



May 6, 2021

Mr. Ken Tutt
Project Representative
Nutrien Ltd.
Swift Creek Mine Float Plant
15843 SE 78th Street
White Springs, Florida 32096-2703

RE: SWIFT CREEL MINE FLOAT PLANT
CATHODIC PROTECTION SURVEY
2021 RECOMMENDATIONS

Dear Mr. Tutt;

Please review the general recommendations concerning the results of the Nutrien Ltd. – Swift Creek Mine Float Plant cathodic protection survey, performed beginning May 4, 2021. The following recommendations were cited during this inspection:

- Cathodic Protection measurements indicate approximately 100% of the steel gas system piping components currently meet or exceed the minimum CP requirements. No further action is required at this time.

I trust the information to be in sufficient detail, however, should you require additional information or would like to discuss these recommendations, please contact me.

Sincerely,

A handwritten signature in black ink that reads 'W. L. Hays'.

W. L. Hays
CITY SERVICES, INC.



CITYSERVICES, INC
P.O. Box 3217
538 Powell Dr.
Thomasville, GA 31799

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NUTRIEN LTD. SCM Float Plant

CATHODIC PROTECTION SURVEY
MAY 2021

TABLE OF CONTENTS

CATHODIC TEST POINTS-----	5
GAS PIPE CASING-----	7
INTRODUCTION-----	1
<i>I</i> R DROP CONSIDERATION-----	2
RECOMMENDATIONS-----	4
RESULTS AND ANALYSIS-----	1
STRUCTURE-TO-SOIL POTENTIAL DATA-----	9
SURVEY TEST INSTRUMENTATION-----	3

May 2021

Nutrien Ltd.
Swift Creek Mine Float Plant
15843 SE 78th Street
White Springs, Florida 32096-2703
ATTN: Mr. Ken Tutt
Project Representative

Swift Creek Mine Float Plant
Effectiveness of Cathodic Protection
Survey Underground Natural Gas System

INTRODUCTION

The annual cathodic protection survey was conducted for Nutrien Ltd. – Swift Creek Mine Float Plant beginning May 4, 2021. During this survey, the Swift Creek Mine Float Plant natural gas system was inspected for the effectiveness of cathodic protection, as applied. The cathodic protection system for the Swift Creek Mine Float Plant consists essentially of Galvomag Magnesium anodes placed in various locations throughout the natural gas system.

RESULTS AND ANALYSIS

A total of Fifteen [15] cathodic protection voltage readings, Three [3] Galvomag anode / CTP readings, Five [5] gas casing pipe readings and Seven [7] gas pipeline readings were taken during this survey. As can be seen by the structure-to-soil potential measurements and the enclosed data sheet, 100% of the gas pipeline readings obtained are indicative of cathodic protection. A structure-to-soil potential of 850 millivolts [-0.850] or more negative direct current is the basis used in this report to confirm cathodic protection.

IR DROP CONSIDERATION

Aging pipes and changing conditions can cause significant problems, such as an increase in applied CP levels and enlarged holidays in coating. In addition, increased environmental concerns also emphasize the need to minimize leaks as much as possible.

The effectiveness of any cathodic protection system can be determined by taking potential measurements between the structure and a reference electrode. These potential measurements have traditionally been recorded with “average reading” digital voltmeters while the protective current is flowing or applied. These potential measurements contain the error produced by the voltage drop in the soil (electrolyte resistance) and the voltage drop (current) in the structure being protected. This error is referred to as *IR* drop. Interpretation of a current applied measurement requires consideration of the significance of voltage drops in the earth and metallic paths.

An *IR* drop is a voltage across a resistance, in accordance with Ohm’s law ($V=IR$). Although there are several *IR* drops in a structure-to-electrolyte potential circuit, the *IR* drop of most concern is that which occurs between the reference electrode (half-cell) and the structure-to-electrolyte (pipe) boundary. This *IR* drop is due to a CP current in the resistance of the electrolyte and is an error in the measurement.

One way to reduce the *IR* drop is to bring the reference electrode close to the structure (pipe) to reduce the resistance of the electrolyte (soil). Another way to reduce the *IR* drop is to bring the current to zero by interrupting all sources of current (anodes) influencing that reference point at the same precise time.

An instant off-potential measurement is the reading taken instantaneously after the protective current reaches zero. Off-potential measurements eliminate the *IR* drop error, allowing the true *IR* drop free polarized potential of a cathodically protected structure to be determined in the field. *IR* drop error is eliminated since there is no current flowing when the measurement is taken (i.e. $I = 0$ A, then $IR = 0$ V).

SURVEY TEST INSTRUMENTATION

The Cathodic Protection Analyzer, developed by Universal Rectifiers, Inc, (Hereinafter referred to as CPA), is a handheld instrument used with a reference electrode to measure the uninterrupted characteristics of the signal generated from a CP source. It can be used to evaluate the coating of a pipeline to ensure that the pipe is fully protected from corrosion. The CPA is designed for use with any pipeline system or structure at risk to corrosion factors. Aging pipes and changing conditions can cause significant problems, such as an increase in applied CP levels and enlarged holidays in coating. In addition, increased environmental concerns also emphasize the need to minimize leaks as much as possible.

The CPA has computer capabilities of filtering interfering signals. The instrument is also capable of measuring several facets of the protection waveform. The software-driven instrument reads the minimum, average, and maximum voltage levels emanating from the pipe, thereby allowing an overview of the entire CPv signature. Digital signal processing makes the accuracy and precision of the CPA possible. It utilizes software to provide the extra speed and flexibility that is becoming increasingly important in the field.

The CPA is operated in conjunction with a Copper – Copper Sulfate [Cu/CuSO₄] shielded reference electrode known by its model number SPI, which allows the measurement of the cathodic protection voltage without interrupting the potential source.

RECOMMENDATIONS

Nutrien Ltd. – Swift Creek Mine Float Plant
Underground Natural Gas System
May 2021

The sacrificial galvanic anode arrangement designed to protect the coated and wrapped steel natural gas system indicates adequate current to afford cathodic protection to the steel distribution system. Structure-to-soil readings obtained from Cathodic Test Points and gas risers on the steel distribution system indicate CP readings above State and Federal minimum standards of -0.850 volts direct current. Five [5] gas pipeline casings, Three [3] Galvomag anodes / Cathodic Test Points and Seven [7] gas pipeline contacts were inspected during this survey.

The coated and wrapped main lines show a minimum *IR* drop free structure-to-soil potential of -1.080 vdc and a maximum *IR* drop free structure-to-soil potential of -1.323 vdc at various Cathodic Test Points in the Swift Creek Mine Float Plant distribution system. Continuity over the entire main line system is fair to good.

At the time of survey, the Natural Gas Distribution System for Nutrien Ltd.'s Swift Creek Mine Float Plant complex indicates cathodic protection levels exceeding State and Federal minimum guidelines for applied cathodic protection. I trust the above information to be satisfactory and in sufficient detail, however, should you require additional information.

CATHODIC TEST POINTS

CATHODIC TEST POINTS

Nutrien Ltd. – Swift Creek Mine Float Plant
Underground Natural Gas System
May 2021

Cathodic Test Point - #1

Black Anode Connection	-1.524 Vdc
Black Gas Pipeline Connection	-1.200 Vdc
White Casing Pipe Connection	-0.564 Vdc

Cathodic Test Point - #2

Black Anode Connection	-1.192 Vdc
Black Gas Pipeline Connection	-1.080 Vdc
White Casing Pipe Connection	-0.610 Vdc

Cathodic Test Point - #3

Black Anode Connection	-1.422 Vdc
Green Gas Pipeline Connection	-1.323 Vdc

STRUCTURE-TO-SOIL POTENTIALS
GAS PIPE CASINGS

**STRUCTURE-TO-SOIL POTENTIAL
GAS PIPE CASINGS**

Nutrien Ltd. – Swift Creek Mine Float Plant
Underground Natural Gas System
May 2021

<u>Test Location</u>	<u>Energized Potentials Volts</u>
Railroad Casing - #1	-0.505
Railroad Casing - #2	-0.521
Highway Casing - #3	-0.511

STRUCTURE - TO - SOIL POTENTIAL DATA

STRUCTURE – TO – SOIL POTENTIAL DATA

Nutrien Ltd. – Swift Creek Mine Float Plant

Underground Natural Gas System

May 2021

<u>Test Location</u>	<u>Energized Potentials Volts</u>
Gas Metering Station - Inlet	-1.137
Gas Metering Station – Outlet	-1.274
4" Gas Riser @ Plant	-1.109
2" Gas Riser @ Boiler Room	-1.211

City Services, Inc. (CSI)
User Task Status Report

Run by: Bobby Boyd
Run on: 1/12/2021

Whitfield, Mitch

0001 - Measure Structure-To-Electrolyte Potential

Qualification Type	Evaluations	Evaluation Date	Expiration Date	Qualified Verified
ENERGY worldnet, Inc. - Performance	EWN-PE-Perform AC Structure-to-Electrolyte Potential Readings at Test Points - 2374	3/9/2020	3/9/2023	EV
ENERGY worldnet, Inc. - Performance	EWN-PE-Measure Structure-to-Soil Potentials (1.1, 0021, 0001) - 2649	3/9/2020	3/9/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-AOC Failure to Follow Procedures - 2207	3/11/2020	3/11/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-AOC Insufficient Cathodic Protection - 2212	3/11/2020	3/11/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-Corrosion Control Fundamentals (5.3, 9.2, 1021, 0031, 0091) - 2355	3/12/2020	3/12/2023	EV

0031 - Inspect And Monitor Galvanic Ground Beds/Anodes

Qualification Type	Evaluations	Evaluation Date	Expiration Date	Qualified Verified
ENERGY worldnet, Inc. - Performance	EWN-PE-Install Galvanic Anode (9.2, 0031) - 2584	3/9/2020	3/9/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-AOC Failure to Follow Procedures - 2207	3/11/2020	3/11/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-AOC Insufficient Cathodic Protection - 2212	3/11/2020	3/11/2023	EV

ENERGY worldnet, Inc. - Written	EWN-CBT-Corrosion Control Fundamentals (5.3, 9.2, 1021, 0031, 0091) - 2355	3/12/2020	3/12/2023	EV Qualified
0061 - Inspect or Test Cathodic Protection Bonds				
Qualification Type	Evaluations	Evaluation Date	Expiration Date	Verified
ENERGY worldnet, Inc. - Performance	EWN-PE-Inspect and Perform Electrical Test of Bonds and Isolation Devices (1.4, 0061) - 2652	3/9/2020	3/9/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-AOC Failure to Follow Procedures - 2207	3/11/2020	3/11/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-AOC Insufficient Cathodic Protection - 2212	3/11/2020	3/11/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-Corrosion Control Fundamentals (5.3, 9.2, 1021, 0031, 0091) - 2355	3/12/2020	3/12/2023	EV Qualified
0071 - Inspect or Test Cathodic Protection Electrical Isolation Devices				
Qualification Type	Evaluations	Evaluation Date	Expiration Date	Verified
ENERGY worldnet, Inc. - Performance	EWN-PE-Inspect and test isolation devices (1.5, 0071, 0081) - 2653	3/9/2020	3/9/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-AOC Failure to Follow Procedures - 2207	3/11/2020	3/11/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-AOC Insufficient Cathodic Protection - 2212	3/11/2020	3/11/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-Corrosion Control Fundamentals (5.3, 9.2, 1021, 0031, 0091) - 2355	3/12/2020	3/12/2023	EV Qualified
0081 - Install Cathodic Protection Electrical Isolation Devices				
Qualification Type	Evaluations	Evaluation Date	Expiration Date	Verified

ENERGY worldnet, Inc. - Performance	EWN-PE-Inspect and test isolation devices (1.5, 0071, 0081) - 2653	3/9/2020	3/9/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-AOC Failure to Follow Procedures - 2207	3/11/2020	3/11/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-AOC Insufficient Cathodic Protection - 2212	3/11/2020	3/11/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-Corrosion Control Fundamentals (5.3, 9.2, 1021, 0031, 0091) - 2355	3/12/2020	3/12/2023	EV

0091 - Troubleshoot in-Service Cathodic Protection System

Qualification Type	Evaluations	Evaluation Date	Expiration Date	Qualification Status
ENERGY worldnet, Inc. - Performance	EWN-PE-Cathodic Protection Remediation (0091) - 2361	3/9/2020	3/9/2023	EV
ENERGY worldnet, Inc. - Performance	EWN-PE-Test to Detect Interference (1.3) - 2651	3/12/2020	3/12/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-AOC Failure to Follow Procedures - 2207	3/11/2020	3/11/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-AOC Insufficient Cathodic Protection - 2212	3/11/2020	3/11/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-Corrosion Control Fundamentals (5.3, 9.2, 1021, 0031, 0091) - 2355	3/12/2020	3/12/2023	EV
ENERGY worldnet, Inc. - Written	EWN-WE-Test to Detect Interference (1.3) - 2594	3/12/2020	3/12/2023	EV

0101 - Inspect Rectifier And Obtain Readings

Qualification Type	Evaluations	Evaluation Date	Expiration Date	Qualification Status
ENERGY worldnet, Inc. - Performance	EWN-PE-Obtain a voltage output reading from a rectifier (3.1, 0101) - 2697	3/9/2020	3/9/2023	EV

ENERGY worldnet, Inc. - Performance	EWN-PE-Check for Proper Operation of a Rectifier (3.2) - 2698	3/12/2020	3/12/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-AOC Failure to Follow Procedures - 2207	3/11/2020	3/11/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-AOC Insufficient Cathodic Protection - 2212	3/11/2020	3/11/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-Corrosion Control Fundamentals (5.3, 9.2, 1021, 0031, 0091) - 2355	3/12/2020	3/12/2023	EV
0111 - Maintain Rectifier				
Qualification Type				
ENERGY worldnet, Inc. - Performance	Evaluations EWN-PE-Repair or Replace Defective Rectifier Components (4.2, 0111) - 2573	3/12/2020	3/12/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-AOC Failure to Follow Procedures - 2207	3/11/2020	3/11/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-AOC Insufficient Cathodic Protection - 2212	3/11/2020	3/11/2023	EV
ENERGY worldnet, Inc. - Written	EWN-CBT-Rectifiers(3.1, 3.2, 4.1, 4.2, 4.3, 9.3, 0101, 0111) - 2319	3/12/2020	3/12/2023	EV

CITY SERVICES, INC.

2020 Drug Test Statistical Summary

City Services, Inc.
 Post Office Box 3217
 Thomasville, Georgia 31799

Contact Person: Jerry Allen
 Title: Office Manager
 Telephone: (229) 226-6569

Total Number of Employees in Organization:	7
Number of Employees in Test Pool:	
Full Time:	6
Temporary:	0
Part Time:	0
Others:	0

Summarized is the number of test, number of employees tested, and positive results for each category listed.

<u>Type of Test</u>	<u>Draws</u>	<u>Tested</u>	<u>Positive Results</u>	<u>Positive For:</u>
Pre-Employment:	0	0	0	N/A
Random:	4	3	0	N/A
Reasonable Cause:	0	0	0	N/A
Post-Accident	0	0	0	N/A
Post-Rehab	0	0	0	N/A

DOT drug tests are conducted only using urine specimens. The urine specimens are analyzed for the following drugs/metabolites:

- Marijuana metabolites/THC
- Cocaine metabolites
- Amphetamines
- Phencyclidine (PCP)
- Opioid Metabolites (i.e., codeine, 6-AM (heroin), morphine)
- Also, four Semi-Synthetic Opioids (i.e., oxycodone, oxymorphone, hydrocodone, hydromorphone)

Indicate positive results by number as follows:

Marijuana-1, Cocaine-2, Amphetamines-3, Phencyclidine-4, Opioid Metabolites-5, Semi-Synthetic Opioids - 6

Indicate test by number as follows:

Random-1, Post Accident-2, Reasonable Cause-3, Post-Rehab-4, Pre-employment-5

<u>Age</u>	<u>Sex</u>	<u>Test</u>	<u>Substance Found</u>
—	—	—	—
—	—	—	—
—	—	—	—

Report Prepared By: Jerry Allen
 Period Covered: 1/1/2020 – 12/31/2020

Date Submitted: 5/5/2021
 Distributed To: Nutrien – White Springs, Florida