ENGINEERING DEPARTMENT

INFORMATION TO PROPOSERS
for

(C3) RFP No. E17-102
Inspection Services for Cathodic Protection Systems at Public Works Utilities

ISSUED BY:

City and Borough of Juneau
ENGINEERING DEPARTMENT
155 South Seward Street
Juneau, Alaska 99801

Date Issued: September 1, 2016

The following information is posted online. Please refer to the CBJ Engineering Contracts Division webpage at: http://www.juneau.org/engineering_ftp/contracts/Contracts.php. This is ***not*** an addendum.

The City & Borough of Juneau is posting two previous cathodic annual reports completed by Norton Corrosion Limited, LLC.

- 2015 Annual Cathodic Protection System Inspection of Three Lift Stations
- 2015 Annual Inspection of Cathodic Protection Systems of six water storage tanks.

Norton Corrosion Limited, LLC
Since 1959

8820 222nd Street SE, Woodinville, WA 98077
Phone (425) 483-1616 • Fax (425) 485-1754
sales@nortoncorrosion.com
www.nortoncorrosion.com

December 6, 2015

City & Borough of Juneau
Wastewater Division
Attention: Mark Mow
2009 Radcliffe Road
Juneau, AK 99801
mark_mow@ci.juneau.ak.us

Subject: **2015 ANNUAL CATHODIC PROTECTION SYSTEM INSPECTIONS THREE LIFT STATIONS**

Dear Mr. Mow:

On September 14, 2015, Norton Corrosion Limited (NCL) inspected the impressed current cathodic protection (CP) systems that protect three of your buried steel lift stations from external corrosion. Written authorization to complete this testing was issued on March 9, 2015.

Executive Summary

Inspection of the three CP systems indicated they were functioning properly. The Skaters Cabin and Slim Williams systems are operating at maximum output. Additional anodes may be required within the next few years at each of these locations.

Work Performed

NCL's inspection included visual inspection, electrical measurements, and adjustment as needed. Electrical measurements were recorded using a Fluke Model 87 digital multi-meter. Structure-to-soil potential measurements were recorded at representative test locations for the purpose of evaluating the level of CP received. Readings were obtained using the test methods described in NACE International Test Method TM0101, "Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Tank Systems." Readings were recorded using the aforementioned multi-meter in conjunction with a portable saturated copper/copper sulfate (CSE) half-cell. Both "on" and "instant-off" potential measurements were typically recorded while simultaneously interrupting the impressed current CP systems for 2.0 seconds on a 10-second cycle using a solid state current interrupter. At least one reading was recorded 10 or more feet from the dry well to better evaluate the level of protection at depth, as opposed to near the surface. Adjustments and calibration were made as necessary. The native readings reported were previously recorded.

Criteria

NCL has evaluated the CP systems based on the criteria established in the NACE International Standard SP0285, "Corrosion Control of Underground Storage Tank Systems by Cathodic Protection." The following criteria when used separately or in combination indicate that adequate CP is being provided.

- Adequate protection is indicated by a potential difference of -0.850 volts or more negative between a steel structure and a saturated CSE reference half-cell. This criterion requires all voltage drops, other than those across the structure-to-electrolyte boundary, to be considered for a valid interpretation of the potential data. Instant-off potential measurements were recorded to account for the voltage drops (IR drop) and have been used to evaluate the level of protection achieved.
- Adequate protection is also indicated by a cathodic polarization shift of not less than 100 millivolts. This is equivalent to the difference between the instant-off (polarized) and native (depolarized) potential measurements. This criteria is only valid where bi-metallic couples (contact between different metals, i.e., steel to copper grounding) do not exist.

Conclusions and Recommendations

The attached data sheets detail the results of the inspection. All three CP systems are set and functioning properly. The Gruening Park steel dry well is receiving adequate protection. One reading was slightly below criteria, but this is likely due to the proximity of the reference half-cell to the lift station and dry conditions at this spot. The Skaters Cabin and Slim Williams sites are receiving partial to adequate protection. The majority of the locations tested were adequately protected; only 2-3 locations at each lift station were receiving partial protection. This may be attributed to the diminishing current output of each system causing insufficient current distribution to protect these specific locations. Consideration should be given to installing additional anodes at these sites.

NCL recommends the volts and amps from each rectifier continue to be monitored monthly to assure proper operation. Rectifier log sheets can be found within each lift station to facilitate this monitoring. The recommended range for each system is included at the top of each log sheet. If a problem is found, please contact NCL.

NCL appreciates the opportunity to provide this service to the City and Borough of Juneau, Public Works - Wastewater Division. If you have any questions or require additional information, please do not hesitate to contact our office.

Sincerely,

Eric Shadle

Eric Shadle, P.E.
Corrosion Engineer

21630_CBJ_LiftSta_2015.docx

NORTON CORROSION LIMITED

CITY AND BOROUGH OF JUNEAU
CATHODIC PROTECTION SYSTEMS
SEWER LIFT STATIONS

DATA SHEET: 1 OF 3
NCL JOB NO.: O-21630
DATE: 9/14/2015
BY: E. SHADLE

GRUENING PARK

Rectifier

Manufacturer:	Good-All Electric
Model No.:	FSAYSA40-5N
Serial No.:	95F7481
AC Input Rating:	120 volts, 2.53 amps
DC Output Rating:	40 volts, 5 amps

Field Measurements	Readings
Panel Meters:	30 volts
	2.1 amps
Portable Meter:	120.8 VAC input
	30.7 volts
	1.83 amps
Shunt (5A/ 50mV):	18.3 mV
Taps (Max. 120):	80

Structure-to-Soil Potential Measurements (Final)

Location	Potential (volts DC ref. CSE) On	Off	Native
Building side, west ≈3' hole in asphalt	-0.576	-0.436	-0.268
NW across asphalt, @ NW corner of bldg.	-2.342	-0.984	
North side, (10' away, across asphalt in grass toward road)	-2.045	-0.942	-0.278
East side, ≈3' from lift station (hole in asphalt)	-4.160	-1.490	-0.393
S. Side (15' away across asphalt)	-7.930	-1.655	

Note: Native potential recorded in 1999.

NORTON CORROSION LIMITED

CITY AND BOROUGH OF JUNEAU
CATHODIC PROTECTION SYSTEMS
SEWER LIFT STATIONS

DATA SHEET: 2 OF 3
NCL JOB NO.: O-21630
DATE: 9/14/2015
BY: E. SHADLE

SKATERS CABIN

Rectifier

Manufacturer:	Good-All Electric
Model No.:	FSAYSA40-5N
Serial No.:	95F7475
AC Input Rating:	120 volts, 2.53 amps
DC Output Rating:	40 volts, 5 amps

Field Measurements	Reading
Panel Meters:	50 volts
	0.7 amps
Portable Meter:	122.4 VAC input
	49.7 volts
	0.61 amps
Shunt (5A/ 50mV):	6.1 mV
Taps (Max. 120):	120

Structure-to-Soil Potential Measurements

	Potential (volts DC ref. CSE)		
Location	On	Off	Native
Road side	-4.094	-0.919	
Rectifier side	-0.973	-0.616	
20' remote – rect. side	-1.593	-0.554	
Woods side	-1.062	-0.763	-0.570
Opposite rectifier	-1.970	-0.909	
20' remote – opposite rect.	-6.850	-0.933	

Note: The native potential listed was an instant off reading recorded in 1997.

NORTON CORROSION LIMITED

CITY AND BOROUGH OF JUNEAU
CATHODIC PROTECTION SYSTEMS
SEWER LIFT STATIONS

DATA SHEET: 3 OF 3
NCL JOB NO.: O-21630
DATE: 9/14/2015
BY: E. SHADLE

SLIM WILLIAMS

Rectifier

Manufacturer:	Good-All Electric
Model No.:	FSAYSA40-5N
Serial No.:	95F7480
AC Input Rating:	120 volts, 2.53 amps
DC Output Rating:	40 volts, 5 amps

Field Measurements	Reading
Panel Meters:	44 volts
	0.7 amps
Portable Meter:	118.2 VAC input
	44.5 volts
	0.66 amps
Shunt (5A/ 50mV):	6.6 mV
Taps (Max. 120):	110

Structure-to-Soil Potential Measurements

Location	Potential (volts DC ref. CSE) On	Off	Native
House side	-6.860	-1.076	-0.420
Rectifier side	-1.584	-0.980	
20' remote – rect. side	-1.460	-0.889	
Road side	-0.838	-0.590	-0.343
5' remote	-1.144	-0.789	
Opposite rect.	-3.358	-0.933	
20' remote – opposite rect.	-5.561	-1.174	

Note: The native potentials listed were instant off readings recorded in 1997.

NORTON CORROSION LIMITED

8820 222nd Street SE, Woodinville, WA 98077
Phone (425) 483-1616 • Fax (425) 485-1754
E-mail: sales@nortoncorrosion.com

December 16, 2015

City and Borough of Juneau
Public Works Department
Water Utility Supervisor
Attn: Evan Champion
5433 Shaune Drive
Juneau, AK 99801
evan.champion@juneau.org

Subject: **2015 ANNUAL INSPECTION**
CATHODIC PROTECTION SYSTEMS
SIX WATER STORAGE TANKS

Dear Mr. Champion:

On December 9-10, 2015, Norton Corrosion Limited (NCL) personnel completed an annual inspection of the impressed current type cathodic protection (CP) systems that protect the internal submerged steel surfaces of six water reservoirs from corrosion. Your authorization to complete this work was issued by Renee Loree per Purchase Order No. 107390, dated December 8, 2015.

Executive Summary

The CP systems located at the following reservoirs were inspected:

- Auke Lake
- Crow Hill
- East Valley
- Lemon Creek
- Lena Loop
- West Juneau

The attached data sheets detail the results of this inspection. The data obtained indicate the systems are set and functioning properly with the exception of the Lemon Creek rectifier. Structure-to-electrolyte potential measurements indicate all six water reservoirs tested were receiving adequate protection from internal corrosion at the locations tested. No adjustments were required to most of the systems.

Work Performed

Field work was performed by John Keppler, P.E., NACE International certified CP Specialist and Coating Inspector (Level 2).

NCL's inspection included visual inspection, electrical measurements, and adjustment as needed. Electrical measurements were recorded using a Fluke Model 28 digital multi-meter. Structure-to-soil potential measurements were recorded at various depths in each tank for the purpose of evaluating the level of CP received. Readings were obtained using the test

methods described in NACE International Standard Test Method TM0101, "Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Tank Systems." Readings were recorded using the aforementioned multi-meter in conjunction with a portable saturated copper/copper sulfate (CSE) half-cell and the permanently installed half-cells. Both "on" and "instant-off" potential measurements were typically recorded while manually interrupting the CP current.

Based on the information obtained, minor repairs and adjustments were completed. Engineering recommendations are made herein.

Criteria

NACE International has established criteria that indicate, when used separately or in combination, whether adequate CP has been achieved. The applicable criteria are stated in the NACE International Standard Practice SP0388, "Impressed Current Cathodic Protection of Internal Submerged Surfaces of Carbon Steel Water Storage Tanks."

NCL has evaluated your CP system based on the following criteria:

- Adequate CP is indicated by a potential difference of -0.850 volts or more negative between a steel structure and a saturated CSE half-cell. This criterion requires all voltage drops, other than those across the structure-to-electrolyte boundary, to be considered for a valid interpretation of the potential data. Instant-off potential measurements recorded to account for the voltage drops (IR drop) have been used to evaluate the level of protection achieved.

- In reference to a zinc electrode, the above criterion is equivalent to +0.250 volts.

- Adequate protection is also indicated by a cathodic polarization shift of not less than 100 millivolts. This is equivalent to the difference between the instant-off (polarized) and native (depolarized) potential measurements.

Recommendations

The Lemon Creek rectifier was left set and functioning at the desired level; however, NCL was unable to make the circuit control card auto range with adjustment to the set potential. Testing had the same results while operating with a portable half-cell and separate lead wire to the tank, which rules out a bad permanent zinc half-cell and an induced current on the control wiring. NCL recommends a replacement card be provided and the system adjusted and retested during the next annual inspection (Summer 2016), or sooner if we are available in Juneau.

To ensure the CP systems remain operational, NCL recommends each CP system be monitored on a monthly basis, recording volts, amps, reference potential, set potential, date, and initials. Log sheets have been attached for your convenience.

These systems should be inspected on an annual basis to assure continued and proper operation. NCL recommends your next inspection be performed in Summer 2016 to coordinate with other projects in the area.

If you intend to remove a tank from service for inspection and maintenance, the following procedure is recommended. Prior to draining a tank, the CP should be inspected to evaluate the operational condition of all components, particularly those located within the tank. The system should then be turned off and locked out. Once opened and prior to cleaning, an internal visual inspection of the tank condition and the CP system components should be completed. If any equipment requires repair or replacement, this will permit time to obtain the necessary materials. It also allows the corrosion engineer an opportunity to evaluate past performance of the CP system and coating condition prior to repair. Following return to service, the CP should be commissioned and adjusted by the engineer.

NCL appreciates the opportunity to again be of service to the City and Borough of Juneau. If you have any questions or concerns, please contact our office.

Yours truly,

John F. Keppler, P.E.

John F. Keppler, P.E.
Corrosion Engineer

21862ot_CBJuneau_WaterTanks.docx
Cc: P Goodwin, NCL Sales
enclosures: (2: data, log sheets)

NORTON CORROSION LIMITED

CITY AND BOROUGH OF JUNEAU
WATER RESERVOIRS
CATHODIC PROTECTION SYSTEM

DATA SHEET: 1 OF 6
NCL JOB NO.: O-21862
DATE: DEC. 9-10, 2015
BY: J. KEPPLER

AUKE LAKE RESERVOIR

Tank Information

Height:	32 ft
Diameter:	90 ft
Capacity:	1.42 MG
Constructed:	1984
Water Level:	16.5 ft

Rectifier Data

Note:	Rectifier located below grade in vault.
Manufacturer:	Good-All Electric
Model No:	CSAYSE16-12NZ manual control
Serial No:	84C2809
AC Input Rating:	**115**/230 volts, **2.8**/1.4 amps
DC Output Rating:	16 volts, 12 amps
Permanent Half-Cell:	Zinc (1)

Field Measurements	Reading
Panel Readings	2.25 V
	<0.1 A
Tap Setting (CD/F5 max.):	CA/F2
Aux. Adjustment:	0.00
Portable Meter	121.4 V ac input
	5.884V ac secondary
	4.574 V dc output
	0.111 A
Shunt (15A/50mV):	0.37 mV
Perm. Zn Ref.:	-0.549 V on / -0.203 V off

Structure-to-Water Potentials

Depth	Potential (V dc ref. CSE) On	Instant Off
16.5' - surface	-1.973	-1.123
15'	-1.975	
10'	-1.959	-1.136
5'	-1.953	
0' – Bottom	-1.952	-1.148

Note: Aux adjust provided no fine tuning with single circuit.

CROW HILL RESERVOIR

Tank Information

Height:	32.5 ft
Diameter:	74 ft
Capacity:	1 MG
Constructed:	1991
Water Level:	29.7 ft

Rectifier Data

Manufacturer:	Good-All Electric	
Model No:	CSAWSE36-12KNZ	manual control
Serial No:	91C1739	
AC Input Rating:	120/**240** V, 6/**3** A	
DC Output Rating:	36 V, 12 A	
Permanent Half-Cell:	Zinc (2)	

Field Measurements	Reading
Panel Readings	2.5 V
	<0.1 A
Tap Setting (CD/F5 max.):	CA/F1
Portable Meter	243.2 V ac input
	2.734 V ac secondary
	2.481 V dc output
	0.014 A
Shunt (5A/50mV):	0.0014 mV
Perm Zn Ref. 1:	-0.432 V on / -0.098 V off
Perm Zn Ref. 2:	-0.276 V on / -0.034 V off

Structure-to-Water Potentials

	Potential (V dc ref. CSE)		
Depth	On	Instant Off	Native
29.5' - surface	-1.340	-1.011	-0.489
25'	-1.337		-0.490
20'	-1.340	-1.018	-0.488
15'	-1.338		-0.490
10'	-1.336	-1.022	-0.488
5'	-1.332		-0.487
0' – Bottom	-1.334	-1.062	-0.485

Note: Native potentials recorded October, 2010.

CITY AND BOROUGH OF JUNEAU
WATER RESERVOIRS
CATHODIC PROTECTION SYSTEM

DATA SHEET: 3 OF 6
NCL JOB NO.: O-21862
DATE: DEC. 9-10, 2015
BY: J. KEPPLER

EAST VALLEY RESERVOIR

Tank Information

Height:	ft
Diameter:	ft
Capacity:	2.3 MG
Constructed:	
Water Level:	16 ft

Rectifier Data

Manufacturer:	Good-All Electric
Model No:	CSAWSE25-50KNZ manual control
Serial No:	86C1279
AC Input Rating:	120/**240** V,18.5/**9.2** A
DC Output Rating:	25 V, 50 A
Permanent Half-Cell:	Zinc (4)

Field Measurements	Reading
Panel Readings	4.0 V
	0.1 A
Tap Setting (CD/F5 max.):	CA/F3
Portable Meter	249.3 V ac input
	6.028 V ac secondary
	4.415 V dc output
	0.219 A
Shunt (5A/50mV):	2.19 mV
Perm Zn Ref. 1:	-0.931 V on / -0.074 V off
Perm Zn Ref. 2:	-0.881 V on / -0.046 V off
Perm Zn Ref. 3:	-0.876 V on / 0.000 V off
Perm Zn Ref. 4:	-0.903 V on / -0.056 V off

Structure-to-Water Potentials

Depth	Potential (V dc ref. CSE) On	Instant Off	Native
29.5'			-0.489
25'			-0.490
20'			-0.488
15' - surface	-1.950		-0.490
10'	-1.952		-0.488
5'	-1.938		-0.487
0' – Bottom	-1.932		-0.485

Note: Native potentials recorded October, 2010. Instant off reading was not established, but the on data is comparable to the prior survey having instant off potential data between -1.043 and -1.020 V ref. CSE.

CITY AND BOROUGH OF JUNEAU
WATER RESERVOIRS
CATHODIC PROTECTION SYSTEM

DATA SHEET: 4 OF 6
NCL JOB NO.: O-21862
DATE: DEC. 9-10, 2015
BY: J. KEPPLER

LEMON CREEK RESERVOIR

Tank Information

Height:	32 ft	Constructed:	1984
Diameter:	95 ft	Water Level:	16 ft
Capacity:	1.6 MG		

Rectifier Data

Note:	Rectifier located below grade in vault.
Manufacturer:	Universal Rectifiers
Model No:	CSA-APAI (potential control)
Serial No:	985685
AC Input Rating:	**115**/230 V, 2.0/**1.0** A
DC Output Rating:	20 V, 8 A
Permanent Half-Cell:	Zinc (1)

Field Measurements	Readings
Panel Readings	2.5 V
	0.20 A
Set Potential	0.01 V
Ref. Potential	0.01 V
Tap Setting (C4/F5 max.):	C1/F5
Potential Set Point:	0.20
Portable Meter	116.6 V ac input
	7.17 V ac secondary
	2.170 V dc output
	0.021 A
Shunt (0.01 ohm):	0.21 mV
Set Potential	-0.100 V
On Potential	-0.087 V
Instant Off Potential	-0.100 V
Native Potential:	-0.075 V native
Voltage Limit:	2.977 V
Potential Limit:	-0.215 V on

Structure-to-Water Potentials

	Potential (V dc ref. CSE)		
Depth	On	Instant Off	Native
15' - surface	-1.207		-0.582
10'	-1.193		-0.583
5'	-1.199		-0.582
0' – Bottom	-1.104	-0.728	-0.579

Note: Unit was found turned off. Native potentials recorded Dec. 10, 2015.

CITY AND BOROUGH OF JUNEAU
WATER RESERVOIRS
CATHODIC PROTECTION SYSTEM

DATA SHEET: 5 OF 6
NCL JOB NO.: O-21862
DATE: DEC. 9-10, 2015
BY: J. KEPPLER

LENA LOOP RESERVOIR

Tank Information

Height:	32.5 ft	Constructed:	2001
Diameter:	74 ft	Water Level:	20 ft
Capacity:	1.0 MG		

Rectifier Data

Note:	Rectifier located below grade in vault.
Manufacturer:	Universal Rectifiers
Model No:	CSA-AIAI (IR free)
Serial No:	002335
AC Input Rating:	**115**/230 V, **1.0**/0.5 A
DC Output Rating:	16 V, 5 A
Permanent Half-Cell:	Zinc (2)

Field Measurements	Reading
Panel Readings	2.1 V
	<0.1 A
Set Potential	0.18 V
Ref. Potential	0.18 V
Tap Setting (C3/F6 max.):	C1/F3
Portable Meter	121.1 V ac input
	4.382 V ac secondary
	2.170 V dc output
	0.008 A
Shunt (0.01 ohm):	0.08 mV
Set Potential	-0.173 V
Ref. Potential	-0.171 V
Perm Zn Ref. 1:	-0.181 V on / -0.026 V off / +0.504 V native
Perm Zn Ref. 2:	+0.012 V on / +0.237 V off / +0.504 V native
Voltage Limit:	2.057 V
Current Limit:	0.008 mV
Potential Limit:	-0.932 V on

Structure-to-Water Potentials

Depth	Potential (V dc ref. CSE) On	Instant Off	Native
27'			-0.424
25'			-0.424
20' - surface	-0.581		-0.423
15'	-0.582		-0.424
10'	-0.583		-0.422
5'	-0.582		-0.429
0' – Bottom	-0.579		-0.576

Note: Native potentials recorded May 30, 2001.

CITY AND BOROUGH OF JUNEAU
WATER RESERVOIRS
CATHODIC PROTECTION SYSTEM

DATA SHEET: 6 OF 6
NCL JOB NO.: O-21862
DATE: DEC. 9-10, 2015
BY: J. KEPPLER

WEST JUNEAU RESERVOIR

Tank Information

Height:	30 ft
Diameter:	70 ft
Capacity:	920,000 G
Constructed:	1985
Water Level:	26.2 ft

Rectifier Data

Note:	Rectifier located below grade in vault.
Manufacturer:	Good-All Electric
Model No:	CSAWSE16-12KNZ manual control
Serial No:	86C1280
AC Input Rating:	**120**/240 V, **2.8**/1.4 A
DC Output Rating:	16 V, 12 A
Permanent Half-Cell:	Zinc (2)

Field Measurements	Reading
Panel Readings	2.5 V
	<0.05 A
Tap Setting (CD/F5 max.):	CA/F2
Portable Meter	118.3 V ac input
	2.859 V ac secondary
	2.730 V dc output
	0.040 A
Shunt (0.01 ohm):	0.40 mV
Perm Ref. 1:	-0.610 V on / -0.220 V off
Perm Ref. 2:	-0.723 V on / -0.303 V off

Structure-to-Water Potentials

Depth	Potential (V dc ref. CSE) On	Instant Off
25' - surface	-1.380	-0.981
20'	-1.383	-0.981
15'	-1.400	
10'	-1.404	-0.958
5'	-1.407	
0' – Bottom	-1.409	-0.982

NORTON CORROSION LIMITED

RECTIFIER LOG

OWNER: City and Borough of Juneau

STRUCTURE: Crow Hill Reservoir

RECOMMENDED CURRENT OUTPUT: 0.05 – 0.2 amps

DATE	VOLTS	AMPS	TAPS	COMMENTS
12/10/15	2.5	0.1	A/1	NCL 2015 Inspection

RECTIFIER LOG

OWNER: City and Borough of Juneau

STRUCTURE: West Juneau Reservoir

RECOMMENDED CURRENT OUTPUT: 0.05 – 0.01 amps

DATE	VOLTS	AMPS	TAPS	COMMENTS
12/10/15	2.5	0.05	A/2	NCL 2015 Inspection

NORTON CORROSION LIMITED

RECTIFIER LOG

OWNER: City and Borough of Juneau

STRUCTURE: Auke Lake Reservoir

RECOMMENDED CURRENT OUTPUT: 0.05 – 0.2 amps

DATE	VOLTS	AMPS	TAPS	COMMENTS
12/10/15	2.25	0.1	A/2	NCL 2015 Inspection

NORTON CORROSION LIMITED

RECTIFIER LOG

OWNER: City and Borough of Juneau

STRUCTURE: Lena Loop Reservoir

RECOMMENDED REF POTENTIAL: 0.2 volts

DATE	VOLTS	AMPS	POTENTIAL SET	POTENTIAL REF	COMMENTS
12/10/15	2.1	0.1	0.17	0.17	NCL 2015 Inspection

NORTON CORROSION LIMITED

RECTIFIER LOG

OWNER: City and Borough of Juneau

STRUCTURE: Lemon Creek Reservoir

RECOMMENDED CURRENT OUTPUT: 0.1 to 0.3 amps

DATE	VOLTS	AMPS	TAPS	COMMENTS
12/10/15	2.5	0.2	1/5	NCL 2015 Inspection

NORTON CORROSION LIMITED

RECTIFIER LOG

OWNER: City and Borough of Juneau

STRUCTURE: East Vally Reservoir

RECOMMENDED CURRENT OUTPUT: 0.05 – 0.2 amps

DATE	VOLTS	AMPS	TAPS	COMMENTS
12/10/15	4.0	0.1	A/3	NCL 2015 Inspection