remaining useful life: 15 years
- Condition rating: 9
- Likelihood of failure rating: low
- Consequence of failure rating: medium

Blower bldg, PLC Quantum, Blower Master Controller: NEED AN SOP TO PM MCC PANELS
John narrative or Rick Komaus

- Original installation:
- Major upgrades/modifications: none
- Life expectancy:
- Remaining useful life:

- Condition rating:
- Likelihood of failure rating:
- Consequence of failure rating:

Chlorine Residual Analyzers (3) Hypochlorite Contact Building:
This analyzer is serviced twice a week with annual preventative maintenance. Our permit requires this piece of equipment. The three units are rotated out frequently because of the high failure rate.

- Original installation: 1998
- Major upgrades/modifications: 2008
- Life expectancy: 20 years
- Remaining useful life: 16 years
- Condition rating: 5
- Likelihood of failure rating: high
- Consequence of failure rating: medium

Digester Thickened Primary Sludge Flow:
Unit is obsolete and parts availability is in question. It is very difficult to actually determine the internal condition of the coils. Our permit requires this piece of equipment.

- Original installation: 1976
- Major upgrades/modifications: none
- Life expectancy: 20 years
- Remaining useful life: zero
- Condition rating: 5
- Likelihood of failure rating: medium
- Consequence of failure rating: high

Digester Thickened Primary Sludge Pump Pressure:
Requires frequent checks, with today's technology the results desired from this unit could be done in a much simpler approach and much more reliable. Our permit requires this piece of equipment.

- Original installation: 1976
- Major upgrades/modifications: none
- Life expectancy: 20 years
- Remaining useful life: zero
- Condition rating: 5
- Likelihood of failure rating: high
- Consequence of failure rating: high

Hypochlorite Feed Pump1, 2&3:
Routine pm schedule for all three pumps, they all seem to be functioning well at this time. Our permit requires this piece of equipment.

- Original installation: 2007
- Major upgrades/modifications: none
- Life expectancy 15 years
- Remaining useful life: zero
- Condition rating: 1
- Likelihood of failure rating: high

- Consequence of failure rating: high

Lake Oswego Influent Flow Meter:
It is very difficult to actually determine the internal condition of the coils. Our permit requires this piece of equipment.

- Original installation: 1976
- Major upgrades/modifications: 2006
- Life expectancy: 20 years
- Remaining useful life: 14 years
- Condition rating: 3
- Likelihood of failure rating: low
- Consequence of failure rating: high

Metering Vault Turbidity Meter:
This analyzer is serviced monthly, but occasionally requires additional cleaning.

- Original installation: 1998
- Major upgrades/modifications: 2008
- Life expectancy: 15 years
- Remaining useful life: 11 years
- Condition rating: 5
- Likelihood of failure rating: medium
- Consequence of failure rating: medium

Plant Final Effluent Chlorine Residual Analyzer TC Contact Basin #3:
Our permit requires this piece of equipment. This analyzer is serviced twice a week and also goes through a major annual service.

- Original installation: 1964
- Major upgrades/modifications: 2007
- Life expectancy: 20 years
- Remaining useful life: 15 yeas
- Condition rating: 3
- Likelihood of failure rating: medium
- Consequence of failure rating: high

Primary Effluent Bypass Gate “actuator” Controllers:
The gates are original with no records of upgrades or modification.

- Original installation: no record
- Major upgrades/modifications: 2008
- Life expectancy: 10 years
- Remaining useful life: 6 years
- Condition rating: 1
- Likelihood of failure rating: medium
- Consequence of failure rating: high

Primary Effluent Pit Level A & B:
Transmitters are obsolete and nearing their life cycle. Transmitters have needed calibration due to drifting issues the last few years. If these transmitters fail it would require constant observation. It is time to upgrade to a more robust installation.

- Original installation: 1996
- Major upgrades/modifications: none
- Life expectancy: years: 5 years
- Remaining useful life:
- Condition rating: 7
- Likelihood of failure rating: high
- Consequence of failure rating: high

Primary Sludge Bldg PLC, SQD
Jay or Rick we need a narrative

- Original installation:
- Major upgrades/modifications: none
- Life expectancy: years: years
- Remaining useful life:
- Condition rating:
- Likelihood of failure rating: high
- Consequence of failure rating: high

Portland Influent Flow Meter:
It is very difficult to actually determine the internal condition of the coils. Our permit requires this piece of equipment.

- Original installation: 1976
- Major upgrades/modifications: 2006
- Life expectancy: 20 years
- Remaining useful life: 14 years
- Condition rating: 3
- Likelihood of failure rating: low
- Consequence of failure rating: high

PLCA, SQD, Primary Effluent Pumping Effluent Pumphouse:
Control Panel is old and barely functional. PLC should be replaced (square D PLC) early 90s and they are fragile. The cables between the PLC and base lose connection if bumped, tripping PLC off line.

- Original installation: no record
- Major upgrades/modifications: none
- Life expectancy: 20 years
- Remaining useful life: zero
- Condition rating: 6
- Likelihood of failure rating: high
- Consequence of failure rating: high

Sampler, Final Chlorinated Effluent:
This unit has reached its life expectancy and is due for replacement. Equipment is obsolete, the performance is good, and we have had some moisture problems. There is preventative maintenance performed on a weekly basis. Our permit requires this piece of unit.

- Original installation: 2002
- Major upgrades/modifications: none
- Life expectancy: 15 years
- Remaining useful life: 5 years
- Condition rating: 7
- Likelihood of failure rating: medium
- Consequence of failure rating: medium

Sampler #1 North Channel, Portland Flow:
Equipment is obsolete, with moisture problems. There is preventative maintenance performed on a weekly basis. Our permit requires this piece of equipment. Our permit requires this piece of equipment.

- Original installation: 2002
- Major upgrades/modifications: none
- Life expectancy: 7 years
- Remaining useful life: zero
- Condition rating: 7
- Likelihood of failure rating: medium
- Consequence of failure rating: medium

Sampler, Primary Effluent Pump House:
Equipment is obsolete, with numerous plugging problems. There have been thoughts to install a larger stilling well to help cure the plugging problem; larger piping would also need to be installed. There is preventative maintenance performed on a weekly basis.

- Original installation: 2001
- Major upgrades/modifications: none
- Life expectancy: 15 years
- Remaining useful life: 4 years
- Condition rating: 7
- Likelihood of failure rating: high
- Consequence of failure rating: low

Sampler #2 South Channel, Lake Oswego Flow:
Equipment is obsolete, with moisture problems. There is preventative maintenance performed on a weekly basis. Our permit requires this piece of equipment. Our permit requires this piece of equipment.

- Original installation: 2002
- Major upgrades/modifications: none
- Life expectancy: 7 years
- Remaining useful life: zero
- Condition rating: 5
- Likelihood of failure rating: medium
- Consequence of failure rating: medium

Secondary Effluent Turbidity Pumps: INSTRUMENTATION how many pumps and which pump are we describing below? I added two more assessments

Installed in 1997, replaced 2 pumps in 2009, 3 years of expected life, 1 year of remaining useful life, condition rating of 6, with a low risk assessment for (LoF) and medium for (CoF). Run to fail component and requires a call out if they should fail.

- Original installation: 1997
- Major upgrades/modifications: 2009
- Life expectancy: 20 years
- Remaining useful life: zero
- Condition rating: 7
- Likelihood of failure rating: high
- Consequence of failure rating: high

Secondary Effluent Turbidity Pumps #2

- Original installation: 1997
- Major upgrades/modifications: 2009
- Life expectancy: 20 years
- Remaining useful life: zero
- Condition rating: 7
- Likelihood of failure rating: high
- Consequence of failure rating: high

Secondary Effluent Turbidity Pump #3

- Original installation: 1997
- Major upgrades/modifications: 2009
- Life expectancy: 20 years
- Remaining useful life: zero
- Condition rating: 7
- Likelihood of failure rating: high
- Consequence of failure rating: high

Sludge Heat Exchanger Temperature Cool Side:
Rated Risk: Likely hood of failure low/ Consequence of failure medium
Rated Condition: Good
Concern of: Inst

There was a repair made 10 years ago and installation has been very reliable every since.

- Original installation: no record
- Major upgrades/modifications: 2002
- Life expectancy: 20 years
- Remaining useful life: 10
- Condition rating: 3
- Likelihood of failure rating: low
- Consequence of failure rating: high

Total Influent Flow Meter:

This unit is calibration every two years, with the upgrades in electronics to what and when (Portland/Lake Oswego meters) it has been obsolete for several years and is going to fail at some point. The Hypo upgrade project that is

currently happening is planning on eliminating this unit and running both flow signals into the PLC. Our permit requires this unit...

- Original installation: 1976
- Major upgrades/modifications: none
- Life expectancy: 20 years
- Remaining useful life: zero
- Condition rating: 9
- Likelihood of failure rating: high
- Consequence of failure rating: high

Truck Loading Station Pit Flushing Valve:
Annual inspections of proximity switches are required with some trouble calls in between. Equipment is installed in a wet and corrosive atmosphere which is also a confined space. System needs to be redesigned and have valves brought out of the confined space. This would result in a more robust installation which would also be safer to service.

- Original installation: 2002
- Major upgrades/modifications: none
- Life expectancy 2 years
- Remaining useful life: zero
- Condition rating: 9
- Likelihood of failure rating: high
- Consequence of failure rating: high

Tryon Creek Gas Detectors:
Gas detectors are not up to our current standards and are nearing there life cycle. Detectors are serviced once a month and upgrading would make service less labor intensive and we would also be able to standardize on parts. These are a very integral part of our safety program. The units are not available for Columbia operators during the off shifts via I-fix

- Original installation: no record
- Major upgrades/modifications: none
- Life expectancy: 15 years
- Remaining useful life:
- Condition rating: 5
- Likelihood of failure rating: low
- Consequence of failure rating: high

Turblex Blowers:
Current performance is good. Blowers do not have a sufficient turn down so during low flow conditions there is wasting of both energy and air.

- Original installation: 2002
- Major upgrades/modifications: none
- Life expectancy: ___ years
- Remaining useful life: ___
- Condition rating: ___
- Likelihood of failure rating: medium
- Consequence of failure rating: high

Weather Station:
Weather station currently displays wind direction, speed, and indoor temperature. Outdoor temperature does not function and is needed for operations report.

- Original installation:
- Major upgrades/modifications:
- Life expectancy:
- Remaining useful life:
- Condition rating:
- Likelihood of failure rating: medium
- Consequence of failure rating: high

INSTRUMENTATION / AST RISK ASSESSMENT

RISK ASSESSMENT
LoF: weigh score
Physical condition: 20%
Performance: 50%
Repair history: 30%
CoF: weigh score
Permit compliance 25%
Impact on process 15%
Financial impact 15%
Health & safety 35%
Community & public image 10%

Scale: LoF – 1.00 = Excellent; 9.00 = virtually unserviceable
CoF – 1.00 = No impact 9.00 = Catastrophic
Total risk LoF x CoF = 1.00 – 81.00

Aeration Tank #1 Flow Control Valve Positioner (13.65)

- Likelihood of Failure (3,64)
  Physical Condition (1.59) good, few minor deficiencies some corrective maintenance needs, minor defects only
  Performance (1.60) barely meets current expectations room for performance improvement.
  Repair History (0.45) Repair history suggests occasional minor problems

- Consequence of Failure (3.75)
  Permit compliance (1.13) meeting permit each week but no impact on monthly standard
  Impact on process (0.75) cannot be down more than a week
  Financial impact (0.53) does not exceed O&M line item (< $ 5000)
  Health & Safety (0.75) minor injury with no lost time; no public health effects
  Community & Public image (0.60) small number of complaints, no damage to public or private property, adverse media coverage

Chlorine Residual Analyzer #2 TC Hypo Contact bldg (20.79)

- Likelihood of Failure (3.30)
  Physical Condition (1.59) good, few minor deficiencies some corrective maintenance needs, minor defects only

Performance (0.96) meets current performance expectations
Repair History (0.75) Repair history indicates frequent minor problems

- Consequence of Failure (6.30)
  Permit compliance (1.58) Violated monthly standard
  Impact on process (0.75) cannot be down more than a week
  Financial impact (1.23) catastrophic-budget overages for WG
  Health & Safety (1.75) Major injury with lost time; localized public health issues
  Community & Public image (1.00) many complaints, minor damage to public or private property, adverse media coverage

Chlorine Residual Analyzer #3 TC Hypo Contact bldg (

- Likelihood of Failure
  Physical Condition
  Performance
  Repair History

- Consequence of Failure
  Permit compliance
  Impact on process
  Financial impact
  Health & Safety
  Community & Public image

Chlorine Residual Analyzer #4 TC Hypo Contact bldg

- Likelihood of Failure
  Physical Condition
  Performance
  Repair History

- Consequence of Failure
  Permit compliance
  Impact on process
  Financial impact
  Health & Safety
  Community & Public image

Compressor Room Gas Detector TC Digester Pumphouse (18.60)

- Likelihood of Failure (3.00)
  Physical Condition (1.59) Good, few minor deficiencies, some corrective maintenance needed. Minor defects only
  Performance (0.96) meets current performance expectations
  Repair History (0.45) Repair history suggests occasional minor problems

- Consequence of Failure (6.20)
  Permit compliance (0.23) Permit conditions met
  Impact on process (1.05) cannot be down more than a day
  Financial impact (0.88) Catastrophic-budget overages for WW programs
  Health & Safety (2.25) Loss of life, wide spread public health issues
  Community & Public image (1.80) National media coverage, major damage to public or private property. Legal action impending

Digester Thickened Primary Sludge Flow, TC Primary Sludge bldg (11.28)

- Likelihood of Failure (4.70)
  Physical Condition (2.65) fair, several minor deficiencies require significant repair or rehabilitation. Moderate deterioration
  Performance (1.60) barely meets current expectations room for performance improvement
  Repair History (0.45) Repair history suggests occasional minor problems

- Consequence of Failure (2.40)
  Permit compliance (0.23) Permit conditions met
  Impact on process (0.45) can be down more than a month
  Financial impact (0.88) catastrophic-budget overages for WW programs
  Health & Safety (0.25) no injuries or adverse health effects
  Community & Public image (0.60) small number of complaints, no damage to public or private property, adverse media coverage

Lake Oswego influent flow meter (6.08)

- Likelihood of Failure (2.70)
  Physical Condition (1.59) Good, few minor deficiencies, some corrective maintenance needed. Minor defects only
  Performance (0.96 meets current performance expectations
  Repair History (0.15) Repair history does not suggest problems

- Consequence of Failure (2.25)
  Permit compliance (0.23) Permit conditions met
  Impact on process (1.05) cannot be down more than a day
  Financial impact (0.53) Does not exceed O&M line item (<$5000)
  Health & Safety (0.25) No injuries or adverse health effects
  Community & Public image (0.20) No complaints, no media coverage, no damage to public or private property

PLCA, SQD, Primary Effluent Pumping Effluent Pumphouse (9.216)

- Likelihood of Failure (2.60)
  Physical Condition (0.53) Very good, no corrective maintenance needed. New or excellent condition
  Performance (1.60) Barely meets current expectations, room for performance improvement
  Repair History (0.75) Repair history suggests occasional minor problems

- Consequence of Failure (3.20)
  Permit compliance (1.13) Meeting permit each week but no impact on monthly standard
  Impact on process (0.75) Major equipment involved. Inability to meet process needs.
  Financial impact (0.88) Catastrophic-budget overages for WG
  Health & Safety (0.25) No injuries or adverse health effects
  Community & Public image (0.20) No complaints, no media coverage, no damage to public or private property.

Plant Final Effluent Chlorine Residual Analyzers TC Contact Basin #3 (18.30)

- Likelihood of Failure (3.00)
  Physical Condition (1.59) Good, few minor deficiencies, some corrective maintenance needed. Minor defects only
  Performance (0.96) meets current performance expectations
  Repair History (0.45) Repair history suggests occasional minor problems

- Consequence of Failure (6.10)
  Permit compliance (1.58) Violated monthly standard
  Impact on process (1.05) cannot be down more than a day
  Financial impact (1.23) Catastrophic-budget overages for WG
  Health & Safety (1.25) Minor injury with lost time; no public health effects
  Community & Public image (1.00) many complaints, minor damage to public or private property. Adverse media coverage

Portland influent flow meter (6.075)

- Likelihood of Failure (2.70)
  Physical Condition (1.59) Good, few minor deficiencies, some corrective maintenance needed. Minor defects only
  Performance (0.96) meets current performance expectations
  Repair History (0.15) Repair history does not suggest problems

- Consequence of Failure (2.25)
  Permit compliance (0.23) Permit conditions met
  Impact on process (1.05) cannot be down more than a day
  Financial impact (0.53) Does not exceed O&M line item (<$5000)
  Health & Safety (0.25) No injuries or adverse health effects
  Community & Public image (0.20) No complaints, no media coverage, no damage to public or private property

Primary Bldg PLC, SQD "42 items rely on power" (21.15)

- Likelihood of Failure (7.42)
  Physical Condition (4.77) Very Poor, rehabilitation or replacement necessary, virtually unserviceable
  Performance (1.60) Barely meets current expectations, room for performance improvement
  Repair History (1.05) Repair history suggest occasional minor problems

- Consequence of Failure (2.85)
  Permit Compliance (1.13) Meeting permit each week but no impact on monthly standard
  Impact on Process (0.75) cannot be down more than a week
  Financial Impact (0.53) Does not exceed O&M line item (<$ 5000)
  Health & Safety (0.25) No injuries or adverse health effects
  Impact to Public (0.20) No complaints, no media coverage, and no damage to public or private property

Primary Effluent Pit Level B (21.51)

- Likelihood of Failure (6.06)
  Physical Condition (3.71) Poor, major deficiencies, requires significant repair or rehabilitation. Significant deterioration
  Performance (1.60) barely meets current expectations, room for performance improvement.
  Repair History (0.75) Repair history indicates frequent minor problems

- Consequence of Failure (3.55)
  Permit compliance (0.68) Exceeds permit on an individual day but no impact on monthly standard
  Impact on process (1.05) cannot be down more than a day
  Financial impact (0.88) Catastrophic-budget overages for WW programs
  Health & Safety (0.75) Minor injury with no lost time; no public health effects
  Community & Public image (0.20) No complaints, no media coverage, no damage to public or private property

Sampler #1 North Channel Portland flow (10.40)

- Likelihood of Failure (3.30)
  Physical Condition (1.59) Good, few minor deficiencies, some corrective maintenance needed. Minor defects only
  Performance (0.96) meets current performance expectations
  Repair History (0.75) Repair history indicates frequent minor problems

- Consequence of Failure (3.15)
  Permit compliance (1.13) Meeting permit each week but no impact on monthly standard
  Impact on process (1.05) cannot be down more than a day
  Financial impact (0.53) Does not exceed O&M line item (<$5000)
  Health & Safety (0.25) No injuries or adverse health effects
  Community & Public image (0.20) No complaints, no media coverage, no damage to public or private property

Sampler Final Chlorinated Effluent (9.45)

- Likelihood of Failure (3.00)
  Physical Condition (1.59) Good, few minor deficiencies, some corrective maintenance needed. Minor defects only
  Performance (0.96) meets current performance expectations
  Repair History (0.45) Repair history suggests occasional minor problems

- Consequence of Failure (3.15**)**
  Permit compliance (1.13) Meeting permit each week but no impact on monthly standard
  Impact on process (1.05) cannot be down more than a day
  Financial impact (0.53) Does not exceed O&M line item < $5000
  Health & Safety (0.25) No injuries or adverse health effects
  Community & Public image (0.20) No complaints, no media coverage, no damage to public or private property

Sampler, TC Primary Effluent Pumphouse (16.00)

- Likelihood of Failure (5.00)
  Physical Condition (2.65) fair, several minor deficiencies require significant repair or rehabilitation. Moderate deterioration
  Performance (1.60) barely meets current expectations room for performance improvement
  Repair History (0.75) Repair history indicates frequent minor problems

- Consequence of Failure (3.20)
  Permit compliance (1.13) meeting permit each week but no impact on monthly standard
  Impact on process (0.75) cannot be down more than a week
  Financial impact (0.88) catastrophic-budget overages for WW programs
  Health & Safety (0.25) no injuries or adverse health effects
  Community & Public image (0.20) no complaints, no media coverage, no damage to public or private property

Thickened Primary Sludge Pump Discharge PSI (9.464)

- Likelihood of Failure (3.64)
  Physical Condition (1.59) good, few minor deficiencies some corrective maintenance needs, minor defects only
  Performance (1.60) barely meets current expectations room for performance improvement.

Repair History (0.45) Repair history suggests occasional minor problems

- Consequence of Failure (2.60)
  Permit compliance (0.23) permit condition met
  Impact on process (1.05) cannot be down more than a day
  Financial impact (0.88) catastrophic-budget overages for WW programs
  Health & Safety (0.25) no injuries or adverse health effects
  Community & Public image (0.20) no complaints, no media coverage, no damage to public or private property

Total Influent Flow "TC Admin bldg" (21.14)

- Likelihood of Failure (5.42**)**
  Physical Condition (3.71) Poor, major deficiencies, requires significant repair or rehabilitation. Significant deterioration
  Performance (0.96) meets current performance expectations
  Repair History (0.75) Repair history indicates frequent minor problems

- Consequence of Failure (3.90)
  Permit compliance (1.13) Meeting permit each week but no impact on monthly standard
  Impact on process (1.05) cannot be down more than a day
  Financial impact (0.88) Catastrophic-budget overages for WW programs
  Health & Safety (0.25) No injuries or adverse health effects
  Community & Public image (0.60) Small number of complaints, no damage to public or private property, adverse media coverage

Truck Loading Station Pit Flushing Valve (26.95)

- Likelihood of Failure (7.00)
  Physical Condition (3.71) poor, major deficiencies requires significant repair or rehabilitation, significant deterioration
  Performance (2.24) does not meet current performance expectations
  Repair History (1.05) repair history suggests occasional major problems

- Consequence of Failure (3.85)
  Permit compliance (0.23) permit conditions met
  Impact on process (0.75) cannot be down more than a week
  Financial impact (0.53) Does not exceed O&M line item < $5000
  Health & Safety (1.75) major injury with lost time; localized public health issues
  Community & Public image (0.60) Small number of complaints, no damage to public or private property, adverse media coverage

TCWTP PLC (30.65)

- Likelihood of Failure (7.76)
  Physical Condition (4.77) Very poor, rehabilitation or replacement necessary, may be unserviceable, virtually unserviceable
  Performance (2.24) does not meet current performance expectations
  Repair History (0.75) Repair history indicates frequent minor problems.

- Consequence of Failure (3.95)
  Permit compliance (1.13) Meeting permit each week but no impact on monthly standard
  Impact on process (0.75) Major equipment involved, inability to meet process needs
  Financial impact (1.23) Catastrophic-budget overages for WG

Health & Safety (0.25) No injuries or adverse health effects
Community & Public image (0.60) Small number of complaints, no damage to public or private property, adverse media coverage

TCWTP PLC (UPS) uninterrupted power system (19.08)

- Likelihood of Failure (6.36)
  Physical condition (3.71) Poor, major deficiencies, requires significant repair or rehabilitation significant deterioration
  Performance (1.60) barely meets current expectations. Room for performance improvement
  Repair History (1.05) repair history suggests occasional major problems

- Consequence of Failure (3.00)
  Permit Compliance (0.68) Exceeds permit on an individual day but no impact on monthly standard
  Impact on Process (0.45) multiple equipment available can still meet all process demands
  Financial Impact (0.53) does not exceed O&M line item (< $5000)
  Health & Safety (0.75) Minor injury with no lost time; no public healthy effects
  Impact to Public (0.60) Small number of complaints, no damage to public or private property, adverse media coverage

TCWTP PLC "Aeration" – (21.00)

- Likelihood of Failure (7.00)
  Physical condition (3.71) Poor, major deficiencies, requires significant repair or rehabilitation significant deterioration
  Performance (2.24) does not meet current performance expectations
  Repair History (1.05) repair history suggests occasional major problems

- Consequence of Failure (3.00)
  Permit Compliance (0.68) Exceeds permit on an individual day but no impact on monthly standard
  Impact on Process (0.45) multiple equipment available can still meet all process demands
  Financial Impact (0.53) does not exceed O&M line item (< $5000)
  Health & Safety (0.75) Minor injury with no lost time; no public healthy effects
  Impact to Public (0.60) Small number of complaints, no damage to public or private property, adverse media coverage

Weather Station, TC Admin bldg (28.35)

- Likelihood of Failure (9.00)
  Physical Condition (4.77) very poor, rehabilitation or replacement necessary, may be unserviceable virtually unserviceable.
  Performance (2.88) inefficient performance; bottleneck; obsolete
  Repair History (1.35) repair history indicates frequent major problems

- Consequence of Failure (3.15)
  Permit compliance (1.13) meeting permit each week but no impact on monthly standard
  Impact on process (0.15) can be out of service for several months
  Financial impact (0.53) does not exceed O&M line item (< $ 5000)
  Health & Safety (0.75) minor injury with no lost time; no public health effects
  Community & Public image (0.60) small number of complaints, no damage to public or private property, adverse media coverage