



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

Tel ☎ 229-226-6569
Fax ☎ 229-227-0335
Email ✉ cityservicesinc@gmail.com

May 20, 2024

Mr. Ken Tutt
Project Representative
Nutrien Ltd.
SRC Dry Area Plant
15843 SE 78th Street
White Springs, Florida 32096-2703

RE: CATHODIC PROTECTION SURVEY
SRC DRY AREA PLANT
2024 RECOMMENDATIONS

Dear Mr. Tutt;

Please review the general recommendations concerning the results of the Nutrien Ltd. – SRC Dry Area Plant cathodic protection survey, performed beginning May 17, 2024. 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 required by State and Federal regulatory agencies.

I trust the information to be in sufficient detail. Please contact me after reviewing this report to discuss these recommendations. A copy of this report is available online at www.cityservices.biz. Click on Clients → Nutrien → Corrosion Surveys. To obtain or change your username and password, contact us at 229.226.6569.

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

Tel ☎ 229-226-6569

Fax ☎ 229-227-0335

Email ☎ cityservicesinc@gmail.com

NUTRIEN LTD.

SRC Dry Area Plant

CATHODIC PROTECTION SURVEY
MAY 2024

CATHODIC PROTECTION SURVEY
TABLE OF CONTENTS

**NUTRIEN
SRC**
DRY AREA PLANT

2024

- 1 INTRODUCTION
RESULTS AND ANALYSIS
- 2 SURVEY TEST & INSTRUMENTATION
IR DROP CONSIDERATION
- 3 RECOMMENDATIONS
- 4 CATHODIC TEST POINTS
- 6 STRUCTURE-TO-POTENTIAL-DATA
(GAS PIPE CASINGS)
- 8 STRUCTURE-TO-POTENTIAL DATA



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

Tel ☎ 229-226-6569
Fax ☎ 229-227-0335
Email ✉ cityservicesinc@gmail.com

May 2024

Nutrien Ltd.
SRC Dry Area Plant
15843 SE 78th Street
White Springs, Florida 32096-2703
ATTN: Mr. Ken Tutt
Project Representative

SRC Dry Area Plant
2024 Cathodic Protection Survey

Effectiveness of Underground Cathodic Protection

INTRODUCTION

A cathodic protection survey was conducted for Nutrien Ltd. - SRC Dry Area Plant beginning May 17, 2024. During this survey, the SRC Dry Area Plant natural gas system was inspected for the effectiveness of cathodic protection, as applied. The cathodic protection system for Nutrien Ltd. - SRC Dry Area Plant consists essentially of Galvomag Magnesium anodes placed in various locations throughout the natural gas distribution system.

RESULTS AND ANALYSIS

CATHODIC PROTECTION READINGS:	15	GAS CASING PIPE REAINGS	4
GALVOMAG ANODE / CTP READINGS:	3	GAS PIPELINE READINGS	8
		COMPLETE PROTECTION:	100%

A total of Fifteen [15] cathodic protection voltage readings consisting of Three [3] Galvomag anode / CTP readings, Four [4] gas casing pipe readings and Eight [8] 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.

SURVEY TEST INSTRUMENTATION

- Gas Electronics Model 601 Insulation Checker
- Fluke Model 71 Digital Multi-meter
- Tinker & Rasor 6-B Reference Electrode [CSE]
- Cu/CuSO₄ Reference Electrode Calibration 05/06/2024 – 2.1 Mv

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.

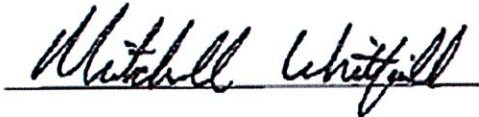
RECOMMENDATIONS

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.

The coated and wrapped main distribution lines show a minimum structure-to-soil potential of -0.995 vdc and a maximum structure-to-soil potential of -1.519 vdc at cathodic test points in the SCC Sulfuric Acid Plant distribution system. Continuity over the entire main line system is good to excellent.

At the time of survey, the Natural Gas Distribution System for Nutrien Ltd. - SRC Dry Area Plant complex indicates cathodic protection levels above regulatory minimum levels. I trust the above information to be satisfactory and in sufficient detail, however, should you require additional information, please contact me.

Sincerely,



Mitchell Whitfield, CP Tester
City Services, Inc.

CATHODIC TEST POINTS

CATHODIC TEST POINTS (CTP)

Underground Natural Gas System

CATHODIC TEST POINT - #1

Black Anode Connection	-1.592 Vdc
Black Gas Pipeline Connection	-1.043 Vdc
Anode / Gas Line Connections Combined	-0.519 Vdc

CATHODIC TEST POINT - #2

Red Anode Connection	-1.581 Vdc
Black [Tape] Casing Pipeline Connection	-0.729 Vdc
Black Gas Pipeline Connection	-1.183 Vdc
Anode / Gas Line Connections Combined	-1.294 Vdc

CATHODIC TEST POINT - #3

Red Anode Connection	-1.266 Vdc
White Casing Pipeline Connection	-0.842 Vdc
Black Gas Pipeline Connection	-1.213 Vdc
Anode / Gas Line Connections Combined	-1.138 Vdc

STRUCTURE-TO-SOIL POTENTIALS
GAS PIPE CASINGS

STRUCTURE – TO – SOIL POTENTIALS DATA

Underground Natural Gas System

GAS PIPE CASINGS

**Casing Anode Installed*

TEST LOCATION	ENERGIZED POTENTIAL VOLTS
*Railroad Casing @ CTP #3	-0.811
*Scale House Drive Casing @ CTP #2	-0.741

STRUCTURE - TO - SOIL POTENTIAL DATA

STRUCTURE – TO – SOIL POTENTIAL DATA

Underground Natural Gas System

TEST LOCATION	ENERGIZED POTENTIAL VOLTS
Metering Station [6" Steel Line Outlet]	-1.211
Limestone Loading [6" Riser Inlet]	-0.995