



July 5, 2022

Mr. Ken Tutt  
Project Representative  
Nutrien Ltd.  
SCC Sulfuric Acid Plant  
15843 SE 78<sup>th</sup> Street  
White Springs, Florida 32096-2703

RE: CATHODIC PROTECTION SURVEY  
SCC SULFURIC ACID PLANT - 2022 RECOMMENDATIONS

Dear Mr. Tutt;

Please review the general recommendations concerning the results of the Nutrien Ltd. – SCC Sulfuric Acid Plant cathodic protection survey, performed beginning June 30, 2022. 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. A copy of this report is available online at [www.cityservices.biz](http://www.cityservices.biz). Click on Clients → Nutrien → Corrosion Surveys. To obtain or change your username and password, contact us at 229.226.6569.

Sincerely,

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](mailto:cityservicesinc@gmail.com)

# NUTRIEN LTD.

# SCC Sulfuric Acid Plant

CATHODIC PROTECTION SURVEY  
JUNE 2022

## TABLE OF CONTENTS

CATHODIC TEST POINTS-----	5
INTRODUCTION-----	1
<i>I</i> R DROP CONSIDERATION-----	2
RECOMMENDATIONS-----	4
RESULTS AND ANALYSIS-----	1
SURVEY TEST INSTRUMENTATION-----	3

June 2022

Nutrien Ltd.  
SCC Sulfuric Acid Plant  
15843 SE 78<sup>th</sup> Street  
White Springs, Florida 32096-2703  
ATTN: Mr. Ken Tutt  
Project Representative

SCC Sulfuric Acid Plant  
Effectiveness of Cathodic Protection  
Survey Underground Natural Gas System

## **INTRODUCTION**

The annual cathodic protection survey was conducted for Nutrien Ltd. – SCC Sulfuric Acid Plant beginning June 30, 2022. During this survey, the SCC Sulfuric Acid Plant natural gas distribution system was inspected for the effectiveness of cathodic protection, as applied. The cathodic protection system for the SCC Sulfuric Acid Plant consists essentially of Galvomag Magnesium anodes placed in various locations throughout the natural gas system.

## **RESULTS AND ANALYSIS**

A total of Three [3] structure readings and One [1] anode reading 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.

### **SURVEY TEST INSTRUMENTATION & METHOD**

- Gas Electronics Model 601 Insulation Checker
- Fluke Model 71 Digital Multi-meter
- Tinker & Rasor 6-B Reference Electrode [CSE]
- Cu/CuSO<sub>4</sub> Reference Electrode Calibration 06/29/2022 – 3.3 Mv



## **RECOMMENDATIONS**

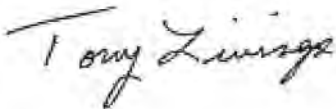
Nutrien Ltd. – SCC Sulfuric Acid Plant  
Underground Natural Gas System  
June 2022

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 One [1] Cathodic Test Point and One [1] gas riser [8"] 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 -1.168 vdc and a maximum structure-to-soil potential of -1.345 vdc at Cathodic Test Point #1 in the SCC Sulfuric Acid Plant distribution system. Continuity over the entire main line system is good to excellent.

At this time, the Natural Gas Distribution System for Nutrien Ltd. SCC Sulfuric Acid Plant complex indicates cathodic protection levels exceeding State and Federal minimum guidelines for applied cathodic protection, with no further action required. I trust the above information to be satisfactory and in sufficient detail, however, should you require additional information, please contact me.

Sincerely,



Anthony Livings  
C.P. Tester

## CATHODIC TEST POINTS

## **CATHODIC TEST POINTS**

Nutrien Ltd. – SCC Sulfuric Acid Plant  
Underground Natural Gas System  
June 2022

---

### Cathodic Test Point - #1

Green Anode Connection	-1.338 Vdc
Green/Black Gas Pipeline Connection	-1.360 Vdc
Green Gas Pipeline Connection	-1.168 Vdc
Structure-to-Soil 8" Riser	-1.345 Vdc