1.5 Definitions of Standards

Definitions of terms and adopted standards shall be in accordance with an attachment to this SOP, if so provided. Otherwise, it is intended that they be consistent with those used or implied in the Work Plan, or other parent document referencing this SOP.

2.0 EXECUTION

2.1 General Requirements and Considerations

Sample control and custody shall be followed, without exception, by all persons involved in sampling and documentation activities at the site within the program outlined or specified in the project Work Plan or SAP.

Samples may be defined as any physical evidence collected for environmental measuring and monitoring and includes portions of site media and non-media evidence such as remote-sensing imagery and photographs.

Sample identification documents must be prepared to maintain sample identification and chain-of-custody. The following are sample identification documents:

- Sample identification labels or tags
- Chain-of-custody records
- Custody seals
- Field logbook

The above documents are discussed in this SOP. Other documents, including sample traffic reports, receipts for sample forms, analytical request forms, and shipment records may also be required for specific laboratories.

2.2 Sample Identification Labels or Tags

2.2.1 Label Forms

Sample labels or tags shall be provided by the Project Manager or the sample personnel in a form appropriate for the sampling activity. Labels may be preprinted with spaces for the appropriate sample identification and

information requirements or may be blank tags with lines provided for uniform recording. The label shall be of the type material that ink will write, but not be so overly absorbent that ink will run. Labels should be self-adhesive on glass and polyethylene containers. Examples of labels are provided in Attachment 1060-1.

The following sample information should be contained on each sample label or tag and kept tabulated in the field logbook.

- Project identification number or code
- Date and time of the sample collection
- Sample station identification (boring number, well number, other number or code, etc.)
- Preservative(s) used
- Laboratory analysis or code referencing the analysis.
- Serial number (if required)

2.2.2 Labeling Procedure

Following collection of the sample and placement into the appropriate container, wipe excess soil, waste, or water off of container. Affix adhesive label or tag to container. Fill out label or tag information as prescribed above using indelible ink. If a mistake is made, neatly mark through the mistake and write in the correction, initializing the correction. If the label is too smudged or damaged to neatly correct, void it by writing "VOID" across it and initialize it, then affix a new label onto the container, partially covering the voided label. Cover over the label or tape with clear plastic adhesive tape to protect the label and prevent it from being subsequently written upon.

Serialized sample labels, if used, require additional procedures and restrictions that are discussed in the Work Plan or SAP incorporating this SOP.

For custody control, sample labels or tags should be considered to be in an individual's possession until it is filled out, attached to the sample, and transferred to another individual along with the corresponding chain-of-custody form.

2.3 Chain-of-Custody Record

2.3.1 Definition of Custody

A sample is under custody if one or more of the following criteria are met:

- The sample is in the sampler's possession.
- It is in the sampler's view after being in possession.
- It was in the sampler's possession and then was locked up to prevent tampering.
- It is in a designated secure area.

Because samples collected during an investigation could be used as evidence in litigation, possession of the samples must be traceable from the time each is collected until it is introduced as evidence in legal proceedings. To document sample possession, chain-of-custody procedures and documentation are discussed below.

2.3.2 Chain-of-Custody Documentation and Forms

Chain-of-Custody documents are initiated by the sampling personnel in the field with the notation of sampling data and sample identification during the sampling activity. This data is collected in the field logbook generally in a

tabulated form along with the description of the sample and sampling procedure, and includes the following:

- Sample station identification
- Sample identification
- Date and time sample was taken
- Number and type of container used
- Whether sample was grab or composite
- Preservation method used
- Analysis requested
- Name of sampling personnel involved
- Contact names and telephone numbers
- Shipping method

Each sample sent off-site will be recorded on a chain-of-custody form by the sampler or a field sample custodian at the site. The form should be filled out after returning the sample from the sampling locations and after decontamination. An example Chain-of-Custody form is attached. Chain-of-Custody forms will be serialized so they can be documented in the field log book and traced back to the analytical laboratory.

The chain-of-custody form should be filled out by the sampler or the field sample custodian on behalf of the sampler. The information indicated on the chain-of-custody form should be reconciled with that in the field logbook used by the sample personnel. The chain-of-custody form should be signed by the sampling personnel.

2.3.3 Custody Seals

When samples are shipped to the laboratory, they must be placed in padlocked containers or containers sealed with custody seals. Some custody seals are serially numbered. These numbers must appear in a cross-reference matrix of the field document and on the chain-of-custody report. Other types of custody seals include unnumbered seals and evidence tape.

When samples are shipped, two or more seals are to be placed on each shipping container (such as a cooler), with at least one at the back, located in a manner that would indicate if the container were opened in transit. Wide, clear tape should be placed over the seals to ensure that seals are not accidentally broken during shipment. Nylon packing tape may be used providing that it does not completely cover the custody seal. Completely covering the seal with this type of tape may allow the label to be peeled off. Alternatively, evidence tape may be substituted for custody seals.

If samples are subject to interim storage before shipment, custody seals or evidence tape may be placed over the lid of the jar or across the opening of the storage box. Custody during shipment should be the same as described above. Evidence tape may also be used to seal the plastic bags or metal cans that are used to contain samples in the cooler or shipping container. Sealing individual sample containers assures that sample integrity will not be compromised if the outer container seals are accidentally broken.

2.3.4 Field Custody Procedures

Only enough of the sample should be collected to provide a good representation of the medium being sampled. To the extent possible, the quantity and types of samples and the sample locations should be

determined before the actual field work. As few people as possible should handle the samples.

Field samplers are personally responsible for the care and custody of the samples collected by their teams until the samples are transferred or dispatched properly. A person should be designated to receive the samples from the field samplers after decontamination; this person maintains custody until the samples are dispatched. The site manager should determine whether proper custody procedures were followed during the field work and decides if additional samples are required to make up for any deficiencies.

Samples shall be accompanied by a chain-of-custody form or record. When transferring samples, the individuals relinquishing and receiving them should sign, date and note the time on the form. This form documents sample custody transfer from the sampler, often through another person, to the analyst at the laboratory.

Samples are packaged properly for shipment and dispatched to the appropriate laboratory for analysis, with a separate chain-of-custody record accompanying each shipment. Shipping containers are padlocked or sealed with custody seals for shipment to the laboratory. The method for shipment, courier name(s), and other pertinent information such as the laboratory name should be entered in the "Remarks" section of the chain-of-custody record.

When samples are split with an owner, operator, or government agency, the event is noted in the "Remarks" section of the chain-of-custody record. The note indicates with whom the samples are being split. The person relinquishing the samples to the facility or agency requests the signature of

the receiving party on a receipt-for-samples form, thereby acknowledging receipt of the samples. If a representative is unavailable or refuses to sign, this situation is noted in the "Remarks" section of the chain-of-custody record. The samples shall be secured if no one is present to receive them.

All shipments are accompanied by a chain-of-custody record identifying their contents. The original form accompanies the shipment; the copies are retained by the sampler.

If nonhazardous samples are sent by mail, the package is registered, and the return receipt is requested. Note: Hazardous materials shall not be sent by mail. If samples are sent by common carrier, a bill of lading is used. Air freight shipments should be sent prepaid. Freight bills, postal service receipts, and bills of lading should be retained as part of the permanent documentation of the chain-of-custody records.

2.4 Field Logbook

A bound field logbook must be maintained by the sampling team leader to provide daily records of significant events, observations, and measurements during field investigations. All entries are to be signed and dated. Observations or measurements that are taken in an area where contamination of the field notebooks may occur may be recorded in a separate bound and numbered logbook before being transferred to the project logbook. The original records are retained, and the delayed entry is noted as such.

Field logbooks are intended to provide sufficient data and observations to enable participants to reconstruct events that occurred during projects and to

refresh the memory of the field personnel if called upon to give testimony during legal proceedings. In a legal proceeding, notes, if referred to, are subject to cross-examination and are admissible as evidence. The field notebook entries should be factual, detailed, and objective.

2.4.1 Corrections to Documentation

Unless restricted by weather conditions, all original data recorded in field logbooks and on sample identification labels, chain-of-custody forms, and custody seals forms are written in waterproof ink. Accountable serialized documents are not to be destroyed or thrown away, even if they are illegible or contain inaccuracies that require a replacement document.

If an error is made on an accountable document assigned to one person, that individual may make corrections simply by crossing out the error and entering the correction information. The erroneous information should not be obliterated. Any error discovered on an accountable document should be corrected by the person who made the entry. All corrections must be initialed and dated.

For all photographs taken, a photographic log should be kept; the log records date, time, subject, frame and roll number, and photographer. For "instant photos", the date, time, subject, and photographer are recorded directly on the developed picture. The serial number of the camera and lens are recorded in the project notebook. The photographer should review the photographs or slides when they return from developing and compare them to the log, to assure that the log and photographs match. It can be particularly useful to photograph the labeled sample jars before packing them into shipping containers. A clear photograph of the sample jar, showing the

label, any evidence tape sealing the jar, and the color and amount of sample, can be most useful in reconciling any later discrepancies.

3.0 REFERENCES

U. S. EPA, "A Compendium of Superfund Field Operations Methods", publication EPA/540/P-87?001, December, 1987.

U. S. EPA, "RCRA Ground-water Technical Enforcement Guidance Document, September 1986.

STANDARD OPERATING PROCEDURE-1060
CALIBRATION AND MAINTENANCE OF FIELD INSTRUMENTS

STANDARD OPERATING PROCEDURE-1060
TABLE OF CONTENTS

STANDARD OPERATING PROCEDURE-1060
CALIBRATION AND MAINTENANCE OF FIELD INSTRUMENTS

1.0 SCOPE OF PROCEDURE

1.1 Purpose of Procedure

Standard Operating Procedures-1060 (SOP-1060) describes the minimum requirements for setup, calibration and maintenance of field instruments to be used for obtaining samples for chemical analyses and to ensure the validity of measurement data generated during the sampling event.

1.2 Scope Covered by SOP-1060

- General Requirements
- Setup Procedures for Field Instruments
- Calibration Procedures for Field Instruments
- Maintenance Schedules for Field Instruments
- Calibration/Maintenance Documentation

1.3 Related Procedures and Documents

- Quality Assurance Project Plan
- Field Measurements (SOP-640)
- Field Reporting and Documentation (SOP-210)
- Equipment Decontamination (SOP-1020)
- Work Plan or Sampling and Analysis Plan (SAP)

1.4 Work Specifications

Setup, calibration and maintenance of field instruments shall be conducted in conformance with the procedures described in this SOP, unless otherwise prescribed in the Work Plan, Sampling and Analysis Plan, or QAPP referencing this SOP. In the event there is a substantive conflict in the specifications presented herein with those presented in the parent document

referencing this SOP, then the specifications in the parent document will be followed to the extent they are different.

1.5 Definitions of Standards

Definitions of terms and adopted standards shall be in accordance with an attachment to this SOP, if so provided. Otherwise, it is intended that they be consistent with those used of implied in the Work Plan, Sampling and Analysis Plan, QAPP, or other parent document referencing this SOP.

1.6 Health and Safety Considerations

This procedure may involve exposure to impacted water, soil or air particulates via routes of dermal contact and inhalation. Accordingly, field personnel should follow the precautions procedures and use the appropriate personal protective equipment described in the approved Health and Safety Plan.

2.0 EXECUTION

2.1 General Requirements and Considerations

Measuring devices must be calibrated before initial use and recalibrated once daily as a minimum or as recommended in the Field Sampling Plan.

Instrument operations must be thoroughly familiar with the operation of measuring instruments. Users should complete the appropriate training and be certified before using the instrument in the field.

Manufacturers' instructions should be followed for correct methods of operation for various measuring devices.

2.2 OVM Photoionization Detector (PID) Model 580B

PIDs must be used, calibrated, and maintained according to the manufacturer's instructions for each specific instrument. The following equipment and materials are needed for the calibration and operation of the PID:

- Photoionization Detector, Model 580B, Thermo Environmental Instruments, Inc.
- Probe assembly with 10.2eV (or other appropriate lamp)
- Battery charger adapter cord
- Calibration gas with control valve and tubing
- Periodic check source (marking pen)
- Field notebook
- Calibration/Survey information to be recorded in calibration logbook
- Appropriate health and safety equipment

Personnel overseeing the calibration and operation of the PID will have an appropriate amount of field experience and/or on-the-job training under the supervision of another qualified person. The personnel will be specifically trained to calibrate, set up, operate, and maintain the PID. The personnel will

also be trained in field data collection and documentation. Personnel using the PID to measure volatile organic compounds are also required to have the appropriate health and safety training as specified in the Health and Safety Plan.

2.2.1 Startup/Shutdown Procedures

Startup procedures for the OVM photoionization tool are as follows:

- Assemble sample inlet tube to OVM.
- Insert power plug into back of OVM.
- Press the ON/OFF switch to ignite lamp and initiate sample pump (indicated by audible sound of pump).
- Unit is ready for calibration.

Shutdown procedures:

- Press the ON/OFF switch to turn unit off.
- Remove power plug.
- Remove inlet tube.

2.2.2 Maintenance and Calibration Schedule

The following maintenance and calibration schedule represents the minimum requirements for operation of the PID tool.

Function	Frequency
Perform routine calibration	Prior to each use; at least once daily
Initiate factory checkout and calibration	Yearly or when malfunctioning or after changing UV light source
Wipe down readout unit	After each use

Clean UV light source window	Every month or as use and site conditions dictate
Clean the ionization chamber	Monthly
Recharge battery	After each use

Instruments should be given a thorough checkout before their first use.

2.2.3 Calibration Procedures (with Regulator)

The calibration of the analyzer can be rapidly checked by the use of a PID small disposable cylinder containing isobutylene with a regulator. After calibration in the factory, the PID tool can be recalibrated in the field as follows:

1. Connect the analyzer to the regulator and cylinder with a short piece of tubing. The calibration gas in the cylinder consists of a mixture of isobutylene and zero air. Isobutylene is nontoxic and safe to use in confined areas. There are no listed exposure levels at any concentration. The regulator sets and controls the flow rate of gas at a value preset at the factory. This will be about 100 to 200 cc/min. It is important that the tubing be clean since contaminated tubing will effect the calibration reading. Do not use the cylinder below about 30 psig as readings below that level can deviate up to 10% from the rated value.
2. Safely discard the disposable cylinder when empty. Do not refill this cylinder. (t is against the law to transport refilled cylinders.)
3. Power-up instrument using power plug.
4. Depress ON/OFF Key to ignite lamp and initiate sample pump.
5. Depress MODE/STORE Key.
6. Depress -/CRSR Key in response to LOG THIS VALUE? Prompt.
7. Depress -/CRSR Key to select Parameters Mode from the Main Menu.
8. Depress +/INC Key to advance through the Run Mode selection parameter prompt.
9. Depress +/INC Key to advance through the Auto Logging Mode parameter prompt.

10. Depress +/INC Key to advance through the Average Time selection parameter prompt.
11. Depress +/INC Key to advance through the Alarm Setting parameter prompt.
12. Depress +/INC Key to advance through Lamp Selection parameter prompt.
13. Depress +/INC Key to advance through Response Factor Setting parameter prompt.
14. Depress RESET Key to initiate calibration sequence.
15. Depress -/CRSR Key to decline restoration of the backup calibration.
16. Connect outlet of calibration tubing assembly to the Model 580B Detector Inlet.
17. Introduce Zero Air to Model 580B by opening flow regulator. Zero air can be either ambient air (if organic free) or from an air cylinder.
18. Depress RESET Key to "Zero" Model 580B.
19. Close Flow Regulator.

Span Calibration - assuming that the Span gas has a concentration of 100 ppm isobutylene the following procedure is followed:

20. Simultaneously Depress RESET and -/CRSR Keys to activate the movable cursor.
21. Repeat Step 18 until the cursor is at the "ones" place.
22. Simultaneously Depress RESET and +/INC Keys to increment the "ones" place value.
23. Repeat Step 20 until the ones place value reads 0.
24. Repeat Step 18 to move cursor to the "tens" place.
25. Repeat Step 20 until the "tens" place value reads 5.
26. Repeat Step 18 to move the cursor to the "hundreds" place.
27. Repeat Step 20 until the "hundreds" place value reads 2.
28. Repeat Step 18 to move the cursor to the "thousands" place.
29. Repeat Step 20 until the "thousands" place values reads 0.
30. The LCD should now read:

    SPAN PPM = 0100
    "+" TO CONTINUE

31. Depress +/INC to accept the span conc. value.
32. Connect isobutylene cylinder (100 ppm) to calibration tubing assembly.
33. Connect outlet of calibration tubing assembly to the Model 580B Detector Inlet.

34. Introduce isobutylene standard to Model 580B by opening flow regulator.
35. Reset key to "CALIBRATE" Model 580B.
36. Close Flow Regulator.
37. Depress +/INC Key in response to "RESET" TO CALIBRATE message.
38. Depress MODE/STORE to return to the Run Mode.

The instrument has been calibrated and is ready to take measurements.

2.3 Dissolved Oxygen Meter

For dissolved oxygen and eH, two types of meters will be used. The two dissolved oxygen meters are the YSI Model 51B meter and the YSI Model 50B meter. The manufacturers' recommendations for the initial setup, ongoing calibration, and routine maintenance will be followed for each meter. These manufacturers' recommendations and procedures will be available with each machine and all such activities will be documented in the instrument log book. The batteries in these machines will be checked daily and a fresh set of batteries will be maintained onsite. Calibration will occur prior to each use, with additional calibrations conducted after no more than five (5) sample measurements. Maintenance or functional checks will be conducted prior to each use.

2.3.1 Setup and Calibration for YSI Model 50B

SETUP PROCEDURES

It is important that before the meter is prepared for use and calibrated, it should be placed in the intended operating position: vertical, tilted, or on its back. Readjustment may be necessary when the instrument operating position is changed. Prepare the probe as described in the probe instructions, then proceed as follows:

1. With switch set to OFF, adjust the meter pointer to zero with the screw in the center of the meter panel. Do not force this adjustment, or you may damage the meter.
2. Switch to ZERO and adjust to zero with the ZERO knob.
3. Switch to FULL SCALE and adjust the FULL SCALE knob until the meter needle aligns with the 15 mark on the mg/L scale.
4. Attach the prepared probe to the probe connector of the instrument and adjust the retaining ring finger tight.
5. Before calibrating, allow 15 minutes for optimum probe stabilization and polarization. Allow 15 minutes for repolarization whenever the instrument has been off, or the probe has been disconnected.

CALIBRATION PROCEDURES

Calibration is accomplished by exposing the probe to a known oxygen concentration, such as water-saturated air (%), or water of a known oxygen content (mg/L), and then adjusting the calibration controls so the meter indicates a reading matching the oxygen concentration of the known sample.

The operator has a choice of three calibration methods: Winkler Titration. Saturated Water, and Air. Experience has shown that air calibration is quite reliable, yet far simpler than the other two methods. Therefore, the air calibration method is presented here.

Daily calibration is generally appropriate. Calibration can be disturbed by physical shock, touching the membrane, fouling of the membrane or drying out of the electrolyte. Check calibration after each series of measurements.

Air Calibration

1. Switch to CALIB O_2.

2. Place the probe in moist air. BOD probes can be placed in partially filled (50 mL) BOD bottles. Other probes can be placed in the 5075A bottle (the one with the hole in the bottom) along with a few drops of water. The probe can also be wrapped loosely in a damp cloth taking care the cloth does not touch the membrane. Wait approximately 10 minutes for temperature stabilization. This may be done at the same time that the probe is stabilizing.
3. Using the CALIB know, set the meter pointer to the mark for the local altitude. Be sure reading is steady. For calibration at altitudes higher than 7000 feet above sea level, see Table II. Recalibration is recommended when you change altitude. A 1000 ft. altitude change can result in a 3% reading error: 0.3 mg/L at 10.0 mg/L.

2.3.2 Setup and Calibration for YSI Model 51B

SETUP

1. Prepare the probe according to the 5700 probe instructions.
2. Connect the probe to the meter, then place the probe in a constant oxygen environment, such as a BOD bottle or the calibration bottle supplied.
3. Set the function switch to the C position. An audible tone will sound. This is a signal that the micro-processor's Power On Self Testing (POST) diagnostic mode has been activated. Simultaneously, the display shown below will appear. Check to see that all meter segments are displayed. A second tone will sound in about 7 seconds to signal the end of the POST diagnosis, and the display will blank briefly.
4. If the POST diagnosis discovers a fault in instrument operation, the display will not appear, or will "freeze". Should this occur, it is necessary to return the instrument for repair to the dealer or to YSI. See Warranty and Repair.

5. Temperature will be displayed after the second tone. Observe the reading for stability. Temperature equilibration may take up to 5 minutes.
6. Set the function switch to either the % or the mg/L position and allow 15 minutes for the system to stabilize. If calibration is attempted prematurely, calibration values will drift and may be out of specification.

It is not necessary or desirable to turn the instrument off after each measurement. In normal laboratory use, the meter may be left on in any switch position between measurements, and turned off only at the end of the day. Each startup from OFF could require a 5 to 15 minute wait for probe stabilization.

CALIBRATION

Calibration is accomplished by exposing the probe to a known oxygen concentration, such as water-saturated air (%), or water of a know oxygen content (mg/L), and then adjusting the calibration controls so the display shows a reading that matches the oxygen concentration of the known sample.

The Model 50B may be calibrated in either air or in water. Both pressure compensated and uncompensated calibration methods are described in the following instructions, which include procedures for Winkler Titration and for calibration in salt water.

Daily calibration is generally appropriate. Calibration can be disturbed by physical shock, touching the membrane, fouling of the membrane or drying out of the electrolyte. Check calibration after each series of measurements, and in time you will develop a realistic schedule for recalibration. When

probes are not in use, store them according to the procedures recommended in Probe Service.

IMPORTANT NOTE: For measurements of the very highest accuracy, particularly when measuring very low oxygen samples, it is desirable to offset the meter zero in order to cancel out any background signals which might influence the reading. This should be done before calibration.

It is quicker and easier to calibrate in air than in water. Experience has shown air calibration to be reliable and accurate, and it is the technique recommended by YSI for the Model 50B.

Calibration in air, for either the % air saturation or the mg/L mode, is quick and simple. Instructions for compensated calibration in air are also given.

Air Calibration

The measurement displayed when the function switch is set to the % position is the percent of oxygen saturation in a liquid sample saturated with air under a barometric pressure of 1013 millibars (760 mm or 29.92 inches of mercury). Measurements resulting from calibration by this method should be reported as % air saturation corrected to "standard pressure".

For highest accuracy, calibrate at a temperature as close as possible to the temperature of the sample to be measured. Proceed as follows:

1. Set the function switch to % CAL.
2. Any of the YSI 5700 Series BOD probes may be placed in a BOD bottle containing about 1" of water to provide a 100% relative humidity calibration environment. To calibrate the YSI 5739 probe, place a moist sponge or a wet piece of cloth in the plastic calibration bottle

provided with the probe. Slip the bottle over the probe guard up to the body. Place the probe in a protected location where temperature is not changing, or wrap in a cloth or other insulator, and allow 3 to 5 minutes for temperature equilibration.

3. Press the CAL key once. 100.0 will appear on the display.
4. Turn the function switch to %. CAL will appear on the display, then one or two audible tones will sound, followed by the display of 100.0 (±0.2). Observe the reading for stability for one minute. Drift in the reading of more than two digits may mean that insufficient time was allowed for instrument stabilization.

This completes Calibration to 100% Air Saturation.

2.4 Combustible Gas (Explosimeter) and Oxygen Gastech Safe T Mate Meter

Procedure for Startup

- Turn the instrument on and wait approximately one minute for the display to stabilize (follow manufacturers recommendations).
- For each channel of detection (except 0_2) adjust the applicable zero potentiometer to obtain a reading of 000 on the display panel.
- For the 0_2 channel, adjust the 0_2 span potentiometer to obtain a reading of 20.9 on the display panel.
- Calibrate the combustible gas channel of detection using the appropriate span gas as recommended by the instrument manufacturer.
- Ensure that instrument alarm points are set at the following levels:

  - 10% LEL (Lower Explosive Limit)
  - 19.5% 0_2 (Oxygen)
  - 23% 0_2

2.4.1 Calibration and Procedure

Calibration procedures for the explosimeter are listed below:

1. Connect the analyzer to a cylinder of combustible gas of known concentration.
2. After the calibration gas is introduced to the instrument, adjust the internal span control to read the standard. If the explosimeter cannot be adjusted to read the standard, then the detector filament must be replaced, and the procedure should be repeated.

The procedures to calibrate the oxygen meter are to compare its reading in ambient air to the value of standard atmospheric oxygen content at the corresponding altitude.

2.4.2 Calibration Schedule

The explosimeter and the oxygen meter must be calibrated before each field use. Also, functional checks must be made prior to each use.

2.5 Orion Model 200 Series pH Meters

The pH meters to be used will be Orion Model 200 series meters, either the Model 250A or Model 290A. These meters are portable, battery operated and micro-processor controlled.

2.5.1 Setup Procedure

1. Attach BNC Shorting Plug (Orion Cat. No. 090045) to BNC connector on top of meter.
2. Press power key to turn meter on.
3. If battery indicator remains on replace battery or use line adapter.

4. Press the POWER key to turn meter off.
5. Press the POWER key and quickly press the YES key to start the self-test. (Alternatively, press and hold the yes key while pressing the power key). The instrument automatically performs electronic and hardware diagnostic tests. See the explanation in the self-test section of the trouble shooting guide, page 47, for a more detailed explanation.
6. After code 7 a "0" will appear on the display. Press each key (the numeric digits will change).
   NOTE: All keys must be pressed within 10 seconds to complete test 7.

7a. Model 230A: After the keypad test the meter will shut off.

7b. Model 250A or Model 290A: After the keypad test the meter will turn off then back on again. After completing the self-test the meter will resume normal operations.

8. If any problems are found during self-test the meter will display the operator assistance code until acknowledged. Check the trouble-shooting section on page 47.
9. Proceed to the specific checkout procedure for either Model 250A or Model 290A, as described in the instruction manual. After successfully completing steps 1 through 5 of The Checkout Procedure the meter is ready to use. Remove the shorting plug.

2.5.2 Calibration Procedure

A one, two, or multi-point calibration should be performed using fresh buffers before pH is measured. It is recommended that a minimum of a two point calibration using buffers that bracket the expected sample range be performed at the beginning of each day to determine the slope of the electrode. This serves the dual purpose of determining if the electrode is working properly and storing the slope value in memory. Perform a one

buffer calibration every two hours to compensate for electrode drift. Use a fresh aliquot of one of the calibration buffers.

2.5.3 Calibration Schedule

Calibration must be conducted prior to each use, with additional calibrations conducted after no more than five (5) sample measurements. Equipment maintenance and functional checks must be made prior to each use.

Prior to calibration, scroll through the setup menu and ensure all parameters are set properly for the analysis you want to perform. Select the resolution desired and verify the isopotential point is set correctly for the electrode.

There are two ways of calibrating the 200 Series autocalibration or manual calibration. Follow the descriptions and instructions for each method as described in the instruction manual.

2.6 Conductivity Meters

Four makes of conductivity meters will be used; all are temperature compensated.

This procedure describes the generic methods for determining the conductivity and temperature of unknown solutions and groundwater using conductivity meters; YSI Model 63, Model 122 & 123, and YSI Models 610D and 610DM. Generally, meters have a readability as low as 2.5 umhos/cm, and a range between 0 to 50,000 umhos/cm. The following procedures are applicable to most conductivity meters. However, field personnel will consult the manufacturers instruction manual for the specific instrument they will use.

For specific information related to each of the above-listed model, refer to the operations manual for each unit.

Setup

1. Adjust meter zero (if necessary) by turning the zero adjusting know screw on the meter face so that the meter needle coincides with the zero on the conductivity scale.
2. Turn the MODE control to REDLINE and adjust the REDLINE control so the meter needle lines up with the redline on the meter face. If this cannot be accomplished, replace the batteries.
3. Plug the probe into the probe jack on the side of the instrument.

Conductivity Measurement

1. Perform calibration check at beginning and end of each day of sampling.
2. Put the probe in the solution to be measured so that there are no obstructions near the probe. Also, be certain the probe is immersed so that the vent hole is submerged.
3. Switch the MODE control to the x100 scale. If the reading is below 50 on the 0-500 range, switch to the x10 scale. If the reading is still below 50, switch to the x1 scale. Read the meter scale and multiply the reading appropriately to get the conductivity in umhos/cm. Record value in field notebook and/or on appropriate form.
4. When measuring on the x100 and x10 scales, depress the CELL TEST button. The meter reading should fall less than 2%; if greater, the probe is fouled. Clean the probe and re-measure. The CELL TEST does not function on the x1 scale.
5. Rotate switch to OFF position. Rinse the probe with deionized (or distilled) water before reinserting it in the next solution.

Temperature Measurement

1. Repeat setup steps 1-3, if necessary.
2. Set MODE control to TEMPERATURE.
3. Place probe into solution to be measured. Allow time for the probe temperature to come to the equilibrium with that of the water before reading.
4. Read the temperature on the bottom scale in degrees celsius.
5. Record value in field notebook and/or on appropriate form.

Maintenance

1. When the cell test indicates low reading, the probable cause is dirty electrodes. For normal cleaning, soak the probe for five minutes with a locally available bathroom tile cleaning preparation. For stronger cleaning, a five minute soak in a solution made of 10 parts distilled water, 10 parts isopropyl alcohol and one part HCl can be used. Rinse the probe with distilled water after cleaning and before storage.
2. Probes are best stored in deionized (or distilled) water. If the probe has been stored dry, soak with deionized (or distilled) water before use.

Calibration Check

Conductivity meters are calibrated to absolute accuracy using a standard solution of 0.001 molal KCl. Standard solutions are available from vendors and can be substituted into the following method if available. To prepare a standard solution:

1. In a one liter flask, dissolve 0.745 grams of pure dry Kcl until the solution is one kilogram in weight.

2. Use table below and the temperature of the water to determine the conductivity of the solution just prepared. Note: This table shows conductivity as if the distilled water was nonconductive. Since even high purity distilled water is slightly conductive, the measured conductivity will be higher by an amount equal to the water's conductivity.

Calibration check with 0.01 dermal KCl solution.

Temperature °C	Conductivity umhos/cm
15	1141.5
16	1167.5
17	1193.6
18	1219.9
19	1246.4
20	1246.4
20	1273.0
21	1299.7
22	1326.6
23	1353.6
24	1380.8
25	1408.1

Temperature °C	Conductivity umhos/cm
26	1436.5
27	1463.2
28	1490.9
29	1518.7
30	1546.7

3. Place probe in solution and measure conductivity. The conductivity of the solution plus the conductivity of the distilled water should not vary from the meter reading by +/- 1.5%. If the reading is greater than 1.5%, clean the probe and then recheck the conductivity. If after cleaning it is not possible to measure the conductivity of the calibration solutions within +/- 1.5%, the probe and instrument should be returned to the manufacturer for calibration and maintenance.

4. When using a vendor standard solutions place the probe in the solution and measure conductivity and temperature. Correct conductivity measurement to 25°C with the following formula:

$$C_{25} = Co/(1+0.0191\ (t-25)$$

Where: C_{25} = Conductivity at 25°

C_0 = Observed conductivity

T = Sample temperature in °C

Compare C_{25} of the sample with the C_{25} of the standard solution. Observe any difference and record results in the field logbook and/or appropriate form.

TEMPERATURE COMPENSATION

The Model 122 has a fixed temperature coefficient (TC) of 2.1% per EC and a fixed reference temperature (Tref) of 25EC. These parameters are sufficient for the majority of "natural water" samples you will encounter.

However, to accurately measure the conductivity of solutions that have a temperature coefficient (TC) other than 2.1% per EC (e.g. acids, leaches, salt solutions, seawater), that solution must be brought to reference temperature (25EC) before being measured.

For exact measurements of very low conductivities (#1mS/cm), meters with special ultrapure water temperature compensation and with the capability to support cells with a cell constant of 0.1 cm^{-1} (i.e. adjustable cell constant settings) are required.

TEMPERATURE MEASUREMENT

1. Immerse the Conductivity Cell into the sample.
2. Turn Conductivity/Temperature Selector Know (lower knob, front panel) to temperature readout (labelled "EC") mode.
3. If the sample temperature falls outside the admissible temperature range of -5 to +50EC, the meter measurement accuracy is no longer "0.2EC"1 digit.

2.7 Metal Detection Instruments

Field personnel conducting a site survey for buried objects (metal) may use a combination of metal detecting instruments, depending on the depth of the objects. Generally, three instruments will be used to locate objects to a depth of approximately 15 feet. The three instruments typically include depth ranges of 0 to 3 feet, 0 to 8 feet, and 0 to 15 feet. Each instrument will be used to compliment the others in a manner which may allow the depth of the object to be approximated. For instance, if an object is detected with the three foot depth range instrument, it must be within three feet of the surface. It then follows that if an object is detected with the eight foot depth range instrument, and cannot be detected with the three foot instrument, it lies between three and eight feet deep.

The following equipment and materials are needed for the operational check and operation of metal detectors:

- Metal detectors suitable for project requirements,
- Rechargeable nickel/cadmium batteries,
- Battery charger,
- Field logbook,
- Survey log forms,
- Appropriate health and safety equipment.

Personnel will be specifically trained to set up the equipment, perform the operational check, operate, and maintain metal detectors. Personnel using metal detectors on hazardous sites are also required to have the appropriate health and safety training, as specified in the site-specific Health and Safety Plan.

The following procedures will be followed for the use of metal detection instruments:

5. Since metal detectors are not precision instruments, they cannot be calibrated in the normal sense. They can, however, be checked for proper operation. The instrument user is responsible for properly checking and operating the instrument prior to each use.
6. Prior to each use, check the batteries by turning the instrument's function switch to battery check. If the batteries are not fully charged, replace them with new or fully charged batteries.
7. Prior to each use, turn the function switch to the operating mode and zero the meter if necessary. Check the operation of the instrument by moving the probe within range of a metal source on the surface. If the instrument does not detect the metal within the limits of its range, return it to the appropriate person or facility for maintenance.
8. Personnel operating the metal detectors in the field will check the battery whenever the unit has not been used for an hour or more. Periodic operation checks will be made by placing the probe near the check source (metal) and checking the readout meter for movement. The readout meter should rise rapidly when the probe is placed near the source. If the unit still does not respond, return it for maintenance. At least two (2) checks must be made daily when used.
9. The survey may be conducted using parallel survey lines four feet apart or by dividing the area into sections or a grid in order to facilitate documentation of results. Area or surface surveys will be conducted by slowly moving the probe assembly over the area or surface to be surveyed. If parallel lines are used, the instruments will be slowly swung from side to side (2 feet either side of the line), as the site is

traversed. If sections are used, the same procedure will be used as for parallel lines with the parallel lines within the sections. This also applies for grids, however, if the grid lines are sufficiently close together they may be used as the parallel lines for survey purposes.

10. The initial survey will be conducted using the instrument with the least range (i.e., 0 to 3 feet). If an object is detected, its location and depth (less than 3 feet) should be documented for further investigation. If no objects are detected with this instrument, the next higher range will be used. If an object is detected with this instrument, its location and depth (between 3 and 8 feet) should be documented. Repeat this process for the highest range instrument.

3.0 DOCUMENTATION

A calibration logbook(s) must be maintained, preferably in the instrument case, and include the following information for each instrument calibrated daily and/or during use by field personnel:

- Name of equipment
- Equipment identification/serial number
- Calibration frequency (daily, weekly, monthly, etc.)
- Date and time of calibration/maintenance check
- Results of calibration
- Standards used (reference lot #, batch #)
- Signature/initials of individual who performed the calibration
- Description of maintenance performed

The following information is to be maintained in the instrument case in addition to the calibration logbook:

- Manufacturer's operating instructions
- Manufacturer's calibration and maintenance instructions
- Local location for purchase of spare and replacement parts (when applicable)

3.1 Non-Conformance with Calibration or Functional Checks

If any instrument does not calibrate within the ranges suggested by the instrument manufacturer, the project manager will be notified, and then the instrument will not be used for field measurements, and a replacement meter ordered, calibrated, and utilized. If functional checks show any instrument not operating properly, the project manager shall be notified, and a replacement instrument ordered. No readings shall be made using equipment not functioning properly.

4.0 REFERENCES

U. S. Environmental Protection Agency, "A Compendium of Superfund Field Operations Methods", EPA/548/P-87/001, December, 1987.

ATTACHMENT 3

FEBRUARY 28, 2003 LETTER TO DEQ

TEMPORARY PIEZOMETERS

environmental
ATKINS

Atkins Environmental
3700 West Robinson, Suite 200
Norman, OK 73072

Telephone 405.321.3895
Fax 405.364.1708

info@atkinsamericas.com
www.atkinsamericas.com

February 28, 2003

Saba Tahmassebi, Ph.D., P.E.
Chief Engineer
Land Protection Division
Oklahoma Department of Environmental Quality
707 North Robinson
P.O. Box 1677
Oklahoma City, OK 73101-1677

RE: Zinc Corporation of America Bartlesville, OK Facility, Permit #OKD000829440, Follow-up to February 7, 2003 Meeting

Dear Dr. Tahmassebi:

This letter is written by Atkins Americas, Inc., Environmental Division (Atkins) at the request of Zinc Corporation of America (ZCA) to provide a response to a suggestion provided by DEQ staff at the recent meeting between ZCA representatives and DEQ. During the February 7, 2003 meeting at DEQ's offices, the suggestion was made that temporary piezometers be utilized in addition to the six (6) groundwater monitoring wells proposed as RCRA post-closure monitoring wells, to define post-construction groundwater flow directions. After considering this suggestion, ZCA asked Atkins to inform the DEQ that ZCA is agreeable to utilizing temporary piezometers as suggested.

Enclosed is a site map (Figure 1) that shows the locations proposed for the temporary piezometers and post-closure monitoring wells. As shown on Figure 1, ZCA proposes to utilize the ten (10) existing wells as temporary piezometers, install five (5) additional temporary piezometers, and utilize water level measurements from the six (6) post-closure groundwater monitoring wells to define post-construction groundwater flow directions.

ZCA proposes that the installed wells and piezometers be utilized as follows:

1. Initial water level measurements will be taken from the 21 locations at the time the five (5) additional temporary piezometers and six (6) RCRA post-closure monitoring wells are installed;
2. Water level measurements will be taken from the 21 locations during subsequent monitoring events;

3. At any time following the fourth quarterly monitoring event, if ZCA believes the groundwater flow direction has been adequately defined, ZCA will so notify the DEQ and request approval from the DEQ to plug and abandon the temporary piezometers; and
4. Upon receipt of the DEQ's approval, ZCA will plug and abandon the fifteen (15) temporary piezometers.

Although ZCA believes the groundwater flow direction is currently well defined and that the proposed locations of the post-closure monitoring wells are in the proper locations, the preceding described process should allow the DEQ to verify the appropriateness of the locations. Furthermore, if DEQ determines that the locations are not appropriate, adjustments to the RCRA groundwater monitoring system can be made at that time.

If you have any questions or comments, please feel free to contact myself at (405) 701-3146 or Mr. Thomas W. Johnston at (724) 773-2214.

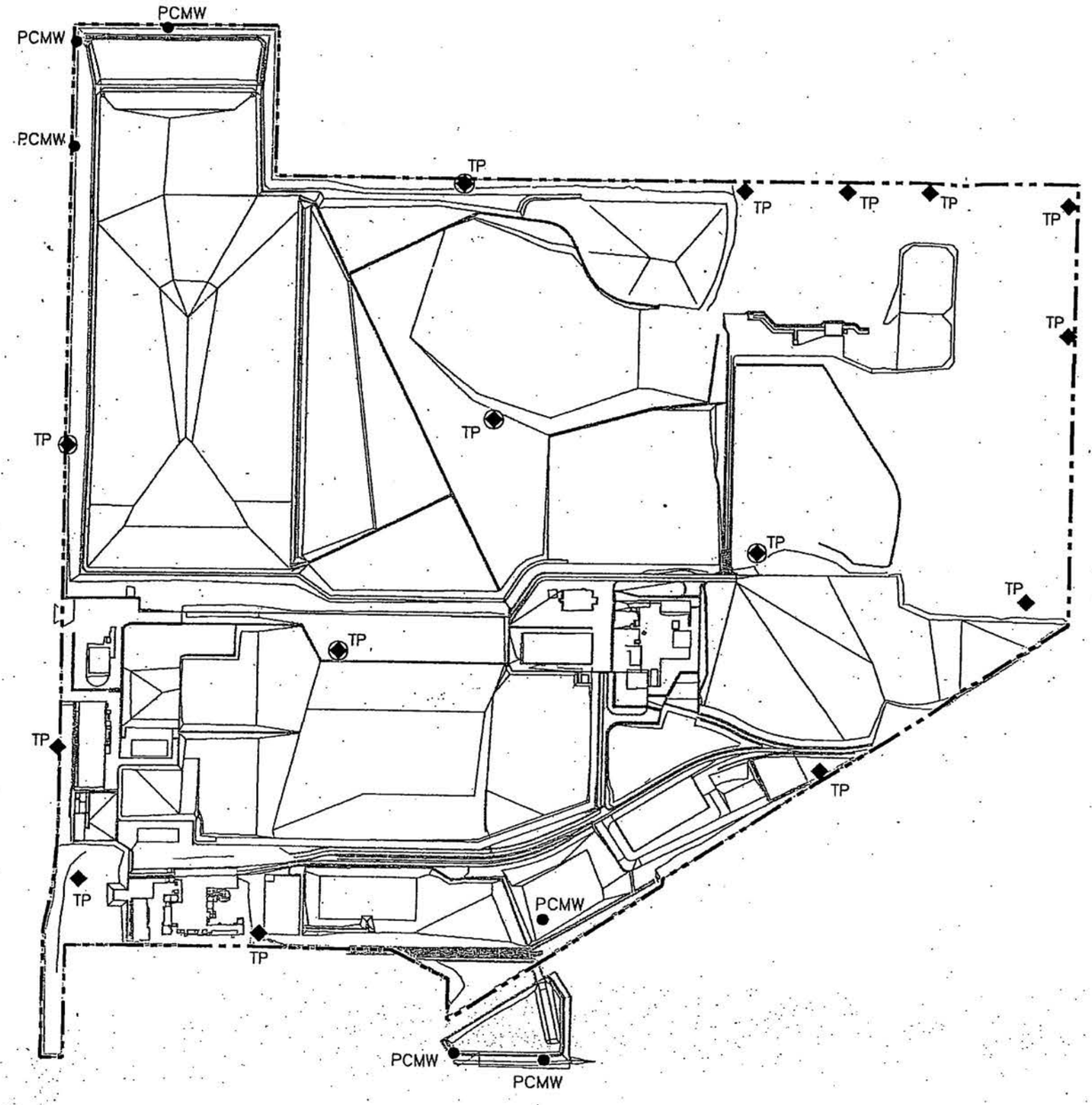
Sincerely,
Atkins Americas Environmental Division

Jack Lawmaster /hh
Jack D. Lawmaster, P.E.
Project Manager

JDL/hh

Enclosure

cc: Thomas W. Johnston, ZCA
J. David Lawson, DEQ
Don Hensch, DEQ
Herschel Roberts, Atkins
Mary Gilkison, Atkins
File



LEGEND

PCMW ● PROPOSED POST CLOSURE MONITORING WELL

TP ◈ PROPOSED TEMPORARY PIEZOMETER

TP ◆ EXISTING MONITORING WELL PROPOSED FOR USE AS TEMPORARY PIEZOMETERS

——— GRADE BREAKLINE

—·—·— PROPERTY LINE

N

400' 0 400' 800'

SCALE FEET

ATKINS

ATKINS AMERICAS, INC.
ENVIRONMENTAL DIVISION
3700 W. Robinson, Suite 200
Norman, Oklahoma 73072
(405) 321-3895
www.atkinsamericas.com

FIGURE TITLE	*PROPOSED TEMPORARY PIEZOMETER LOCATIONS*
DOCUMENT TITLE	FEBRUARY 28, 2003 LETTER TO DEQ
CLIENT	ZINC CORPORATION OF AMERICA
LOCATION	BARTLESVILLE, OKLAHOMA

DATE	02/21/2003
SCALE	AS SHOWN
DESIGNED BY	JL
APPROVED BY	MG
DRAWN BY	LJ

PROJECT NUMBER
9750701 M08
FIGURE NUMBER
1

P:\USOCB\...07\97507\cad\9750701M08.DWG on Feb 28, 2003–10:00am

ATTACHMENT 4

TRAINING PLAN FOR POST-CLOSURE MONITORING

TRAINING PLAN FOR POST-CLOSURE MONITORING
HORSEHEAD CORP.
BARTLESVILLE, OKLAHOMA FACILITY

Prepared for:

Horsehead Corp.
Bartlesville, Oklahoma

Prepared by:

The Benham Companies, LLC
Infrastructure and Environment

3700 W. Robinson, Suite 200
Norman, Oklahoma 73072
(405) 321-3895

2488 E. 81st, Suite 610
Tulsa, Oklahoma 74137
(918) 496-0059

November 2002
Revised October 29, 2004

TABLE OF CONTENTS

LIST OF ATTACHMENTS

Attachment

1 Maintenance Inspection Forms

1.0 INTRODUCTION

Horsehead Corp. (HC) (formerly Zinc Corporation of America (ZCA)) Facility (Facility) is located at Highway 123 and West 11th in Bartlesville, Oklahoma, and includes parts of Sections 11 and 14 of Township 26N, Range 12E, in western Washington County. During its operation, the Facility produced various metals from the smelting and refining of zinc concentrates, secondary materials, and other zinc rich materials. The Facility has undergone closure and corrective action as required by the Resource Conservation and Recovery Act (RCRA) permit number OKD000829440.

This training plan has been prepared to ensure that the remedies put into place at the Facility are properly maintained and that in the event that a remedy fails or an emergency situation arises, facility personnel will be familiar with the types of wastes that are at the Facility and will respond appropriately.

The training discussed in this plan is for facility personnel that will be performing inspections and monitoring of the post-closure structures and who may be in a position to discover emergency situations.

1.1 Regulatory Basis for Post-Closure Monitoring Training

The Oklahoma Department of Environmental Quality (ODEQ) has adopted the Flexible Closure Plan Rule that was promulgated by the Environmental Protection Agency (EPA) on October 22, 1998 (63 FR 57609). When EPA added specific items to be included in applications for post-closure permits, the agency purposefully left out any requirements for training programs. However, at the request of ODEQ, the requirement for personnel training as required by 40 CFR 264.16 is addressed in this training plan. HC agrees with the ODEQ that this is an important element in the overall performance of the post-closure care program.

As allowed by 40 CFR 264.16, the format of the training may be classroom instruction or on-the-job training that teaches personnel to perform their duties in a way that ensures the facility's compliance with the post-closure permit. The training will be directed by a person(s) trained in the proper procedures for performing facility monitoring and inspections.

Facility personnel are required to have the initial 40-hour OSHA Hazwoper training and the annual refresher training. Therefore, this plan does not cover personnel protection.

1.2 Facility Description

HC, a secondary metals recovery facility, is the only current operation on-site. Ancillary features that support HC include storage buildings, administrative offices, a boiler house, a Process Water Treatment Facility (PWTF), and an Underground Injection Control (UIC) well system. Infrastructure components include roadways, rail spurs and utilities.

Between 1907 and 1991, at which time the facility became regulated under RCRA, zinc refining was performed continuously at the Site. During this period, waste materials were managed and deposited across much of the site. As a result, numerous Solid Waste Management Units (SWMUs) were created, including Landfill LF.1, a permitted RCRA unit.

The Corrective Measures Alternative selected by the ODEQ, and subsequently implemented, primarily consisted of the following three measures:

1. Demolition of certain buildings and structures, abandonment of underground utilities and relocation of those utilities above-ground;
2. Construction of a final cover system consisting of:
    a. Soil and vegetative cover;
    b. Multimedia cap; and
    c. Paved surfaces; and
3. Installation of surface water controls.

These measures were developed to provide total containment of wastes and prevent environmental impact and human contact with materials.

The permitted RCRA unit, Landfill LF.1, has been closed.

For the purposes of corrective action, the Facility was divided into five distinct areas as follows:

- Northeast Area
- Class I Area
- Class II Area
- Class III Area
- Class IV Area

All SWMUs encompassed by the five areas described above, including a Corrective Action Management Unit (CAMU), are also closed. This Post-Closure Training Plan addresses the post-closure inspection and monitoring activities that will be implemented for Landfill LF.1, Class Areas I, II, III, and IV, and the Northeast Area. The areas not addressed in this plan include the following:

- Active areas of the Facility
- Underground Injection Control System – separately permitted by the ODEQ
- Operation and maintenance of the PCAs and their appurtenances – managed in accordance with the Facility's Operation and Maintenance Plan
- No-Name Creek Off Site Flow Improvements

The Facility Operation and Maintenance Plan, includes maintenance requirements for the off-site upper reaches of No-Name Creek, as required in an agreement with the City of Bartlesville, to ensure that the improved portions of the creek are maintained.

1.3 Facility Storm Water Management

Facility surface water runoff may be generally classified as follows:

- Runoff from active industrial areas
- Runoff from non-industrial areas

Active industrial areas have been defined as those areas in the immediate vicinity of the HC Process Area (Process Area) and the PWTF.

1.3.1 Active Industrial Areas Storm Water Management

Drainage controls direct surface water runoff from the Process Area into a process containment area (PCA). A PCA is essentially a large concrete containment area equipped with transfer pumps to remove water following a precipitation event. Surface water runoff from the PWTF Area is directed into a separate PCA.

Storm water collected in the Process Area PCA is combined with gray water and boiler sump water and either transferred to tanks for reuse or pumped to the PWTF for treatment and subsequent injection into the permitted UIC wells. Runoff collected in the PWTF PCA is treated at the PWTF and injected into the UIC wells.

During significant storm events, the PCAs are designed to receive the initial surge of storm water and contain a runoff volume equivalent to at least the 25-year, 24-hour rainfall event. After filling, the excess storm water will bypass the PCAs and flow into the Central Drainage System (CDS) which discharges to No-Name Creek. The Storm Water Pollution Prevention Plan (SWPPP) required under the ODEQ General Permit for Storm Water Discharge contains best management practices, including a provision to shutdown the HC Plant, in the event that a bypass discharge is imminent or occurs.

1.3.2 Non-Industrial Areas Storm Water Management

All facility surface water from non-industrial areas, either vegetated or paved, is discharged off-site. A minor portion of this facility surface water from non-industrial areas is discharged directly off-site. However, the majority of the storm water is routed through the CDS to No-Name Creek.

2.0 TRAINING PROGRAM OUTLINE

The training program will cover the following topics:

- Groundwater Monitoring
- Inspections and Maintenance (i.e., repairs)
- Incidental Spills

The information presented for each of these topics is discussed below.

2.1 Groundwater Monitoring Training

Groundwater monitoring will be performed in accordance with the requirements set forth in the post-closure permit.

Currently, trained environmental contractors perform groundwater monitoring. It is anticipated that the groundwater monitoring program will continue to be performed by contractors; however, HC may train and use their own personnel for the monitoring. The contractors hired to perform groundwater monitoring will already be trained in the proper procedures for environmental groundwater monitoring and sampling.

Facility personnel not required to perform groundwater monitoring will not be required to undergo the groundwater monitoring training. However, in the event that facility personnel are required to perform groundwater monitoring or sampling in the future, the HC personnel will be trained.

The following items will be addressed as part of the training:

- Number of Wells for Monitoring
- Well Locations
- Sampling Frequency
- Proper Sampling Procedures and Standard Operating Procedures

2.2 Inspection and Maintenance Training

Inspections and maintenance will be performed in accordance with the requirements set forth in the post-closure permit.

The following items will be addressed in training:

- Monitoring well inspections and maintenance
- Storm water drainage structure inspections and maintenance
- Utility structure inspections and maintenance
- Fencing inspections and maintenance
- Paved areas inspections and maintenance
- Portland cement concrete structure inspections and maintenance
- Railroad inspections and maintenance
- Soil and vegetative cover system inspections and maintenance
- Landscaped areas inspections and maintenance

All inspection and maintenance items are included in the maintenance inspection forms provided in Attachment 1 and are discussed below.

Certain inspections, described in the following sections of this training plan, will be performed after each heavy storm event for a period of one year. For the purposes of this Plan, a heavy storm event is defined as one in which 1.0 inch or greater rainfall occurs over a 24-hour period or less.

If, during the first year there is no evidence of erosion, washouts or subsidence, the frequency of inspections may be reduced at the discretion of HC, but not to less frequently than annually.

Inspectors will either be able to make repairs themselves based on the deficiencies found during their inspection, or they will have the repairs made by another party but will then re-inspect the repaired item to ensure that the repairs were made correctly.

2.2.1 Monitoring Well Inspections and Maintenance

The Facility will maintain six wells for post-closure monitoring. The components of the each well's surface protection system include a surface protective well pad and an outer protective casing with a locking cap. Inspectors will be trained to recognize whether wells are in good physical condition or whether the wells have been damaged.

Monitoring wells that are found to be damaged during inspection will be repaired prior to the next scheduled sampling event.

2.2.2 Storm Water Drainage Structures (Hydraulic Control Structures)

Storm water runoff conveyance consists of gravity flow, using vegetated swales, concrete gutters and channels, and a central subsurface 54-inch diameter HDPE drainage pipe. Inspectors will be trained on recognizing problems associated with these drainage structures, including sediment and debris buildup; concrete cracking; erosion; and joint distress.

After heavy storm events, all drainage structures will be visually inspected during a site walk, for sediment and debris accumulation. However for safety reasons, entry into the 54-inch diameter pipe will not be required as part of this inspection. If visual inspection of the pipe entrance, drop inlet structures, and exit indicates drainage problems exist in the 54-inch diameter pipe, a contractor trained in confined space entry will be utilized to perform a complete inspection of the pipe and/or perform any necessary maintenance.

Sediment and debris removal is the primary maintenance item for the storm water drainage structures. Any significant sediment or debris accumulations noted during the inspection of the structures will be removed and appropriately disposed. All subgrade drains will be cleaned as required to maintain proper operating conditions. Cracking or displacement of concrete structures will be repaired since such damage compromises performance.

Riprap has been placed at the outlet of the channel that connects the paved areas of the western portion of the Class II Area to the central Class II Area. The function of the riprap is to protect the channel against erosion. This riprap will be inspected and riprap that has washed or slid out of place will be recovered and the affected area reconstructed with rip-rap materials meeting the requirements of the design specifications. The filter fabric underlying the rip-rap will also be replaced as needed.

2.2.3 Utility Structures

Concrete foundations and poles and sleepers supporting the overhead utility service penetrate the soil cover system. Soil shrinkage around utility poles, sleepers, and adjacent to foundations will generally be self-healing but inspectors will be trained on recognizing what is acceptable space between the structures and soil cover system.

Spacing gaps of 2 inches or greater around poles and sleepers supporting the overhead utility service or the concrete foundations associated with the UIC system, will be filled in with clean soil to limit erosion and infiltration.

2.2.4 Fencing

Inspectors will be trained to inspect fencing to identify any damage that could occur as a result of vandalism, mowing equipment, or other causes.

Any fence damage will be repaired immediately to maintain security.

2.2.5 Paved Areas

Inspectors will be trained to inspect paved areas (including roads) located within the Facility for aging, cracking, rutting, corrugating, and shoving.

Paved areas (including roads) located within the Facility are constructed of an asphaltic concrete paving and will be maintained for aging, cracking, rutting, corrugating, and shoving. Distressed areas will be repaired as soon as possible to reduce further deterioration and maintain pavement serviceability.

Joint and crack treatment will be performed to prevent potential subgrade damage and progressive pavement failure. All pavement openings will be sealed or filled with a high quality crack treatment material specifically designed for the intended application, and in accordance with the manufacturer's recommendation. Crack opening sizes, potential movements, edge deterioration and frequency of occurrence will determine the method of repair.

Additionally, surface treatments, to reduce the effects of asphalt aging will be performed at least every five years to maintain the life expectancy of the pavement. Surface treatments may also be required in areas where frequent cracking is present. A competent paving contractor will be consulted for the appropriate materials and methods for repair.

Pavement distress resulting from excessive deflection shall be repaired by deep patching the affected area to the depth required for adequate subgrade support. All distressed areas will be repaired as soon as practicable after discovery to reduce progressive failures.

2.2.6 Portland Cement Concrete Structures

Inspectors will be trained to inspect Portland cement concrete headwalls, retaining walls, v-gutters, u-gutters and crane use areas located within the Facility for joint and concrete distress.

Distressed areas will be repaired as soon as possible to reduce further deterioration. Joint and crack sealing will be performed to prevent potential subgrade damage and progressive failure of the surfacing. Cracks will be sealed as soon as practicable after they have developed. Joints shall be resealed as necessary. All sealing activities shall be performed using a high quality joint sealing material suitable for the application and installed in accordance with the manufacturer's recommendation.

2.2.7 Railroads

The railroad tracks and ballast at the Facility are constructed on an asphaltic concrete underlayment. Inspectors will be trained to inspect the railroad bed for track distress, deflection and misalignment, and for ballast displacement. Switch and frog systems will also be inspected for proper operational condition and wear. All deficiencies noted during inspection will be repaired as soon as possible to reduce further deterioration.

2.2.8 Soil and Vegetative Cover System

The soil cover system has a permanent vegetative cover. The function of the vegetative cover is to provide protection against wind and water erosion of the soil cover. Inspectors will be trained to inspect the soil cover system in year one and annually thereafter as follows:

- Vegetated areas will be inspected for bare spots, washouts, and healthy growth after heavy storm events for the first year and at least annually thereafter.
- All drainage control structures in areas with a soil and vegetative cover system will be inspected after heavy storm events for the first year and at least annually thereafter.
- All structures associated with the soil and vegetative cover system will be inspected according to the inspection schedule to ensure they are maintained in good working order.
- All cover systems will be inspected for unauthorized excavations.

If there is evidence of erosion, washouts or subsidence of the caps or covers, steps will be taken to repair the damage and fully restore the vegetative cover.

The following maintenance will be used to maintain the soil cover system in year one and thereafter:

- Vegetated areas found to have bare spots greater than approximately two feet across will be fully restored.
- Sediment will be removed from v-gutters and swales as required to maintain proper drainage and appropriately disposed.

2.2.8.1 Mowing

Mowing will be performed as necessary during the Bermuda grass growing season so as to maintain desired grass height. A minimum cutting height of 2.5 inches is recommended during the summer months. At least three cuttings per year is recommended to prevent buildup of dry matter. Mowing will not be performed when the soil is wet, to avoid rutting of the cover soils.

2.2.8.2 Re-establishment of Vegetative Cover

Soil replacement and re-vegetation will be required in areas where erosion has occurred. Areas where the vegetative cover has been damaged or destroyed such as by vehicular traffic, drought, mowing equipment, etc., will also require revegetation. Revegetation will be established by hydroseeding with Bermuda grass seed, sprigging, or sodding, in accordance with the design specifications for revegetation (Reference Construction Documents Specification Section 02931 – Revegetation). If used, herbicides should be applied in a manner consistent with the manufacturer's instructions.

2.2.8.3 Intrusive Plants

Excessive intrusive plant growth in the Bermuda grass is undesirable and should be controlled until a vigorous stand of grass is established. Once a vigorous stand of grass is established, no weed control measures are anticipated to be necessary. Control measures will be implemented as necessary during the first two growing seasons of the post-closure period to ensure a vigorous stand of grass is established and excessive intrusive plant growth is prevented. Control measures may include irrigation, fertilization, mowing, and application of herbicides.

2.2.8.4 Erosion

Erosion of the soil cover system may occur by wind or rain. Inspections will determine if wind or rain has eroded the cover system significantly. In the event that erosion occurs, the severity of the erosion will be assessed and steps taken to fill in eroded areas and re-establish vegetation.

2.2.8.5 Burrowing Animals

If extensive damage to the vegetative cover from burrowing animals is observed, it may be necessary to implement an eradication or control program. Grub control is the most effective means of preventing mole intrusions. Pesticide granules or liquids applied in late August per the manufacturer's recommendations should be effective in controlling grubs.

2.2.8.6 Subsidence

There is minor tolerance for subsidence due to the slight grades of the drainage structures. The cover system will be inspected for ponding or evidence of subsidence. Fill material will be placed in areas where subsidence interferes with proper drainage of the cover system. Revegetation of fill areas will also be required.

2.2.9 Landscaped Areas (trees/shrubs)

The landscaped areas contain several varieties of trees and shrubs. Inspectors will be trained to inspect trees and shrubs during the first growing season to maintain healthy growth, proper moisture level, and to prevent damage from intrusive plants and insects. Thereafter, an annual inspection in the spring will be performed.

Decaying root systems from dying or dead trees and shrubs can affect the performance of the cover and slopes. Therefore, early detection and proper treatment of potentially dying or distressed plants is required for long-term performance of the cover system.

2.3 Incidental Spills Training

There is a potential for spills to occur at the facility if overhead piping that is carrying wastewater from the Process Area to the PWTF and from the PWTF to the UIC wells becomes damaged and stormwater leaks or spills on the ground.

Inspectors will be trained to routinely inspect overhead piping and on the appropriate measures to take if a leak or spill occurs.

3.0 ADMINISTRATIVE REQUIREMENTS

In accordance with 40 CFR 264.16, the following requirements will be met for facility personnel required to have the training discussed in this plan.

- Facility personnel shall successfully complete the training program within six months of the effective date of the post-closure permit or six months after the date of their employment or assignment to the facility, or to a new position at the facility, whichever is later. Employees hired must not work in unsupervised positions until they have completed the training.
- Facility personnel must take part in an annual review of the initial training.
- HC must maintain the following for employees that must undergo the training:
  - Job title and the name of the employee filling the job
  - Written job description including the requisite skill, education, or other qualifications, and duties of the employee assigned to the position
  - Written description of the type and amount of both introductory and continuing training given
  - Records that document the training or job experience that has been given to, and completed by, facility personnel
- Training records on current personnel will be kept until post-closure of the facility has been completed; training records on former employees will be kept for at least three years form the date the employee last worked at the facility.

ATTACHMENT 5

MAINTENANCE INSPECTION FORMS

MAINTENANCE INSPECTION FORM – HEAVY STORM EVENTS
POST-CLOSURE PLAN REQUIREMENTS

INSPECTION DATE: _____ **TIME:** _____

INSPECTOR'S NAME: _____ **TITLE:** _____

A. REASON FOR INSPECTION:	_____ Heavy Storm Event _____ Other, Specify _____
B. AREA INSPECTED/ FINDINGS:	Describe each item found to be deficient in the "Describe Deficiencies" spaces provided below. Continue on separate sheet if necessary.
1. Soil, Vegetative and Landscaped Cover System	Any sign of erosion? ___YES ___NO Any sign of subsidence? ___YES ___NO Any sign of oil or leachate resurfacing? ___YES ___NO Is ponding occurring? ___YES ___NO Any bare spots or washouts? ___YES ___NO **Describe Deficiencies:**
2. Hydraulic Control Structures	GUTTERS, CHANNELS, AND HEADWALLS Are concrete gutters free of sediment and debris? ___YES ___NO Any signs of cracking or other distress in concrete? ___YES ___NO Any signs of joint distress? ___YES ___NO Any signs of displacement in concrete sections? ___YES ___NO Is riprap in place? ___YES ___NO **Describe Deficiencies:**

EARTHEN BERMS AND SWALES

Is there any sign of erosion?	____YES ____NO
Is there any evidence of embankment surface cracking?	____YES ____NO
Is there any evidence of slope sloughing?	____YES ____NO
Are there any other signs of slope distress?	____YES ____NO

Describe Deficiencies:

HDPE PIPE (30-inch and 54-inch diameter)

Is pipe free of sediment and debris?	____YES ____NO
Are manholes/drop inlets free of obstructions?	____YES ____NO
Are varmint screens in place?	____YES ____NO

Describe Deficiencies:

C. LIST PROBLEMS NOTED AND THE CORRESPONDING REMEDIAL ACTION. IF NO PROBLEMS ARE NOTED, CERTIFY IN SECTION (E) THAT THE FACILITY IS IN COMPLIANCE WITH THE POST-CLOSURE PLAN.

D. POST-CLOSURE PLAN REVISION NECESSARY? _____ Yes _____ No

Item:

Reason:

E. CERTIFICATION

I, _____, hereby certify that the Facility has been inspected for the items listed herein, and is in
(Print Name)

compliance with the Post-Closure Plan.

Signed: _____ Date: _____

MAINTENANCE INSPECTION FORM - SEMI-ANNUAL
POST-CLOSURE PLAN REQUIREMENTS

INSPECTION DATE:_____ **TIME:**_____

INSPECTOR'S NAME:_____ **TITLE:**_____

A. REASON FOR INSPECTION:	_____Routine semi-annual inspection _____Other, Specify_____
B. AREA INSPECTED/ FINDINGS:	Describe each item found to be deficient in the "Describe Deficiencies" spaces provided below. Continue on separate sheet if necessary.
1. Hydraulic Control Structures	GUTTERS, CHANNELS, AND HEADWALLS Are concrete gutters free of sediment and debris? ___YES ___NO Any signs of cracking or other distress in concrete? ___YES ___NO Any signs of joint distress? ___YES ___NO Any signs of displacement in concrete sections? ___YES ___NO Is riprap in place? ___YES ___NO **Describe Deficiencies:** EARTHEN BERMS AND SWALES Is there any sign of erosion? ___YES ___NO Is there any evidence of embankment surface cracking? ___YES ___NO Is there any evidence of slope sloughing? ___YES ___NO Are there any other signs of slope distress? ___YES ___NO **Describe Deficiencies:** HDPE PIPE (30-inch and 54-inch diameter) Is pipe free of sediment and debris? ___YES ___NO Are manholes/drop inlets free of obstructions? ___YES ___NO Are varmint screens in place? ___YES ___NO **Describe Deficiencies:**

2. Fences	Is there any evidence of fence damage or openings? ____YES ____NO Are gates functioning properly? ____YES ____NO Are signs legible and in-place? ____YES ____NO **Describe Deficiencies:**

C. LIST PROBLEMS NOTED AND THE CORRESPONDING REMEDIAL ACTION. IF NO PROBLEMS ARE NOTED, CERTIFY IN SECTION (E) THAT THE FACILITY IS IN COMPLIANCE WITH THE POST-CLOSURE PLAN.

D. POST-CLOSURE PLAN REVISION NECESSARY? Yes No

Item:

Reason:

E. CERTIFICATION

I, _____, hereby certify that the Facility has been inspected for the items listed herein, and is in
(Print Name)
compliance with the Post-Closure Plan.

Signed: _____ Date: _____

MAINTENANCE INSPECTION FORM - ANNUAL
POST-CLOSURE PLAN REQUIREMENTS

INSPECTION DATE: _____ **TIME:** _____

INSPECTOR'S NAME: _____ **TITLE:** _____

A. REASON FOR INSPECTION:	_____Routine annual inspection _____Other, Specify_____
B. AREA INSPECTED/ FINDINGS:	Describe each item found to be deficient in the "Describe Deficiencies" spaces provided below. Continue on separate sheet if necessary.
1. Soil, Vegetative and Landscaped Cover System	Any sign of erosion? ____YES ____NO Any sign of intrusive plants that need removal? ____YES ____NO Any sign of burrowing animals? ____YES ____NO Any sign of subsidence? ____YES ____NO Any sign of oil or leachate resurfacing? ____YES ____NO Is ponding occurring? ____YES ____NO Any bare spots or washouts? ____YES ____NO Does grass appear to be well maintained and healthy? ____YES ____NO Is there any evidence of tree/shrub distress? ____YES ____NO **Describe Deficiencies:**
2. Hydraulic Control Structures	GUTTERS, CHANNELS, AND HEADWALLS Are concrete gutters free of sediment and debris? ____YES ____NO Any signs of cracking or other distress in concrete? ____YES ____NO Any signs of joint distress? ____YES ____NO Any signs of displacement in concrete sections? ____YES ____NO Is riprap in place? ____YES ____NO **Describe Deficiencies:**

	EARTHEN BERMS AND SWALES Is there any sign of erosion? ____YES ____NO Is there any evidence of embankment surface cracking? ____YES ____NO Is there any evidence of slope sloughing? ____YES ____NO Are there any other signs of slope distress? ____YES ____NO **Describe Deficiencies:** HDPE PIPE (30-inch and 54-inch diameter) Is pipe free of sediment and debris? ____YES ____NO Are manholes/drop inlets free of obstructions? ____YES ____NO Are varmint screens in place? ____YES ____NO **Describe Deficiencies:**
3. Concrete: Pavements, Slabs, and Retaining Walls	Is there evidence of cracking or other distress? ____YES ____NO Is there evidence of joint or sealant deterioration? ____YES ____NO Is there evidence of displacement? ____YES ____NO **Describe Deficiencies (Indicate type, size and location of distress):**

4. Maintenance of Soil Cover Around Structures	Is there evidence of soil shrinkage (2" or greater) around structures? ____YES ____NO **If so, list structures and the location of shrinkage:**
5. Railroads	Is there any evidence of track displacement or misalignment? ____YES ____NO Is there any evidence of ballast displacement? ____YES ____NO Are all switches in operational condition? ____YES ____NO **Describe Deficiencies:**
6. Fences	Is there any evidence of fence damage or openings? ____YES ____NO Are gates functioning properly? ____YES ____NO Are sign legible and in-place? ____YES ____NO **Describe Deficiencies:**

7. Groundwater Monitoring Wells	Is the inner casing cracked, broken, or deteriorating? ____YES ____NO Is the inner casing cap in place and not broken? ____YES ____NO Is the inner cap seal in operable condition? ____YES ____NO Is the outer cover housing broken? ____YES ____NO Is the outer cover in place and not broken? ____YES ____NO Is the outer cover seal in operable condition? ____YES ____NO Is the lock in good working order? ____YES ____NO Is the well pad damaged or deteriorating? ____YES ____NO **Describe Deficiencies:**
8. Asphalt Paving	Is there evidence of cracking or other distress? ____YES ____NO Is there evidence of joint or sealant deterioration? ____YES ____NO Is there evidence of displacement? ____YES ____NO **Describe Deficiencies (Indicate type, size and location of distress):**

C. LIST PROBLEMS NOTED AND THE CORRESPONDING REMEDIAL ACTION. IF NO PROBLEMS ARE NOTED, CERTIFY IN SECTION (E) THAT THE FACILITY IS IN COMPLIANCE WITH THE POST-CLOSURE PLAN.

D. POST-CLOSURE PLAN REVISION NECESSARY? _____ Yes _____ No

Item:

Reason:

E. CERTIFICATION

I, _____, hereby certify that the Facility has been inspected for the items listed herein, and is in
(Print Name)

compliance with the Post-Closure Plan.

Signed: _____ Date: _____

MAINTENANCE INSPECTION FORM
GROUNDWATER MONITORING WELLS SAMPLING EVENTS
POST-CLOSURE PLAN REQUIREMENTS

INSPECTION DATE:_____ **TIME:**_____

INSPECTOR'S NAME:_____ **TITLE:**_____

A. REASON FOR INSPECTION:	_____Routine semi-annual groundwater sampling _____Other, Specify_____
B. AREA INSPECTED/ FINDINGS:	Describe each item found to be deficient in the "Describe Deficiencies" spaces provided below. Continue on separate sheet if necessary.
1. Groundwater Monitoring Wells	Is the inner casing cracked, broken, or deteriorating? ____YES ____NO Is the inner casing cap in place and not broken? ____YES ____NO Is the inner cap seal in operable condition? ____YES ____NO Is the outer cover housing broken? ____YES ____NO Is the outer cover in place and not broken? ____YES ____NO Is the outer cover seal in operable condition? ____YES ____NO Is the lock in good working order? ____YES ____NO Is the well pad damaged or deteriorating? ____YES ____NO **Describe Deficiencies:**

C. LIST PROBLEMS NOTED AND THE CORRESPONDING REMEDIAL ACTION. IF NO PROBLEMS ARE NOTED, CERTIFY IN SECTION (E) THAT THE FACILITY IS IN COMPLIANCE WITH THE O&M PLAN.

D. POST-CLOSURE PLAN REVISION NECESSARY? _____ YES NO

Item:

Reason:

E. CERTIFICATION

I, _____, hereby certify that the Facility has been inspected for the items listed herein, and is in compliance
(Print name)
with the O&M Plan.

Signed: _____ Date: _____

ATTACHMENT 5
MAINTENANCE INSPECTION FORMS

MAINTENANCE INSPECTION FORM – HEAVY STORM EVENTS
POST-CLOSURE PLAN REQUIREMENTS

INSPECTION DATE: _____ **TIME:** _____

INSPECTOR'S NAME: _____ **TITLE:** _____

A. REASON FOR INSPECTION:	_____Heavy Storm Event _____Other, Specify_____
B. AREA INSPECTED/ FINDINGS:	Describe each item found to be deficient in the "Describe Deficiencies" spaces provided below. Continue on separate sheet if necessary.
1. Soil, Vegetative and Landscaped Cover System	Any sign of erosion? ____YES ____NO Any sign of subsidence? ____YES ____NO Any sign of oil or leachate resurfacing? ____YES ____NO Is ponding occurring? ____YES ____NO Any bare spots or washouts? ____YES ____NO **Describe Deficiencies:**
2. Hydraulic Control Structures	GUTTERS, CHANNELS, AND HEADWALLS Are concrete gutters free of sediment and debris? ____YES ____NO Any signs of cracking or other distress in concrete? ____YES ____NO Any signs of joint distress? ____YES ____NO Any signs of displacement in concrete sections? ____YES ____NO Is riprap in place? ____YES ____NO **Describe Deficiencies:**

EARTHEN BERMS AND SWALES

Is there any sign of erosion?	____YES ____NO
Is there any evidence of embankment surface cracking?	____YES ____NO
Is there any evidence of slope sloughing?	____YES ____NO
Are there any other signs of slope distress?	____YES ____NO

Describe Deficiencies:

HDPE PIPE (30-inch and 54-inch diameter)

Is pipe free of sediment and debris?	____YES ____NO
Are manholes/drop inlets free of obstructions?	____YES ____NO
Are varmint screens in place?	____YES ____NO

Describe Deficiencies:

C. LIST PROBLEMS NOTED AND THE CORRESPONDING REMEDIAL ACTION. IF NO PROBLEMS ARE NOTED, CERTIFY IN SECTION (E) THAT THE FACILITY IS IN COMPLIANCE WITH THE POST-CLOSURE PLAN.

D. POST-CLOSURE PLAN REVISION NECESSARY? _____ Yes _____ No

Item:

Reason:

E. CERTIFICATION

I, _____, hereby certify that the Facility has been inspected for the items listed herein, and is in
(Print Name)

compliance with the Post-Closure Plan.

Signed: _____ Date: _____

MAINTENANCE INSPECTION FORM - SEMI-ANNUAL
POST-CLOSURE PLAN REQUIREMENTS

INSPECTION DATE:_____ **TIME:**_____

INSPECTOR'S NAME:_____ **TITLE:**_____

A. REASON FOR INSPECTION:	_____Routine semi-annual inspection _____Other, Specify_____
B. AREA INSPECTED/ FINDINGS:	Describe each item found to be deficient in the "Describe Deficiencies" spaces provided below. Continue on separate sheet if necessary.
1. Hydraulic Control Structures	<u>GUTTERS, CHANNELS, AND HEADWALLS</u> Are concrete gutters free of sediment and debris? ___YES ___NO Any signs of cracking or other distress in concrete? ___YES ___NO Any signs of joint distress? ___YES ___NO Any signs of displacement in concrete sections? ___YES ___NO Is riprap in place? ___YES ___NO **Describe Deficiencies:** <u>EARTHEN BERMS AND SWALES</u> Is there any sign of erosion? ___YES ___NO Is there any evidence of embankment surface cracking? ___YES ___NO Is there any evidence of slope sloughing? ___YES ___NO Are there any other signs of slope distress? ___YES ___NO **Describe Deficiencies:** <u>HDPE PIPE (30-inch and 54-inch diameter)</u> Is pipe free of sediment and debris? ___YES ___NO Are manholes/drop inlets free of obstructions? ___YES ___NO Are varmint screens in place? ___YES ___NO **Describe Deficiencies:**

2. Fences	Is there any evidence of fence damage or openings? ____YES ____NO Are gates functioning properly? ____YES ____NO Are signs legible and in-place? ____YES ____NO **Describe Deficiencies:**

C. LIST PROBLEMS NOTED AND THE CORRESPONDING REMEDIAL ACTION. IF NO PROBLEMS ARE NOTED, CERTIFY IN SECTION (E) THAT THE FACILITY IS IN COMPLIANCE WITH THE POST-CLOSURE PLAN.

D. POST-CLOSURE PLAN REVISION NECESSARY? Yes No

Item:

Reason:

E. CERTIFICATION

I, _____, hereby certify that the Facility has been inspected for the items listed herein, and is in
(Print Name)
compliance with the Post-Closure Plan.

Signed: _____ Date: _____

MAINTENANCE INSPECTION FORM - ANNUAL
POST-CLOSURE PLAN REQUIREMENTS

INSPECTION DATE: _____ **TIME:** _____

INSPECTOR'S NAME: _____ **TITLE:** _____

A. REASON FOR INSPECTION:	_____Routine annual inspection _____Other, Specify_____
B. AREA INSPECTED/ FINDINGS:	Describe each item found to be deficient in the "Describe Deficiencies" spaces provided below. Continue on separate sheet if necessary.
1. Soil, Vegetative and Landscaped Cover System	Any sign of erosion? ____YES ____NO Any sign of intrusive plants that need removal? ____YES ____NO Any sign of burrowing animals? ____YES ____NO Any sign of subsidence? ____YES ____NO Any sign of oil or leachate resurfacing? ____YES ____NO Is ponding occurring? ____YES ____NO Any bare spots or washouts? ____YES ____NO Does grass appear to be well maintained and healthy? ____YES ____NO Is there any evidence of tree/shrub distress? ____YES ____NO **Describe Deficiencies:**
2. Hydraulic Control Structures	GUTTERS, CHANNELS, AND HEADWALLS Are concrete gutters free of sediment and debris? ____YES ____NO Any signs of cracking or other distress in concrete? ____YES ____NO Any signs of joint distress? ____YES ____NO Any signs of displacement in concrete sections? ____YES ____NO Is riprap in place? ____YES ____NO **Describe Deficiencies:**

	EARTHEN BERMS AND SWALES Is there any sign of erosion? ____YES ____NO Is there any evidence of embankment surface cracking? ____YES ____NO Is there any evidence of slope sloughing? ____YES ____NO Are there any other signs of slope distress? ____YES ____NO **Describe Deficiencies:** HDPE PIPE (30-inch and 54-inch diameter) Is pipe free of sediment and debris? ____YES ____NO Are manholes/drop inlets free of obstructions? ____YES ____NO Are varmint screens in place? ____YES ____NO **Describe Deficiencies:**
3. Concrete: Pavements, Slabs, and Retaining Walls	Is there evidence of cracking or other distress? ____YES ____NO Is there evidence of joint or sealant deterioration? ____YES ____NO Is there evidence of displacement? ____YES ____NO **Describe Deficiencies (Indicate type, size and location of distress):**

4. Maintenance of Soil Cover Around Structures	Is there evidence of soil shrinkage (2" or greater) around structures? ____YES ____NO **If so, list structures and the location of shrinkage:**
5. Railroads	Is there any evidence of track displacement or misalignment? ____YES ____NO Is there any evidence of ballast displacement? ____YES ____NO Are all switches in operational condition? ____YES ____NO **Describe Deficiencies:**
6. Fences	Is there any evidence of fence damage or openings? ____YES ____NO Are gates functioning properly? ____YES ____NO Are sign legible and in-place? ____YES ____NO **Describe Deficiencies:**

7. Groundwater Monitoring Wells	Is the inner casing cracked, broken, or deteriorating?	____YES ____NO
	Is the inner casing cap in place and not broken?	____YES ____NO
	Is the inner cap seal in operable condition?	____YES ____NO
	Is the outer cover housing broken?	____YES ____NO
	Is the outer cover in place and not broken?	____YES ____NO
	Is the outer cover seal in operable condition?	____YES ____NO
	Is the lock in good working order?	____YES ____NO
	Is the well pad damaged or deteriorating?	____YES ____NO
	Describe Deficiencies:	
8. Asphalt Paving	Is there evidence of cracking or other distress?	____YES ____NO
	Is there evidence of joint or sealant deterioration?	____YES ____NO
	Is there evidence of displacement?	____YES ____NO
	Describe Deficiencies (Indicate type, size and location of distress):	

C. LIST PROBLEMS NOTED AND THE CORRESPONDING REMEDIAL ACTION. IF NO PROBLEMS ARE NOTED, CERTIFY IN SECTION (E) THAT THE FACILITY IS IN COMPLIANCE WITH THE POST-CLOSURE PLAN.

D. POST-CLOSURE PLAN REVISION NECESSARY? _____ Yes _____ No

Item:

Reason:

E. CERTIFICATION

I, _____, hereby certify that the Facility has been inspected for the items listed herein, and is in
(Print Name)

compliance with the Post-Closure Plan.

Signed: _____ Date: _____

MAINTENANCE INSPECTION FORM
GROUNDWATER MONITORING WELLS SAMPLING EVENTS
POST-CLOSURE PLAN REQUIREMENTS

INSPECTION DATE:_____ **TIME:**_____

INSPECTOR'S NAME:_____ **TITLE:**_____

A. REASON FOR INSPECTION:	_____Routine semi-annual groundwater sampling _____Other, Specify_____
B. AREA INSPECTED/ FINDINGS:	Describe each item found to be deficient in the "Describe Deficiencies" spaces provided below. Continue on separate sheet if necessary.
1. Groundwater Monitoring Wells	Is the inner casing cracked, broken, or deteriorating? ___YES ___NO Is the inner casing cap in place and not broken? ___YES ___NO Is the inner cap seal in operable condition? ___YES ___NO Is the outer cover housing broken? ___YES ___NO Is the outer cover in place and not broken? ___YES ___NO Is the outer cover seal in operable condition? ___YES ___NO Is the lock in good working order? ___YES ___NO Is the well pad damaged or deteriorating? ___YES ___NO **Describe Deficiencies:**

C. LIST PROBLEMS NOTED AND THE CORRESPONDING REMEDIAL ACTION. IF NO PROBLEMS ARE NOTED, CERTIFY IN SECTION (E) THAT THE FACILITY IS IN COMPLIANCE WITH THE POST-CLOSURE PLAN.

D. POST-CLOSURE PLAN REVISION NECESSARY? _____ YES NO

Item:

Reason:

E. CERTIFICATION

I, _____, hereby certify that the Facility has been inspected for the items listed herein, and is in compliance
(Print name)
with the Post-Closure Plan.

Signed: _____ Date: _____

ATTACHMENT 6

POST-CLOSURE NOTICES

(To be inserted)

BENHAM
infrastructure & environment

The Benham Companies, LLC
3700 W. Robinson, Ste. 200
Norman, OK 73072

Telephone 405.321.3895
Fax 405.364.1708

info@benham.com
www.benham.com

November 9, 2004

Metropolitan Area Planning Commission
City of Bartlesville
Attn: Nancy Wade, City Planner
401 S. Johnstone Avenue
Bartlesville, OK 74003
Phone: 918-338-4234

Dear Ms. Wade:

In accordance with the requirements set forth in 40 CFR 264.116 and 40 CFR 264.119, enclosed please find one (1) survey plat for the closed units at the Horsehead Corp. (formerly Zinc Corporation of America) Facility located at 11th and Virginia Avenue in Bartlesville, Oklahoma. In accordance with the regulations, this plat contains a record of the type, location, and quantity of hazardous waste disposed at the facility.

Sincerely,
The Benham Companies, LLC

Jack D. Lawmaster, P.E.
Manager, Engineering & Regulatory Compliance

ja:LL

xc: David Lawson, ODEQ (letter only)
Tom Johnston, HC (letter only)
Mark Coldiron, Ryan, Whaley & Coldiron (letter only)
Benham File: 9750701

U.S. Postal Service
CERTIFIED MAIL RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

OFFICIAL USE

Postage	$ 1.52
Certified Fee	2.30
Return Receipt Fee (Endorsement Required)	1.75
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$ 5.57

Postmark Here

Sent To: Metropolitan Area Planning Commission
City of Bartlesville
Street, Apt. No. or PO Box No.: Nancy wade, City Planner
401 S. Johnstone Avenue
City, State, ZIP+4: Bartlesville, OK 74003

PS Form 3800, April 2002 — See Reverse for Instructions

7002 0860 0007 6438 6939

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Metropolitan Area Planning Commission
City of Bartlesville
Attn: Nancy wade, City Planner
401 S. Johnstone Avenue
Bartlesville, OK 74003

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Nancy Wade — ☐ Agent ☐ Addressee

B. Received by (Printed Name): Nancy Wade — C. Date of Delivery: 11/12/04

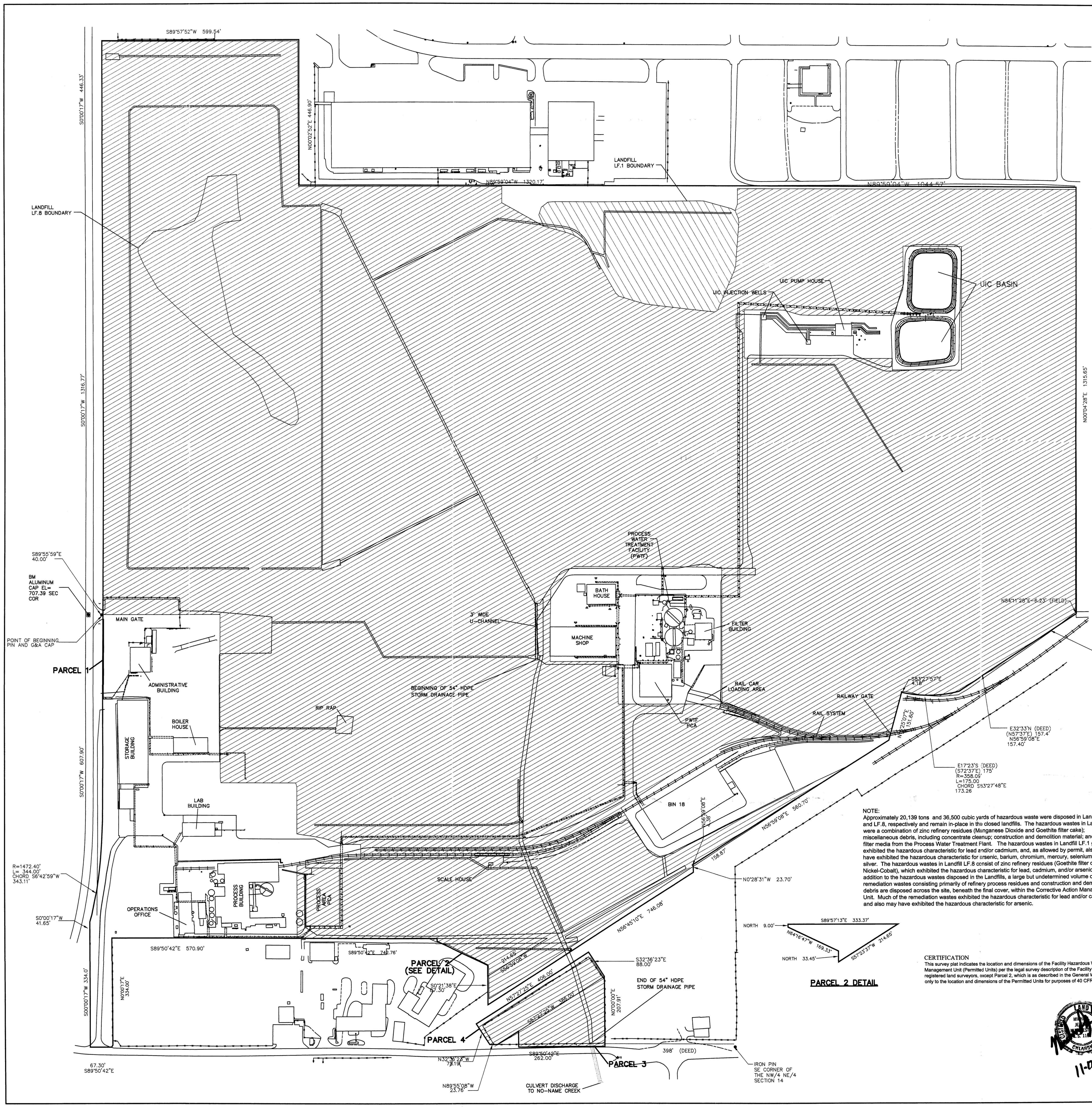
D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☒ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label): 7002 0860 0007 6438 6939

PS Form 3811, August 2001 — Domestic Return Receipt — 102595-02-M-1540



Horsehead Corp.
Legal Description

NOTE:
The legal description was referenced from SHEET SP-02, PERIMETER BOUNDARY DESCRIPTION FOR THE ZINC CORPORATION OF AMERICA by G&A Associates dated JUNE 2, 1997, except for PARCEL 2, which is as described in the General Warranty Deed of record.

PARCEL 1
A part of the SE/4 SE/4, all of the SW/4 SE/4, all of government Lot 4 and a part of government Lot 3 of Section 11, T26N, R12E, Indian Base Line and Meridian, Washington County, Oklahoma and also part of government Lot 1, Part of the NW/4 NE/4 and part of the NE/4 NE/4 of Section 14, T26N, R12E, Indian Base Line and Meridian, Washington County, Oklahoma more particularly described as follows:
Commencing at an iron pin and aluminum cap marking the NW corner of said Section 14, T26N, R12E, said pin being on the centerline of State Highway #123; Thence along the North line of said Section 14 S89°55'59"E a distance of 40.00 feet to another iron pin and aluminum cap on the Easterly Right-of-Way line of State Highway #123 and the true point of beginning: (1) Thence along the Easterly Right-of-Way line of State Highway #123 running parallel with and 40.00 feet East of the West line of said Section 14 SO°00'17"W a distance of 607.90 feet; (2) Thence SW along the curved Easterly Right-of-Way line of State Highway #123 an arc distance of 344.00 feet, said curve being concave to the NW having a radius of 1472.40 feet and a chord bearing S6°42'59"W 343.11 feet to intersect the West line of said Section 14 at a point which is SO°00'17"W a distance of 948.70 feet from the NW corner of said Section 14; (3) Thence leaving the Easterly Right-of-Way of State Highway #123 and continuing along the West line of said Section 14 SO°00'17"W a distance of 41.65 feet to an iron pin and aluminum cap; (4) Thence continuing along the West line of said Section 14 SO°00'17"W a distance of 334.00 feet to an iron pin and aluminum cap marking the SW corner of government Lot 1; (5) Thence along the South line of government Lot 1 S89°50'42"E a distance of 67.30 feet to an iron pin marking the SW corner of the South 334.00 feet of the East 570.90 feet of government Lot 1; (6) Thence NO°00'17"E a distance of 334.00 feet to an iron pin marking the NW corner of the South 334.00 feet of the East 570.90 feet of government Lot 1; (7) Thence S89°50'42"E a distance of 570.90 feet to an iron pin marking the NE corner of the South 334.00 feet of the East 570.90 feet of government Lot 1; (8) Thence running parallel to and 334.00 feet North of the South line of the NW/4 NE/4 of said Section 14 S89°50'42"E a distance of 742.76 feet to a point on the Westerly Right-of-way line of the M.K.&T. Railroad, said Right-of-Way line being 100.00 feet from the centerline of the railroad; (9) Thence along the Westerly Right-of-Way line of the railroad S56°59'08"W a distance of 214.65 feet; (10) Thence following the Westerly line of a tract formerly within said railroad Right-of-Way SO°21'38"E a distance of 87.30 feet; (11) Thence following the Easterly line of said tract N56°45'10"E a distance of 746.08 feet; (12) Thence following the Northerly line of said tract NO°28'31"W a distance of 23.70 feet to a point on the Westerly Right-of-Way of the railroad, said Right-of-Way line being now 50.00 feet from the centerline of the railroad and also located N56°59'08"E along the Westerly Right-of-Way of the railroad a distance of 4.38 feet from the North end of the widening of the railroad Right-of-Way to 100.00 feet from the centerline of the railroad; (13) Thence continuing along the Westerly Right-of-Way line of the railroad N56°59'08"E a distance of 158.87 feet to a point on the East line of the NW/4 NE/4 of said Section 14 which is NO°02'22"E a distance of 650.66 feet from the SE corner of the NW/4 NE/4 of said Section 14; (14) Thence continuing along the Westerly Right-of-Way line of the Railroad N56°59'08"E a distance of 560.70 feet; (15) Thence continuing along the Westerly Right-of-Way line of the railroad N15°25'07"E a distance of 151.60 feet; (16) Thence continuing along the Westerly Right-of-Way line of the railroad S83°27'57"E a distance of 4.18 feet; (17) Thence SE along the curved Westerly Right-of-Way line of the railroad an arc distance of 175.00 feet, said curve being concave to the NW having a radius of 358.09 feet and a chord bearing S83°27'48"E 173.26 feet; (18) Thence continuing along the Westerly Right-of-Way line of the railroad N56°59'08"E a distance of 157.40 feet; (19) Thence NE along the curved Westerly Right-of-Way line of the railroad an arc distance of 271.40 feet, said curve being concave to the NW having a radius of 2864.79 feet and a chord bearing N54° 16' 18"E 271.30 feet to an iron pin marking a point on the North line of said Section 14 which is N89°55'59W along the North section line a distance of 280.65 feet from the iron pin marking the NE corner of said Section 14; (20) Thence continuing along the Westerly Right-of-Way line of the railroad N54°11'28"E a distance of 6.23 feet; (21) Thence leaving the railroad and running parallel with and 275.60 feet West of the East line of said Section 11, T26N, R12E, NO°04'28"E a distance of 1315.65 feet to an iron pin marking a point on the North line of the SE/4 SE/4 of said Section 11 which is N89°59'04"W along the North line of the SE/4 SE/4 from the NE corner of the SE/4 SE/4 of said Section 11; (22) Thence along the North line of the SE/4 SE/4 of said Section 11 N89°59'04"W a distance of 1044.57 feet to an iron pin marking the NW corner of the SE/4 SE/4. (23) Thence along the North line of the SW/4 SE/4 of said Section 11 N89°59'04"W a distance of 1320.17 feet to an iron pin marking the SE corner of government Lot 3; (24) Thence along the East line of government Lot 3 NO°02'52"W a distance of 446.90 feet to an iron pin marking the SE corner of the North 870.29 feet of government Lot 3; (25) Thence S89°57'52"W a distance of 599.54 feet to an iron pin marking a point on the South line of the North 870.29 feet of government Lot 3 which is N89°57'52"E a distance of 40.00 feet from an iron pin marking the West line of said Section 11, said point also being on the Easterly Right-of-Way line of State Highway #123 (26) Thence along the Easterly Right-of-Way line of State Highway #123 running parallel with and 40.00 feet East of the West line of said Section 11 SO°00'17"W a distance of 446.33 feet to a point on the South line of government Lot 3; (27) Thence continuing along the Easterly Right-of-Way line of State Highway #123, running parallel with and 40.00 feet East of the West line of said Section 11 SO°00'17"W a distance of 1316.77 feet to the beginning point, containing 6,402,991 sq. ft (146.992 acres) more or less.

PARCEL 2
A tract of land in Washington County, Oklahoma, in the NW/4 NE/4 of Section 14, T26N, R12E, described as follows: Commencing at the NW corner of Section 14, thence S0°00'17"W 990.35 feet, thence S89°57'13"E 1053.32 feet, to the true point of beginning, thence S89°57'13"E 333.37 feet, thence S57°23'37"W 214.65 feet, thence North 33.45 feet, thence N64°16'47"W 169.33 feet, thence North 9.00 feet to the point of beginning, containing 0.40 acres, more or less.

PARCEL 3
All that portion of the SE1/4 of the NW1/4 of the NEl/4 of Section 14, T26N, R12E, more particularly described as follows: beginning at a point on the South line of the NW1/4 NEl/4 that is 398 feet west of the Southeast corner thereof; thence West along the South line of said NW1/4 NEl/4 for a distance of 262 feet to the southwest corner of the SE1/4 NW1/4 NEl/4; thence North along the West line of said SE1/4 NW1/4 NEl/4 to the point of intersection with the South line of the M. K. & T. Railroad Right-of-Way; thence in a Northeasterly direction along the said South Right-of-Way line to a point due North of the point of beginning; thence South to the point of beginning.

PARCEL 4
A tract of land situated in the NW/4 NE/4 of Section 14, Township 26 North, Range 12 East in Washington County, Oklahoma more particularly described as follows:
Commencing the Southeast corner of said NW/4 NE/4, thence N89°55'08"W along the South line of said NW/4 NE/4, a distance of 398.00 feet, thence North along a straight line a distance of 207.91 feet to a point on the Southeasterly Right-of-Way line of the Missouri Pacific Railroad Company and the true point of beginning. Thence S57°27'25"W along said Southeasterly Right-of-Way line, a distance of 386.00 feet to a point on the said South line of the NW/4 NE/4 , thence N89°55'08"W along said South line, a distance of 23.76 feet, thence N32°36'23"W along a straight line, a distance of 75.19 feet, thence N57°27'25"E along a straight line, a distance of 406.00 feet, thence S32°36'23"E along a straight line, a distance of 88.00 feet to the point of beginning containing an area of .82 of an acre, more or less.

LEGEND

PROPERTY LINE
FENCE LINE
CORRECTIVE ACTION MANAGEMENT UNIT
LANDFILL LF.1
PWTF PROCESS WATER TREATMENT FACILITY
PCA PROCESS CONTAINMENT AREA

NOTE:
THE OWNER AND/OR OPERATOR OF THE PROPERTY ON WHICH THE CORRECTIVE ACTION MANAGEMENT UNIT (CAMU) AND LANDFILL LF.1 (LF.1) IS LOCATED IS OBLIGATED TO RESTRICT DISTURBANCE OF THE CAMU AND LF.1 IN ACCORDANCE WITH THE APPLICABLE 40 CFR 264 SUBPART G REGULATIONS.

NOTE:
Approximately 20,139 tons and 36,500 cubic yards of hazardous waste were disposed in Landfills LF.1 and LF.8, respectively and remain in-place in the closed landfills. The hazardous wastes in Landfill LF.1 were a combination of zinc refinery residues (Manganese Dioxide and Goethite filter cake); miscellaneous debris, including concentrate cleanup; construction and demolition material; and spent filter media from the Process Water Treatment Plant. The hazardous wastes in Landfill LF.1 generally exhibited the hazardous characteristic for lead and/or cadmium, and, as allowed by permit, also may have exhibited the hazardous characteristic for arsenic, barium, chromium, mercury, selenium, and/or silver. The hazardous wastes in Landfill LF.8 consist of zinc refinery residues (Goethite filter cake and Nickel-Cobalt), which exhibited the hazardous characteristic for lead, cadmium, and/or arsenic. In addition to the hazardous wastes disposed in the Landfills, a large but undetermined volume of remediation wastes consisting primarily of refinery process residues and construction and demolition debris are disposed across the site, beneath the final cover, within the Corrective Action Management Unit. Much of the remediation wastes exhibited the hazardous characteristic for lead and/or cadmium and also may have exhibited the hazardous characteristic for arsenic.

100' 0 100' 200'

CERTIFICATION
This survey plat indicates the location and dimensions of the Facility Hazardous Waste Landfill LF.1 and the Facility Corrective Action Management Unit (Permitted Units) per the legal survey description of the Facility performed on June 2, 1997 by G&A associates, registered land surveyors, except Parcel 2, which is as described in the General Warranty Deed of record. The undersigned is certifying only to the location and dimensions of the Permitted Units for purposes of 40 CFR 264.116.

11-06-04

HORSEHEAD CORP, BARTLESVILLE, OK	
DWG NAME: CERTIFICATION OF CLOSED UNITS	
DATE: 11/04/2004	SCALE: AS SHOWN
PH 918-451-1925	
EXP 6-30-2005	
HUDDLESTON LAND SURVEYING, INC.	
P.O. BOX 496	
VINITA, OK. 74301	

ATTACHMENT 7

POST-CLOSURE COST ESTIMATE

Notation on Property Deed - Final Closure (40 CFR 264.119)

1	Attorney		
	a. Attorney time required (hrs)	1	
	b. Attorney unit labor costs ($/hr)	$200	
	c. Attorney cost ($) Line 1a x Line 1b		***$200***
2	Clerical		
	a. Clerical time required (hrs)	1	
	b. Clerical unit labor cost ($/hr)	$29	(ABI Environmental Rate Sheet)
	c. Clerical cost ($) Line 2a x Line 2b	$29	
	d. Filing fee ($)	$25	
	e. Clerical subtotal Line 2c + Line 2d)		***$54***
3	Waste Record Submittal		
	a. Engineer time required (hrs)	4	
	b. Engineer unit labor cost ($/hr)	$95	(RSA Rate Sheet)
	c. Engineer cost ($) Line 3a x Line 3b)	$380	
	d. Clerical time required (hrs)	2	
	e. Clerical unit labor cost ($/hr)	$29	(RSA Rate Sheet)
	f. Clerical cost ($) Line 3d x Line 3e	$58	
	g. Waste record submittal cost ($) Line 3c + Line 3f		***$438***
4	Notation on Property Deed Subtotal ($) Line 1c + Line 2e + Line 3g		***$692***

Facility Inspection

1 Engineer

a. Number of inspections during post-closure period (inspections/30 years): 60

b. Engineer time required (hrs/insp): 8 (includes drive time)

c. Engineer unit labor cost ($/hr): $95 (ABI Environmental Rate Sheet)

d. Engineer cost ($)
Line 1a x Line 1b x Line 1c: ***$45,600***

2 Technician

a. Technician time required (hrs/insp): 8 (includes drive time)

b. Technician unit labor cost ($/hr): $52 (ABI Environmental Rate Sheet)

c. Technician cost ($)
Line 1a x Line 2a x Line 2b: ***$24,960***

3 Clerical

a. Clerical time required (hrs/insp): 1

b. Clerical unit labor cost ($/hr): $29 (ABI Environmental Rate Sheet)

c. Clerical cost ($)
Line 1a x Line 3a x Line 3b: ***$1,740***

4 Facility Inspection Subtotal ($)
Line 1d + Line 2c + Line 3c: ***$72,300***

Routine Maintenance and Repairs

1 Mowing

a. Mowing frequency (visits/30 yrs)	90 (3 times per year)	
b. Area to be mowed per visit (acres/visit)	129 (acre)	
c. Mowing unit cost ($/acre)	40 (ODOT)	
d. Mowing cost ($) Line 1a x Line 1b x Line 1c		***$464,400.00***

2 Fertilizing

a. Fertilizing frequency (visits/30 yrs)	30 (1/yr)	
b. Area to be fertilized (acres/visit)	129	
c. Fertilizer unit cost ($/acre)	143.00 (Means Cost Data)	
d. Fertilizing cost ($) (Line 2a x Line 2b x Line 2c)		***$553,410.00***

3 Landscape Tree & Shrub Replacement

a. Tree & Shrub Replacement	140 (≈20% replacement)	
b. Unit Cost ($/plant)	70.00 (Means)	
c. Total Line 3a x Line 3b		***$9,800.00***

4 Re-establishment of Vegetative Cover

a. Area requiring re-establishment of vegetation per visit (acres/visit)	26 (20% over Post Closure)
b. Hydroseeding with Mulch and Fertilizer unit cost ($/acre)	2113/acre (Means)
c. Seeding cost ($) Line 4a x Line 4b x Line 4c	54,938.00
d. Sod Replacement on Slopes	5,642.00 (10%)
e. Sod Unit Costs ($/sy)	6.00 (Means)
f. Sod Cost Line 4d + Line 4e	33,852.00

Routine Maintenance and Repairs

g. Re-establishment of cover ($)
(Line 4c + Line 4f) ***$88,790.00***

5 Repair Erosion, Settlement & Subsidence

a. Quantity of soil required (yd^3) 258 (2cy/acre)

b. Off-site soil unit cost ($/$yd^3$) 14.00 (ODOT)

c. Soil placement cost ($) 22.50 (Means)

d. Erosion damage repair subtotal ($) ***$9,417.00***
Line 5a + Line 5b) + Line 5a + Line 5c)

6 Security System Maintenance and Repair

a. Amount of fence needing replacement (L.F./visit) 12900 (1 replacement in 30 Yrs)

b. Fencing unit cost ($/L.F.) 17.20 (Means)

c. Fence cost ($) 221,880.00
Line 6a x Line 6b

d. Number of replacement gates (gates/visit) 1.00

e. Gate unit cost ($/gate) 1,400.00 (Means)

f. Gate replacement cost ($) 1,400.00
Line 6d x Line 6e

g. Security repair total ($) ***$223,280.00***
Line 6c + Line 6f

7 Road Repair & Maintenance

a. Surf Treatment Area 249000 sy (Every 5 yrs x 41,500 sy)

b. Unit Cost Surf Treatment 1.12 sy (Means)

c. Crack Repair 24,900 sy (10% Every 5 yrs)

d. Unit cost ($/sf) 2.4 sy (Means)

e. Total ***$338,640.00***
Line 7a x Line 7b x Line 7c x Line 7d

8 Concrete Repair & Maintenance

Routine Maintenance and Repairs

a.	Patching & Crack Repair	5000 S.F.	
b.	Unit Cost	6.45 S.F. (Means)	
c.	Total Patch & Repair (Line 8a x 8b)	32,250.00	
d.	V-Gutter & Curb & Gutter Replacement	2,000 L.F. (≈ 20% replacement)	
e.	Unit Cost	22.00 L.F.	
f.	Total Gutter (Line 8d x 8e)	44,000.00	
g.	Total Concrete Repair and Maintenance (Line 8c + 8f)		***$76,250.00***

9	Routine Maintenance and Repairs Subtotal ($) Line 1d + Line 2d + Line 3c + Line 4g + Line 5d + Line 6g + Line 7e + Line 8g	***$1,763,987.00***

GROUNDWATER MONITORING COST WORKSHEET

Note: hours and cost adjusted to account for equipment, shipping and reporting.

1 Detection Monitoring - Background/Upgradient Wells

a. Detection monitoring frequency for background/upgradient wells (visits/30 yrs)	0	
b. Number of wells sampled per visit (wells/visit)	0	
c. Number of samples collected per well (samples/well)	0	
d. Number of replicate analyses per sample (replicates/sample)	0	
e. Number of analyses per visit Line 1b x Line 1c x Line 1d	0	
f. Sample collection and preparation time required (hrs/well)	0	
g. Transportation time to and from site (hrs/visit)	0	
h. Contract lab technician unit labor cost ($/hr)	0	
i. Sample collection time (hrs/visit) Line 1b x Line 1f + Line 1g	0	
j. Sample cost ($/visit) Line 1h x Line 1i	0	
k. Contract lab fee ($/analysis)	0	
l. Contract lab cost ($/visit) Line 1e x Line 1k	0	
m. Upgradient/background detection monitoring cost ($) Line 1a x (Line 1j + Line 1l)		0

2 Detection Monitoring - Compliance Point/Downgradient Wells

a. Detection monitoring frequency for compliance point/downgradient wells (visits/5 yrs)	12 visits/5 years
b. Number of wells sampled per visit (wells/visit)	6 well/visit

GROUNDWATER MONITORING COST WORKSHEET

Note: hours and cost adjusted to account for equipment, shipping and reporting.

c. Number of samples collected per well (samples/well)	1 sample/well	
d. Number of replicate analyses per sample (replicates/sample)	2 QA samples/visit	
e. Number of analyses per visit Line 2b x Line 2c x Line 2d	12 sample/visit	
f. Sample collection and preparation time required (hrs/well)	19.5 hours/well	
g. Transportation time to and from site (hrs/visit)	6 hours/visit	
h. Contract lab technician unit labor cost ($/hr)	$80/hour	
i. Sample collection time (hrs/visit) (Line 2b x Line 2f) + Line 2g	117 hours/visit	
j. Sample cost ($/visit) Line 2h x Line 2i	$9,360	
k. Contract lab fee ($/analysis)	$165	
l. Contract lab cost ($/visit) Line 2e x Line 2k	$1,980	
m. Downgradient/compliance point detection monitoring cost ($) Line 2a x (Line 2j + Line 2l)		$136,080

3 Compliance Monitoring - Background/Upgradient Wells

a. Compliance monitoring frequency for background/upgradient wells (visits/30 yrs)	0
b. Number of wells sampled per visit (wells/visit)	0
c. Number of samples collected per well (samples/well)	0

GROUNDWATER MONITORING COST WORKSHEET

Note: hours and cost adjusted to account for equipment, shipping and reporting.

d. Number of replicate analyses per sample (replicates/sample)	0	
e. Number of analyses per visit Line 3b x Line 3c x Line 3d	0	
f. Sample collection and preparation time required (hrs/well)	0	
g. Transportation time to and from site (hrs/visit)	0	
h. Contract lab technician unit labor cost ($/hr)	0	
i. Sample collection time (hrs/visit) (Line 3b x Line 3f) + Line 3g	0	
j. Sample cost ($/visit) Line 3h x Line 3i	0	
k. Contract lab fee ($/analysis)	0	
l. Contract lab cost ($/visit) Line 3e x Line 3k	0	
m. Upgradient/background compliance monitoring cost ($) Line 3a x (Line 3j + Line 3l)		0

4 Compliance Monitoring - for Selected Hazardous Constituents at Compliance Point/Downgradient Wells

a. Compliance monitoring frequency for hazardous constituents at downgradient wells (visits/30 yrs)	0
b. Number of wells sampled per visit (wells/visit)	0
c. Number of samples collected per well (samples/well)	0
d. Number of replicate analyses per sample (replicates/sample)	0
e. Number of analyses per visit Line 4b x Line 4c x Line 4d	0
f. Sample collection and preparation time required (hrs/well)	0

GROUNDWATER MONITORING COST WORKSHEET
Note: hours and cost adjusted to account for equipment, shipping and reporting.

g. Transportation time to and from site (hrs/visit)	0	
h. Contract lab technician unit labor cost ($/hr)	0	
i. Sample collection time (hrs/visit) (Line 4b x Line 4f) + Line 4g	0	
j. Sample cost ($/visit) Line 4h x Line 4i	0	
k. Contract lab fee ($/analysis)	0	
l. Contract lab cost ($/visit) Line 4e x Line 4k	0	
m. Downgradient hazardous constituents compliance monitoring cost ($) Line 4a x (Line 4j + Line 4l)		0

5 Compliance Monitoring - for Appendix VIII Constituents at Compliance Point/ Downgradient Wells

a. Compliance monitoring frequency for Appendix VIII constituents at downgradient wells (visits/30 yrs)	0
b. Number of wells sampled per visit (wells/visit)	0
c. Number of samples collected per well (samples/well)	0
d. Number of replicate analyses per sample (replicates/sample)	0
e. Number of analyses per visit Line 5b x Line 5c x Line 5d	0
f. Sample collection and preparation time required (hrs/well)	0
g. Transportation time to and from site (hrs/visit)	0
h. Contract lab technician unit labor cost ($/hr)	0
i. Sample collection time (hrs/visit) (Line 5b x Line 5f) + Line 5g	0

GROUNDWATER MONITORING COST WORKSHEET
Note: hours and cost adjusted to account for equipment, shipping and reporting.

	j. Sample cost ($/visit) Line 5h x Line 5i		
	k. Contract lab fee ($/analysis)	0	
	l. Contract lab cost ($/visit) Line 5e x Line 5k	0	
	m. Downgradient Appendix VIII constituents monitoring cost ($) Line 5a x (Line 5j + Line 5l)		0
6	Monitoring Well Inspection		
	a. Inspection frequency (insp/5 yrs)	10 inspections/5 years	
	b. Inspection time required (hrs/insp)	10	
	c. Technician unit labor cost ($/hr)	$52	
	d. Inspection cost ($) Line 6a x Line 6b x Line 6c		$5,200
7	Monitoring Well Maintenance		
	a. Maintenance frequency (visits/5 yrs)	5 visits/5years	
	b. Number of monitoring wells needing maintenance per visit	2	
	c. Maintenance time required (hrs/well)	5 hours/well	
	d. Unit labor cost ($/hr)	$52	
	e. Monitoring well maintenance cost ($) Line 7a x Line 7b x Line 7c x Line 7d		$2,600
8	Monitoring Well and Parts Replacement (Includes initial installation of 4 new wells, replacement of 2 wells, and abandonment of 21 wells.)		
	a. Number of wells needing replacement during post-closure period	6 wells/5years	
	b. Existing monitoring well sealing unit cost ($/well)	$1,620	
	c. New monitoring well construction unit cost ($/well)	$3,230	

GROUNDWATER MONITORING COST WORKSHEET

Note: hours and cost adjusted to account for equipment, shipping and reporting.

d. Mobilization/demobilization ($)	$400	
e. Monitoring well replacement cost ($) [Line 8a x (Line 8b + Line 8c)] + Line 8e	$29,000	
f. Number of pumps needing replacement during post-closure period	6	
g. Pump unit cost ($/pump)	$1,400	
h. Pump cost ($) Line 8f x Line 8g	$84,000	
i. Number of wells needing tubing replacement during post-closure period	2	
j. Length of tubing (ft/well)	20	
k. Tubing unit cost ($/ft)	$10	
l. Tubing replacement cost ($) Line 8i x Line 8j x Line 8k	$400	
m. Number of wells needing cap replacement during post-closure period	2	
n. Well cap unit cost ($/cap)	$20	
o. Well cap replacement cost ($) Line 8m x Line 8n	$40	
p. Monitoring well and parts replacement cost ($) Line 8e + Line 8h + Line 8l + Line 8o		$37,840

9 Post-closure Groundwater Monitoring Subtotal ($) **$181,720**
Line 1m + Line 2m + Line 3m + Line 4m +
Line 5m + Line 6d + Line 7e + Line 8p

* Based on a depth of 100 vertical lineal feet.

Certification of Post-Closure

1 Independent Registered Professional Engineer

a. Initial review of post-closure plan (hrs)	4	(4 hrs; p. 8-5)
b. Inspection frequency (inspections/yr)	1	(p. 8-4)
c. Inspection time required (hrs/inspection)	8	(includes drive time)
d. Number of years of post-closure care (yrs)	30	(30 yrs)
e. Inspection time required (hrs) Line 1b x Line 1c x Line 1d	240	
f. Prepare final documentation (hrs)	4	(4 hrs; p. 8-5)
g. Total professional engineer time required (hrs) Line 1a + Line 1e + Line 1f	248	
h. Professional engineer unit labor cost ($/hr)	$95	(ABI Environmental Rate Sheet)
i. Number of separate post-closures	1	
j. Professional engineer cost ($) Line 1g x Line 1h x Line 1i		***$23,560***

2 Clerical*

a. Clerical time required (hrs/inspection)	4	(4 hrs/insp; p. 8-4)
b. Clerical unit labor cost ($/hr)	$29	(ABI Environmental Rate Sheet)
c. Clerical cost ($) Line 1b x Line 2a x Line 2b x Line 1d		***$3,480***

3 Certification of Post-Closure Subtotal ($) Line 1j + Line 2c ***$27,040***

* Clerical time should be included only if the Professional Engineer is operating independently in a single-person business.

ENVIRO CLEAN SERVICES, LLC

February 26, 2016

Mr. Saba Tahmassebi, Ph.D., P.E.
Chief Engineer
Oklahoma Department of Environmental Quality
707 North Robinson
P. O. Box 1677
Oklahoma City, OK 73101-1677

Re: 2015 Annual Groundwater Monitoring Report
Horsehead Corporation, Facility
Bartlesville Oklahoma

Dear Mr. Tahmassebi:

Enviro Clean Services, LLC hereby submits on behalf of Horsehead Corporation, the report entitled "2015 Annual Groundwater Monitoring Report" for the Horsehead Corporation facility located in Bartlesville, OK. This report, which is a requirement of the Post-Closure Permit, presents the analytical data from the two groundwater sampling events conducted at the facility in 2015 and a statistical trend analysis. The certification required by 40 CFR 270.11 is being provided under separate cover by Mr. Thomas W. Johnston, Horsehead Corporation.

If you have any questions or comments, please contact me at your convenience.

Sincerely,
Enviro Clean Services, LLC

George H. (Buddy) Richardson, P.G.
Project Manager

xc: William (Bill) Anderson, Doerner, Saunders, Daniel & Anderson
Thomas W. Johnston, Horsehead Corp.
Mark Coldiron, Ryan Whaley Coldiron Jantzen Peters & Webber PLLC
David Patton, Horsehead Corp.
Jack Lawmaster, Enviro Clean
David Brady, Enviro Clean

W:\Projects\HOREBVL001\01_CorresEmails\FromECS\20160226_2015AnnGWrpt_XmLtr.docx

2015 ANNUAL GROUNDWATER MONITORING REPORT HORSEHEAD CORP. BARTLESVILLE, OKLAHOMA

Prepared for:

Horsehead Corp.
Highway 123 & West 11th
Bartlesville, Oklahoma 74005

Prepared by:

Enviro Clean Cardinal, LLC
7060 South Yale, Suite 603
Tulsa, Oklahoma 74136

February 26, 2016

ENVIRO CLEAN CARDINAL

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

HORSEHEAD CORP.
BARTLESVILLE, OKLAHOMA
2015 ANNUAL GROUNDWATER MONITORING REPORT
February 26, 2016

1.0 INTRODUCTION

This report presents the results of the semi-annual groundwater monitoring events conducted in 2015 for the Horsehead Corp. (Horsehead) located in Bartlesville, Oklahoma (Facility) as shown on **Figure 1**. Groundwater monitoring was conducted in accordance with the Post-Closure Permit (#000829440-PC) effective May 15, 2006.

Beginning in September 1995 and continuing through 2002, semi-annual groundwater monitoring events were conducted in accordance with the requirements for corrective action monitoring specified in the Resource Conservation and Recovery Act (RCRA) Operation Permit issued on July 14, 1995, as modified October 30, 1997, and made effective November 30, 1997.

Prior to conducting the first semi-annual groundwater monitoring event in 2003, Horsehead proposed to the Oklahoma Department of Environmental Quality (DEQ) that the Facility groundwater monitoring network be modified to meet the requirements contemplated for post-closure groundwater monitoring. Approval for construction of the post-closure monitoring well network was given to Horsehead by the DEQ in correspondence dated June 12, 2003, as shown in **Appendix A**. Following this approval six new groundwater monitoring wells were installed. The data set generated during post-closure semi-annual groundwater monitoring of the six newly installed wells is utilized to evaluate groundwater at the Facility. Historical data generated at the Facility prior to installation of the new wells are also presented in this report for informational purposes.

2.0 GROUNDWATER MONITORING WELL NETWORK

The groundwater monitoring well network approved by the DEQ for post-closure groundwater monitoring consists of six groundwater monitoring wells used for water level and water quality monitoring, and 15 temporary piezometers used for water level monitoring to evaluate groundwater flow. The locations of the groundwater monitoring wells and piezometers are shown on **Figure 2**. Monitoring well and piezometer completion and construction details are summarized in **Table 1**.

3.0 GROUNDWATER MONITORING

The objectives of the groundwater monitoring program include the following:

1. To evaluate trends over time in constituent concentrations in groundwater beneath the Facility, and

2. Evaluate groundwater levels and flow directions in the unconsolidated material, and ensure that water quality monitoring wells are in proper downgradient position to the Site.

During the groundwater monitoring events, groundwater levels were measured in all piezometers and monitoring wells to calculate groundwater elevations and flow directions. Groundwater level measurements and corresponding groundwater elevations are presented in **Table 2**. In addition, groundwater samples were collected and tested for the following indicator parameters and water quality parameters:

Indicator Parameters	Cadmium, lead, and zinc – both total and dissolved
Water Quality Parameters	Specific conductivity, pH, temperature, and turbidity

During the calendar year 2015, the semi-annual groundwater monitoring events were conducted on the following dates:

April 1 - 3, 2015	First semi-annual sampling event
October 14 - 16, 2015	Second semi-annual sampling event

Groundwater samples for both events were sent to TestAmerica, Inc. (a DEQ-certified laboratory in Nashville, Tennessee) for analysis of indicator parameters. The water quality parameters (temperature, pH, turbidity, and specific conductance) were measured on-site during sample collection. A summary of analytical parameters and test methods utilized is presented in **Table 3**.

A map showing the locations of the piezometers and monitoring wells utilized for sampling and groundwater level measurement is included as **Figure 2**. Groundwater monitoring procedures utilized are documented in Appendix A of the first 1996 Semi-Annual Groundwater Monitoring Report (RSA, 1996a).

4.0 GROUNDWATER MONITORING RESULTS

4.1 GROUNDWATER FLOW DIRECTION

Depth to groundwater was measured in the piezometers and monitoring wells on April 2, 2015 and October 15, 2015. These data are included in **Table 2**.

Groundwater potentiometric surface maps were prepared for groundwater in the shallow unconsolidated material for each monitoring event. These maps are shown on **Figure 3** for April 2, 2015, and **Figure 4** for October 15, 2015.

The potentiometric surface maps for each event show that groundwater flow was predominantly flowing toward the south and southwest in the northeastern portion of the Facility and to the northwest and west in the northwestern portion of the Facility. In the south-central portion of the Facility, groundwater flow direction was generally toward the south-southeast. Groundwater gradients in the unconsolidated material groundwater system across the site averaged approximately 0.008 feet/foot. Based on a comparison of water table elevation maps presented in prior reports and in this report, no significant changes in groundwater flow direction in the unconsolidated material groundwater system have been observed since Interim Status Groundwater Monitoring began in 1992, although there have been fluctuations in groundwater elevations over time.

4.2 GROUNDWATER ANALYTICAL RESULTS

Low-flow purging/sampling methods were utilized for groundwater sampling at the Site.

The specific conductance, pH and temperature results of the purge water just prior to sample collection are summarized in **Table 4**. The laboratory analytical reports for the groundwater samples are included in **Appendix B**, and are summarized with the field measured turbidity in **Table 5**. **Figure 5** shows the results of the 2015 data and the historical data for each monitoring well. The historical high, low and mean of the metals were calculated using data from 2003-2014.

4.3 TREND ANALYSIS

Groundwater samples from the Facility have been collected and analyzed on a semi-annual basis beginning in June 2003 and continuing through October 2015. A trend analysis has been performed on this data since the 2005 report, the first containing the requisite minimum number of eight data points.

As required by the Post-Closure Plan, a Mann-Kendall (M-K) test for trend analysis was conducted on this data, on a well by well basis, to look for statistically significant increases in concentrations. For the purposes of this test, all non-detected data were converted to a value of one-half the laboratory reporting limit.

The M-K trend test is a non-parametric test that involves listing sample data in temporal order, listing all unique pairs of data, and then comparing the data in each pair and assigning that data pair one of the following values:

- 1 if the earlier measurement is less than the later measurement;
- -1 if the earlier value is greater than the later measurement; or
- 0 if the measurements are identical.

These values are then summed for all data pairs to get the M-K statistic, S. If S is positive then there is the potential for an upward trend, if negative a potential decreasing trend.

Critical values for S are determined by assuming that as the number of data points, n, becomes large (n>10) then the behavior of S approximates the normal distribution based on the Central Limit Theorem. A standardized Z statistic for each data set is calculated by taking the absolute value of S and subtracting 1 (continuity correction) then dividing that result by the standard deviation calculated for the data set.

This standardized Z statistic is then compared to 2.32634 (the Z value for the 99% confidence level of a normal standard distribution), and, if greater, the data set is determined to have a statistically significant increasing trend.

The trend analysis summarized in the following portions of this report was made using all total metals data generated from June 2003 (the date post-closure monitoring began) through October 2015. Data from duplicate samples are not included in the analysis.

A computer software package, ProUCL Version 5.0, was used to conduct the M-K trend test, at a 99% confidence level. The actual test results are presented in **Appendix C**. The table on the following page summarizes the results of the M-K trend tests.

Monitor Well	Total Cadmium	Total Lead	Total Zinc
MW-14B	NT	NT	NT
MW-23A	D	NT	NT
MW-26A	NT	NT	D
MW-33A	D	D	NT
MW-46A	NT	D	NT
MW-48A	NT	NT	NT

Note:
NT : No trend
I : Increasing trend
D : Decreasing trend

As shown above, no statistically significant increasing trends were found for the total cadmium, lead, and zinc concentrations detected in any of the groundwater samples collected from any of the six monitoring wells. The M-K trend test graphs for the three indicator parameters were generated from the analytical data used to run the M-K analysis. These graphs with an ordinary least squares (OLS) regression line "Best Fit Line" are presented in **Appendix D**.

5.0 SUMMARY OF FINDINGS AND CONCLUSIONS

The following findings and conclusions are based on the results of the 2015 Annual Groundwater Monitoring Program.

1. Groundwater within the shallow alluvial groundwater system beneath the Facility was determined to be flowing towards the south, west and southwest in the northeastern portion of the Facility and to the northwest in the northwestern portion of the Facility. In the south-central portion of the Facility, groundwater generally flows toward the south-southeast. Groundwater gradients in the unconsolidated material groundwater system across the site averaged approximately 0.008 feet/foot. Although there have been fluctuations in groundwater elevations over time, no significant changes in groundwater flow direction within the unconsolidated alluvial groundwater system have been observed since Interim Status Monitoring began in 1992. All water-quality monitoring wells are in proper downgradient positions to the Site.

2. Trend analyses were conducted of the groundwater monitoring data set incorporating the total metals analyses obtained from June 2003 through October 2015 sampling event data. No statistically significant increasing trends were found in any of the six wells for total cadmium, lead, or zinc.

6.0 REFERENCES

RSA, 1996a. Semi-Annual Groundwater Monitoring Report, Zinc Corporation of America, Bartlesville, Oklahoma, August, 1996, prepared by Roberts/Schornick & Associates, Inc.

TABLES

Table 1 : Summary of Peizometer and Monitoring Well Construction Details
Horsehead Corp., Bartlessville Facility
Bartlesville, Oklahoma

Well Number	Northing	Easting	Ground Surface Elevation, feet AMSL	TOC Elevation, feet AMSL	Wall Size & Type	Well Depth, feet TOC	Screen Interval, feet BGL*	Slot Size, inches	Installation Date
P-1 (MW-47)	639968.825994	2554351.799347	711.55	711.30	2" PVC	12.79	1.47 - 10.98	0.010	22-Apr-92
P-2 (MW-31A)	639576.797142	2554422.280092	712.19	712.04	2" PVC	10.12	2.75 - 6.32	0.010	24-Jun-93
P-3 (MW-40)	639407.424752	2554959.037937	705.47	706.63	2" PVC	10.03	3.22 - 7.82	0.010	24-Jun-93
P-4 (MW-1A)	639969.349132	2556577.679674	709.10	708.87	2" PVC	13.28	6.21 - 10.85	0.010	13-Feb-92
P-5 (MW-42)	640511.712295	2557168.610446	709.47	709.30	2" PVC	6.19	3.45 - 5.45	0.010	21-Apr-92
P-6 (MW-41)	641326.218685	2557246.251810	716.65	716.42	2" PVC	6.30	3.45 - 5.45	0.010	21-Apr-92
P-7 (MW-17)	641698.864218	2557246.551685	710.05	709.66	2" PVC	10.39	5.0 - 10.0	0.010	16-Jul-85
P-S (MW-37)	641705.413170	2556810.723414	712.25	711.91	2" PVC	10.86	3.84 - 8.28	0.010	13-Feb-92
P-9 (MW-40)	641703.837606	2556565.658370	713.52	713.10	2" PVC	7.51	3.45 - 5.45	0.010	21-Apr-92
P-10 (MW-39)	641701.785510	2556276.223980	709.68	709.46	2" PVC	11.17	4.05 - 8.55	0,010	21-Apr-92
P-11(MW-25)	641693.539802	2555401.792867	704.41	703.96	2" PVC	6.65	4.50 - 7.00	0.010	18-Jun-03
P-12 (MW-32)	640865.101278	2554335.543785	702.73	702.11	2" PVC	14.64	5.00 - 14.50	0.010	14-Jun-03
P-13 (MW-P1A)	640274.452094	2555206.183850	704.06	703.81	2" PVC	17.01	7.00 - 16.50	0.010	18-Jun-03
P-14 (MW-P3A)	640916.006880	2555607.209744	702.73	702.22	2" PVC	14.61	5.00 - 14.50	0.010	19-Jun-03
P-15 (MW-18A)	640647.861192	2556326.213014	708.20	707.77	2" PVC	15.32	6.00 - 15.00	0.010	18-Jun-03
MW-14B	642126.637553	2554303.557916	697.57	697.16	2" PVC	10.16	3.50 - 10.00	0.010	19-Jun-03
MW-23A	639553.083608	2555868.117607	699.94	699.55	2" PVC	13.66	5.00 - 14.50	0.010	18-Jun-03
MW-26A	639116.746755	2555557.143661	691.02	693.09	2" PVC	8.18	3.50 - 5.00	0.010	19-Jun-03
MW-33A	641730.152281	2554315.942979	698.31	698.01	2" PVC	12.25	4.00 - 13.00	0.010	17-Jun-03
MW-46A	639094.850168	2555819.827628	689.19	688.64	2" PVC	5.17	3.50 - 5.00	0.010	19-Jun-03
MW-48A	642138.825722	2554502.117924	697.35	697.35	2" PVC	11.82	5.00 - 11.50	0.010	19-Jun-03

Notes:

1. P-1 (MW-47) : Former monitor well identification number in parenthesis.
2. AMSL : Above mean sea level.
3. TOC : Top of casing.
4. BGL : Below ground level.
5. Well P-6 surface casing was repaired and a new TOC elevation was measured in July 2004.
6. Well MW-26A surface casing was repaired and a new TOC elevation was measured in February 2005.
7. * : Based on data at the time of installation.
8. All monitoring wells were re-surveyed on January 24, 2013 due to inconsistencies discovered in the monitoring well top of casing elevations, previously tabulated. Total depths of the monitoring wells were also measured to confirm the depths to the bottom of the wells.

Table 2 : Summary of Depth to Groundwater and Groundwater Elevation Measrements
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well Number	Measurement Date	TOC Elevation feet, AMSL	Depth to Groundwater feet, TOC	Groundwater Elevation feet, AMSL
P-1 (MW-47)	23-Jun-03	710.86	4.13	706.73
	24-Sep-03	710.86	4.61	706.25
	1-Dec-03	710.86	5.25	705.61
	23-Feb-04	710.86	3.45	707.41
	25-Feb-04	710.86	3.45	707.41
	10-Jun-04	710.86	3.61	707.25
	14-Dec-04	710.86	4.09	706.77
	7-Jun-05	710.86	3.20	707.66
	14-Dec-05	710.86	5.87	704.99
	13-Jun-06	710.86	4.49	706.37
	6-Dec-06	710.86	7.45	703.41
	20-Jun-07	710.86	0.05	710.81
	18-Dec-07	710.86	5.42	705.44
	22-Jul-08	710.86	1.34	709.52
	16-Dec-08	710.86	3.44	707.42
	2-Jun-09	710.86	1.41	709.45
	8-Dec-09	710.86	4.30	706.56
	2-Jun-10	710.86	1.48	709.38
	19-Oct-10	710.86	4.18	706.68
	1-Jun-11	710.86	3.68	707.18
	4-Oct-11	710.86	5.44	705.42
	10-Apr-12	711.30	3.70	707.60
	2-Oct-12	711.30	5.61	705.69
	13-May-13	711.30	4.21	707.09
	1-Oct-13	711.30	3.34	707.96
	15-May-14	711.30	3.72	707.58
	23-Oct-14	711.30	3.99	707.31
	2-Apr-15	711.30	3.26	708.04
	15-Oct-15	711.30	4.68	706.62
P-2 (MW 31A)	23-Jun-03	711.39	5.59	705.80
	24-Sep-03	711.39	6.52	704.87
	1-Dec-03	711.39	6.60	704.79
	23-Feb-04	711.39	5.30	706.09
	25-Feb-04	711.39	5.23	706.16
	10-Jun-04	711.39	4.65	706.74
	14-Dec-04	711.39	5.56	705.83
	7-Jun-05	711.39	5.40	705.99
	14-Dec-05	711.39	8.01	703.38
	13-Jun-06	711.39	7.63	703.76
	6-Dec-06	711.39	9.51	701.88
	20-Jun-07	711.39	4.02	707.37
	18-Dec-07	711.39	8.24	703.15
	22-Jul-08	711.39	5.66	705.73
	16-Dec-08	711.39	5.94	705.45
	2-Jun-09	711.39	5.20	706.19
	8-Dec-09	711.39	7.39	704.00
	2-Jun-10	711.39	6.26	705.13
	19-Oct-10	711.39	6.32	705.07
	1-Jun-11	711.39	7.01	704.38
	4-Oct-11	711.39	7.60	703.79
	10-Apr-12	712.04	8.31	703.73
	2-Oct-12	712.04	8.35	703.69
	13-May-13	712.04	10.00	702.04
	1-Oct-13	712.04	6.65	705.39
	15-May-14	712.04	6.64	705.40
	23-Oct-14	712.04	6.83	705.21
	2-Apr-15	712.04	6.74	705.30
	15-Oct-15	712.04	6.67	705.37

Table 2 : Summary of Depth to Groundwater and Groundwater Elevation Measrements
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well Number	Measurement Date	TOC Elevation feet, AMSL	Depth to Groundwater feet, TOC	Groundwater Elevation feet, AMSL
P-3 (MW-40)	23-Jun-03	705.99	5.31	700.68
	24-Sep-03	705.99	5.31	700.68
	1-Dec-03	705.99	6.31	699.68
	23-Feb-04	705.99	5.31	700.68
	25-Feb-04	705.99	5.34	700.65
	10-Jun-04	705.99	5.27	700.72
	14-Dec-04	705.99	5.08	700.91
	7-Jun-05	705.99	4.83	701.16
	14-Dec-05	705.99	6.24	699.75
	13-Jun-06	705.99	5.39	700.60
	6-Dec-06	705.99	5.46	700.53
	20-Jun-07	705.99	4.48	701.51
	18-Dec-07	705.99	5.27	700.72
	22-Jul-08	705.99	4.38	701.61
	16-Dec-08	705.99	5.81	700.18
	2-Jun-09	705.99	4.91	701.08
	8-Dec-09	705.99	5.84	700.15
	2-Jun-10	705.99	5.01	700.98
	19-Oct-10	705.99	5.72	700.27
	1-Jun-11	705.99	5.02	700.97
	4-Oct-11	705.99	6.89	699.10
	10-Apr-12	706.63	4.78	701.85
	2-Oct-12	706.63	7.62	699.01
	13-May-13	706.63	4.81	701.82
	1-Oct-13	706.63	4.68	701.95
	15-May-14	706.63	5.33	701.30
	23-Oct-14	706.63	4.79	701.84
	2-Apr-15	706.63	4.74	701.89
	15-Oct-15	706.63	5.61	701.02
P-4 (MW-1A)	23-Jun-03	708.06	9.70	698.36
	24-Sep-03	708.06	10.62	697.44
	1-Dec-03	708.06	11.07	696.99
	23-Feb-04	708.06	9.38	698.68
	25-Feb-04	708.06	9.24	698.82
	10-Jun-04	708.06	9.42	698.64
	14-Dec-04	708.06	8.81	699.25
	7-Jun-05	708.06	8.33	699.73
	14-Dec-05	708.06	11.25	696.81
	13-Jun-06	708.06	10.35	697.71
	6-Dec-06	708.06	12.71	695.35
	20-Jun-07	708.06	7.96	700.10
	18-Dec-07	708.06	9.93	698.13
	22-Jul-08	708.06	8.33	699.73
	16-Dec-08	708.06	8.83	699.23
	2-Jun-09	708.06	8.30	699.76
	8-Dec-09	708.06	8.77	699.29
	2-Jun-10	708.06	8.64	699.42
	19-Oct-10	708.06	9.57	698.49
	1-Jun-11	708.06	8.89	699.17
	4-Oct-11	708.06	11.68	696.38
	10-Apr-12	708.87	8.84	700.03
	2-Oct-12	708.87	12.96	695.91
	13-May-13	708.87	9.89	698.98
	1-Oct-13	708.87	9.65	699.22
	15-May-14	708.87	10.71	698.16
	23-Oct-14	708.87	9.14	699.73
	2-Apr-15	708.87	9.11	699.76
	15-Oct-15	708.87	9.72	699.15

Table 2 : Summary of Depth to Groundwater and Groundwater Elevation Measrements
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well Number	Measurement Date	TOC Elevation feet, AMSL	Depth to Groundwater feet, TOC	Groundwater Elevation feet, AMSL
P-5 (MW-42) cont.	23-Jun-03	710.33	6.41	703.92
	24-Sep-03	710.33	7.47	702.86
	1-Dec-03	710.33	7.23	703.10
	23·Feb-04	710.33	4.80	705.53
	25-Feb-04	710.33	4.42	705.91
	10-Jun-04	710.33	5.82	704.51
	14-Dec-04	708.66	3.92	704.74
	7-Jun-05	708.66	2.96	705.70
	14-Dec-05	708.66	Dry	<702.41
	13-Jun-06	708.66	5.97	702.69
	6-Dec-06	708.66	Dry	<702.41
	20-Jun-07	708.66	4.65	704.01
	18-Dec-07	708.66	6.11	702.55
	22-Jul-08	708.66	3.66	705.00
	16-Dec-08	708.66	3.29	705.37
	2-Jun-09	708.66	2.71	705.95
	8-Dec-09	708.66	5.93	702.73
	2-Jun-10	708.66	3.81	704.85
	19-Oct-10	708.66	5.96	702.70
	1-Jun-11	708.66	4.54	704.12
	4-Oct-11	708.66	Dry	<702.41
	10-Apr-12	709.30	Dry	<702.41
	2-Oct-12	709.30	Dry	<702.41
	13-May-13	709.30	Dry	<702.41
	1-Oct-13	709.30	Dry	<702.41
	15-May-14	709.30	5.93	703.37
	23-Oct-14	709.30	Dry	<702.41
	2-Apr-15	709.30	4.32	704.98
	15-Oct-15	709.30	Dry	<702.41
P-6 (MW-41)	23-Jun-03	717.62	8.75	708.87
	24-Sep-03	717.62	8.78	708.84
	1-Dec-03	717.62	Dry	<711.28
	23·Feb-04	717.62	6.40	711.22
	25-Feb-04	717.62	6.98	710.64
	10-Jun-04	717.62	7.39	710.23
	14-Dec-04	715.12	4.42	710.70
	7-Jun-05	715.12	4.47	710.65
	14-Dec-05	715.12	Dry	<708.78
	13-Jun-06	715.12	6.24	708.88
	6-Dec-06	715.12	Dry	<708.78
	20-Jun-07	715.12	5.41	709.71
	18-Dec-07	715.12	6.17	708.95
	22-Jul-08	715.12	5.53	709.59
	16-Dec-08	715.12	5.42	709.70
	2-Jun-09	715.12	2.02	713.10
	8-Dec-09	715.12	6.15	708.97
	2-Jun-10	715.12	4.66	710.46
	19-Oct-10	715.12	6.30	708.82
	1-Jun-11	715.12	5.91	709.21
	4-Oct-11	715.12	Dry	<708.78
	10-Apr-12	716.42	Dry	<708.78
	2-Oct-12	716.42	Dry	<708.78
	13-May-13	716.42	Dry	<708.78
	1-Oct-13	716.42	Dry	<708.78
	15-May-14	716.42	Dry	<708.78
	23-Oct-14	716.42	Dry	<708.78
	2-Apr-15	716.42	Dry	<708.78
	15-Oct-15	716.42	Dry	<708.78

Table 2 : Summary of Depth to Groundwater and Groundwater Elevation Measrements
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well Number	Measurement Date	TOC Elevation feet, AMSL	Depth to Groundwater feet, TOC	Groundwater Elevation feet, AMSL
P-7 (MW-17)	23-Jun-03	711.61	Dry	<698.85
	24-Sep-03	711.61	12.53	699.08
	1-Dec-03	711.61	12.44	699.17
	23-Feb-04	711.61	Dry	<698.74
	25-Feb-04	711.61	Dry	<698.74
	10-Jun-04	711.61	Dry	<698.75
***	14-Dec-04	709.15	Dry	<698.72
	14-Jun-05	709.15	Dry	<698.72
	14-Dec-05	709.15	Dry	<698.72
	13-Jun-06	709.15	Dry	<698.72
	6-Dec-06	709.15	Dry	<698.72
	20-Jun-07	709.15	7.41	701.74
	18-Dec-07	709.15	10.41	698.74
	22-Jun-08	709.15	10.02	699.13
	16-Dec-08	709.15	10.17	698.98
	2-Jun-09	709.15	7.64	701.51
	8-Dec-09	709.15	Dry	<698.72
	2-Jun-10	709.15	8.30	700.85
	19-Oct-10	709.15	10.19	698.96
	1-Jun-11	709.15	Dry	<698.72
	4-Oct-11	709.15	Dry	<698.72
	10-Apr-12	709.66	10.23	699.43
	2-Oct-12	709.66	Dry	<698.72
	16-May-13	709.66	Dry	<698.72
	1-Oct-13	709.66	Dry	<698.72
	15-May-14	709.66	Dry	<698.72
	23-Oct-14	709.66	Dry	<698.72
	2-Apr-15	709.66	Dry	<698.72
	15-Oct-15	709.66	Dry	<698.72
P-8 (MW-37)	23-Jun-03	711.78	6.42	705.36
	24-Sep-03	711.78	6.90	704.88
	1-Dec-03	711.78	8.15	703.63
	23-Feb-04	711.78	7.19	704.59
	25-Feb-04	711.78	6.86	704.92
	10-Jun-04	711.78	4.84	706.94
	14-Dec-04	711.78	6.29	705.49
	7-Jun-05	711.78	3.46	708.32
	14-Dec-05	711.78	8.13	703.65
	13-Jun-06	711.78	9.05	702.73
	6-Dec-06	711.78	10.22	701.56
	20-Jun-07	711.78	7.90	703.88
	18-Dec-07	711.78	7.33	704.45
	22-Jul-08	711.78	1.10	710.68
	16-Dec-08	711.78	3.00	708.78
	2-Jun-09	711.78	0.58	711.20
	8-Dec-09	711.78	7.88	703.90
	2-Jun-10	711.78	2.85	708.93
	19-Oct-10	711.78	6.15	705.63
	1-Jun-11	711.78	5.85	705.93
	4-Oct-11	711.78	8.49	703.29
	10-Apr-12	711.91	6.54	705.37
	2-Oct-12	711.91	10.31	701.60
	16-May-13	711.91	9.62	702.29
	1-Oct-13	711.91	6.63	705.28
	15-May-14	711.91	5.74	706.17
	23-Oct-14	711.91	6.79	705.12
	2-Apr-15	711.91	6.73	705.18
	15-Oct-15	711.91	6.99	704.92

Table 2 : Summary of Depth to Groundwater and Groundwater Elevation Measrements
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well Number	Measurement Date	TOC Elevation feet, AMSL	Depth to Groundwater feet, TOC	Groundwater Elevation feet, AMSL
P-9 (MW-40)	23-Jun-03	712.91	3.92	708.99
	24-Sep-03	712.91	4.42	708.49
	1-Dec-03	712.91	4.84	708.07
	23-Feb-04	712.91	3.70	709.21
	25-Feb-04	712.91	6.63	706.28
	10-Jun-04	712.91	4.05	708.86
	14-Dec-04	712.91	3.21	709.70
	7-Jun-05	712.91	3.92	708.99
	14-Dec-05	712.91	5.86	707.05
	13-Jun-06	712.91	5.78	707.13
	6-Dec-06	712.91	Dry	<706.91
	20-Jun-07	712.91	1.19	711.72
	18-Dec-07	712.91	2.91	710.00
	22-Jul-08	712.91	2.04	710.87
	16-Dec-08	712.91	2.37	710.54
	2-Jul-09	712.91	2.06	710.85
	8-Dec-09	712.91	4.88	708.03
	2-Jun-10	712.91	3.68	709.23
	19-Oct-10	712.91	3.49	709.42
	1-Jun-11	712.91	5.31	707.60
	7-Oct-11	712.91	5.96	706.95
	10-Apr-12	713.10	3.82	709.28
	2-Oct-12	713.10	7.08	706.02
	16-May-13	713.10	7.01	706.09
	1-Oct-13	713.10	7.07	706.03
	15-May-14	713.10	6.40	706.70
	23-Oct-14	713.10	6.37	706.73
	2-Apr-15	713.10	5.60	707.50
	15-Oct-15	713.10	5.93	707.17
P-10 (MW-39)	23-Jun-03	709.35	4.18	705.17
	24-Sep-03	709.35	3.51	705.84
	1-Dec-03	709.35	3.81	705.54
	23-Feb-04	709.35	2.66	706.69
	25-Feb-04	709.35	2.21	707.14
	10-Jun-04	709.35	4.48	704.87
	14-Dec-04	709.35	3.03	706.32
	7-Jun-05	709.35	3.15	706.20
	14-Dec-05	709.35	6.39	702.96
	13-Jun-06	709.35	5.56	703.79
	6-Dec-06	709.35	8.46	700.89
	20-Jun-07	709.35	1.66	707.69
	18-Dec-07	709.35	3.21	706.14
	22-Jul-08	709.35	4.18	705.17
	16-Dec-08	709.35	4.42	704.93
	2-Jul-09	709.35	3.57	705.78
	8-Dec-09	709.35	2.99	706.36
	2-Jun-10	709.35	3.96	705.39
	19-Oct-10	709.35	5.82	703.53
	1-Jun-11	709.35	3.78	705.57
	7-Oct-11	709.35	7.34	702.01
	10-Apr-12	709.46	2.45	707.01
	2-Oct-12	709.46	8.80	700.66
	16-May-13	709.46	3.20	706.26
	1-Oct-13	709.46	4.20	705.26
	15-May-14	709.46	4.34	705.12
	23-Oct-14	709.46	3.32	706.14
	2-Apr-15	709.46	2.23	707.23
	15-Oct-15	709.46	7.37	702.09

Table 2 : Summary of Depth to Groundwater and Groundwater Elevation Measrements
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well Number	Measurement Date	TOC Elevation feet, AMSL	Depth to Groundwater feet, TOC	Groundwater Elevation feet, AMSL
P-11 (MW-25A)	23-Jun-03	703.40	Dry	<696.75
	24-Sep-03	703.40	6.30	697.10
	1-Dec-03	703.40	6.30	697.10
	23-Feb-04	703.40	6.44	696.96
	25-Feb-04	703.40	6.45	696.95
	10-Jun-04	703.40	6.19	697.21
	14-Dec-04	703.40	5.68	697.72
	7-Jun-05	703.40	5.68	697.72
	14-Dec-05	703.40	4.44	698.96
	13-Jun-06	703.40	4.87	698.53
	6-Dec-06	703.40	5.81	697.59
	20-Jun-07	703.40	0.08	703.32
	18-Dec-07	703.40	5.09	698.31
	22-Jul-08	703.40	5.45	697.95
	16-Dec-08	703.40	5.33	698.07
	2-Jul-09	703.40	5.36	698.04
	8-Dec-09	703.40	4.44	698.96
	2-Jun-10	703.40	4.63	698.77
	19-Oct-10	703.40	3.80	699.60
	1-Jun-11	703.40	3.85	699.55
	7-Oct-11	703.40	4.55	698.85
	10-Apr-12	703.96	3.68	700.28
	2-Oct-12	703.96	5.55	698.41
	16-May-13	703.96	4.07	699.89
	1-Oct-13	703.96	3.63	700.33
	15-May-14	703.96	4.55	699.41
	23-Oct-14	703.96	5.08	698.88
	2-Apr-15	703.96	4.74	699.22
	15-Oct-15	703.96	5.03	698.93
P-12 (MW-32A)	23-Jun-03	701.43	6.58	694.85
	24-Sep-03	701.43	8.61	692.82
	1-Dec-03	701.43	9.08	692.35
	23-Feb-04	701.43	4.95	696.48
	25-Feb-04	701.43	4.79	696.64
	10-Jun-04	701.43	6.04	695.39
	14-Dec-04	701.43	4.41	697.02
	7-Jun-05	701.43	5.22	696.21
	14-Dec-05	701.43	9.97	691.46
	13-Jun-06	701.43	7.45	693.98
	6-Dec-06	701.43	11.51	689.92
	20-Jun-07	701.43	3.50	697.93
	18-Dec-07	701.43	8.12	693.31
	22-Jul-08	701.43	5.26	696.17
	16-Dec-08	701.43	6.32	695.11
	2-Jul-09	701.43	4.56	696.87
	8-Dec-09	701.43	8.02	693.41
	2-Jun-10	701.43	5.41	696.02
	19-Oct-10	701.43	7.81	693.62
	1-Jun-11	701.43	5.11	696.32
	7-Oct-11	701.43	10.17	691.26
	10-Apr-12	702.11	4.87	697.24
	2-Oct-12	702.11	11.18	690.93
	16-May-13	702.11	7.27	694.84
	1-Oct-13	702.11	6.68	695.43
	15-May-14	702.11	7.61	694.50
	23-Oct-14	702.11	7.13	694.98
	2-Apr-15	702.11	6.28	695.83
	15-Oct-15	702.11	8.00	694.11

Table 2 : Summary of Depth to Groundwater and Groundwater Elevation Measrements
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well Number	Measurement Date	TOC Elevation feet, AMSL	Depth to Groundwater feet, TOC	Groundwater Elevation feet, AMSL
P-13 (P-1A)	23-Jun-03	703.20	6.02	697.18
	24-Sep-03	703.20	5.58	697.62
	1-Dec-03	703.20	6.45	696.75
	23-Feb-04	703.20	6.11	697.09
	25-Feb-04	703.20	6.17	697.03
	10-Jun-04	703.20	4.82	698.38
	14-Dec-04	703.20	5.01	698.19
	7-Jun-05	703.20	3.59	699.61
	14-Dec-05	703.20	4.07	699.13
	13-Jun-06	703.20	3.98	699.22
	6-Dec-06	703.20	4.71	698.49
	20-Jun-07	703.20	3.61	699.59
	18-Dec-07	703.20	3.88	699.32
	22-Jul-08	703.20	2.53	700.67
	18-Dec-08	703.20	3.80	699.40
	2-Jun-09	703.20	3.11	700.09
	8-Dec-09	703.20	3.54	699.66
	2-Jun-10	703.20	3.66	699.54
	19-Oct-10	703.20	3.45	699.75
	1-Jun-11	703.20	4.63	698.57
	4-Oct-11	703.20	4.83	698.37
	10-Apr-12	703.81	5.40	698.41
	2-Oct-12	703.81	4.96	698.85
	16-May-13	703.81	5.32	698.49
	1-Oct-13	703.81	3.77	700.04
	15-May-14	703.81	5.06	698.75
	23-Oct-14	703.81	4.17	699.64
	2-Apr-15	703.81	4.96	698.85
	15-Oct-15	703.81	3.88	699.93
P-14 (P-3A)	23-Jun-03	701.59	13.76**	687.83**
	24-Sep-03	701.59	3.34	698.25
	1-Dec-03	701.59	4.68	696.91
	23-Feb-04	701.59	5.99	695.60
	25-Feb-04	701.59	6.01	695.58
	10-Jun-04	701.59	3.11	698.48
	14-Dec-04	701.59	4.63	696.96
	7-Jun-05	701.59	2.40	699.19
	14-Dec-05	701.59	5.32	696.27
	13-Jun-06	701.59	3.69	697.90
	6-Dec-06	701.59	6.13	695.46
	20-Jun-07	701.59	3.99	697.60
	18-Dec-07	701.59	5.48	696.11
	22-Jul-08	701.59	2.01	699.58
	18-Dec-08	701.59	3.00	698.59
	2-Jun-09	701.59	2.93	698.66
	8-Dec-09	701.59	5.21	696.38
	2-Jun-10	701.59	3.25	698.34
	19-Oct-10	701.59	3.25	698.34
	1-Jun-11	701.59	3.84	697.75
	4-Oct-11	701.59	5.85	695.74
	10-Apr-12	702.22	7.02	695.20
	2-Oct-12	702.22	6.01	696.21
	16-May-13	702.22	7.05	695.17
	1-Oct-13	702.22	4.42	697.80
	15-May-14	702.22	5.40	696.82
	23-Oct-14	702.22	4.85	697.37
	2-Apr-15	702.22	5.87	696.35
	15-Oct-15	702.22	4.04	698.18

Table 2 : Summary of Depth to Groundwater and Groundwater Elevation Measrements
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well Number	Measurement Date	TOC Elevation feet, AMSL	Depth to Groundwater feet, TOC	Groundwater Elevation feet, AMSL
P·15 (MW 18A)	23-Jun-03	707.13	6.02	701.11
	24-Sep-03	707.13	5.57	701.56
	1-Dec-03	707.13	6.56	700.57
	23-Feb-04	707.13	6.61	700.52
	25-Feb-04	707.13	6.59	700.54
	10-Jun-04	707.13	5.27	701.86
	14-Dec-04	707.13	6.20	700.93
	7-Jun-05	707.13	4.53	702.60
	14-Dec-05	707.13	6.21	700.92
	13-Jun-06	707.13	6.15	700.98
	6-Dec-06	707.13	7.00	700.13
	20-Jun-07	707.13	3.91	703.22
	18-Dec-07	707.13	5.91	701.22
	22-Jul-08	707.13	4.16	702.97
	18-Dec-08	707.13	5.82	701.31
	2-Jun-09	707.13	4.38	702.75
	8-Dec-09	707.13	5.68	701.45
	2-Jun-10	707.13	4.05	703.08
	19-Oct-10	707.13	5.30	701.83
	1-Jun-11	707.13	5.29	701.84
	4-Oct-11	707.13	5.83	701.30
	10-Apr-12	707.77	6.74	701.03
	2-Oct-12	707.77	6.13	701.64
	16-May-13	707.77	7.63	700.14
	1-Oct-13	707.77	6.56	701.21
	15-May-14	707.77	6.82	700.95
	23-Oct-14	707.77	6.40	701.37
	2-Apr-15	707.77	7.30	700.47
	15-Oct-15	707.77	5.67	702.10
MW-14B	23-Jun-03	696.58	5.93	690.65
	24-Sep-03	696.58	6.49	690.09
	1-Dec-03	696.58	7.31	689.27
	23-Feb-04	696.58	5.58	691.00
	25-Feb-04	696.58	5.24	691.34
	10-Jun-04	696.58	5.81	690.77
	14-Dec-04	696.58	5.78	690.80
	7-Jun-05	696.58	5.22	691.36
	14-Dec-05	696.58	8.00	688.58
	13-Jun-06	696.58	6.77	689.81
	6-Dec-06	696.58	9.04	687.54
	20-Jun-07	696.58	4.47	692.11
	18-Dec-07	696.58	5.31	691.27
	22-Jul-08	696.58	5.48	691.10
	18-Dec-08	696.58	6.47	690.11
	2-Jun-09	696.58	4.45	692.13
	8-Dec-09	696.58	6.57	690.01
	2-Jun-10	696.58	5.30	691.28
	19-Oct-10	696.58	7.02	689.56
	1-Jun-11	696.58	5.78	690.80
	4-Oct-11	696.58	8.76	687.82
	10-Apr-12	697.16	5.01	692.15
	2-Oct-12	697.16	9.73	687.43
	16-May-13	697.16	5.13	692.03
	1-Oct-13	697.16	5.24	691.92
	15-May-14	697.16	6.16	691.00
	23-Oct-14	697.16	5.45	691.71
	2-Apr-15	697.16	4.55	692.61
	15-Oct-15	697.16	6.75	690.41

Table 2 : Summary of Depth to Groundwater and Groundwater Elevation Measrements
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well Number	Measurement Date	TOC Elevation feet, AMSL	Depth to Groundwater feet, TOC	Groundwater Elevation feet, AMSL
MW-23A	23-Jun-03	698.84	6.02	692.82
	24-Sep-03	698.84	2.67	696.17
	1-Dec-03	698.84	3.01	695.83
	23-Feb-04	698.84	3.71	695.13
	25-Feb-04	698.84	5.11	693.73
	10-Jun-04	698.84	2.58	696.26
	14-Dec-04	698.84	3.05	695.79
	7-Jun-05	698.84	1.03	697.81
	14-Dec-05	698.84	2.70	696.14
	27-Feb-06	698.84	3.11	695.73
	13-Jun-06	698.84	1.48	697.36
	25-Sep-06	698.84	3.02	695.82
	6-Dec-06	698.84	3.46	695.38
	20-Jun-07	698.84	0.27	698.57
	18-Dec-07	698.84	2.64	696.20
	22-Jul-08	698.84	1.12	697.72
	16-Dec-08	698.84	1.64	697.20
	2-Jun-09	698.84	0.99	697.85
	8-Dec-09	698.84	2.42	696.42
	2-Jun-10	698.84	1.68	697.16
	19-Oct-10	698.84	2.57	696.27
	5-Jan-11	698.84	3.20	695.64
	1-Jun-11	698.84	2.40	696.44
	4-Oct-11	698.84	2.92	695.92
	10-Apr-12	699.55	2.74	696.81
	2-Oct-12	699.55	3.36	696.19
	16-May-13	699.55	3.01	696.54
	1-Oct-13	699.55	2.09	697.46
	15-May-14	699.55	3.48	696.07
	23-Oct-14	699.55	3.88	695.67
	2-Apr-15	699.55	3.42	696.13
	15-Oct-15	699.55	2.92	696.63
MW-26A	23-Jun-03	689.52	Full	689.52*
	24-Sep-03	689.52	Full	689.52*
	1-Dec-03	689.52	0.12	689.40
	23-Feb-04	689.52	Full	689.52*
	25-Feb-04	689.52	0.05	689.47
	10-Jun-04	689.52	Full	689.52*
	14-Dec-04	689.52	Full	689.52*
****	7-Jun-05	692.33	1.54	690.79
	14-Dec-05	692.33	2.68	689.65
	13-Jun-06	692.33	2.30	690.03
	6-Dec-06	692.33	2.47	689.86
	20-Jun-07	692.33	0.31	692.02
	18-Dec-07	692.33	1.66	690.67
	22-Jul-08	692.33	2.93	689.40
	16-Dec-08	692.33	1.84	690.49
	2-Jun-09	692.33	1.11	691.22
	8-Dec-09	692.33	1.62	690.71
	2-Jun-10	692.33	1.90	690.43
	19-Oct-10	692.33	2.32	690.01
	1-Jun-11	692.33	1.91	690.42
	4-Oct-11	692.33	3.91	688.42
	10-Apr-12	693.09	1.52	691.57
	2-Oct-12	693.09	5.23	687.86
	16-May-13	693.09	2.31	690.78
	1-Oct-13	693.09	1.63	691.46
	15-May-14	693.09	2.95	690.14
	23-Oct-14	693.09	1.87	691.22
	2-Apr-15	693.09	2.16	690.93
	15-Oct-15	693.09	3.05	690.04

Table 2 : Summary of Depth to Groundwater and Groundwater Elevation Measrements
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well Number	Measurement Date	TOC Elevation feet, AMSL	Depth to Groundwater feet, TOC	Groundwater Elevation feet, AMSL
MW-33A	23-Jun-03	697.36	9.50	687.86
	24-Sep-03	697.36	6.18	691.18
	1-Dec-03	697.36	6.40	690.96
	23-Feb-04	697.36	4.27	693.09
	25-Feb-04	697.36	7.72	689.64
	10-Jun-04	697.36	4.73	692.63
	14-Dec-04	697.36	4.07	693.29
	7-Jun-05	697.36	4.27	693.09
	14-Dec-05	697.36	7.43	689.93
	13-Jun-06	697.36	5.88	691.48
	6-Dec-06	697.36	9.19	688.17
	20-Jun-07	697.36	0.51	696.85
	18-Dec-07	697.36	6.42	690.94
	22-Jul-08	697.36	3.85	693.51
	16-Dec-08	697.36	5.02	692.34
	2-Jun-09	697.36	4.22	693.14
	8-Dec-09	697.36	5.88	691.48
	2-Jun-10	697.36	4.14	693.22
	19-Oct-10	697.36	5.64	691.72
	1-Jun-11	697.36	4.60	692.76
	4-Oct-11	697.36	7.78	689.58
	10-Apr-12	698.01	1.05	696.96
	2-Oct-12	698.01	9.16	688.85
	16-May-13	698.01	4.70	693.31
	1-Oct-13	698.01	4.43	693.58
	15-May-14	698.01	5.90	692.11
	23-Oct-14	698.01	5.18	692.83
	2-Apr-15	698.01	4.43	693.58
	15-Oct-15	698.01	5.95	692.06
MW-46A	23-Jun-03	687.96	2.70	685.26
	24-Sep-03	687.96	2.43	685.53
	1-Dec-03	687.96	2.63	685.33
	23-Feb-04	687.96	1.77	686.19
	25-Feb-04	687.96	1.66	686.30
	10-Jun-04	687.96	2.69	685.27
	14-Dec-04	687.96	2.74	685.22
	7-Jun-05	687.96	2.83	685.13
	14-Dec-05	687.96	2.97	684.99
	13-Jun-06	687.96	3.93	684.03
	6-Dec-06	687.96	2.18	685.78
	20-Jun-07	687.96	0.97	686.99
	18-Dec-07	687.96	1.46	686.50
	22-Jul-08	687.96	3.30	684.66
	16-Dec-08	687.96	2.11	685.85
	2-Jun-09	687.96	3.46	684.50
	8-Dec-09	687.96	1.79	686.17
	2-Jun-10	687.96	1.10	686.86
	19-Oct-10	687.96	3.74	684.22
	1-Jun-11	687.96	2.73	685.23
	4-Oct-11	687.96	4.96	683.00
	10-Apr-12	688.64	1.16	687.48
	2-Oct-12	688.64	Dry	<682.46
	16-May-13	688.64	2.17	686.47
	1-Oct-13	688.64	1.71	686.93
	15-May-14	688.64	3.72	684.92
	23-Oct-14	688.64	1.57	687.07
	4-Feb-15	688.64	1.96	686.68
	15-Oct-15	688.64	4.09	684.55

Table 2 : Summary of Depth to Groundwater and Groundwater Elevation Measrements
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well Number	Measurement Date	TOC Elevation feet, AMSL	Depth to Groundwater feet, TOC	Groundwater Elevation feet, AMSL
MW-48A	23-Jun-03	696.80	1.76	695.04
	24-Sep-03	696.80	2.35	694.45
	1-Dec-03	696.80	4.16	692.64
	23-Feb-04	696.80	2.31	694.49
	25-Feb-04	696.80	2.47	694.33
	10-Jun-04	696.80	1.57	695.23
	14-Dec-04	696.80	2.98	693.82
	7-Jun-05	696.80	1.05	695.75
	14-Dec-05	696.80	4.86	691.94
	13-Jun-06	696.80	2.64	694.16
	6-Dec-06	696.80	5.72	691.08
	20-Jun-07	696.80	1.27	695.53
	18-Dec-07	696.80	4.40	692.40
	22-Jul-08	696.80	1.01	695.79
	16-Dec-08	696.80	2.91	693.89
	2-Jun-09	696.80	1.06	695.74
	8-Dec-09	696.80	2.75	694.05
	2-Jun-10	696.80	0.92	695.88
	19-Oct-10	696.80	2.62	694.18
	1-Jun-11	696.80	1.76	695.04
	1-Jun-11	696.80	1.76	695.04
	4-Oct-11	696.80	3.65	693.15
	10-Apr-12	697.35	2.00	695.35
	2-Oct-12	697.35	4.95	692.40
	16-May-13	697.35	1.95	695.40
	1-Oct-13	697.35	2.03	695.32
	15-May-14	697.35	2.67	694.68
	23-Oct-14	697.35	2.20	695.15
	2-Apr-15	697.35	1.28	696.07
	15-Oct-15	697.35	3.02	694.33

1. TOC : Measured from top of casing
2. AMSL : Above mean sea level.
3. A : Replacement well.
4. * : Casing was full of water.
5. ** : Water level not stable because well is new.
6. *** : Casing top repaired, new survey elevation, July 2004.
7. **** : Casing top repaired, new survey elevation, February 2005.
8. All monitoring wells were re-surveyed on January 24, 2013 due to inconsistencies discovered in the monitoring well top of casing elevations previously tabulated. Total depths of the monitoring wells were also measured to confirm the depths to the bottom of the wells. These corrections to elevations were made retroactively to the data set starting with April 2012.

Table 3 : Summary of Analytical Parameters and Methods
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Parameters	EPA Method	Recommended		Holdlng Time	Volume for Analysis
		Container	Preservative		
Cadmium	SW 6010C	P or G (A)	HN03 pH<2	6 months	500 ml
Lead	SW 6010C	P or G (A)	HN03 pH<2	6 months	500 ml
Zinc	SW 6010C	P or G (A)	HN03 pH<2	6 months	500 ml
pH	SW 9040	P or G	---	Run immediately	100 ml
Specific Conductivity	SW 9050	P or G	Cool, 4 ^{o}C	28 days	200 ml

Notes:

1. P : Plastic.
2. G : Glass.
3. (A) : Acid rinse.
4. - : Not applicable.
5. ml : Milliliter.
6. Specific Conductivity was measured immediately in the field.

Table 4 : Summary of Field Measurements
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well	Sampling Date	pH S.U.	Specific Conductivity µmhos/cm	Temperature ºC
MW-14B	24-Jun-03	6.58	7,150	18.1
	25-Sep-03	6.49	6,220	19.8
	2-Dec-03	6.72	6,170	16.4
	24-Feb-04	6.98	4,617	9.9
	11-Jun-04	6.89	4,451	20.6
	15-Dec-04	7.02	5,170	14.1
	8-Jun-05	6.54	5,890	20.6
	15-Dec-05	7.06	6,630	11.9
	14-Jun-06	5.28	6,760	17.4
	7-Dec-06	6.52	6,720	12.8
	21-Jun-07	6.73	6,000	22.6
	19-Dec-07	6.54	3,255	15.7
	23-Jul-08	6.86	6,440	22.7
	18-Dec-08	6.59	3,166	13.9
	3-Jun-09	6.54	680	17.3
	8-Dec-09	6.81	6,140	14.5
	2-Jun-10	6.64	6,120	19.3
	19-Oct-10	6.63	6,238	20.6
	4-Jun-11	6.68	5,699	15.8
	4-Oct-11	6.48	6,674	28.2
	11-Apr-12	6.53	3,357	13.5
	2-Oct-12	6.53	6,696	26.1
	17-May-13	6.62	5,491	20.2
	2-Oct-13	6.43	5,987	25.6
	15-May-14	6.55	6,245	18.9
	23-Oct-14	9.69	5,554	23.1
	2-Apr-15	6.61	4,873	26.0
	15-Oct-15	6.54	5,963	27.0
MW-23A	24-Jun-03	6.98	4,119	18.8
	25-Sep-03	6.58	2,142	19.9
	2-Dec-03	6.76	2,963	15.9
	24-Feb-04	7.25	3,664	8.7
	25-Feb-04	7.11	693	12.4
	11-Jun-04	6.76	222	21.3
	15-Dec-04	6.79	2,421	14.8
	8-Jun-05	6.56	3,286	21.2
	15-Dec-05	6.68	3,167	14.7
	24-Feb-06	6.62	3,426	18.8
	14-Jun-06	5.40	3,042	18.7
	25-Sep-06	6.75	3,508	25.9
	7-Dec-06	6.36	3,422	12.8
	21-Jun-07	6.43	3,378	23.5
	19-Dec-07	6.45	2,047	16.3
	23-Jul-08	6.80	3,349	23.7
	18-Dec-08	6.47	1,841	13.6
	3-Jun-09	6.59	1,712	17.9
	8-Dec-09	6.60	3,632	14.4
	2-Jun-10	6.67	3,545	19.7
	19-Oct-10	6.55	3,689	20.4
	5-Jan-11	6.62	3,714	15.1
	1-Jun-11	6.61	3,600	16.4
	5-Oct-11	6.19	3,350	22.0
	11-Apr-12	6.18	3,501	18.1
	3-Oct-12	6.16	4,041	27.1
	17-May-13	6.58	3,027	21.0
	2-Oct-13	6.11	3,403	25.0
	16-May-14	6.31	3,408	20.9
	24-Oct-14	3.83	3,470	24.3
	2-Apr-15	6.43	1,169	22.2
	16-Oct-15	6.29	3,306	21.3

Table 4 : Summary of Field Measurements
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well	Sampling Date	pH S.U.	Specific Conductivity µmhos/cm	Temperature ºC
MW-26A	24-Jun-03	7.00	2,183	24.1
	25-Sep-03	6.87	2,121	20.2
	2-Dec-03	7.09	2,114	11.2
	24-Feb-04	7.31	1,916	6.5
	11-Jun-04	7.12	1,968	21.6
	15-Dec-04	7.15	2,267	9.1
	8-Jun-05	6.72	2,297	25.1
	15-Dec-05	7.13	2,804	8.6
	14-Jun-06	5.63	3,356	24.5
	7-Dec-06	6.73	4,276	8.2
	21-Jun-07	6.75	4,371	27.3
	19-Dec-07	6.71	2,921	15.1
	23-Jul-08	6.85	1,940	24.8
	18-Dec-08	6.51	2,138	12.1
	3-Jun-09	6.58	2,158	10.4
	8-Dec-09	6.90	4,703	6.7
	2-Jun-10	6.72	4,653	25.9
	19-Oct-10	6.96	4,475	19.8
	4-Jun-11	6.94	4,204	20.4
	4-Oct-11	6.65	4,064	24.5
	11-Apr-12	6.59	3,837	18.1
	2-Oct-12	6.64	3,632	29.5
	17-May-13	6.76	3,201	20.5
	2-Oct-13	6.53	3,979	28.5
	16-May-14	6.70	3,942	13.4
	24-Oct-14	3.74	4,061	24.0
	3-Apr-15	6.75	4,014	14.0
	15-Oct-15	6.72	3,919	22.5
MW-33A	24-Jun-03	6.84	7,500	19.0
	25-Sep-03	6.71	7,460	19.3
	2-Dec-03	6.83	7,460	17.5
	24-Feb-04	7.05	6,100	11.5
	11-Jun-04	6.89	6,150	19.6
	15-Dec-04	6.56	6,580	15.5
	8-Jun-05	6.94	6,220	20.5
	15-Dec-05	7.05	8,050	16.0
	14-Jun-06	5.53	7,150	16.8
	7-Dec-06	6.50	8,580	14.8
	21-Jun-07	6.72	6,390	22.5
	19-Dec-07	6.31	2,127	15.7
	23-Jul-08	7.16	3,092	21.8
	18-Dec-08	6.76	3,205	13.8
	3-Jun-09	6.55	3,051	16.9
	8-Dec-09	6.76	6,810	12.7
	2-Jun-10	6.61	6,140	19.9
	19-Oct-10	6.72	6,405	19.5
	4-Jun-11	6.70	6,693	15.6
	4-Oct-11	6.72	4,254	28.1
	11-Apr-12	6.61	1,451	18.3
	2-Oct-12	6.66	5,133	28.3
	17-May-13	6.34	1,382	20.9
	2-Oct-13	6.30	2,791	26.6
	15-May-14	6.67	5,654	21.8
	23-Oct-14	10.55	4,959	24.7
	2-Apr-15	6.68	5,809	24.0
	15-Oct-15	6.74	3,025	27.3

Table 4 : Summary of Field Measurements
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well	Sampling Date	pH S.U.	Specific Conductivity µmhos/cm	Temperature ºC
MW-46A	24-Jun-03	6.67	1,680	22.2
	25-Sep-03	6.68	1,709	21.2
	2-Dec-03	6.77	1,746	12.6
	24-Feb-04	7.10	1,251	7.0
	25-Feb-04	6.98	1,321	0.8
	11-Jun-04	6.96	1,425	21.5
	15-Dec-04	6.59	1,656	11.7
	8-Jun-05	6.65	1,588	22.8
	15-Dec-05	7.00	2,045	9.3
	14-Jun-06	5.12	2,853	21.7
	7-Dec-06	6.42	6,100	11.3
	21-Jun-07	6.76	2,352	28.1
	19-Dec-07	6.61	2,382	15.3
	23-Jul-08	6.62	1,191	25.5
	18-Dec-08	6.65	803	8.2
	3-Jun-09	6.42	704	19.4
	8-Dec-09	6.87	1,870	11.1
	2-Jun-10	6.82	2,157	23.3
	19-Oct-10	6.62	1,988	20.8
	4-Jun-11	6.89	1,478	19.1
	4-Oct-11	---	---	---
	11-Apr-12	6.69	1,971	17.0
	2-Oct-12	---	---	---
	17-May-13	6.78	3,287	17.5
	2-Oct-13	6.45	1,543	27.1
	16-May-14	6.60	4,168	18.7
	24-Oct-14	2.93	1,414	21.8
	3-Apr-15	6.71	3,337	12.5
	15-Oct-15	6.59	1,967	30.8
MW-48A	24-Jun-03	6.67	6,860	21.8
	25-Sep-03	6.71	6,430	20.2
	2-Dec-03	7.04	5,810	14.9
	24-Feb-04	7.10	959	7.6
	11-Jun-04	7.02	5,040	19.8
	15-Dec-04	7.45	5,620	11.8
	8-Jun-05	6.78	5,810	21.8
	15-Dec-05	7.32	6,370	10.3
	14-Jun-06	5.37	6,560	18.8
	7-Dec-06	6.67	6,920	10.2
	21-Jun-07	6.62	6,080	21.5
	19-Dec-07	6.75	3,374	14.4
	23-Jul-08	6.85	6,110	23.6
	18-Dec-08	6.70	2,910	11.7
	3-Jun-09	6.00	739	19.2
	8-Dec-09	6.92	6,630	13.2
	2-Jun-10	7.01	6,610	21.1
	19-Oct-10	6.83	6,695	19.6
	4-Jun-11	6.88	6,726	15.8
	4-Oct-11	6.64	6,801	27.0
	11-Apr-12	6.61	6,656	13.7
	2-Oct-12	6.69	6,832	25.9
	17-May-13	6.63	5,169	23.7
	2-Oct-13	6.50	6,359	25.9
	15-May-14	6.69	6,683	19.5
	23-Oct-14	9.95	2,632	19.5
	2-Apr-15	6.32	3,284	25.2
	16-Oct-15	6.66	6,637	15.4

Notes:
1. All measurements taken in the field.
2. A : Replacement Well.
3. S.U. : Standard Units.
4. µmhos/cm : micromhos per centimeter
5. --- : Not measured.

Table 5 : Summary of Laboratory Analyses of Groundwater Samples
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well	Sampling Date	Total Cadmium, mg/L	Dissolved Cadmium, mg/L	Total Lead, mg/L	Dissolved Lead, mg/L	Total Zinc, mg/L	Dissolved Zinc, mg/L	Total Suspended Solids, mg/L	Dissolved Suspended Solids, mg/L	Total Metals, Field Turbidity, NTU	Dissolved Metals, Field Turbidity, NTU
MW-14B	24-Jun-03	<0.01	---	<0.05	---	<0.11	---	---	---	---	---
Dup	24-Jun-03	<0.01	---	<0.05	---	<0.11	---	---	---	---	---
	25-Sep-03	0.0018	---	<0.0050	---	0.179	---	---	---	---	---
	2-Dec-03	<0.0010	---	<0.0050	---	0.0600	---	---	---	---	---
	24-Feb-04	<0.0010	---	<0.0050	---	0.311	---	---	---	---	---
	11-Jun-04	<0.0010	<0.0010	<0.0050	<0.0050	0.0810	0.081	---	---	---	---
	15-Dec-04	0.0010	<0.0010	<0.0050	<0.0050	0.0810	0.062	---	---	---	---
	8-Jun-05	<0.0010	<0.0010	<0.0050	<0.0050	<0.0500	<0.0500	125	<4.0	94	0
	15-Dec-05	0.00220	0.00210	<0.00500	<0.00500	<0.0500	<0.0500	---	---	7	0
	14-Jun-06	<0.00100	0.00150	<0.00500	<0.00500	0.0690	<0.0500	---	---	5	0
	7-Dec-06	0.00400	0.00490	<0.00500	<0.00500	0.851	1.14	---	---	5	0
	21-Jun-07	0.00430	0.00550	<0.00500	<0.00500	0.891	0.488	---	---	4	1
	19-Dec-07	0.00560	0.00170	<0.00500	<0.00500	0.0907	0.121	---	---	6	1
	23-Jul-08	0.00420	0.00160	<0.00500	<0.00500	0.609	0.126	---	---	3	1
	18-Dec-08	<0.0100	<0.0010	<0.00500	<0.00500	<0.500	<0.500	---	---	8	1
	3-Jun-09	<0.00100	0.00110	<0.00500	<0.00500	0.596	0.467	---	---	11	0
	9-Dec-09	0.00110	<0.00100	<0.00500	0.00580	0.189	0.0919	---	---	7	1
	3-Jun-10	0.0107	0.00610	<0.00500	<0.00500	2.21	1.14	---	---	4	1
	24-Aug-10	0.0039	0.00120	<0.00500	<0.00500	0.673	0.182	---	---	---	---
	20-Oct-10	0.00160	<0.00100	<0.00500	<0.00500	0.252	0.107	---	---	0	0
Dup	20-Oct-10	<0.00100	<0.00100	<0.00500	<0.00500	0.0782	0.109	---	---	---	---
**	4-Apr-11	0.00140	<0.00100	<0.00500	0.00540	0.323	0.152	---	---	0	0
	2-Jun-11	0.00780	0.00780	<0.00500	<0.00500	1.85	1.85	---	---	1	1
**	24-Jun-11	---	---	---	---	0.0783	0.0930	---	---	---	---
	27-Jun-11	---	---	---	---	0.619	0.216	---	---	---	---
	4-Oct-11	<0.00100	<0.00100	<0.00500	<0.00500	<0.00500	<0.00500	---	---	1	1
	4-Oct-11	<0.00100	<0.00100	<0.00500	<0.00500	<0.00500	<0.00500	---	---	---	---
	11-Apr-12	<0.00100	<0.00100	<0.00500	<0.00500	0.621	0.692	---	---	2	0
Dup	11-Apr-12	<0.00100	<0.00100	<0.00500	<0.00500	0.613	0.625	---	---	---	---
	2-Oct-12	<0.00100	<0.00100	<0.00500	<0.00500	<0.00500	<0.00500	---	---	0.75	0
Dup	2-Oct-12	<0.00100	<0.00100	<0.00500	<0.00500	<0.00500	<0.00500	---	---	---	---
	17-May-13	0.00130	<0.00100	<0.00500	<0.00500	0.281	0.278	---	---	---	---
	2-Oct-13	<0.00100	<0.00100	<0.00500	<0.00500	0.277	0.263	---	---	---	---
Dup	2-Oct-13	<0.00100	<0.00100	<0.00500	<0.00500	0.240	0.220	---	---	---	---
	15-May-14	0.00350 J	0.00450 J	<0.0250	<0.0250	0.232 J	0.225 J	---	---	0.18	---
	23-Oct-14	0.00410	0.00410	<0.00500	<0.00500	0.642	0.611	---	---	0.25	---
	2-Apr-15	0.0153	0.0200	0.00230 J	<0.00500	7.05	6.36	---	---	0.22	---
	15-Oct-15	0.00110	0.00120	<0.00200	<0.00200	0.420	0.413	---	---	0.35	---

Table 5 : Summary of Laboratory Analyses of Groundwater Samples
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well	Sampling Date	Total Cadmium, mg/L	Dissolved Cadmium, mg/L	Total Lead, mg/L	Dissolved Lead, mg/L	Total Zinc, mg/L	Dissolved Zinc, mg/L	Total Suspended Solids, mg/L	Dissolved Suspended Solids, mg/L	Total Metals, Field Turbidity, NTU	Dissolved Metals, Field Turbidity, NTU
MW-23A	24-Jun-03	0.030	---	<0.05	---	2.78	---	---	---	---	---
	25-Sep-03	0.0240	---	<0.0050	---	2.13	---	---	---	---	---
	2-Dec-03	0.0220	---	<0.0050	---	2.19	---	---	---	---	---
	24-Feb-04	0.0080	---	0.0230	---	0.85	---	---	---	---	---
	11-Jun-04	0.0380	0.0450	0.0210	<0.0050	3.03	4.65	---	---	---	---
Dup	11-Jun-04	0.0360	0.0450	0.0200	<0.0050	2.93	4.63	---	---	---	---
	15-Dec-04	0.0471	0.0480	0.0100	<0.0050	4.48	4.66	---	---	---	---
Dup	15-Dec-04	0.0460	0.0520	0.0070	<0.0050	4.31	5.06	---	---	---	---
	8-Jun-05	0.0590	0.0520	<0.0050	<0.0050	7.43	5.36	<4.0	<4.0	118	0.0
Dup	8-Jun-05	0.0570	0.0510	<0.0050	<0.0050	7.21	5.21	---	---	---	---
	15-Dec-05	0.0609	0.0666	<0.00500	<0.00500	3.98	4.41	---	---	5	0
Dup	15-Dec-05	0.0603	0.0661	<0.00500	<0.00500	3.97	4.39	---	---	---	---
	27-Feb-06	0.0616	0.0663	---	---	---	---	---	---	6	0
	14-Jun-06	0.0495	0.0537	<0.00500	<0.00500	4.25	4.15	---	---	6	0
Dup	14-Jun-06	0.0470	0.0530	<0.00500	<0.00500	2.88	4.11	---	---	---	---
	25-Sep-06	0.0390	0.0386	<0.00500	<0.00500	3.36	2.60	---	---	3	0
	7-Dec-06	0.0492	0.0518	0.00520	<0.00500	3.23	3.40	---	---	5	0
Dup	7-Dec-06	0.0494	0.0520	<0.00500	<0.00500	3.22	3.42	---	---	---	---
	21-Jun-07	0.0461	0.0493	<0.00500	<0.00500	3.06	3.45	---	---	0	---
Dup	21-Jun-07	0.0481	0.0520	<0.00500	<0.00500	4.05	5.26	---	---	2	0
	19-Dec-07	0.0436	0.0405	<0.00500	0.00670	4.38	4.14	---	---	10	1
Dup	19-Dec-07	0.0439	0.0399	<0.00500	<0.00500	4.54	4.27	---	---	---	---
	23-Jul-08	0.0373	0.0511	0.01050	<0.00500	4.22	9.53	---	---	19	1
Dup	23-Jul-08	0.0394	0.0462	0.00780	<0.00500	4.95	9.14	---	---	---	---
	18-Dec-08	0.0270	0.0180	<0.0050	<0.00500	4.32	4.19	---	---	15	3
Dup	18-Dec-08	0.0270	0.0330	<0.0050	<0.00500	4.25	5.28	---	---	---	---
	3-Jun-09	0.0414	0.0388	<0.00500	<0.00500	6.95	7.54	---	---	3	2
Dup	3-Jun-09	0.0493	0.0377	<0.00500	<0.00500	11.1	7.22	---	---	---	---
	9-Dec-09	0.0223	0.0284	0.00550	0.00690	3.27	4.91	---	---	2	0
Dup	9-Dec-09	0.0251	0.0281	<0.00500	0.00710	4.10	4.97	---	---	---	---
	3-Jun-10	0.0255	0.0327	0.00980	0.00550	4.29	7.91	---	---	14	1
Dup	3-Jun-10	0.0281	0.0329	0.00690	0.00500	5.08	7.02	---	---	---	---
	20-Oct-10	0.0307	0.0332	0.00600	<0.00500	6.38	5.68	---	---	7	0
	6-Jan-11	---	---	---	---	15.2	7.61	---	---	1	0
**	4-Apr-11	0.0281	0.0245	0.00500	0.00970	3.34	2.54	---	---	1	0

Table 5 : Summary of Laboratory Analyses of Groundwater Samples
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well	Sampling Date	Total Cadmium, mg/L	Dissolved Cadmium, mg/L	Total Lead, mg/L	Dissolved Lead, mg/L	Total Zinc, mg/L	Dissolved Zinc, mg/L	Total Suspended Solids, mg/L	Dissolved Suspended Solids, mg/L	Total Metals, Field Turbidity, NTU	Dissolved Metals, Field Turbidity, NTU
MW-23A Cont.	2-Jun-11	0.0220	0.0220	<0.00500	0.00760	2.33	2.50	---	---	4	1
	5-Oct-11	0.0185	0.0168	<0.00500	<0.00500	2.09	1.74	---	---	2	0
	11-Apr-12	0.0193	0.0183	<0.00500	<0.00500	2.87	2.98	---	---	2.86	1.00
	2-Oct-12	0.0240	0.0260	<0.00500	<0.00500	1.78	1.78	---	---	9.52	2.00
	16-May-13	0.0194	0.00780	<0.00500	0.00620	3.14	1.98	---	---	---	---
	2-Oct-13	0.00920	0.00860	<0.00500	<0.00500	1.18	1.17	---	---	---	---
	16-May-14	0.0200	0.0210	<0.0250	<0.0250	2.50	2.29	---	---	6.56	---
Dup	16-May-14	0.0220	0.0235	<0.0250	<0.0250	2.76	2.45	---	---	---	---
	24-Oct-14	0.00850	0.00730	<0.00500	<0.00500	1.77	1.93	---	---	9.57	---
	2-Apr-15	0.00590	0.00760	<0.00500	<0.00500	1.01	0.979	---	---	7.55	---
	16-Oct-15	0.00920	0.00780	0.00610	0.00520	2.01	1.69	---	---	27.6	---

Table 5 : Summary of Laboratory Analyses of Groundwater Samples
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well	Sampling Date	Total Cadmium, mg/L	Dissolved Cadmium, mg/L	Total Lead, mg/L	Dissolved Lead, mg/L	Total Zinc, mg/L	Dissolved Zinc, mg/L	Total Suspended Solids, mg/L	Dissolved Suspended Solids, mg/L	Total Metals, Field Turbidity, NTU	Dissolved Metals, Field Turbidity, NTU
MW-26A	24-Jun-03	<0.01	---	<0.05	---	<0.11	---	---	---	---	---
	25-Sep-03	<0.0010	---	<0.0050	---	<0.0500	---	---	---	---	---
	2-Dec-03	<0.0010	---	<0.0050	---	<0.0500	---	---	---	---	---
	24-Feb-04	<0.0010	---	<0.0050	---	<0.0500	---	---	---	---	---
	25-Feb-04	0.0560	0.0150	0.130	<0.0050	3.78	1.78	---	---	---	---
	11-Jun-04	<0.0010	<0.0010	<0.0050	<0.0050	<0.500	<0.500	---	---	---	---
	15-Dec-04	<0.0010	<0.0010	<0.0050	<0.0050	<0.500	<0.500	---	---	---	---
	8-Jun-05	<0.0010	<0.0010	<0.0050	<0.0050	<0.500	<0.500	61.6	<4.0	7.0	0
	15-Dec-05	0.00200	0.00260	<0.00500	<0.00500	<0.500	<0.500	---	---	6	0
	14-Jun-06	<0.00100	0.00220	<0.00500	<0.00500	<0.0500	<0.0500	---	---	6	0
	7-Dec-06	<0.00100	0.00120	<0.00500	<0.00500	0.0520	<0.0500	---	---	4	0
	21-Jun-07	0.00110	0.00200	<0.00500	<0.00500	<0.0500	<0.0500	---	---	6	0
	19-Dec-07	<0.00100	<0.00100	0.00730	0.00540	0.0544	<0.0500	---	---	4	2
	23-Jul-08	0.00100	<0.00100	<0.00500	<0.00500	<0.0500	<0.0500	---	---	7	1
	19-Dec-08	<0.0100	<0.0100	<0.0500	<0.0500	<0.500	<0.500	---	---	12	2
	3-Jun-09	0.00100	<0.00100	<0.00500	<0.00500	<0.0500	<0.0500	---	---	9	0
	9-Dec-09	<0.00100	<0.00100	0.00550	<0.00500	0.0577	<0.0500	---	---	17	3
	3-Jun-10	<0.00100	<0.00100	<0.00500	<0.00500	<0.0500	<0.0500	---	---	12	0
	20-Oct-10	<0.00100	<0.00100	<0.00500	<0.00500	<0.0500	<0.0500	---	---	5	1
	2-Jun-11	<0.00100	<0.00100	<0.00500	<0.00500	<0.0500	<0.0500	---	---	20	0
	5-Oct-11	0.00150	<0.00100	0.0174	<0.00500	<0.0500	<0.0500	---	---	4	0
	11-Apr-12	<0.00100	<0.00100	<0.00500	<0.00500	<0.0500	<0.0500	---	---	0.60	0.28
	3-Oct-12	<0.00100	<0.00100	<0.00500	<0.00500	<0.0500	<0.0500	---	---	0.99	0.31
	16-May-13	<0.00100	<0.00100	<0.00500	0.00550	<0.0500	<0.0500	---	---	---	---
Dup	16-May-13	<0.00100	<0.00100	<0.00500	0.00650	<0.0500	<0.0500	---	---	---	---
	3-Oct-13	<0.00100	<0.00100	<0.00500	<0.00500	<0.0500	<0.0500	---	---	---	---
	16-May-14	0.000600 J	0.000500 J	<0.00500	<0.00500	<0.0500	<0.0500	---	---	0.29	---
	24-Oct-14	0.000800 J	0.000800 J	<0.00500	<0.00500	<0.0500	<0.0500	---	---	1.19	---
	3-Apr-15	<0.00500	<0.00100	<0.00500	<0.00500	0.0109 J	0.0736	---	---	0.33	---
	15-Oct-15	<0.000500	<0.000500	<0.00200	<0.00200	<0.0100	<0.0100	---	---	1.52	0.65
Dup	15-Oct-15	<0.000500	<0.000500	<0.00200	<0.00200	<0.0100	0.0114 J	---	---	---	---

Table 5 : Summary of Laboratory Analyses of Groundwater Samples
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well	Sampling Date	Total Cadmium, mg/L	Dissolved Cadmium, mg/L	Total Lead, mg/L	Dissolved Lead, mg/L	Total Zinc, mg/L	Dissolved Zinc, mg/L	Total Suspended Solids, mg/L	Dissolved Suspended Solids, mg/L	Total Metals, Field Turbidity, NTU	Dissolved Metals, Field Turbidity, NTU
MW-33A	24-Jun-03	0.08	---	<0.05	---	6.61	---	---	---	---	---
	25-Sep-03	0.0850	---	<0.0050	---	1.22	---	---	---	---	---
Dup	25-Sep-03	0.0820	---	<0.0050	---	1.22	---	---	---	---	---
	2-Dec-03	0.0790	---	0.0050	---	0.969	---	---	---	---	---
Dup	2-Dec-03	0.0800	---	<0.0050	---	0.942	---	---	---	---	---
	24-Feb-04	0.0720	---	<0.0050	---	3.49	---	---	---	---	---
Dup	24-Feb-04	0.0700	---	<0.0050	---	3.38	---	---	---	---	---
	11-Jun-04	0.0670	0.0710	0.0080	0.0060	3.97	6.52	---	---	---	
	15-Dec-04	0.0773	0.0790	0.0060	<0.0050	3.10	3.08	---	---	---	
	8-Jun-05	0.0720	0.0700	<0.0050	<0.0050	2.79	2.71	---	---	7.0	0.0
	15-Dec-05	0.0960	0.101	<0.00500	<0.00500	0.744	0.752	---	---	8	0
	14-Jun-06	0.0567	0.0819	<0.00500	<0.00500	0.395	0.638	---	---	3	0
	7-Dec-06	0.0980	0.107	<0.00500	<0.00500	0.387	0.352	---	---	4	0
	21-Jun-07	0.104	0.0999	<0.00500	<0.00500	25.2	13.4	---	---	24	0
	19-Dec-07	0.0532	0.0560	<0.00500	0.00640	1.39	1.06	---	---	11	1
	23-Jul-08	0.0263	0.0302	<0.00500	<0.00500	0.986	0.778	---	---	6	1
	19-Dec-08	0.0600	0.0600	<0.0500	<0.0500	1.71	1.02	---	---	4	1
	3-Jun-09	0.0679	0.0676	<0.00500	<0.00500	1.13	1.13	---	---	5	1
	9-Dec-09	0.0332	0.0611	<0.00500	0.00690	1.69	1.11	---	---	8	1
	3-Jun-10	0.0409	0.0571	<0.00500	<0.00500	3.74	1.47	---	---	5	0
	20-Oct-10	0.0373	0.0410	<0.00500	<0.00500	0.415	0.637	---	---	5	0
	2-Jun-11	0.0151	0.0392	<0.00500	<0.00500	0.596	0.560	---	---	4	1
	5-Oct-11	0.0087	0.00700	<0.00500	<0.00500	0.804	0.713	---	---	2	0
	11-Apr-12	0.0018	0.00150	<0.00500	<0.00500	0.404	0.358	---	---	3.15	0.55
	3-Oct-12	0.0408	0.04080	<0.00500	<0.00500	0.789	0.711	---	---	1.65	0.19
	16-May-13	0.0268	0.0226	<0.00500	<0.00500	6.88	8.58	---	---	---	---
	3-Oct-13	0.0277	0.0292	<0.00500	<0.00500	5.91	7.41	---	---	---	---
	15-May-14	0.0639	0.0600	<0.00500	<0.00500	0.446	0.537	---	---	1.68	---
	23-Oct-14	0.0466	0.0426	<0.00500	<0.00500	1.16	1.83	---	---	1.12	---
Dup	23-Oct-14	0.0482	0.0438	<0.00500	<0.00500	1.18	1.61	---	---	---	---
	2-Apr-15	0.0495	0.0539	<0.00500	<0.00500	0.930	1.20	---	---	1.14	---
	15-Oct-15	0.0309	0.0265	<0.00200	<0.00200	0.812	0.960	---	---	0.50	---

Table 5 : Summary of Laboratory Analyses of Groundwater Samples
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well	Sampling Date	Total Cadmium, mg/L	Dissolved Cadmium, mg/L	Total Lead, mg/L	Dissolved Lead, mg/L	Total Zinc, mg/L	Dissolved Zinc, mg/L	Total Suspended Solids, mg/L	Dissolved Suspended Solids, mg/L	Total Metals, Field Turbidity, NTU	Dissolved Metals, Field Turbidity, NTU
MW-46A	24-Jun-03	0.22	---	<0.05	---	28.0	---	---	---	---	---
	25-Sep-03	0.120	---	0.0110	---	23.6	---	---	---	---	---
	2-Dec-03	0.196	---	0.124	---	34.1	---	---	---	---	---
	24-Feb-04	0.115	0.114	0.0340	0.0140	24.6	24.7	---	---	---	---
	25-Feb-04	0.111	0.108	0.0150	0.0130	22.7	22.4	---	---	---	---
	11-Jun-04	0.131	0.136	0.0300	0.0170	21.8	22.0	---	---	---	---
	15-Dec-04	0.175	0.159	0.160	0.0220	28.6	31.2	---	---	---	---
	8-Jun-05	0.138	0.140	0.0740	0.0260	22.7	22.6	104	<4.0	62	1.0
	15-Dec-05	0.158	0.189	0.00977	0.0105	27.8	32.5	---	---	0	0
	14-Jun-06	0.285	0.286	0.0191	0.00767	39.5	32.8	---	---	56	0
	7-Dec-06	0.258	0.321	0.0143	0.00950	33.8	45.8	---	---	6	0
	21-Jun-07	0.0228	0.0743	<0.00500	<0.00500	1.51	4.8	---	---	3	0
	19-Dec-07	0.0800	0.0723	0.0513	0.00600	9.18	9.47	---	---	4	1
	23-Jul-08	0.140	0.159	0.0216	0.0153	18.6	22.3	---	---	9	1
	19-Dec-08	0.0240	0.0320	<0.0500	<0.0500	4.52	5.55	---	---	14	1
	3-Jun-09	0.0495	0.0495	0.0103	0.00580	8.37	8.49	---	---	7	1
	9-Dec-09	0.0495	0.0552	0.0177	0.00940	9.51	10.2	---	---	3	0
	3-Jun-10	0.0857	0.0936	0.0120	0.00710	16.2	18.2	---	---	40	1
	20-Oct-10	0.147	0.153	0.0149	0.0105	23.1	24.5	---	---	2	0
	2-Jun-11	0.0551	0.0633	0.00600	0.00880	11.0	11.5	---	---	3	0
	5-Oct-11	---	---	---	---	---	---	---	---	---	---
	11-Apr-12	0.0713	0.0654	<0.00500	<0.00500	7.46	7.3	---	---	3.73	0.87
	3-Oct-12	---	---	---	---	---	---	---	---	---	---
	16-May-13	0.216	0.216	0.0073	0.0161	20.1	18.6	---	---	---	---
	3-Oct-13	0.0524	0.0546	0.0058	0.00560	5.04	5.85	---	---	---	---
	16-May-14	0.300	0.292	<0.00500	0.00200 J	42.1	36.2	---	---	0.29	---
	25-Oct-14	0.0429	0.0450	0.00260 J	<0.00500	5.64	5.66	---	---	0.93	---
	3-Apr-15	0.151	0.162	0.00300 J	0.00290 J	76.5	26.5	---	---	0.83	---
	15-Oct-15	0.0999	0.0922	0.00510	0.00440 J	14.7	14.7	---	---	0.50	---

Table 5 : Summary of Laboratory Analyses of Groundwater Samples
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well	Sampling Date	Total Cadmium, mg/L	Dissolved Cadmium, mg/L	Total Lead, mg/L	Dissolved Lead, mg/L	Total Zinc, mg/L	Dissolved Zinc, mg/L	Total Suspended Solids, mg/L	Dissolved Suspended Solids, mg/L	Total Metals, Field Turbidity, NTU	Dissolved Metals, Field Turbidity, NTU
MW-48A	24-Jun-03	<0.01	---	<0.05	---	<0.11	---	---	---	---	---
	25-Sep-03	0.0012	---	<0.0050	---	<0.0500	---	---	---	---	---
	2-Dec-03	<0.0010	---	<0.0050	---	0.0660	---	---	---	---	---
	24-Feb-04	<0.0010	---	0.0140	---	0.248	---	---	---	---	---
	11-Jun-04	0.0061	0.0050	0.0080	<0.0050	0.522	0.372	---	---	---	---
	15-Dec-04	0.0012	0.0010	<0.0050	<0.0050	<0.0500	<0.0500	---	---	---	---
	8-Jun-05	<0.0010	<0.0010	<0.0050	<0.0050	<0.0500	<0.0500	48.4	<4.0	140	0.0
	15-Dec-05	0.00180	0.00200	<0.00500	<0.00500	<0.0500	<0.0500	---	---	4	0
	14-Jun-06	<0.00100	0.00140	<0.00500	<0.00500	<0.0500	<0.0500	---	---	6	0
	7-Dec-06	<0.00100	0.00110	<0.00500	<0.00500	<0.0500	<0.0500	---	---	4	0
	21-Jun-07	0.0154	0.0103	0.00740	<0.00500	1.50	0.663	---	---	210	0
	19-Dec-07	0.00600	<0.00100	<0.00500	<0.00500	<0.0500	<0.0500	---	---	19	2
	23-Jul-08	0.00140	0.00210	<0.0500	<0.00500	<0.0500	0.0693	---	---	3	0
	18-Dec-08	<0.0100	<0.0100	<0.00500	<0.0500	<0.500	<0.500	---	---	9	1
	3-Jun-09	<0.00100	<0.00100	<0.00500	<0.00500	0.251	0.228	---	---	67	9
	9-Dec-09	<0.00100	<0.00100	<0.00500	0.00570	0.0520	0.0512	---	---	13	3
	3-Jun-10	<0.00100	<0.00100	<0.00500	<0.00500	0.0582	0.0562	---	---	15	0
	20-Oct-10	<0.00100	<0.00100	<0.00500	<0.00500	<0.00500	<0.00500	---	---	1	0
	2-Jun-11	<0.00100	<0.00100	<0.00500	<0.00500	<0.00500	<0.00500	---	---	5	1
	4-Oct-11	<0.00100	<0.00100	<0.00500	<0.00500	0.107	<0.00500	---	---	1	1
	11-Apr-12	0.00290	0.00270	<0.00500	<0.00500	0.255	0.244	---	---	0.56	0.16
	3-Oct-12	<0.00100	<0.00100	<0.00500	<0.00500	<0.00500	0.058	---	---	0.75	0.34
	17-May-13	0.00650	0.00480	<0.00500	0.00710	0.595	0.615	---	---	---	---
	2-Oct-13	0.00320	0.00280	<0.00500	<0.00500	0.350	0.333	---	---	---	---
	15-May-14	0.00250 J	0.00450 J	<0.0250	<0.0250	<0.250	<0.250	---	---	0.43	---
	23-Oct-14	0.00110	0.00110	<0.00500	<0.00500	0.0530	0.0526	---	---	4.13	---
	2-Apr-15	0.00380	0.00610	<0.00500	<0.00500	1.18	0.843	---	---	2.49	---
Dup	2-Apr-15	0.00400	0.00620	<0.00500	<0.00500	1.17	0.903	---	---	---	---
	16-Oct-15	0.00160	<0.000500	<0.00200	<0.00200	0.105 J	0.101	---	---	2.96	---

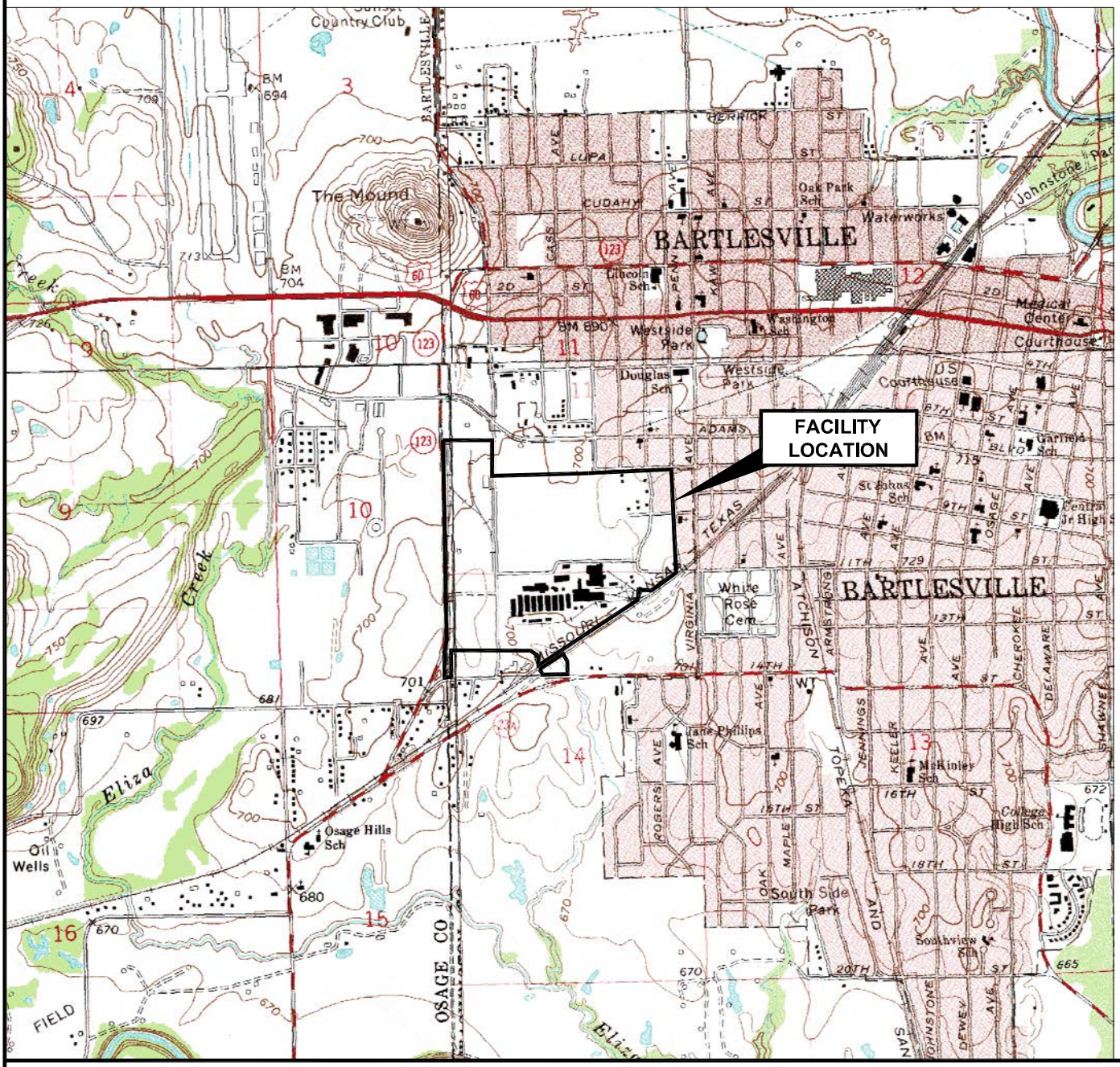
Table 5 : Summary of Laboratory Analyses of Groundwater Samples
Horsehead Corp., Bartlesville Facility
Bartlesville, Oklahoma

Monitor Well	Sampling Date	Total Cadmium, mg/L	Dissolved Cadmium, mg/L	Total Lead, mg/L	Dissolved Lead, mg/L	Total Zinc, mg/L	Dissolved Zinc, mg/L	Total Suspended Solids, mg/L	Dissolved Suspended Solids, mg/L	Total Metals, Field Turbidity, NTU	Dissolved Metals, Field Turbidity, NTU
Equipment Blank	25-Sep-03	<0.0010	---	<0.0050	---	<0.500	---	---	---	---	---
	2-Dec-03	<0.0010	---	<0.0050	---	<0.500	---	---	---	---	---
	24-Feb-04	<0.0010	---	<0.0050	---	<0.500	---	---	---	---	---
	11-Jun-04	<0.0010	<0.0010	<0.0050	<0.0050	<0.500	<0.500	---	---	---	---
	15-Dec-04	<0.00100	<0.0010	<0.0050	<0.0050	<0.500	<0.500	---	---	---	---
	15-Dec-05	<0.00100	<0.00100	<0.00500	<0.00500	<0.500	<0.500	---	---	---	---
	14-Jun-06	<0.00100	<0.00100	<0.00500	<0.00500	<0.500	<0.500	---	---	---	---
	7-Dec-06	<0.00100	<0.00100	<0.00500	<0.00500	<0.500	<0.500	---	---	---	---
	21-Jun-07	<0.00100	<0.00100	0.00620	<0.00500	<0.500	<0.500	---	---	---	---
	19-Dec-07	<0.00100	<0.00100	<0.00500	<0.00500	<0.500	<0.500	---	---	---	---
	23-Jul-08	<0.00100	<0.00100	<0.00500	<0.00500	<0.500	<0.500	---	---	---	---
	18-Dec-08	<0.00100	<0.00100	<0.00500	<0.00500	<0.500	<0.500	---	---	---	---
	2-Jun-09	<0.00100	<0.00100	<0.00500	<0.00500	<0.500	<0.500	---	---	---	---
	3-Jun-10	<0.00100	<0.00100	<0.00500	<0.00500	<0.500	<0.500	---	---	---	---
	20-Oct-10	<0.00100	<0.00100	<0.00500	<0.00500	<0.500	<0.500	---	---	---	---
	2-Jun-11	<0.00100	<0.00100	<0.00500	<0.00500	<0.500	<0.500	---	---	---	---
	5-Oct-11	<0.00100	<0.00100	<0.00500	<0.00500	<0.500	<0.500	---	---	---	---
	11-Apr-12	<0.00100	<0.00100	<0.00500	<0.00500	<0.500	<0.500	---	---	---	---
	2-Oct-12	<0.00100	<0.00100	<0.00500	<0.00500	<0.500	<0.500	---	---	---	---
	17-May-13	<0.00100	<0.00100	<0.00500	0.01190	<0.500	0.1	---	---	---	---
	3-Oct-13	<0.00100	<0.00100	<0.00500	<0.00500	<0.500	<0.500	---	---	---	---
	16-May-14	<0.00100	<0.00100	<0.00500	<0.00500	<0.0500	<0.0500	---	---	---	---
	24-Oct-14	<0.00100	<0.00100	<0.00500	<0.00500	<0.0500	<0.0500	---	---	---	---
	3-Apr-15	0.000700 J	<0.00100	0.00350 J	<0.00500	0.0621	<0.0250	---	---	---	---
	16-Oct-15	<0.000500	<0.000500	<0.00200	<0.00200	<0.0100	<0.0100	---	---	---	---

Notes:
1. < : Denotes a sample value of less than the laboratory reporting limit.
2. --- : No analysis performed.
3. mg/L : milligrams per liter.
4. NTU : Nephelometric Turbidity Units.
5. * : Verification resampling on 8/24/10 of the 6/3/10 sampling event. Sample from 6/3/10 may have had excessive sediment in the sample when field preserved.
6. ** : Low flow purge.
7. Beginning in October 2011, all samples were collected using a low flow purge method.
8. J : Result is less than the reporting limit (RL) but greater or equal to the method detection limit (MDL) and the concentration is an approximate value.
9. Data from October 2015 is reported to the MDL.

FIGURES

R 12 E



SOURCE: U.S.G.S. 7.5 MINUTE TOPOGRAPHIC QUADRANGLES
BARTLESVILLE NORTH, OKLAHOMA - 1971, PHOTOINSPECTED 1980,
BARTLESVILLE SOUTH, OKLAHOMA - 1971, PHOTOINSPECTED 1980,
BOWRING SE, OKLAHOMA - 1971, AND
WOLLAROC, OKLAHOMA - 1971, PHOTOINSPECTED 1976

SCALE
0 1/2 1 MILE

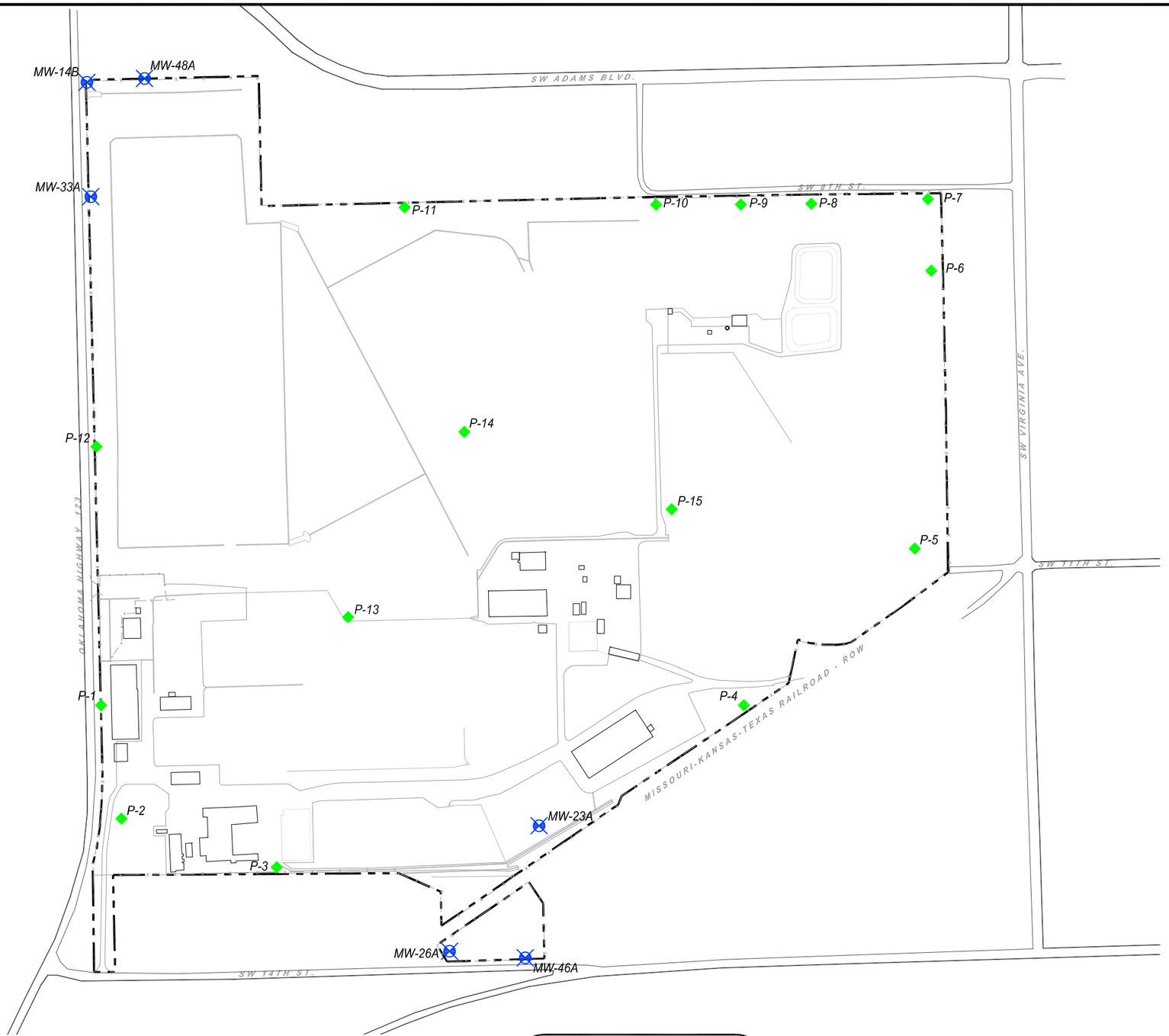
CLIENT HORSEHEAD CORP. BARTLESVILLE, OKLAHOMA	FIGURE TITLE ***SITE LOCATION AND TOPOGRAPHIC FEATURES***
LOCATION BARTLESVILLE FACILITY HWY 123 AND WEST 11TH ST., BARTLESVILLE, OK	DOCUMENT TITLE 2015 ANNUAL GROUNDWATER MONITORING REPORT

ENVIRO CLEAN CARDINAL

Enviro Clean Cardinal, LLC
7060 South Yale Avenue, Suite 603
Tulsa, Oklahoma 74136
918.794.7828
www.EnviroCleanPS.com

		DESIGNED BY	JDL
DATE	2/18/2016	APPROVED BY	JDL\DB
SCALE	AS SHOWN	DRAWN BY	SKG
PROJECT NUMBER		FIGURE NUMBER	
HOREBVL001		1	

D:\Projects\HOREBVL001\04_CAD\20151015_F01_TOPO.dwg on Feb 17, 2016 – 11:47am



LEGEND

- MW-23A — POST–CLOSURE MONITORING WELL LOCATION (UNCONSOLIDATED MATERIAL)
- P-7 — POST–CLOSURE PIEZOMETER LOCATION (UNCONSOLIDATED MATERIAL)
- PROPERTY LINE
- FENCE
- SURFACE DRAINAGE CHANNELS

NOTES:

1. SITE BASE MAP RECREATED WITH USE OF AERIAL IN GOOGLE EARTH PRO DATED APRIL 23, 2013 TO LOCATE SITE FEATURES, i.e., PROPERTY LINE, MONITOR WELLS, PIEZOMETERS, AND SURFACE DRAINAGE STRUCTURES.
2. GEO-REFERENCED PLACEMENT OF WELLS BASED ON GOOGLE EARTH PRO COORDINATES CONVERTED TO OKLAHOMA STATE PLANE NAD83, SURVEY FEET DONE 2/12/2015.
3. MINOR ADJUSTMENTS WERE MADE TO FEATURE LOCATIONS TO CORRESPOND WITH PREVIOUS REPORT FIGURES AND SITE KNOWLEDGE.

N

200 0 200 400
SCALE FEET

ENVIRO CLEAN CARDINAL
Enviro Clean Cardinal, LLC
7060 South Yale Avenue, Suite 603
Tulsa, Oklahoma 74136
918.794.7828
www.EnviroCleanPS.com

DOCUMENT TITLE: 2015 ANNUAL GROUNDWATER MONITORING REPORT

FIGURE TITLE: ***PIEZOMETER AND MONITORING WELL LOCATIONS***

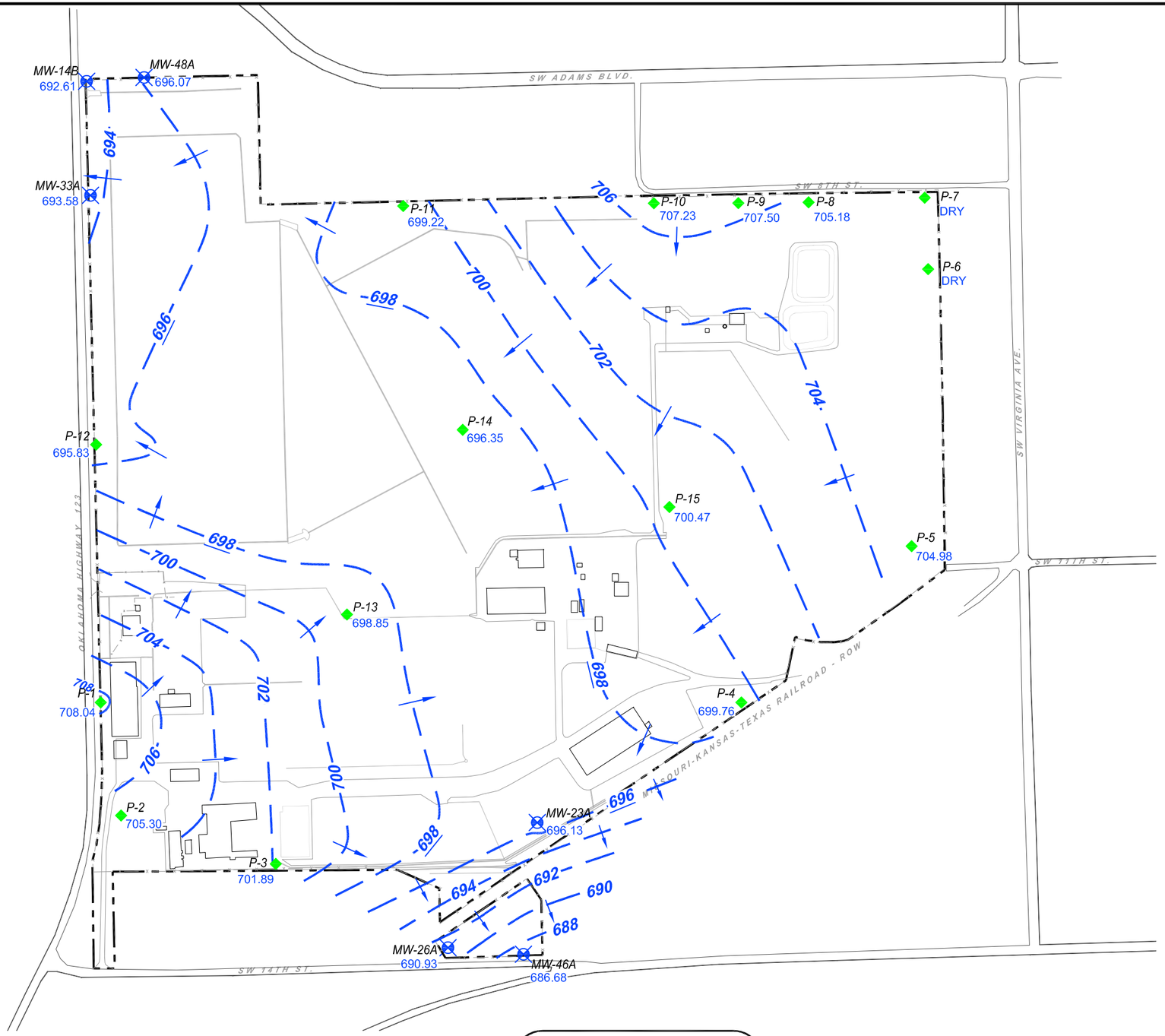
CLIENT: HORSEHEAD CORP. BARTLESVILLE, OKLAHOMA

LOCATION: HORSEHEAD CORP., BARTLESVILLE FACILITY HIGHWAY 123 AND WEST 11TH STREET, BARTLESVILLE, OK

DESIGNED BY	JDL		
APPROVED BY	JDL\DB	SCALE	1"= 400'
DRAWN BY	SKG	DATE	2/18/2016

PROJECT NUMBER	FIGURE NUMBER
HOREBVL001	2

D:\Projects\HOREBVL001\04_CAD\20151015_HorseheadSiteBaseMap.dwg on Feb 17, 2016-11:44am



LEGEND

MW-23A
696.13 — POST–CLOSURE MONITORING WELL LOCATION (UNCONSOLIDATED MATERIAL) AND GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION, FEET AMSL, 4/2/2015

P-7
DRY — POST–CLOSURE PIEZOMETER LOCATION (UNCONSOLIDATED MATERIAL) AND GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION, FEET AMSL, 4/2/2015

PROPERTY LINE

FENCE

SURFACE DRAINAGE CHANNELS

ESTIMATED CONTOUR OF GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION IN UNCONSOLIDATED MATERIAL, FEET AMSL

DIRECTION OF GROUNDWATER FLOW

CONTOUR INTERVAL – 2 FEET

NOTES:
1. SITE BASE MAP RECREATED WITH USE OF AERIAL IN GOOGLE EARTH PRO DATED APRIL 23, 2013 TO LOCATE SITE FEATURES, i.e., PROPERTY LINE, MONITOR WELLS, PIEZOMETERS, AND SURFACE DRAINAGE STRUCTURES.
2. GEO-REFERENCED PLACEMENT OF WELLS BASED ON GOOGLE EARTH PRO COORDINATES CONVERTED TO OKLAHOMA STATE PLANE NAD83, SURVEY FEET DONE 2/12/2015.
3. MINOR ADJUSTMENTS WERE MADE TO FEATURE LOCATIONS TO CORRESPOND WITH PREVIOUS REPORT FIGURES AND SITE KNOWLEDGE.

N

200 0 200 400
SCALE FEET

ENVIRO CLEAN CARDINAL
Enviro Clean Cardinal, LLC
7060 South Yale Avenue, Suite 603
Tulsa, Oklahoma 74136
918.794.7828
www.EnviroCleanPS.com

DOCUMENT TITLE: 2015 ANNUAL GROUNDWATER MONITORING REPORT

FIGURE TITLE: ***GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION (UNCONSOLIDATED MATERIAL), 4/2/2015***

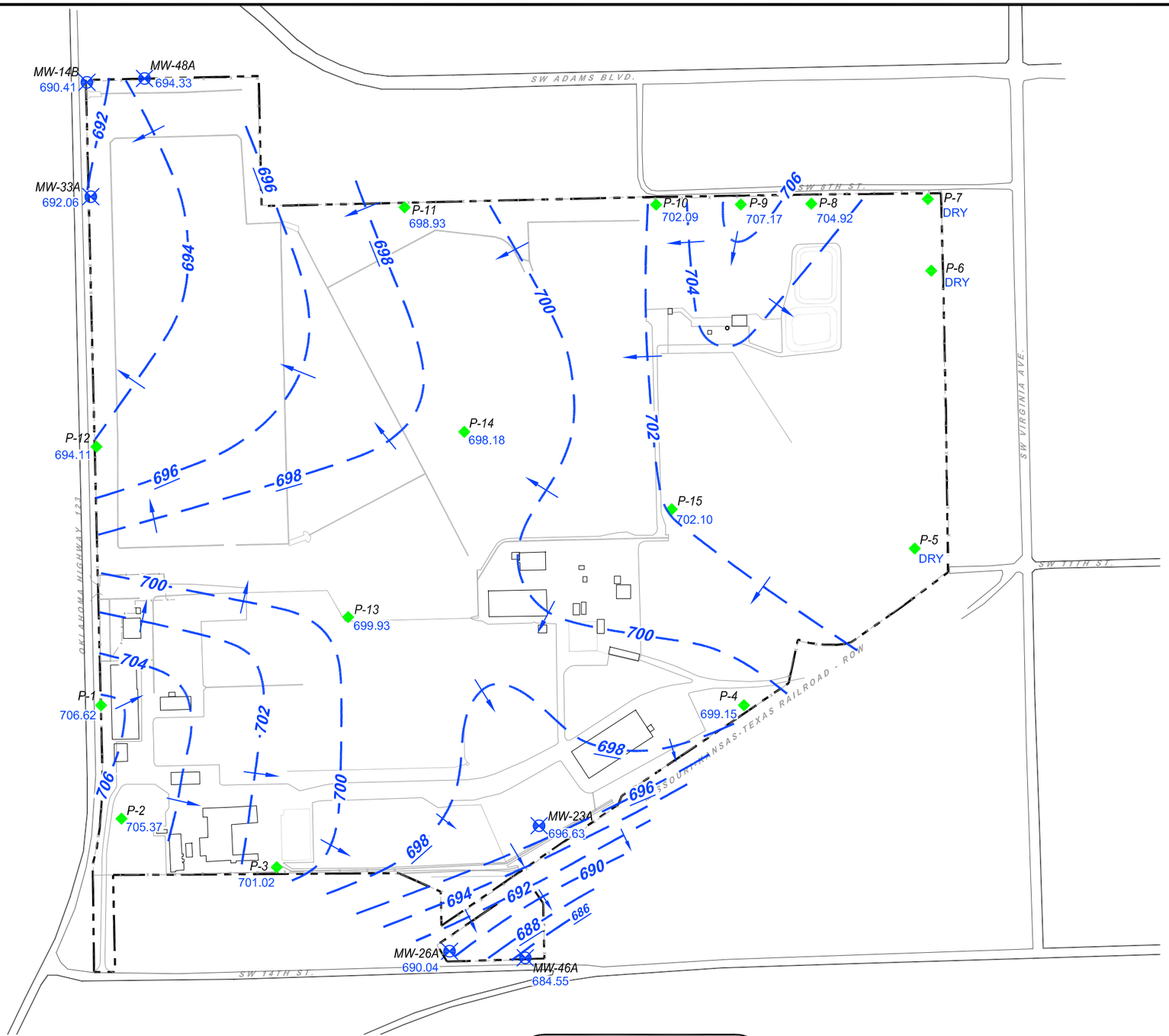
CLIENT: HORSEHEAD CORP.
BARTLESVILLE, OKLAHOMA

LOCATION: HORSEHEAD CORP., BARTLESVILLE FACILITY
HIGHWAY 123 AND WEST 11TH STREET, BARTLESVILLE, OK

DESIGNED BY	DB		
APPROVED BY	JDL\DB	SCALE	1"= 400'
DRAWN BY	SKG	DATE	2/18/2016

PROJECT NUMBER	FIGURE NUMBER
HOREBVL001	3

D:\Projects\HOREBVL001\04_CAD\20151015_HorseheadSiteBaseMap.dwg on Feb 17, 2016–11:44am



LEGEND

- MW-23A 696.63 — POST–CLOSURE MONITORING WELL LOCATION (UNCONSOLIDATED MATERIAL) AND GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION, FEET AMSL, 10/15/2015
- P-7 DRY — POST–CLOSURE PIEZOMETER LOCATION (UNCONSOLIDATED MATERIAL) AND GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION, FEET AMSL, 10/15/2015
- PROPERTY LINE
- FENCE
- SURFACE DRAINAGE CHANNELS
- ESTIMATED CONTOUR OF GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION IN UNCONSOLIDATED MATERIAL, FEET AMSL
- DIRECTION OF GROUNDWATER FLOW
- CONTOUR INTERVAL – 2 FEET

NOTES:

1. SITE BASE MAP RECREATED WITH USE OF AERIAL IN GOOGLE EARTH PRO DATED APRIL 23, 2013 TO LOCATE SITE FEATURES, i.e., PROPERTY LINE, MONITOR WELLS, PIEZOMETERS, AND SURFACE DRAINAGE STRUCTURES.
2. GEO-REFERENCED PLACEMENT OF WELLS BASED ON GOOGLE EARTH PRO COORDINATES CONVERTED TO OKLAHOMA STATE PLANE NAD83, SURVEY FEET DONE 2/12/2015.
3. MINOR ADJUSTMENTS WERE MADE TO FEATURE LOCATIONS TO CORRESPOND WITH PREVIOUS REPORT FIGURES AND SITE KNOWLEDGE.

N

200 0 200 400
SCALE FEET

ENVIRO CLEAN CARDINAL
Enviro Clean Cardinal, LLC
7060 South Yale Avenue, Suite 603
Tulsa, Oklahoma 74136
918.794.7828
www.EnviroCleanPS.com

DOCUMENT TITLE: 2015 ANNUAL GROUNDWATER MONITORING REPORT

FIGURE TITLE: ***GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION (UNCONSOLIDATED MATERIAL), 10/15/2015***

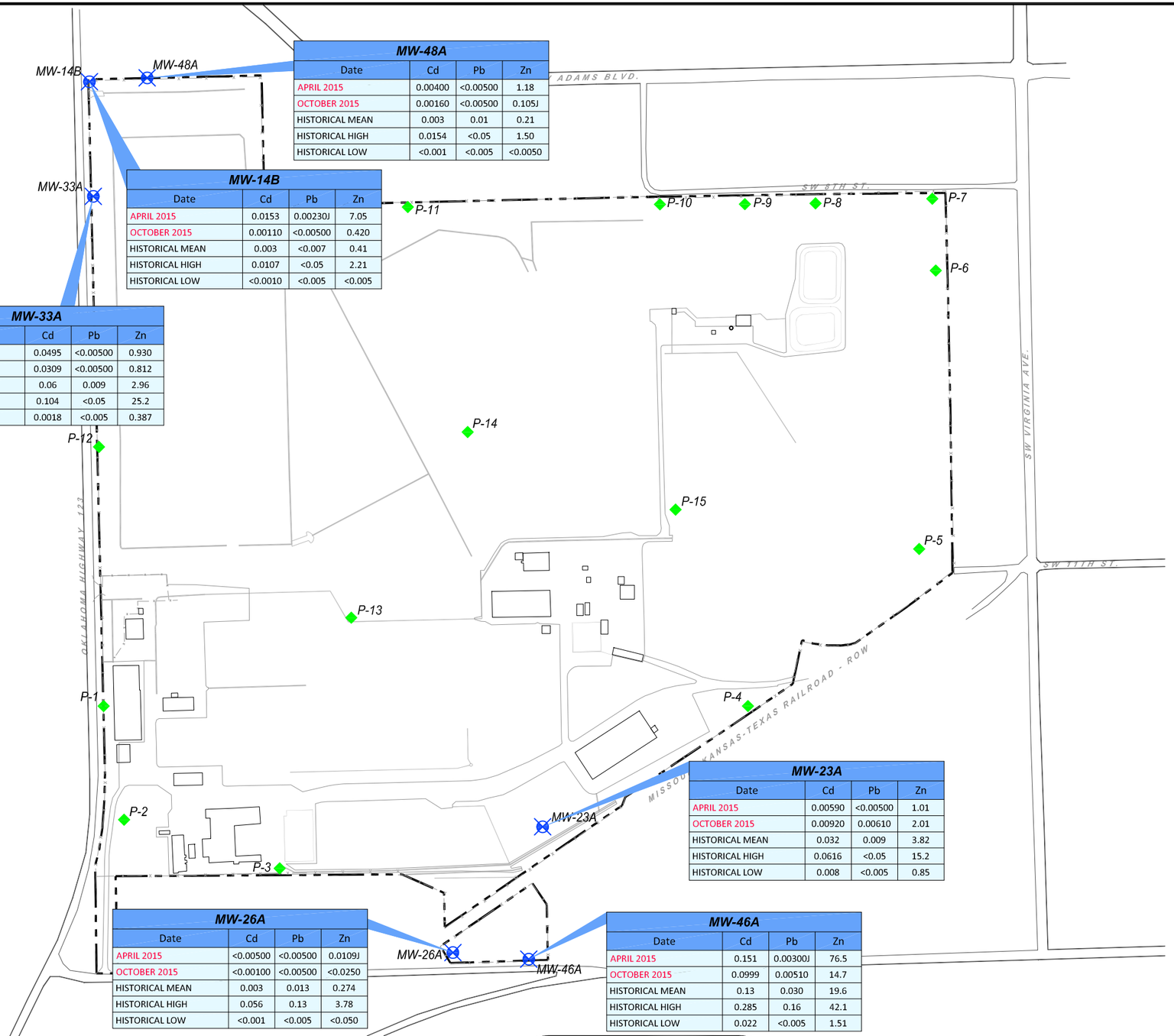
CLIENT: HORSEHEAD CORP. BARTLESVILLE, OKLAHOMA

LOCATION: HORSEHEAD CORP., BARTLESVILLE FACILITY HIGHWAY 123 AND WEST 11TH STREET, BARTLESVILLE, OK

DESIGNED BY	DB		
APPROVED BY	JDL\DB	SCALE	1"= 400'
DRAWN BY	SKG	DATE	2/18/2016

PROJECT NUMBER	FIGURE NUMBER
HOREBVL001	4

D:\Projects\HOREBVL001\04_CAD\20151015_HorseheadSiteBaseMap.dwg on Feb 17, 2016–11:45am



MW-48A

Date	Cd	Pb	Zn
APRIL 2015	0.00400	<0.00500	1.18
OCTOBER 2015	0.00160	<0.00500	0.105J
HISTORICAL MEAN	0.003	0.01	0.21
HISTORICAL HIGH	0.0154	<0.05	1.50
HISTORICAL LOW	<0.001	<0.005	<0.0050

MW-14B

Date	Cd	Pb	Zn
APRIL 2015	0.0153	0.00230J	7.05
OCTOBER 2015	0.00110	<0.00500	0.420
HISTORICAL MEAN	0.003	<0.007	0.41
HISTORICAL HIGH	0.0107	<0.05	2.21
HISTORICAL LOW	<0.0010	<0.005	<0.005

MW-33A

Date	Cd	Pb	Zn
APRIL 2015	0.0495	<0.00500	0.930
OCTOBER 2015	0.0309	<0.00500	0.812
HISTORICAL MEAN	0.06	0.009	2.96
HISTORICAL HIGH	0.104	<0.05	25.2
HISTORICAL LOW	0.0018	<0.005	0.387

MW-23A

Date	Cd	Pb	Zn
APRIL 2015	0.00590	<0.00500	1.01
OCTOBER 2015	0.00920	0.00610	2.01
HISTORICAL MEAN	0.032	0.009	3.82
HISTORICAL HIGH	0.0616	<0.05	15.2
HISTORICAL LOW	0.008	<0.005	0.85

MW-26A

Date	Cd	Pb	Zn
APRIL 2015	<0.00500	<0.00500	0.0109J
OCTOBER 2015	<0.00100	<0.00500	<0.0250
HISTORICAL MEAN	0.003	0.013	0.274
HISTORICAL HIGH	0.056	0.13	3.78
HISTORICAL LOW	<0.001	<0.005	<0.050

MW-46A

Date	Cd	Pb	Zn
APRIL 2015	0.151	0.00300J	76.5
OCTOBER 2015	0.0999	0.00510	14.7
HISTORICAL MEAN	0.13	0.030	19.6
HISTORICAL HIGH	0.285	0.16	42.1
HISTORICAL LOW	0.022	<0.005	1.51

LEGEND

- MW-23A — POST–CLOSURE MONITORING WELL LOCATION (UNCONSOLIDATED MATERIAL)
- P-7 — POST–CLOSURE PIEZOMETER LOCATION (UNCONSOLIDATED MATERIAL)
- PROPERTY LINE
- FENCE
- SURFACE DRAINAGE CHANNELS

NOTES:

1. SITE BASE MAP RECREATED WITH USE OF AERIAL IN GOOGLE EARTH PRO DATED APRIL 23, 2013 TO LOCATE SITE FEATURES, i.e., PROPERTY LINE, MONITOR WELLS, PIEZOMETERS, AND SURFACE DRAINAGE STRUCTURES.
2. GEO-REFERENCED PLACEMENT OF WELLS BASED ON GOOGLE EARTH PRO COORDINATES CONVERTED TO OKLAHOMA STATE PLANE NAD83, SURVEY FEET DONE 2/12/2015.
3. MINOR ADJUSTMENTS WERE MADE TO FEATURE LOCATIONS TO CORRESPOND WITH PREVIOUS REPORT FIGURES AND SITE KNOWLEDGE.
4. HISTORICAL STATISTICAL VALUES WERE CALCULATED USING HISTORICAL DATA FOR ALL SAMPLING EVENTS PRECEDING THE 2015 SAMPLING EVENTS. RESULTS REPORTED AS LESS THAN (<) ARE ASSUMED TO BE THE RL FOR CALCULATING THE HISTORICAL MEAN.
5. GROUNDWATER ANALYTICAL VALUES SHOWN HAVE CONCENTRATIONS IN mg/L.

N

200 0 200 400

SCALE FEET

ENVIRO CLEAN CARDINAL
Enviro Clean Cardinal, LLC
7060 South Yale Avenue, Suite 603
Tulsa, Oklahoma 74136
918.794.7828
www.EnviroCleanPS.com

DOCUMENT TITLE: 2015 ANNUAL GROUNDWATER MONITORING REPORT

FIGURE TITLE: ***MONITORING WELL DATA***

CLIENT: HORSEHEAD CORP. BARTLESVILLE, OKLAHOMA

LOCATION: HORSEHEAD CORP., BARTLESVILLE FACILITY HIGHWAY 123 AND WEST 11TH STREET, BARTLESVILLE, OK

DESIGNED BY	DB		
APPROVED BY	JDL\DB	SCALE	1"= 400'
DRAWN BY	SKG	DATE	2/18/2016

PROJECT NUMBER: HOREBVL001

FIGURE NUMBER: 5

D:\Projects\HOREBVL001\04_CAD\20151015_HorseheadSiteBaseMap.dwg on Feb 17, 2016 - 11:45am

APPENDIX A

JUNE 12, 2003 CORRESPONDENCE

STEVEN A. THOMPSON
Executive Director

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

BRAD HENRY
Governor

June 12, 2003

Mr. Jack D. Lawmaster, Project Manager
Atkins Environmental
3700 West Robinson, Suite 200
Norman, Oklahoma 73072

Re: Zinc Corporation of America (ZCA), Bartlesville, Oklahoma Facility, EPA ID# OKD000829440

Dear Mr. Lawmaster:

The Land Protection Division of the Oklahoma Department of Environmental Quality (Department) received your letter dated June 4, 2003 that requested Departmental approval for Atkins to begin the installation/replacement of the proposed post-closure monitoring well and temporary piezometer network at the ZCA Bartlesville Facility. The Department tentatively agrees with the post-closure monitoring system described by your letter of February 28, 2003 to the Department and agrees that construction of these wells should begin now to expedite the gathering of groundwater monitoring data.

Be advised that this groundwater monitoring system will be specified in the draft post-closure permit which will be subject to a public comment period and possible modification before final approval of the Department.

Address any questions you may have to J. David Lawson of my staff at (405) 702-5104.

Sincerely,

Saba Tahmassebi, Ph.D., P.E.
Chief Engineer
Land Protection Division

ST/jdl

xc: Sarah Perham (6PD-G), EPA Region 6

RECEIVED
JUN 17 2003

707 NORTH ROBINSON, P.O. BOX 1677, OKLAHOMA CITY, OKLAHOMA 73101-1677

printed on recycled paper with soy ink

APPENDIX B

GROUNDWATER ANALYTICAL REPORTS

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Tel: (615)726-0177

TestAmerica Job ID: 490-75927-1
TestAmerica Sample Delivery Group: HOREBVL001
Client Project/Site: Horsehead

For:
Enviro Clean Services LLC
7060 S. Yale Avenue, Suite 603
Tulsa, Oklahoma 74136

Attn: David Brady

Roxanne L Connor

Authorized for release by:
4/15/2015 1:19:13 PM

Roxanne Connor, Senior Project Manager
(615)301-5761
roxanne.connor@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Sample Summary

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-75927-1
SDG: HOREBVL001

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
490-75927-1	MW33A	Water	04/02/15 11:45	04/04/15 08:15
490-75927-2	MW14B	Water	04/02/15 13:00	04/04/15 08:15
490-75927-3	MW48A	Water	04/02/15 14:10	04/04/15 08:15
490-75927-4	MW23A	Water	04/02/15 18:20	04/04/15 08:15
490-75927-5	DUP	Water	04/02/15 00:01	04/04/15 08:15
490-75927-6	MW46A	Water	04/03/15 10:10	04/04/15 08:15
490-75927-7	MW26A	Water	04/03/15 11:30	04/04/15 08:15
490-75927-8	EQ Blank	Water	04/03/15 12:35	04/04/15 08:15

Job ID: 490-75927-1

Laboratory: TestAmerica Nashville

Narrative

Job Narrative
490-75927-1

Comments
No additional comments.

Receipt
The samples were received on 4/4/2015 8:15 AM; the samples arrived in good condition, properly preserved and, where required, on ice.
The temperature of the cooler at receipt was 16.1° C.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Field Service / Mobile Lab
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Qualifiers

Metals

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-75927-1
SDG: HOREBVL001

Client Sample ID: MW33A
Date Collected: 04/02/15 11:45
Date Received: 04/04/15 08:15

Lab Sample ID: 490-75927-1
Matrix: Water

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.0495		0.00100	0.000500	mg/L		04/09/15 11:30	04/13/15 15:45	1
Lead	ND		0.00500	0.00200	mg/L		04/09/15 11:30	04/13/15 15:45	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.0539		0.00100	0.000500	mg/L		04/07/15 15:30	04/13/15 15:20	1
Lead	ND		0.00500	0.00200	mg/L		04/07/15 15:30	04/13/15 15:20	1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	0.930		0.250	0.100	mg/L		04/09/15 11:30	04/14/15 14:11	10

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	1.20		0.250	0.100	mg/L		04/07/15 15:30	04/14/15 12:53	10

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-75927-1
SDG: HOREBVL001

Client Sample ID: MW14B
Date Collected: 04/02/15 13:00
Date Received: 04/04/15 08:15

Lab Sample ID: 490-75927-2
Matrix: Water

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.0153		0.00100	0.000500	mg/L		04/09/15 11:30	04/13/15 15:09	1
Lead	0.00230	J	0.00500	0.00200	mg/L		04/09/15 11:30	04/13/15 15:09	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.0200		0.00100	0.000500	mg/L		04/07/15 15:30	04/13/15 15:52	1
Lead	ND		0.00500	0.00200	mg/L		04/07/15 15:30	04/13/15 15:52	1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	7.05		0.250	0.100	mg/L		04/09/15 11:30	04/14/15 14:39	10

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	6.36		0.250	0.100	mg/L		04/07/15 15:30	04/14/15 12:25	10

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-75927-1
SDG: HOREBVL001

Client Sample ID: MW48A
Date Collected: 04/02/15 14:10
Date Received: 04/04/15 08:15

Lab Sample ID: 490-75927-3
Matrix: Water

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00380		0.00100	0.000500	mg/L		04/09/15 11:30	04/13/15 15:50	1
Lead	ND		0.00500	0.00200	mg/L		04/09/15 11:30	04/13/15 15:50	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00610		0.00100	0.000500	mg/L		04/07/15 15:30	04/13/15 15:57	1
Lead	ND		0.00500	0.00200	mg/L		04/07/15 15:30	04/13/15 15:57	1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	1.18		0.250	0.100	mg/L		04/09/15 11:30	04/14/15 14:45	10

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	0.843		0.250	0.100	mg/L		04/07/15 15:30	04/14/15 12:59	10

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-75927-1
SDG: HOREBVL001

Client Sample ID: MW23A
Date Collected: 04/02/15 18:20
Date Received: 04/04/15 08:15

Lab Sample ID: 490-75927-4
Matrix: Water

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00590		0.00100	0.000500	mg/L		04/09/15 11:30	04/13/15 15:54	1
Lead	ND		0.00500	0.00200	mg/L		04/09/15 11:30	04/13/15 15:54	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00760		0.00100	0.000500	mg/L		04/07/15 15:30	04/13/15 16:02	1
Lead	ND		0.00500	0.00200	mg/L		04/07/15 15:30	04/13/15 16:02	1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	1.01		0.250	0.100	mg/L		04/09/15 11:30	04/14/15 14:51	10

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	0.979		0.250	0.100	mg/L		04/07/15 15:30	04/14/15 13:04	10

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-75927-1
SDG: HOREBVL001

Client Sample ID: DUP
Date Collected: 04/02/15 00:01
Date Received: 04/04/15 08:15

Lab Sample ID: 490-75927-5
Matrix: Water

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00400		0.00100	0.000500	mg/L		04/09/15 11:30	04/13/15 15:59	1
Lead	ND		0.00500	0.00200	mg/L		04/09/15 11:30	04/13/15 15:59	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00620		0.00100	0.000500	mg/L		04/07/15 15:30	04/13/15 16:07	1
Lead	ND		0.00500	0.00200	mg/L		04/07/15 15:30	04/13/15 16:07	1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	1.17		0.250	0.100	mg/L		04/09/15 11:30	04/14/15 15:07	10

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	0.903		0.250	0.100	mg/L		04/07/15 15:30	04/14/15 13:21	10

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-75927-1
SDG: HOREBVL001

Client Sample ID: MW46A
Date Collected: 04/03/15 10:10
Date Received: 04/04/15 08:15

Lab Sample ID: 490-75927-6
Matrix: Water

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.151		0.00100	0.000500	mg/L		04/09/15 11:30	04/13/15 16:03	1
Lead	0.00300	J	0.00500	0.00200	mg/L		04/09/15 11:30	04/13/15 16:03	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.162		0.00100	0.000500	mg/L		04/07/15 15:30	04/13/15 16:12	1
Lead	0.00290	J	0.00500	0.00200	mg/L		04/07/15 15:30	04/13/15 16:12	1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	76.5		2.50	1.00	mg/L		04/09/15 11:30	04/14/15 15:13	100

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	26.5		2.50	1.00	mg/L		04/07/15 15:30	04/14/15 13:27	100

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-75927-1
SDG: HOREBVL001

Client Sample ID: MW26A
Date Collected: 04/03/15 11:30
Date Received: 04/04/15 08:15

Lab Sample ID: 490-75927-7
Matrix: Water

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00500	0.00250	mg/L		04/09/15 11:30	04/14/15 12:27	5
Lead	ND		0.00500	0.00200	mg/L		04/09/15 11:30	04/13/15 16:08	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000500	mg/L		04/07/15 15:30	04/13/15 16:16	1
Lead	ND		0.00500	0.00200	mg/L		04/07/15 15:30	04/13/15 16:16	1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	0.0109	J	0.0250	0.0100	mg/L		04/09/15 11:30	04/14/15 15:39	1

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	0.0736		0.0250	0.0100	mg/L		04/07/15 15:30	04/14/15 13:32	1

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-75927-1
SDG: HOREBVL001

Client Sample ID: EQ Blank

Lab Sample ID: 490-75927-8

Date Collected: 04/03/15 12:35
Date Received: 04/04/15 08:15

Matrix: Water

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	**0.000700**	**J**	0.00100	0.000500	mg/L		04/09/15 11:30	04/13/15 16:12	1
Lead	**0.00350**	**J**	0.00500	0.00200	mg/L		04/09/15 11:30	04/13/15 16:12	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000500	mg/L		04/07/15 15:30	04/13/15 16:21	1
Lead	ND		0.00500	0.00200	mg/L		04/07/15 15:30	04/13/15 16:21	1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	**0.0621**		0.0250	0.0100	mg/L		04/09/15 11:30	04/14/15 15:24	1

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	ND		0.0250	0.0100	mg/L		04/07/15 15:30	04/14/15 13:38	1

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 490-240076/1-A
Matrix: Water
Analysis Batch: 241010

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 240076

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000500	mg/L		04/09/15 11:30	04/13/15 14:24	1
Lead	ND		0.00500	0.00200	mg/L		04/09/15 11:30	04/13/15 14:24	1

Lab Sample ID: LCS 490-240076/2-A
Matrix: Water
Analysis Batch: 241010

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 240076

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cadmium	0.0500	0.04970		mg/L		99	80 - 120
Lead	0.0500	0.05180		mg/L		104	80 - 120

Lab Sample ID: 490-75927-2 MS
Matrix: Water
Analysis Batch: 241010

Client Sample ID: MW14B
Prep Type: Total/NA
Prep Batch: 240076

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Cadmium	0.0153		0.0500	0.06470		mg/L		99	75 - 125
Lead	0.00230	J	0.0500	0.05140		mg/L		98	75 - 125

Lab Sample ID: 490-75927-2 MSD
Matrix: Water
Analysis Batch: 241010

Client Sample ID: MW14B
Prep Type: Total/NA
Prep Batch: 240076

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cadmium	0.0153		0.0500	0.06270		mg/L		95	75 - 125	3	20
Lead	0.00230	J	0.0500	0.04920		mg/L		94	75 - 125	4	20

Lab Sample ID: MB 490-239572/1-A
Matrix: Water
Analysis Batch: 241027

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 239572

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000500	mg/L		04/07/15 15:30	04/13/15 15:11	1
Lead	ND		0.00500	0.00200	mg/L		04/07/15 15:30	04/13/15 15:11	1

Lab Sample ID: LCS 490-239572/2-A
Matrix: Water
Analysis Batch: 241027

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 239572

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cadmium	0.0500	0.05450		mg/L		109	80 - 120
Lead	0.0500	0.05570		mg/L		111	80 - 120

Lab Sample ID: 490-75927-1 MS
Matrix: Water
Analysis Batch: 241027

Client Sample ID: MW33A
Prep Type: Dissolved
Prep Batch: 239572

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Cadmium	0.0539		0.0500	0.1075		mg/L		107	75 - 125

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: 490-75927-1 MS
Matrix: Water
Analysis Batch: 241027

Client Sample ID: MW33A
Prep Type: Dissolved
Prep Batch: 239572

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Lead	ND		0.0500	0.05190		mg/L		104	75 - 125

Lab Sample ID: 490-75927-1 MSD
Matrix: Water
Analysis Batch: 241027

Client Sample ID: MW33A
Prep Type: Dissolved
Prep Batch: 239572

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cadmium	0.0539		0.0500	0.1049		mg/L		102	75 - 125	2	20
Lead	ND		0.0500	0.05080		mg/L		102	75 - 125	2	20

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 490-240077/1-A
Matrix: Water
Analysis Batch: 241298

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 240077

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	ND		0.0250	0.0100	mg/L		04/09/15 11:30	04/14/15 14:00	1

Lab Sample ID: LCS 490-240077/2-A
Matrix: Water
Analysis Batch: 241298

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 240077

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Zinc	0.100	0.09947		mg/L		99	80 - 120

Lab Sample ID: 490-75927-1 MS
Matrix: Water
Analysis Batch: 241298

Client Sample ID: MW33A
Prep Type: Total/NA
Prep Batch: 240077

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Zinc	0.930		0.100	1.042	4	mg/L		112	75 - 125

Lab Sample ID: 490-75927-1 MSD
Matrix: Water
Analysis Batch: 241298

Client Sample ID: MW33A
Prep Type: Total/NA
Prep Batch: 240077

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Zinc	0.930		0.100	1.036	4	mg/L		106	75 - 125	1	20

Lab Sample ID: MB 490-239575/1-A
Matrix: Water
Analysis Batch: 241298

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 239575

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	ND		0.0250	0.0100	mg/L		04/07/15 15:30	04/14/15 12:14	1

Method: 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 490-239575/2-A
Matrix: Water
Analysis Batch: 241298

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 239575

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Zinc	0.100	0.1030		mg/L		103	80 - 120

Lab Sample ID: 490-75927-2 MS
Matrix: Water
Analysis Batch: 241298

Client Sample ID: MW14B
Prep Type: Dissolved
Prep Batch: 239575

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Zinc	6.36		0.100	6.466	4	mg/L		105	75 - 125

Lab Sample ID: 490-75927-2 MSD
Matrix: Water
Analysis Batch: 241298

Client Sample ID: MW14B
Prep Type: Dissolved
Prep Batch: 239575

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Zinc	6.36		0.100	6.254	4	mg/L		-107	75 - 125	3	20

Metals

Prep Batch: 239572

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-75927-1	MW33A	Dissolved	Water	3005A	
490-75927-1 MS	MW33A	Dissolved	Water	3005A	
490-75927-1 MSD	MW33A	Dissolved	Water	3005A	
490-75927-2	MW14B	Dissolved	Water	3005A	
490-75927-3	MW48A	Dissolved	Water	3005A	
490-75927-4	MW23A	Dissolved	Water	3005A	
490-75927-5	DUP	Dissolved	Water	3005A	
490-75927-6	MW46A	Dissolved	Water	3005A	
490-75927-7	MW26A	Dissolved	Water	3005A	
490-75927-8	EQ Blank	Dissolved	Water	3005A	
LCS 490-239572/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
MB 490-239572/1-A	Method Blank	Total Recoverable	Water	3005A	

Prep Batch: 239575

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-75927-1	MW33A	Dissolved	Water	3005A	
490-75927-2	MW14B	Dissolved	Water	3005A	
490-75927-2 MS	MW14B	Dissolved	Water	3005A	
490-75927-2 MSD	MW14B	Dissolved	Water	3005A	
490-75927-3	MW48A	Dissolved	Water	3005A	
490-75927-4	MW23A	Dissolved	Water	3005A	
490-75927-5	DUP	Dissolved	Water	3005A	
490-75927-6	MW46A	Dissolved	Water	3005A	
490-75927-7	MW26A	Dissolved	Water	3005A	
490-75927-8	EQ Blank	Dissolved	Water	3005A	
LCS 490-239575/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
MB 490-239575/1-A	Method Blank	Total Recoverable	Water	3005A	

Prep Batch: 240076

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-75927-1	MW33A	Total/NA	Water	3010A	
490-75927-2	MW14B	Total/NA	Water	3010A	
490-75927-2 MS	MW14B	Total/NA	Water	3010A	
490-75927-2 MSD	MW14B	Total/NA	Water	3010A	
490-75927-3	MW48A	Total/NA	Water	3010A	
490-75927-4	MW23A	Total/NA	Water	3010A	
490-75927-5	DUP	Total/NA	Water	3010A	
490-75927-6	MW46A	Total/NA	Water	3010A	
490-75927-7	MW26A	Total/NA	Water	3010A	
490-75927-8	EQ Blank	Total/NA	Water	3010A	
LCS 490-240076/2-A	Lab Control Sample	Total/NA	Water	3010A	
MB 490-240076/1-A	Method Blank	Total/NA	Water	3010A	

Prep Batch: 240077

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-75927-1	MW33A	Total/NA	Water	3010A	
490-75927-1 MS	MW33A	Total/NA	Water	3010A	
490-75927-1 MSD	MW33A	Total/NA	Water	3010A	
490-75927-2	MW14B	Total/NA	Water	3010A	
490-75927-3	MW48A	Total/NA	Water	3010A	
490-75927-4	MW23A	Total/NA	Water	3010A	

Metals (Continued)

Prep Batch: 240077 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-75927-5	DUP	Total/NA	Water	3010A	
490-75927-6	MW46A	Total/NA	Water	3010A	
490-75927-7	MW26A	Total/NA	Water	3010A	
490-75927-8	EQ Blank	Total/NA	Water	3010A	
LCS 490-240077/2-A	Lab Control Sample	Total/NA	Water	3010A	
MB 490-240077/1-A	Method Blank	Total/NA	Water	3010A	

Analysis Batch: 241010

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-75927-1	MW33A	Total/NA	Water	6010C	240076
490-75927-2	MW14B	Total/NA	Water	6010C	240076
490-75927-2 MS	MW14B	Total/NA	Water	6010C	240076
490-75927-2 MSD	MW14B	Total/NA	Water	6010C	240076
490-75927-3	MW48A	Total/NA	Water	6010C	240076
490-75927-4	MW23A	Total/NA	Water	6010C	240076
490-75927-5	DUP	Total/NA	Water	6010C	240076
490-75927-6	MW46A	Total/NA	Water	6010C	240076
490-75927-7	MW26A	Total/NA	Water	6010C	240076
490-75927-8	EQ Blank	Total/NA	Water	6010C	240076
LCS 490-240076/2-A	Lab Control Sample	Total/NA	Water	6010C	240076
MB 490-240076/1-A	Method Blank	Total/NA	Water	6010C	240076

Analysis Batch: 241027

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-75927-1	MW33A	Dissolved	Water	6010C	239572
490-75927-1 MS	MW33A	Dissolved	Water	6010C	239572
490-75927-1 MSD	MW33A	Dissolved	Water	6010C	239572
490-75927-2	MW14B	Dissolved	Water	6010C	239572
490-75927-3	MW48A	Dissolved	Water	6010C	239572
490-75927-4	MW23A	Dissolved	Water	6010C	239572
490-75927-5	DUP	Dissolved	Water	6010C	239572
490-75927-6	MW46A	Dissolved	Water	6010C	239572
490-75927-7	MW26A	Dissolved	Water	6010C	239572
490-75927-8	EQ Blank	Dissolved	Water	6010C	239572
LCS 490-239572/2-A	Lab Control Sample	Total Recoverable	Water	6010C	239572
MB 490-239572/1-A	Method Blank	Total Recoverable	Water	6010C	239572

Analysis Batch: 241258

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-75927-7	MW26A	Total/NA	Water	6010C	240076

Analysis Batch: 241298

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-75927-1	MW33A	Dissolved	Water	6020A	239575
490-75927-1	MW33A	Total/NA	Water	6020A	240077
490-75927-1 MS	MW33A	Total/NA	Water	6020A	240077
490-75927-1 MSD	MW33A	Total/NA	Water	6020A	240077
490-75927-2	MW14B	Dissolved	Water	6020A	239575
490-75927-2	MW14B	Total/NA	Water	6020A	240077
490-75927-2 MS	MW14B	Dissolved	Water	6020A	239575
490-75927-2 MSD	MW14B	Dissolved	Water	6020A	239575

Metals (Continued)

Analysis Batch: 241298 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-75927-3	MW48A	Dissolved	Water	6020A	239575
490-75927-3	MW48A	Total/NA	Water	6020A	240077
490-75927-4	MW23A	Dissolved	Water	6020A	239575
490-75927-4	MW23A	Total/NA	Water	6020A	240077
490-75927-5	DUP	Dissolved	Water	6020A	239575
490-75927-5	DUP	Total/NA	Water	6020A	240077
490-75927-6	MW46A	Dissolved	Water	6020A	239575
490-75927-6	MW46A	Total/NA	Water	6020A	240077
490-75927-7	MW26A	Dissolved	Water	6020A	239575
490-75927-7	MW26A	Total/NA	Water	6020A	240077
490-75927-8	EQ Blank	Dissolved	Water	6020A	239575
490-75927-8	EQ Blank	Total/NA	Water	6020A	240077
LCS 490-239575/2-A	Lab Control Sample	Total Recoverable	Water	6020A	239575
LCS 490-240077/2-A	Lab Control Sample	Total/NA	Water	6020A	240077
MB 490-239575/1-A	Method Blank	Total Recoverable	Water	6020A	239575
MB 490-240077/1-A	Method Blank	Total/NA	Water	6020A	240077

Client Sample ID: MW33A

Lab Sample ID: 490-75927-1

Date Collected: 04/02/15 11:45

Matrix: Water

Date Received: 04/04/15 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	239572	04/07/15 15:30	TSC	TAL NSH
Dissolved	Analysis	6010C		1	50 mL	50 mL	241027	04/13/15 15:20	LEG	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	240076	04/09/15 11:30	TSC	TAL NSH
Total/NA	Analysis	6010C		1	50 mL	50 mL	241010	04/13/15 15:45	ADN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	239575	04/07/15 15:30	TSC	TAL NSH
Dissolved	Analysis	6020A		10	50 mL	50 mL	241298	04/14/15 12:53	JBD	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	240077	04/09/15 11:30	TSC	TAL NSH
Total/NA	Analysis	6020A		10	50 mL	50 mL	241298	04/14/15 14:11	JBD	TAL NSH

Client Sample ID: MW14B

Lab Sample ID: 490-75927-2

Date Collected: 04/02/15 13:00

Matrix: Water

Date Received: 04/04/15 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	239572	04/07/15 15:30	TSC	TAL NSH
Dissolved	Analysis	6010C		1	50 mL	50 mL	241027	04/13/15 15:52	LEG	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	240076	04/09/15 11:30	TSC	TAL NSH
Total/NA	Analysis	6010C		1	50 mL	50 mL	241010	04/13/15 15:09	ADN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	239575	04/07/15 15:30	TSC	TAL NSH
Dissolved	Analysis	6020A		10	50 mL	50 mL	241298	04/14/15 12:25	JBD	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	240077	04/09/15 11:30	TSC	TAL NSH
Total/NA	Analysis	6020A		10	50 mL	50 mL	241298	04/14/15 14:39	JBD	TAL NSH

Client Sample ID: MW48A

Lab Sample ID: 490-75927-3

Date Collected: 04/02/15 14:10

Matrix: Water

Date Received: 04/04/15 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	239572	04/07/15 15:30	TSC	TAL NSH
Dissolved	Analysis	6010C		1	50 mL	50 mL	241027	04/13/15 15:57	LEG	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	240076	04/09/15 11:30	TSC	TAL NSH
Total/NA	Analysis	6010C		1	50 mL	50 mL	241010	04/13/15 15:50	ADN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	239575	04/07/15 15:30	TSC	TAL NSH
Dissolved	Analysis	6020A		10	50 mL	50 mL	241298	04/14/15 12:59	JBD	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	240077	04/09/15 11:30	TSC	TAL NSH
Total/NA	Analysis	6020A		10	50 mL	50 mL	241298	04/14/15 14:45	JBD	TAL NSH

Client Sample ID: MW23A

Lab Sample ID: 490-75927-4

Date Collected: 04/02/15 18:20

Matrix: Water

Date Received: 04/04/15 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	239572	04/07/15 15:30	TSC	TAL NSH

Client Sample ID: MW23A

Lab Sample ID: 490-75927-4

Date Collected: 04/02/15 18:20

Matrix: Water

Date Received: 04/04/15 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Analysis	6010C		1	50 mL	50 mL	241027	04/13/15 16:02	LEG	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	240076	04/09/15 11:30	TSC	TAL NSH
Total/NA	Analysis	6010C		1	50 mL	50 mL	241010	04/13/15 15:54	ADN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	239575	04/07/15 15:30	TSC	TAL NSH
Dissolved	Analysis	6020A		10	50 mL	50 mL	241298	04/14/15 13:04	JBD	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	240077	04/09/15 11:30	TSC	TAL NSH
Total/NA	Analysis	6020A		10	50 mL	50 mL	241298	04/14/15 14:51	JBD	TAL NSH

Client Sample ID: DUP

Lab Sample ID: 490-75927-5

Date Collected: 04/02/15 00:01

Matrix: Water

Date Received: 04/04/15 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	239572	04/07/15 15:30	TSC	TAL NSH
Dissolved	Analysis	6010C		1	50 mL	50 mL	241027	04/13/15 16:07	LEG	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	240076	04/09/15 11:30	TSC	TAL NSH
Total/NA	Analysis	6010C		1	50 mL	50 mL	241010	04/13/15 15:59	ADN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	239575	04/07/15 15:30	TSC	TAL NSH
Dissolved	Analysis	6020A		10	50 mL	50 mL	241298	04/14/15 13:21	JBD	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	240077	04/09/15 11:30	TSC	TAL NSH
Total/NA	Analysis	6020A		10	50 mL	50 mL	241298	04/14/15 15:07	JBD	TAL NSH

Client Sample ID: MW46A

Lab Sample ID: 490-75927-6

Date Collected: 04/03/15 10:10

Matrix: Water

Date Received: 04/04/15 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	239572	04/07/15 15:30	TSC	TAL NSH
Dissolved	Analysis	6010C		1	50 mL	50 mL	241027	04/13/15 16:12	LEG	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	240076	04/09/15 11:30	TSC	TAL NSH
Total/NA	Analysis	6010C		1	50 mL	50 mL	241010	04/13/15 16:03	ADN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	239575	04/07/15 15:30	TSC	TAL NSH
Dissolved	Analysis	6020A		100	50 mL	50 mL	241298	04/14/15 13:27	JBD	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	240077	04/09/15 11:30	TSC	TAL NSH
Total/NA	Analysis	6020A		100	50 mL	50 mL	241298	04/14/15 15:13	JBD	TAL NSH

Client Sample ID: MW26A

Lab Sample ID: 490-75927-7

Date Collected: 04/03/15 11:30

Matrix: Water

Date Received: 04/04/15 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	239572	04/07/15 15:30	TSC	TAL NSH
Dissolved	Analysis	6010C		1	50 mL	50 mL	241027	04/13/15 16:16	LEG	TAL NSH

Lab Chronicle

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-75927-1
SDG: HOREBVL001

Client Sample ID: MW26A

Date Collected: 04/03/15 11:30
Date Received: 04/04/15 08:15

Lab Sample ID: 490-75927-7

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3010A			50 mL	50 mL	240076	04/09/15 11:30	TSC	TAL NSH
Total/NA	Analysis	6010C		5	50 mL	50 mL	241258	04/14/15 12:27	ADN	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	240076	04/09/15 11:30	TSC	TAL NSH
Total/NA	Analysis	6010C		1	50 mL	50 mL	241010	04/13/15 16:08	ADN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	239575	04/07/15 15:30	TSC	TAL NSH
Dissolved	Analysis	6020A		1	50 mL	50 mL	241298	04/14/15 13:32	JBD	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	240077	04/09/15 11:30	TSC	TAL NSH
Total/NA	Analysis	6020A		1	50 mL	50 mL	241298	04/14/15 15:39	JBD	TAL NSH

Client Sample ID: EQ Blank

Date Collected: 04/03/15 12:35
Date Received: 04/04/15 08:15

Lab Sample ID: 490-75927-8

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	239572	04/07/15 15:30	TSC	TAL NSH
Dissolved	Analysis	6010C		1	50 mL	50 mL	241027	04/13/15 16:21	LEG	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	240076	04/09/15 11:30	TSC	TAL NSH
Total/NA	Analysis	6010C		1	50 mL	50 mL	241010	04/13/15 16:12	ADN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	239575	04/07/15 15:30	TSC	TAL NSH
Dissolved	Analysis	6020A		1	50 mL	50 mL	241298	04/14/15 13:38	JBD	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	240077	04/09/15 11:30	TSC	TAL NSH
Total/NA	Analysis	6020A		1	50 mL	50 mL	241298	04/14/15 15:24	JBD	TAL NSH

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Method Summary

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-75927-1
SDG: HOREBVL001

Method	Method Description	Protocol	Laboratory
6010C	Metals (ICP)	SW846	TAL NSH
6020A	Metals (ICP/MS)	SW846	TAL NSH

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Certification Summary

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-75927-1
SDG: HOREBVL001

Laboratory: TestAmerica Nashville

The certifications listed below are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Oklahoma	State Program	6	9412	08-31-15

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

COOLER RECEIPT FORM

490-75927 Chain of Custody

Cooler Received/Opened On 4/4/2015 @ 0815

1. Tracking # 6576 (last 4 digits, FedEx)

Courier: FedEx IR Gun ID 94660220

2. Temperature of rep. sample or temp blank when opened: 16.1 *Degrees Celsius*

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO...(NA)

4. Were custody seals on outside of cooler? (YES)...NO...NA

If yes, how many and where: (2) Front/Back

5. Were the seals intact, signed, and dated correctly? (YES)...NO...NA

6. Were custody papers inside cooler? (YES)...NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) _____

7. Were custody seals on containers: YES (NO) and Intact YES...NO...NA

Were these signed and dated correctly? YES...NO...NA

8. Packing mat'l used? Bubblewrap (Plastic bag) Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: (Ice) Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? YES...NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA

12. Did all container labels and tags agree with custody papers? 4/6/15 YES...NO...NA

13a. Were VOA vials received? YES...NO...NA

b. Was there any observable headspace present in any VOA vial? YES...NO...NA

14. Was there a Trip Blank in this cooler? YES...NO...(NA) If multiple coolers, sequence #_____

I certify that I unloaded the cooler and answered questions 7-14 (intial) _____

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...NA

b. Did the bottle labels indicate that the correct preservatives were used YES...NO...NA

16. Was residual chlorine present? YES...NO...NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) _____

17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA

18. Did you sign the custody papers in the appropriate place? YES...NO...NA

19. Were correct containers used for the analysis requested? YES...NO...NA

20. Was sufficient amount of sample sent in each container? YES...NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (intial) _____

I certify that I attached a label with the unique LIMS number to each container (intial) _____

21. Were there Non-Conformance issues at login? YES...(NO) Was a NCM generated? YES...(NO)...# 17023

BIS = Broken in shipment

CHAIN OF CUSTODY RECORD

No. 00535

ENVIRO CLEAN SERVICES, LLC
(918) 794-7828

PROJECT NUMBER: HOREBVL00001
PROJECT NAME: HORSEHEAD
COC 1 of 1
SHIPPED TO: TA - NASHVILLE
PROJECT MANAGER: JACK LAWMASTER / DAVID BRADY
TAT: STANDARD
SAMPLER'S PRINTED NAME: JON MARSHALL
SAMPLER'S SIGNATURE:
ASOW: N/A
Loc: 490
75927

Date	Time	Sample ID	Sample Matrix	# of Sample Containers	6020 - Total Pb Zn Cd	6020 - Diss Pb Zn Cd										REMARKS
4.2.15	1145	MW33A	WT	2	X	X									01	- FIELD - FILTERED -
4.2.15	1300	MW14B	WT	2	X	X									2	
4.2.15	1410	MW33A	WT	2	X	X									3	
4.2.15	1820	MW23A	WT	2	X	X									4	
4.2.15	—	DUP	WT	2	X	X									5	
4.3.15	1010	MW46A	WT	2	X	X									6	
4.3.15	1130	MW26A	WT	2	X	X									7	
4.3.15	1235	EQ BLANK	WT	2	X	X									8	

TOTAL NUMBER OF CONTAINERS → 16

RELINQUISHED BY: JON MARSHALL — DATE 4.3.15 — TIME 1430
RECEIVED BY: [signature] 16.1 — DATE 04/04/15 — TIME 0815
RELINQUISHED BY: — DATE — TIME
RECEIVED BY: — DATE — TIME

METHOD OF SHIPMENT: FEDEX
AIRBILL NUMBER: 6365 7476 6576
RECEIVED IN LABORATORY BY: — DATE — TIME
Send PDF, EDD, and INVOICE (if applicable) to: JULIE CZECH at jczech@envirocleanps.com
LABORATORY CONTACT:
LABORATORY ADDRESS: 2960 FOSTER CREIGHTON DRIVE, NASHVILLE, TN 37204

POINT OF ORIGIN: ☐ OKLAHOMA CITY ☒ TULSA ☐ NORMAN ☐ WOODWARD ☐ ARLINGTON ☐ MIDLAND ☐ OTHER:

PAGE #1 - RECEIVING LAB — PAGE #2 - ENVIRO CLEAN PROJECT FILE — PAGE #3 - ENVIRO CLEAN QA/QC DEPT

4/15/2015

Login Sample Receipt Checklist

Client: Enviro Clean Services LLC

Job Number: 490-75927-1
SDG Number: HOREBVL001

Login Number: 75927
List Number: 1
Creator: Gambill, Shane

List Source: TestAmerica Nashville

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	Thermal preservation not required.
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	16.1
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	IDs on containers do not match the COC. Logged in per COC.
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Tel: (615)726-0177

TestAmerica Job ID: 490-89973-1
TestAmerica Sample Delivery Group: HOREBVL001
Client Project/Site: Horsehead

For:
Enviro Clean Services LLC
7060 S. Yale Avenue, Suite 603
Tulsa, Oklahoma 74136

Attn: Ms. Julie Czech

Roxanne Cisneros

Authorized for release by:
11/13/2015 1:03:03 PM

Roxanne Cisneros, Senior Project Manager
(615)301-5761
roxanne.cisneros@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Sample Summary

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-89973-1
SDG: HOREBVL001

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
490-89973-1	MW26A	Water	10/15/15 11:35	10/17/15 09:05
490-89973-2	MW46A	Water	10/15/15 13:35	10/17/15 09:05
490-89973-3	DUP	Water	10/15/15 00:01	10/17/15 09:05
490-89973-4	MW33A	Water	10/15/15 15:40	10/17/15 09:05
490-89973-5	MW14B	Water	10/15/15 17:05	10/17/15 09:05
490-89973-6	MW48A	Water	10/16/15 10:25	10/17/15 09:05
490-89973-7	MW23A	Water	10/16/15 13:05	10/17/15 09:05
490-89973-8	EQBL	Water	10/16/15 13:30	10/17/15 09:05

Job ID: 490-89973-1

Laboratory: TestAmerica Nashville

Narrative

Diss Zn > Total Zn - NCM

Job Narrative
490-89973-1

Comments
No additional comments.

Receipt
The samples were received on 10/17/2015 9:05 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 17.0º C.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Field Service / Mobile Lab
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-89973-1
SDG: HOREBVL001

Qualifiers

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-89973-1
SDG: HOREBVL001

Client Sample ID: MW26A

Date Collected: 10/15/15 11:35
Date Received: 10/17/15 09:05

Lab Sample ID: 490-89973-1

Matrix: Water

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000500	mg/L		10/23/15 08:11	10/27/15 22:21	1
Lead	ND		0.00500	0.00200	mg/L		10/23/15 08:11	10/27/15 22:21	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000500	mg/L		10/24/15 14:16	10/26/15 22:27	1
Lead	ND		0.00500	0.00200	mg/L		10/24/15 14:16	10/26/15 22:27	1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	ND		0.0250	0.0100	mg/L		10/23/15 08:11	10/30/15 21:34	1

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	ND		0.0250	0.0100	mg/L		10/23/15 09:23	10/26/15 17:57	1

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-89973-1
SDG: HOREBVL001

Client Sample ID: MW46A
Date Collected: 10/15/15 13:35
Date Received: 10/17/15 09:05

Lab Sample ID: 490-89973-2
Matrix: Water

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.0999		0.00100	0.000500	mg/L		10/23/15 08:11	10/27/15 22:42	1
Lead	0.00510		0.00500	0.00200	mg/L		10/23/15 08:11	10/27/15 22:42	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.0922		0.00100	0.000500	mg/L		10/24/15 14:16	10/26/15 21:32	1
Lead	0.00440	J	0.00500	0.00200	mg/L		10/24/15 14:16	10/26/15 21:32	1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	14.7		1.25	0.500	mg/L		10/23/15 08:11	11/12/15 18:23	50

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	14.7		2.50	1.00	mg/L		10/23/15 09:23	11/09/15 22:17	100

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-89973-1
SDG: HOREBVL001

Client Sample ID: DUP

Date Collected: 10/15/15 00:01
Date Received: 10/17/15 09:05

Lab Sample ID: 490-89973-3

Matrix: Water

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000500	mg/L		10/23/15 08:11	10/27/15 22:46	1
Lead	ND		0.00500	0.00200	mg/L		10/23/15 08:11	10/27/15 22:46	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000500	mg/L		10/24/15 14:16	10/26/15 21:46	1
Lead	ND		0.00500	0.00200	mg/L		10/24/15 14:16	10/26/15 21:46	1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	ND		0.0250	0.0100	mg/L		10/23/15 08:11	11/12/15 18:59	1

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	**0.0114**	**J**	0.0250	0.0100	mg/L		10/23/15 09:23	10/26/15 18:08	1

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-89973-1
SDG: HOREBVL001

Client Sample ID: MW33A

Date Collected: 10/15/15 15:40
Date Received: 10/17/15 09:05

Lab Sample ID: 490-89973-4

Matrix: Water

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	**0.0309**		0.00100	0.000500	mg/L		10/23/15 08:11	10/27/15 22:50	1
Lead	ND		0.00500	0.00200	mg/L		10/23/15 08:11	10/27/15 22:50	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	**0.0265**		0.00100	0.000500	mg/L		10/24/15 14:16	10/26/15 21:50	1
Lead	ND		0.00500	0.00200	mg/L		10/24/15 14:16	10/26/15 21:50	1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	**0.812**		0.250	0.100	mg/L		10/23/15 08:11	11/12/15 18:28	10

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	**0.960**		0.0250	0.0100	mg/L		10/23/15 09:23	10/26/15 18:13	1

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-89973-1
SDG: HOREBVL001

Client Sample ID: MW14B

Date Collected: 10/15/15 17:05
Date Received: 10/17/15 09:05

Lab Sample ID: 490-89973-5

Matrix: Water

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	**0.00110**		0.00100	0.000500	mg/L		10/23/15 08:11	10/27/15 22:55	1
Lead	ND		0.00500	0.00200	mg/L		10/23/15 08:11	10/27/15 22:55	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	**0.00120**		0.00100	0.000500	mg/L		10/24/15 14:16	10/26/15 21:55	1
Lead	ND		0.00500	0.00200	mg/L		10/24/15 14:16	10/26/15 21:55	1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	**0.420**		0.250	0.100	mg/L		10/23/15 08:11	11/12/15 18:33	10

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	**0.413**		0.0250	0.0100	mg/L		10/23/15 09:23	10/26/15 18:29	1

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-89973-1
SDG: HOREBVL001

Client Sample ID: MW48A

Date Collected: 10/16/15 10:25
Date Received: 10/17/15 09:05

Lab Sample ID: 490-89973-6

Matrix: Water

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	**0.00160**		0.00100	0.000500	mg/L		10/23/15 08:11	10/27/15 22:59	1
Lead	ND		0.00500	0.00200	mg/L		10/23/15 08:11	10/27/15 22:59	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000500	mg/L		10/24/15 14:16	10/26/15 22:00	1
Lead	ND		0.00500	0.00200	mg/L		10/24/15 14:16	10/26/15 22:00	1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	**0.105**	**J**	0.250	0.100	mg/L		10/23/15 08:11	11/12/15 18:38	10

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	**0.101**		0.0250	0.0100	mg/L		10/23/15 09:23	10/26/15 18:34	1

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-89973-1
SDG: HOREBVL001

Client Sample ID: MW23A

Date Collected: 10/16/15 13:05
Date Received: 10/17/15 09:05

Lab Sample ID: 490-89973-7

Matrix: Water

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00920		0.00100	0.000500	mg/L		10/23/15 08:11	10/27/15 23:12	1
Lead	0.00610		0.00500	0.00200	mg/L		10/23/15 08:11	10/27/15 23:12	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00780		0.00100	0.000500	mg/L		10/24/15 14:16	10/26/15 22:04	1
Lead	0.00520		0.00500	0.00200	mg/L		10/24/15 14:16	10/26/15 22:04	1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	2.01		0.500	0.200	mg/L		10/23/15 08:11	11/12/15 18:44	20

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	1.69		0.0250	0.0100	mg/L		10/23/15 09:23	10/26/15 18:39	1

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-89973-1
SDG: HOREBVL001

Client Sample ID: EQBL

Date Collected: 10/16/15 13:30
Date Received: 10/17/15 09:05

Lab Sample ID: 490-89973-8

Matrix: Water

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000500	mg/L		10/23/15 08:11	10/27/15 23:17	1
Lead	ND		0.00500	0.00200	mg/L		10/23/15 08:11	10/27/15 23:17	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000500	mg/L		10/24/15 14:16	10/26/15 22:09	1
Lead	ND		0.00500	0.00200	mg/L		10/24/15 14:16	10/26/15 22:09	1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	ND		0.0250	0.0100	mg/L		10/23/15 08:11	10/30/15 20:27	1

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	ND		0.0250	0.0100	mg/L		10/23/15 09:23	10/26/15 18:44	1

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 490-292276/1-A
Matrix: Water
Analysis Batch: 293404

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 292276

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000500	mg/L		10/23/15 08:11	10/27/15 21:59	1
Lead	ND		0.00500	0.00200	mg/L		10/23/15 08:11	10/27/15 21:59	1

Lab Sample ID: LCS 490-292276/2-A
Matrix: Water
Analysis Batch: 293404

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 292276

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cadmium	0.0500	0.05220		mg/L		104	80 - 120
Lead	0.0500	0.05140		mg/L		103	80 - 120

Lab Sample ID: 490-89973-1 MS
Matrix: Water
Analysis Batch: 293404

Client Sample ID: MW26A
Prep Type: Total/NA
Prep Batch: 292276

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Cadmium	ND		0.0500	0.05130		mg/L		103	75 - 125
Lead	ND		0.0500	0.05080		mg/L		102	75 - 125

Lab Sample ID: 490-89973-1 MSD
Matrix: Water
Analysis Batch: 293404

Client Sample ID: MW26A
Prep Type: Total/NA
Prep Batch: 292276

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cadmium	ND		0.0500	0.04950		mg/L		99	75 - 125	4	20
Lead	ND		0.0500	0.05110		mg/L		102	75 - 125	1	20

Lab Sample ID: MB 490-292688/1-A
Matrix: Water
Analysis Batch: 293088

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 292688

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000500	mg/L		10/24/15 14:16	10/26/15 20:39	1
Lead	ND		0.00500	0.00200	mg/L		10/24/15 14:16	10/26/15 20:39	1

Lab Sample ID: LCS 490-292688/2-A
Matrix: Water
Analysis Batch: 293088

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 292688

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cadmium	0.0500	0.04600		mg/L		92	80 - 120
Lead	0.0500	0.04710		mg/L		94	80 - 120

Lab Sample ID: LCSD 490-292688/3-A
Matrix: Water
Analysis Batch: 293088

Client Sample ID: Lab Control Sample Dup
Prep Type: Total Recoverable
Prep Batch: 292688

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cadmium	0.0500	0.04560		mg/L		91	80 - 120	1	20

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: LCSD 490-292688/3-A
Matrix: Water
Analysis Batch: 293088

Client Sample ID: Lab Control Sample Dup
Prep Type: Total Recoverable
Prep Batch: 292688

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lead			0.0500	0.04740		mg/L		95	80 - 120	1	20

Lab Sample ID: 490-90058-A-8-D MS
Matrix: Water
Analysis Batch: 293088

Client Sample ID: Matrix Spike
Prep Type: Dissolved
Prep Batch: 292688

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Cadmium	ND		0.0500	0.04630		mg/L		93	75 - 125		
Lead	ND		0.0500	0.04780		mg/L		96	75 - 125		

Lab Sample ID: 490-90058-A-8-E MSD
Matrix: Water
Analysis Batch: 293088

Client Sample ID: Matrix Spike Duplicate
Prep Type: Dissolved
Prep Batch: 292688

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cadmium	ND		0.0500	0.04710		mg/L		94	75 - 125	2	20
Lead	ND		0.0500	0.04860		mg/L		97	75 - 125	2	20

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 490-292278/1-A
Matrix: Water
Analysis Batch: 297083

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 292278

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	ND		0.0250	0.0100	mg/L		10/23/15 08:11	11/09/15 20:30	1

Lab Sample ID: LCS 490-292278/2-A
Matrix: Water
Analysis Batch: 297083

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 292278

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Zinc			0.100	0.08517		mg/L		85	80 - 120		

Lab Sample ID: MB 490-292303/1-A
Matrix: Water
Analysis Batch: 292903

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 292303

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	ND		0.0250	0.0100	mg/L		10/23/15 09:23	10/24/15 15:55	1

Lab Sample ID: LCS 490-292303/2-A
Matrix: Water
Analysis Batch: 292903

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 292303

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Zinc			0.100	0.08884		mg/L		89	80 - 120		

Method: 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: 490-89853-A-19-A MS
Matrix: Water
Analysis Batch: 292903

Client Sample ID: Matrix Spike
Prep Type: Dissolved
Prep Batch: 292303

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Zinc	ND		0.100	0.08920		mg/L		89	75 - 125

Lab Sample ID: 490-89853-B-19-B MSD
Matrix: Water
Analysis Batch: 292903

Client Sample ID: Matrix Spike Duplicate
Prep Type: Dissolved
Prep Batch: 292303

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Zinc	ND		0.100	0.08441		mg/L		84	75 - 125	6	20

Metals

Prep Batch: 292276

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89973-1	MW26A	Total/NA	Water	3010A	
490-89973-1 MS	MW26A	Total/NA	Water	3010A	
490-89973-1 MSD	MW26A	Total/NA	Water	3010A	
490-89973-2	MW46A	Total/NA	Water	3010A	
490-89973-3	DUP	Total/NA	Water	3010A	
490-89973-4	MW33A	Total/NA	Water	3010A	
490-89973-5	MW14B	Total/NA	Water	3010A	
490-89973-6	MW48A	Total/NA	Water	3010A	
490-89973-7	MW23A	Total/NA	Water	3010A	
490-89973-8	EQBL	Total/NA	Water	3010A	
LCS 490-292276/24-A	Lab Control Sample	Total/NA	Water	3010A	
LCS 490-292276/2-A	Lab Control Sample	Total/NA	Water	3010A	
MB 490-292276/1-A	Method Blank	Total/NA	Water	3010A	

Prep Batch: 292278

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89973-1	MW26A	Total/NA	Water	3010A	
490-89973-2	MW46A	Total/NA	Water	3010A	
490-89973-3	DUP	Total/NA	Water	3010A	
490-89973-4	MW33A	Total/NA	Water	3010A	
490-89973-5	MW14B	Total/NA	Water	3010A	
490-89973-6	MW48A	Total/NA	Water	3010A	
490-89973-7	MW23A	Total/NA	Water	3010A	
490-89973-8	EQBL	Total/NA	Water	3010A	
LCS 490-292278/2-A	Lab Control Sample	Total/NA	Water	3010A	
MB 490-292278/1-A	Method Blank	Total/NA	Water	3010A	

Prep Batch: 292303

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89853-A-19-A MS	Matrix Spike	Dissolved	Water	3005A	
490-89853-B-19-B MSD	Matrix Spike Duplicate	Dissolved	Water	3005A	
490-89973-1	MW26A	Dissolved	Water	3005A	
490-89973-2	MW46A	Dissolved	Water	3005A	
490-89973-3	DUP	Dissolved	Water	3005A	
490-89973-4	MW33A	Dissolved	Water	3005A	
490-89973-5	MW14B	Dissolved	Water	3005A	
490-89973-6	MW48A	Dissolved	Water	3005A	
490-89973-7	MW23A	Dissolved	Water	3005A	
490-89973-8	EQBL	Dissolved	Water	3005A	
LCS 490-292303/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
MB 490-292303/1-A	Method Blank	Total Recoverable	Water	3005A	

Prep Batch: 292688

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89973-1	MW26A	Dissolved	Water	3005A	
490-89973-2	MW46A	Dissolved	Water	3005A	
490-89973-3	DUP	Dissolved	Water	3005A	
490-89973-4	MW33A	Dissolved	Water	3005A	
490-89973-5	MW14B	Dissolved	Water	3005A	
490-89973-6	MW48A	Dissolved	Water	3005A	
490-89973-7	MW23A	Dissolved	Water	3005A	

Metals (Continued)

Prep Batch: 292688 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89973-8	EQBL	Dissolved	Water	3005A	
490-90058-A-8-D MS	Matrix Spike	Dissolved	Water	3005A	
490-90058-A-8-E MSD	Matrix Spike Duplicate	Dissolved	Water	3005A	
LCS 490-292688/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
LCSD 490-292688/3-A	Lab Control Sample Dup	Total Recoverable	Water	3005A	
MB 490-292688/1-A	Method Blank	Total Recoverable	Water	3005A	

Analysis Batch: 292903

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89853-A-19-A MS	Matrix Spike	Dissolved	Water	6020A	292303
490-89853-B-19-B MSD	Matrix Spike Duplicate	Dissolved	Water	6020A	292303
LCS 490-292303/2-A	Lab Control Sample	Total Recoverable	Water	6020A	292303
MB 490-292303/1-A	Method Blank	Total Recoverable	Water	6020A	292303

Analysis Batch: 293088

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89973-1	MW26A	Dissolved	Water	6010C	292688
490-89973-2	MW46A	Dissolved	Water	6010C	292688
490-89973-3	DUP	Dissolved	Water	6010C	292688
490-89973-4	MW33A	Dissolved	Water	6010C	292688
490-89973-5	MW14B	Dissolved	Water	6010C	292688
490-89973-6	MW48A	Dissolved	Water	6010C	292688
490-89973-7	MW23A	Dissolved	Water	6010C	292688
490-89973-8	EQBL	Dissolved	Water	6010C	292688
490-90058-A-8-D MS	Matrix Spike	Dissolved	Water	6010C	292688
490-90058-A-8-E MSD	Matrix Spike Duplicate	Dissolved	Water	6010C	292688
LCS 490-292688/2-A	Lab Control Sample	Total Recoverable	Water	6010C	292688
LCSD 490-292688/3-A	Lab Control Sample Dup	Total Recoverable	Water	6010C	292688
MB 490-292688/1-A	Method Blank	Total Recoverable	Water	6010C	292688

Analysis Batch: 293129

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89973-1	MW26A	Dissolved	Water	6020A	292303
490-89973-3	DUP	Dissolved	Water	6020A	292303
490-89973-4	MW33A	Dissolved	Water	6020A	292303
490-89973-5	MW14B	Dissolved	Water	6020A	292303
490-89973-6	MW48A	Dissolved	Water	6020A	292303
490-89973-7	MW23A	Dissolved	Water	6020A	292303
490-89973-8	EQBL	Dissolved	Water	6020A	292303

Analysis Batch: 293404

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89973-1	MW26A	Total/NA	Water	6010C	292276
490-89973-1 MS	MW26A	Total/NA	Water	6010C	292276
490-89973-1 MSD	MW26A	Total/NA	Water	6010C	292276
490-89973-2	MW46A	Total/NA	Water	6010C	292276
490-89973-3	DUP	Total/NA	Water	6010C	292276
490-89973-4	MW33A	Total/NA	Water	6010C	292276
490-89973-5	MW14B	Total/NA	Water	6010C	292276
490-89973-6	MW48A	Total/NA	Water	6010C	292276
490-89973-7	MW23A	Total/NA	Water	6010C	292276

Metals (Continued)

Analysis Batch: 293404 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89973-8	EQBL	Total/NA	Water	6010C	292276
LCS 490-292276/24-A	Lab Control Sample	Total/NA	Water	6010C	292276
LCS 490-292276/2-A	Lab Control Sample	Total/NA	Water	6010C	292276
MB 490-292276/1-A	Method Blank	Total/NA	Water	6010C	292276

Analysis Batch: 294891

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89973-1	MW26A	Total/NA	Water	6020A	292278
490-89973-8	EQBL	Total/NA	Water	6020A	292278

Analysis Batch: 297083

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89973-2	MW46A	Dissolved	Water	6020A	292303
LCS 490-292278/2-A	Lab Control Sample	Total/NA	Water	6020A	292278
MB 490-292278/1-A	Method Blank	Total/NA	Water	6020A	292278

Analysis Batch: 298121

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89973-2	MW46A	Total/NA	Water	6020A	292278
490-89973-3	DUP	Total/NA	Water	6020A	292278
490-89973-4	MW33A	Total/NA	Water	6020A	292278
490-89973-5	MW14B	Total/NA	Water	6020A	292278
490-89973-6	MW48A	Total/NA	Water	6020A	292278
490-89973-7	MW23A	Total/NA	Water	6020A	292278

Client Sample ID: MW26A

Date Collected: 10/15/15 11:35
Date Received: 10/17/15 09:05

Lab Sample ID: 490-89973-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	292688	10/24/15 14:16	ZLN	TAL NSH
Dissolved	Analysis	6010C		1	50 mL	50 mL	293088	10/26/15 22:27	TSC	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	292276	10/23/15 08:11	ZLN	TAL NSH
Total/NA	Analysis	6010C		1	50 mL	50 mL	293404	10/27/15 22:21	TSC	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	292303	10/23/15 09:23	ZLN	TAL NSH
Dissolved	Analysis	6020A		1	50 mL	50 mL	293129	10/26/15 17:57	KKK	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	292278	10/23/15 08:11	ZLN	TAL NSH
Total/NA	Analysis	6020A		1	50 mL	50 mL	294891	10/30/15 21:34	CME	TAL NSH

Client Sample ID: MW46A

Date Collected: 10/15/15 13:35
Date Received: 10/17/15 09:05

Lab Sample ID: 490-89973-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	292688	10/24/15 14:16	ZLN	TAL NSH
Dissolved	Analysis	6010C		1	50 mL	50 mL	293088	10/26/15 21:32	TSC	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	292276	10/23/15 08:11	ZLN	TAL NSH
Total/NA	Analysis	6010C		1	50 mL	50 mL	293404	10/27/15 22:42	TSC	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	292303	10/23/15 09:23	ZLN	TAL NSH
Dissolved	Analysis	6020A		100	50 mL	50 mL	297083	11/09/15 22:17	KKK	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	292278	10/23/15 08:11	ZLN	TAL NSH
Total/NA	Analysis	6020A		50	50 mL	50 mL	298121	11/12/15 18:23	KKK	TAL NSH

Client Sample ID: DUP

Date Collected: 10/15/15 00:01
Date Received: 10/17/15 09:05

Lab Sample ID: 490-89973-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	292688	10/24/15 14:16	ZLN	TAL NSH
Dissolved	Analysis	6010C		1	50 mL	50 mL	293088	10/26/15 21:46	TSC	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	292276	10/23/15 08:11	ZLN	TAL NSH
Total/NA	Analysis	6010C		1	50 mL	50 mL	293404	10/27/15 22:46	TSC	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	292303	10/23/15 09:23	ZLN	TAL NSH
Dissolved	Analysis	6020A		1	50 mL	50 mL	293129	10/26/15 18:08	KKK	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	292278	10/23/15 08:11	ZLN	TAL NSH
Total/NA	Analysis	6020A		1	50 mL	50 mL	298121	11/12/15 18:59	KKK	TAL NSH

Client Sample ID: MW33A

Date Collected: 10/15/15 15:40
Date Received: 10/17/15 09:05

Lab Sample ID: 490-89973-4
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	292688	10/24/15 14:16	ZLN	TAL NSH

Lab Chronicle

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-89973-1
SDG: HOREBVL001

Client Sample ID: MW33A
Date Collected: 10/15/15 15:40
Date Received: 10/17/15 09:05

Lab Sample ID: 490-89973-4
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Analysis	6010C		1	50 mL	50 mL	293088	10/26/15 21:50	TSC	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	292276	10/23/15 08:11	ZLN	TAL NSH
Total/NA	Analysis	6010C		1	50 mL	50 mL	293404	10/27/15 22:50	TSC	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	292303	10/23/15 09:23	ZLN	TAL NSH
Dissolved	Analysis	6020A		1	50 mL	50 mL	293129	10/26/15 18:13	KKK	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	292278	10/23/15 08:11	ZLN	TAL NSH
Total/NA	Analysis	6020A		10	50 mL	50 mL	298121	11/12/15 18:28	KKK	TAL NSH

Client Sample ID: MW14B
Date Collected: 10/15/15 17:05
Date Received: 10/17/15 09:05

Lab Sample ID: 490-89973-5
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	292688	10/24/15 14:16	ZLN	TAL NSH
Dissolved	Analysis	6010C		1	50 mL	50 mL	293088	10/26/15 21:55	TSC	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	292276	10/23/15 08:11	ZLN	TAL NSH
Total/NA	Analysis	6010C		1	50 mL	50 mL	293404	10/27/15 22:55	TSC	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	292303	10/23/15 09:23	ZLN	TAL NSH
Dissolved	Analysis	6020A		1	50 mL	50 mL	293129	10/26/15 18:29	KKK	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	292278	10/23/15 08:11	ZLN	TAL NSH
Total/NA	Analysis	6020A		10	50 mL	50 mL	298121	11/12/15 18:33	KKK	TAL NSH

Client Sample ID: MW48A
Date Collected: 10/16/15 10:25
Date Received: 10/17/15 09:05

Lab Sample ID: 490-89973-6
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	292688	10/24/15 14:16	ZLN	TAL NSH
Dissolved	Analysis	6010C		1	50 mL	50 mL	293088	10/26/15 22:00	TSC	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	292276	10/23/15 08:11	ZLN	TAL NSH
Total/NA	Analysis	6010C		1	50 mL	50 mL	293404	10/27/15 22:59	TSC	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	292303	10/23/15 09:23	ZLN	TAL NSH
Dissolved	Analysis	6020A		1	50 mL	50 mL	293129	10/26/15 18:34	KKK	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	292278	10/23/15 08:11	ZLN	TAL NSH
Total/NA	Analysis	6020A		10	50 mL	50 mL	298121	11/12/15 18:38	KKK	TAL NSH

Client Sample ID: MW23A
Date Collected: 10/16/15 13:05
Date Received: 10/17/15 09:05

Lab Sample ID: 490-89973-7
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	292688	10/24/15 14:16	ZLN	TAL NSH
Dissolved	Analysis	6010C		1	50 mL	50 mL	293088	10/26/15 22:04	TSC	TAL NSH

Lab Chronicle

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-89973-1
SDG: HOREBVL001

Client Sample ID: MW23A

Date Collected: 10/16/15 13:05
Date Received: 10/17/15 09:05

Lab Sample ID: 490-89973-7

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3010A			50 mL	50 mL	292276	10/23/15 08:11	ZLN	TAL NSH
Total/NA	Analysis	6010C		1	50 mL	50 mL	293404	10/27/15 23:12	TSC	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	292303	10/23/15 09:23	ZLN	TAL NSH
Dissolved	Analysis	6020A		1	50 mL	50 mL	293129	10/26/15 18:39	KKK	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	292278	10/23/15 08:11	ZLN	TAL NSH
Total/NA	Analysis	6020A		20	50 mL	50 mL	298121	11/12/15 18:44	KKK	TAL NSH

Client Sample ID: EQBL

Date Collected: 10/16/15 13:30
Date Received: 10/17/15 09:05

Lab Sample ID: 490-89973-8

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	292688	10/24/15 14:16	ZLN	TAL NSH
Dissolved	Analysis	6010C		1	50 mL	50 mL	293088	10/26/15 22:09	TSC	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	292276	10/23/15 08:11	ZLN	TAL NSH
Total/NA	Analysis	6010C		1	50 mL	50 mL	293404	10/27/15 23:17	TSC	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	292303	10/23/15 09:23	ZLN	TAL NSH
Dissolved	Analysis	6020A		1	50 mL	50 mL	293129	10/26/15 18:44	KKK	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	292278	10/23/15 08:11	ZLN	TAL NSH
Total/NA	Analysis	6020A		1	50 mL	50 mL	294891	10/30/15 20:27	CME	TAL NSH

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Method Summary

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-89973-1
SDG: HOREBVL001

Method	Method Description	Protocol	Laboratory
6010C	Metals (ICP)	SW846	TAL NSH
6020A	Metals (ICP/MS)	SW846	TAL NSH

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Certification Summary

Client: Enviro Clean Services LLC
Project/Site: Horsehead

TestAmerica Job ID: 490-89973-1
SDG: HOREBVL001

Laboratory: TestAmerica Nashville

The certifications listed below are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Oklahoma	State Program	6	9412	08-31-16

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

COOLER RECEIPT FORM

490-89973 Chain of Custody

Cooler Received/Opened On 10/17/2015 @ 0905

1. Tracking # 0947 (last 4 digits, FedEx)

Courier: FedEx IR Gun ID 12080142

2. Temperature of rep. sample or temp blank when opened: 17.0 *Degrees Celsius*

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO (NA)

4. Were custody seals on outside of cooler? (YES)...NO...NA

If yes, how many and where: Two front

5. Were the seals intact, signed, and dated correctly? (YES)...NO...NA

6. Were custody papers inside cooler? (YES)...NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) DA

7. Were custody seals on containers: YES (NO) and Intact YES...NO...(NA)

Were these signed and dated correctly? YES...NO...(NA)

8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other (None)

9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other (None)

10. Did all containers arrive in good condition (unbroken)? (YES)...NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? (YES)...NO...NA

12. Did all container labels and tags agree with custody papers? (YES)...NO...NA

13a. Were VOA vials received? YES...(NO)...NA

b. Was there any observable headspace present in any VOA vial? YES...NO...(NA)

14. Was there a Trip Blank in this cooler? YES...(NO)...NA If multiple coolers, sequence #_____

I certify that I unloaded the cooler and answered questions 7-14 (intial) AJH

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES..NO..(NA)

b. Did the bottle labels indicate that the correct preservatives were used (YES)...NO...NA

16. Was residual chlorine present? YES...NO...(NA)

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) AJH

17. Were custody papers properly filled out (ink, signed, etc)? (YES)...NO...NA

18. Did you sign the custody papers in the appropriate place? (YES)...NO...NA

19. Were correct containers used for the analysis requested? (YES)...NO...NA

20. Was sufficient amount of sample sent in each container? (YES)...NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (intial) AJH

I certify that I attached a label with the unique LIMS number to each container (intial) AJH

21. Were there Non-Conformance issues at login? YES..(NO) Was a NCM generated? YES..(NO)..#_____

BIS = Broken in shipment

CHAIN OF CUSTODY RECORD

No. 00669

ENVIRO CLEAN SERVICES, LLC
(918) 794-7828

PROJECT NUMBER: HOREBVL00 1
PROJECT NAME: HORSEHEAD
COC 1 of 1
SHIPPED TO: TA - NASHVILLE
PROJECT MANAGER: LAWMASTER/BRADY
TAT: STANDARD
SAMPLER'S PRINTED NAME: [illegible] MARSHALL
SAMPLER'S SIGNATURE:
ASOW: N/A

Cd/Pb - 6010
Zn - 6020
- METALS WERE FIELD-FILTERED

Date	Time	Sample ID	Sample Matrix	# of Sample Containers	TOTAL Cd, Zn, Pb	DISS Cd, Zn, Pb	REMARKS
10.15.15	1135	MW26A	WT	2	X	X	
10.15.15	1335	MW46A	WT	2	X	X	
~~10.15.15~~	—	DUP	WT	2	X	X	
10.15.15	1540	MW33A	WT	2	X	X	
10.15.15	1705	MW14B	WT	2	X	X	
10.16.15	1025	MW48A	WT	2	X	X	
10.16.15	1305	MW28BA	WT	2	X	X	
10.16.15	1330	EQ BL	WT	2	X	X	

Loc: 490
89973

TOTAL NUMBER OF CONTAINERS → 16

RELINQUISHED BY: [illegible] MARSHALL — DATE 10.16.15 — TIME 1500
RECEIVED BY: [illegible] — 17.0°C — DATE 10/17/15 — TIME 09:05
RELINQUISHED BY: — DATE — TIME
RECEIVED BY: — DATE — TIME

METHOD OF SHIPMENT: FEDEX
AIRBILL NUMBER: 6550 8740 0947

RECEIVED IN LABORATORY BY: — DATE — TIME
Send PDF, EDD, and INVOICE (if applicable) to: JULIE CZECH at jczech@envirocleanps.com

LABORATORY CONTACT:
LABORATORY ADDRESS: 2960 FOSTER CREIGHTON DRIVE, NASHVILLE, TN 37204

POINT OF ORIGIN: ☐ OKLAHOMA CITY ☒ TULSA ☐ NORMAN ☐ WOODWARD ☐ ARLINGTON ☐ MIDLAND ☐ OTHER:

PAGE #1 - RECEIVING LAB | PAGE #2 - ENVIRO CLEAN PROJECT FILE | PAGE #3 - ENVIRO CLEAN QA/QC DEPT

Login Sample Receipt Checklist

Client: Enviro Clean Services LLC

Job Number: 490-89973-1
SDG Number: HOREBVL001

Login Number: 89973
List Number: 1
Creator: Huskey, Adam

List Source: TestAmerica Nashville

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

APPENDIX C

TREND ANALYSES STATISTICS

	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	11/18/2015 1:22:14 PM	
From File	Horsehead Mann-Kendall data.xls	
Full Precision	OFF	
Confidence Coefficient	0.99	
Level of Significance	0.01	

MW-14B: Cd

General Statistics

Number or Reported Events Not Used	0
Number of Generated Events	31
Number Values Reported (n)	33
Number Values Missing	2
Number Values Used	31
Minimum	5.0000E-4
Maximum	0.0153
Mean	0.00292
Geometric Mean	0.00164
Median	0.0014
Standard Deviation	0.00339

Mann-Kendall Test

Test Value (S)	26
Critical Value (0.01)	2.326
Standard Deviation of S	57.4
Standardized Value of S	0.436
Approximate p-value	0.332

Insufficient evidence to identify a significant trend at the specified level of significance.

	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	11/18/2015 1:22:23 PM	
From File	Horsehead Mann-Kendall data.xls	
Full Precision	OFF	
Confidence Coefficient	0.99	
Level of Significance	0.01	

MW-14B: Pb

General Statistics

Number or Reported Events Not Used	0
Number of Generated Events	31
Number Values Reported (n)	33
Number Values Missing	2
Number Values Used	31
Minimum	0.0023
Maximum	0.025
Mean	0.00354
Geometric Mean	0.00283
Median	0.0025
Standard Deviation	0.00437

Mann-Kendall Test

Test Value (S)	-33
Critical Value (0.01)	-2.326
Standard Deviation of S	29.99
Standardized Value of S	-1.067
Approximate p-value	0.143

Insufficient evidence to identify a significant trend at the specified level of significance.

	A	B	C	D	E	F	G	H	I	J	K	L
1				**Mann-Kendall Trend Test Analysis**								
2			User Selected Options									
3			Date/Time of Computation	11/18/2015 1:48:32 PM								
4			From File	Horsehead Mann-Kendall data.xls								
5			Full Precision	OFF								
6			Confidence Coefficient	0.99								
7			Level of Significance	0.01								
8												
9	**MW-14B: Zn**											
10												
11	**General Statistics**											
12			Number or Reported Events Not Used	0								
13			Number of Generated Events	33								
14			Number Values Reported (n)	33								
15			Minimum	0.0025								
16			Maximum	7.05								
17			Mean	0.603								
18			Geometric Mean	0.179								
19			Median	0.252								
20			Standard Deviation	1.259								
21												
22	**Mann-Kendall Test**											
23			Test Value (S)	109								
24			Critical Value (0.01)	2.326								
25			Standard Deviation of S	64.5								
26			Standardized Value of S	1.675								
27			Approximate p-value	0.047								
28												
29	**Insufficient evidence to identify a significant**											
30	**trend at the specified level of significance.**											

	A	B	C	D	E	F	G	H	I	J	K	L
1				**Mann-Kendall Trend Test Analysis**								
2			User Selected Options									
3			Date/Time of Computation	11/18/2015 1:48:43 PM								
4			From File	Horsehead Mann-Kendall data.xls								
5			Full Precision	OFF								
6			Confidence Coefficient	0.99								
7			Level of Significance	0.01								
8												
9	**MW-23A: Cd**											
10												
11	**General Statistics**											
12			Number or Reported Events Not Used	0								
13			Number of Generated Events	31								
14			Number Values Reported (n)	32								
15			Number Values Missing	1								
16			Number Values Used	31								
17			Minimum	0.0059								
18			Maximum	0.0616								
19			Mean	0.0305								
20			Geometric Mean	0.0258								
21			Median	0.027								
22			Standard Deviation	0.0161								
23												
24	**Mann-Kendall Test**											
25			Test Value (S)	-228								
26			Critical Value (0.01)	-2.326								
27			Standard Deviation of S	58.81								
28			Standardized Value of S	-3.86								
29			Approximate p-value	5.6726E-5								
30												
31	**Statistically significant evidence of a decreasing**											
32	**trend at the specified level of significance.**											

	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	11/18/2015 1:53:03 PM	
From File	Horsehead Mann-Kendall data.xls	
Full Precision	OFF	
Confidence Coefficient	0.99	
Level of Significance	0.01	

MW-23A: Pb

General Statistics

Number or Reported Events Not Used	0
Number of Generated Events	30
Number Values Reported (n)	32
Number Values Missing	2
Number Values Used	30
Minimum	0.0025
Maximum	0.025
Mean	0.00615
Geometric Mean	0.00432
Median	0.0025
Standard Deviation	0.0064

Mann-Kendall Test

Test Value (S)	-58
Critical Value (0.01)	-2.326
Standard Deviation of S	49.44
Standardized Value of S	-1.153
Approximate p-value	0.124

Insufficient evidence to identify a significant trend at the specified level of significance.

	A	B	C	D	E	F	G	H	I	J	K	L
1				**Mann-Kendall Trend Test Analysis**								
2			User Selected Options									
3			Date/Time of Computation	11/18/2015 1:53:12 PM								
4			From File	Horsehead Mann-Kendall data.xls								
5			Full Precision	OFF								
6			Confidence Coefficient	0.99								
7			Level of Significance	0.01								
8												
9	**MW-23A: Zn**											
10												
11	**General Statistics**											
12			Number or Reported Events Not Used	0								
13			Number of Generated Events	31								
14			Number Values Reported (n)	32								
15			Number Values Missing	1								
16			Number Values Used	31								
17			Minimum	0.849								
18			Maximum	15.2								
19			Mean	3.671								
20			Geometric Mean	3.073								
21			Median	3.14								
22			Standard Deviation	2.66								
23												
24	**Mann-Kendall Test**											
25			Test Value (S)	-95								
26			Critical Value (0.01)	-2.326								
27			Standard Deviation of S	58.84								
28			Standardized Value of S	-1.598								
29			Approximate p-value	0.0551								
30												
31	**Insufficient evidence to identify a significant**											
32	**trend at the specified level of significance.**											

	A	B	C	D	E	F	G	H	I	J	K	L
1				**Mann-Kendall Trend Test Analysis**								
2			User Selected Options									
3			Date/Time of Computation	11/18/2015 1:53:53 PM								
4			From File	Horsehead Mann-Kendall data.xls								
5			Full Precision	OFF								
6			Confidence Coefficient	0.99								
7			Level of Significance	0.01								
8												
9	**MW-26A: Cd**											
10												
11	**General Statistics**											
12			Number or Reported Events Not Used	0								
13			Number of Generated Events	29								
14			Number Values Reported (n)	29								
15			Minimum	5.0000E-4								
16			Maximum	0.056								
17			Mean	0.00295								
18			Geometric Mean	8.7549E-4								
19			Median	5.0000E-4								
20			Standard Deviation	0.0103								
21												
22	**Mann-Kendall Test**											
23			Test Value (S)	-5								
24			Critical Value (0.01)	-2.326								
25			Standard Deviation of S	46.29								
26			Standardized Value of S	-0.0864								
27			Approximate p-value	0.466								
28												
29	**Insufficient evidence to identify a significant**											
30	**trend at the specified level of significance.**											

	A	B	C	D	E	F	G	H	I	J	K	L
1				**Mann-Kendall Trend Test Analysis**								
2			User Selected Options									
3			Date/Time of Computation	11/18/2015 1:54:00 PM								
4			From File	Horsehead Mann-Kendall data.xls								
5			Full Precision	OFF								
6			Confidence Coefficient	0.99								
7			Level of Significance	0.01								
8												
9	**MW-26A: Pb**											
10												
11	**General Statistics**											
12			Number or Reported Events Not Used	0								
13			Number of Generated Events	29								
14			Number Values Reported (n)	29								
15			Minimum	0.0025								
16			Maximum	0.13								
17			Mean	0.00923								
18			Geometric Mean	0.00383								
19			Median	0.0025								
20			Standard Deviation	0.0241								
21												
22	**Mann-Kendall Test**											
23			Test Value (S)	-42								
24			Critical Value (0.01)	-2.326								
25			Standard Deviation of S	37.51								
26			Standardized Value of S	-1.093								
27			Approximate p-value	0.137								
28												
29	**Insufficient evidence to identify a significant**											
30	**trend at the specified level of significance.**											

	A	B	C	D	E	F	G	H	I	J	K	L
1				**Mann-Kendall Trend Test Analysis**								
2			User Selected Options									
3			Date/Time of Computation	11/18/2015 1:54:11 PM								
4			From File	Horsehead Mann-Kendall data.xls								
5			Full Precision	OFF								
6			Confidence Coefficient	0.99								
7			Level of Significance	0.01								
8												
9	**MW-26A: Zn**											
10												
11	**General Statistics**											
12			Number or Reported Events Not Used	0								
13			Number of Generated Events	29								
14			Number Values Reported (n)	29								
15			Minimum	0.0109								
16			Maximum	3.78								
17			Mean	0.196								
18			Geometric Mean	0.0467								
19			Median	0.025								
20			Standard Deviation	0.694								
21												
22	**Mann-Kendall Test**											
23			Test Value (S)	-160								
24			Critical Value (0.01)	-2.326								
25			Standard Deviation of S	47.29								
26			Standardized Value of S	-3.362								
27			Approximate p-value	3.8621E-4								
28												
29	**Statistically significant evidence of a decreasing**											
30	**trend at the specified level of significance.**											

	A	B	C	D	E	F	G	H	I	J	K	L
1				**Mann-Kendall Trend Test Analysis**								
2			User Selected Options									
3			Date/Time of Computation	11/18/2015 1:54:26 PM								
4			From File	Horsehead Mann-Kendall data.xls								
5			Full Precision	OFF								
6			Confidence Coefficient	0.99								
7			Level of Significance	0.01								
8												
9	**MW-33A: Cd**											
10												
11	**General Statistics**											
12			Number or Reported Events Not Used	0								
13			Number of Generated Events	28								
14			Number Values Reported (n)	28								
15			Minimum	0.0018								
16			Maximum	0.104								
17			Mean	0.0542								
18			Geometric Mean	0.0435								
19			Median	0.055								
20			Standard Deviation	0.0274								
21												
22	**Mann-Kendall Test**											
23			Test Value (S)	-181								
24			Critical Value (0.01)	-2.326								
25			Standard Deviation of S	50.61								
26			Standardized Value of S	-3.557								
27			Approximate p-value	1.8765E-4								
28												
29	**Statistically significant evidence of a decreasing**											
30	**trend at the specified level of significance.**											

Mann-Kendall Trend Test Analysis		
User Selected Options		
Date/Time of Computation	11/18/2015 1:54:31 PM	
From File	Horsehead Mann-Kendall data.xls	
Full Precision	OFF	
Confidence Coefficient	0.99	
Level of Significance	0.01	

MW-33A: Pb

General Statistics

Number or Reported Events Not Used	0
Number of Generated Events	28
Number Values Reported (n)	28
Minimum	0.0025
Maximum	0.025
Mean	0.00452
Geometric Mean	0.00325
Median	0.0025
Standard Deviation	0.00592

Mann-Kendall Test

Test Value (S)	-86
Critical Value (0.01)	-2.326
Standard Deviation of S	33.58
Standardized Value of S	-2.532
Approximate p-value	0.00568

Statistically significant evidence of a decreasing trend at the specified level of significance.

	A	B	C	D	E	F	G	H	I	J	K	L
1				**Mann-Kendall Trend Test Analysis**								
2			User Selected Options									
3			Date/Time of Computation	11/18/2015 1:54:41 PM								
4			From File	Horsehead Mann-Kendall data.xls								
5			Full Precision	OFF								
6			Confidence Coefficient	0.99								
7			Level of Significance	0.01								
8												
9	**MW-33A: Zn**											
10												
11	**General Statistics**											
12			Number or Reported Events Not Used	0								
13			Number of Generated Events	28								
14			Number Values Reported (n)	28								
15			Minimum	0.387								
16			Maximum	25.2								
17			Mean	2.81								
18			Geometric Mean	1.466								
19			Median	1.145								
20			Standard Deviation	4.783								
21												
22	**Mann-Kendall Test**											
23			Test Value (S)	-70								
24			Critical Value (0.01)	-2.326								
25			Standard Deviation of S	50.62								
26			Standardized Value of S	-1.363								
27			Approximate p-value	0.0864								
28												
29	**Insufficient evidence to identify a significant**											
30	**trend at the specified level of significance.**											

	A	B	C	D	E	F	G	H	I	J	K	L
1				**Mann-Kendall Trend Test Analysis**								
2			User Selected Options									
3			Date/Time of Computation	11/18/2015 1:54:51 PM								
4			From File	Horsehead Mann-Kendall data.xls								
5			Full Precision	OFF								
6			Confidence Coefficient	0.99								
7			Level of Significance	0.01								
8												
9	**MW-46A: Cd**											
10												
11	**General Statistics**											
12			Number or Reported Events Not Used	0								
13			Number of Generated Events	27								
14			Number Values Reported (n)	29								
15			Number Values Missing	2								
16			Number Values Used	27								
17			Minimum	0.0228								
18			Maximum	0.3								
19			Mean	0.129								
20			Geometric Mean	0.105								
21			Median	0.12								
22			Standard Deviation	0.0778								
23												
24	**Mann-Kendall Test**											
25			Test Value (S)	-54								
26			Critical Value (0.01)	-2.326								
27			Standard Deviation of S	47.96								
28			Standardized Value of S	-1.105								
29			Approximate p-value	0.135								
30												
31	**Insufficient evidence to identify a significant**											
32	**trend at the specified level of significance.**											

Mann-Kendall Trend Test Analysis		
User Selected Options		
Date/Time of Computation	11/18/2015 1:56:23 PM	
From File	Horsehead Mann-Kendall data.xls	
Full Precision	OFF	
Confidence Coefficient	0.99	
Level of Significance	0.01	

MW-46A: Pb

General Statistics	
Number or Reported Events Not Used	0
Number of Generated Events	27
Number Values Reported (n)	29
Number Values Missing	2
Number Values Used	27
Minimum	0.0025
Maximum	0.16
Mean	0.0262
Geometric Mean	0.0133
Median	0.0143
Standard Deviation	0.0374

Mann-Kendall Test	
Test Value (S)	-183
Critical Value (0.01)	-2.326
Standard Deviation of S	47.92
Standardized Value of S	-3.798
Approximate p-value	7.2937E-5

Statistically significant evidence of a decreasing trend at the specified level of significance.

	A	B	C	D	E	F	G	H	I	J	K	L
1				**Mann-Kendall Trend Test Analysis**								
2			User Selected Options									
3			Date/Time of Computation	11/18/2015 1:56:31 PM								
4			From File	Horsehead Mann-Kendall data.xls								
5			Full Precision	OFF								
6			Confidence Coefficient	0.99								
7			Level of Significance	0.01								
8												
9	**MW-46A: Zn**											
10												
11	**General Statistics**											
12			Number or Reported Events Not Used	0								
13			Number of Generated Events	27								
14			Number Values Reported (n)	29								
15			Number Values Missing	2								
16			Number Values Used	27								
17			Minimum	1.51								
18			Maximum	76.5								
19			Mean	21.51								
20			Geometric Mean	16.27								
21			Median	21.8								
22			Standard Deviation	15.57								
23												
24	**Mann-Kendall Test**											
25			Test Value (S)	-82								
26			Critical Value (0.01)	-2.326								
27			Standard Deviation of S	47.96								
28			Standardized Value of S	-1.689								
29			Approximate p-value	0.0456								
30												
31	**Insufficient evidence to identify a significant**											
32	**trend at the specified level of significance.**											

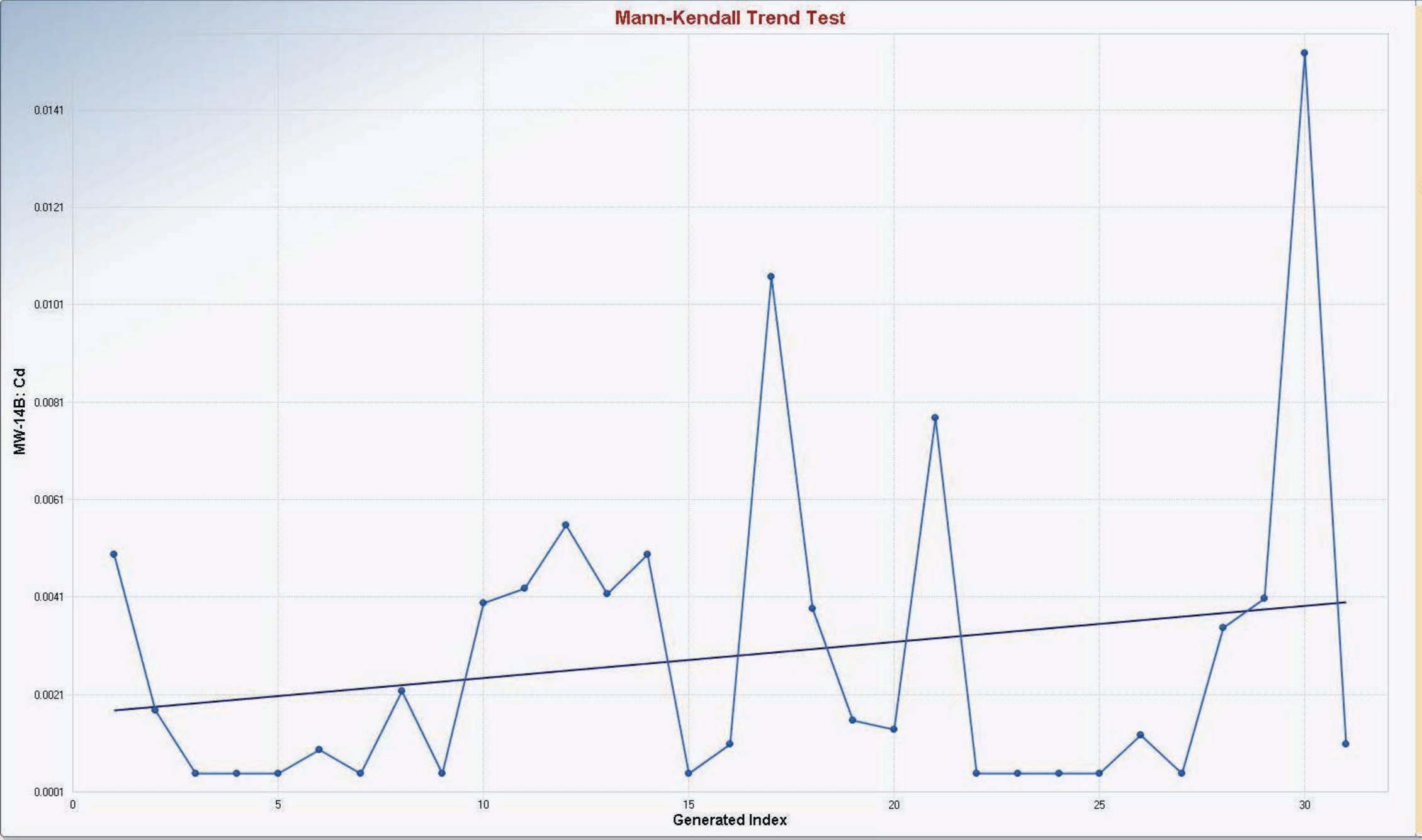
	A	B	C	D	E	F	G	H	I	J	K	L
1				**Mann-Kendall Trend Test Analysis**								
2			User Selected Options									
3			Date/Time of Computation	11/18/2015 1:57:18 PM								
4			From File	Horsehead Mann-Kendall data.xls								
5			Full Precision	OFF								
6			Confidence Coefficient	0.99								
7			Level of Significance	0.01								
8												
9	**MW-48A: Cd**											
10												
11	**General Statistics**											
12			Number or Reported Events Not Used	0								
13			Number of Generated Events	28								
14			Number Values Reported (n)	28								
15			Minimum	5.0000E-4								
16			Maximum	0.0154								
17			Mean	0.00253								
18			Geometric Mean	0.0014								
19			Median	0.0012								
20			Standard Deviation	0.00321								
21												
22	**Mann-Kendall Test**											
23			Test Value (S)	16								
24			Critical Value (0.01)	2.326								
25			Standard Deviation of S	48.45								
26			Standardized Value of S	0.31								
27			Approximate p-value	0.378								
28												
29	**Insufficient evidence to identify a significant**											
30	**trend at the specified level of significance.**											

	A	B	C	D	E	F	G	H	I	J	K	L
1				**Mann-Kendall Trend Test Analysis**								
2			User Selected Options									
3			Date/Time of Computation	11/18/2015 1:57:30 PM								
4			From File	Horsehead Mann-Kendall data.xls								
5			Full Precision	OFF								
6			Confidence Coefficient	0.99								
7			Level of Significance	0.01								
8												
9	**MW-48A: Pb**											
10												
11	**General Statistics**											
12			Number or Reported Events Not Used	0								
13			Number of Generated Events	28								
14			Number Values Reported (n)	28								
15			Minimum	0.0025								
16			Maximum	0.025								
17			Mean	0.00525								
18			Geometric Mean	0.0036								
19			Median	0.0025								
20			Standard Deviation	0.00635								
21												
22	**Mann-Kendall Test**											
23			Test Value (S)	-60								
24			Critical Value (0.01)	-2.326								
25			Standard Deviation of S	36.1								
26			Standardized Value of S	-1.634								
27			Approximate p-value	0.0511								
28												
29	**Insufficient evidence to identify a significant**											
30	**trend at the specified level of significance.**											

	A	B	C	D	E	F	G	H	I	J	K	L
1				**Mann-Kendall Trend Test Analysis**								
2			User Selected Options									
3			Date/Time of Computation	11/18/2015 1:57:38 PM								
4			From File	Horsehead Mann-Kendall data.xls								
5			Full Precision	OFF								
6			Confidence Coefficient	0.99								
7			Level of Significance	0.01								
8												
9	**MW-48A: Zn**											
10												
11	**General Statistics**											
12			Number or Reported Events Not Used	0								
13			Number of Generated Events	28								
14			Number Values Reported (n)	28								
15			Minimum	0.0025								
16			Maximum	1.5								
17			Mean	0.214								
18			Geometric Mean	0.0672								
19			Median	0.0566								
20			Standard Deviation	0.356								
21												
22	**Mann-Kendall Test**											
23			Test Value (S)	57								
24			Critical Value (0.01)	2.326								
25			Standard Deviation of S	49.93								
26			Standardized Value of S	1.122								
27			Approximate p-value	0.131								
28												
29	**Insufficient evidence to identify a significant**											
30	**trend at the specified level of significance.**											

APPENDIX D

TIME VS. CONCENTRATION GRAPHS



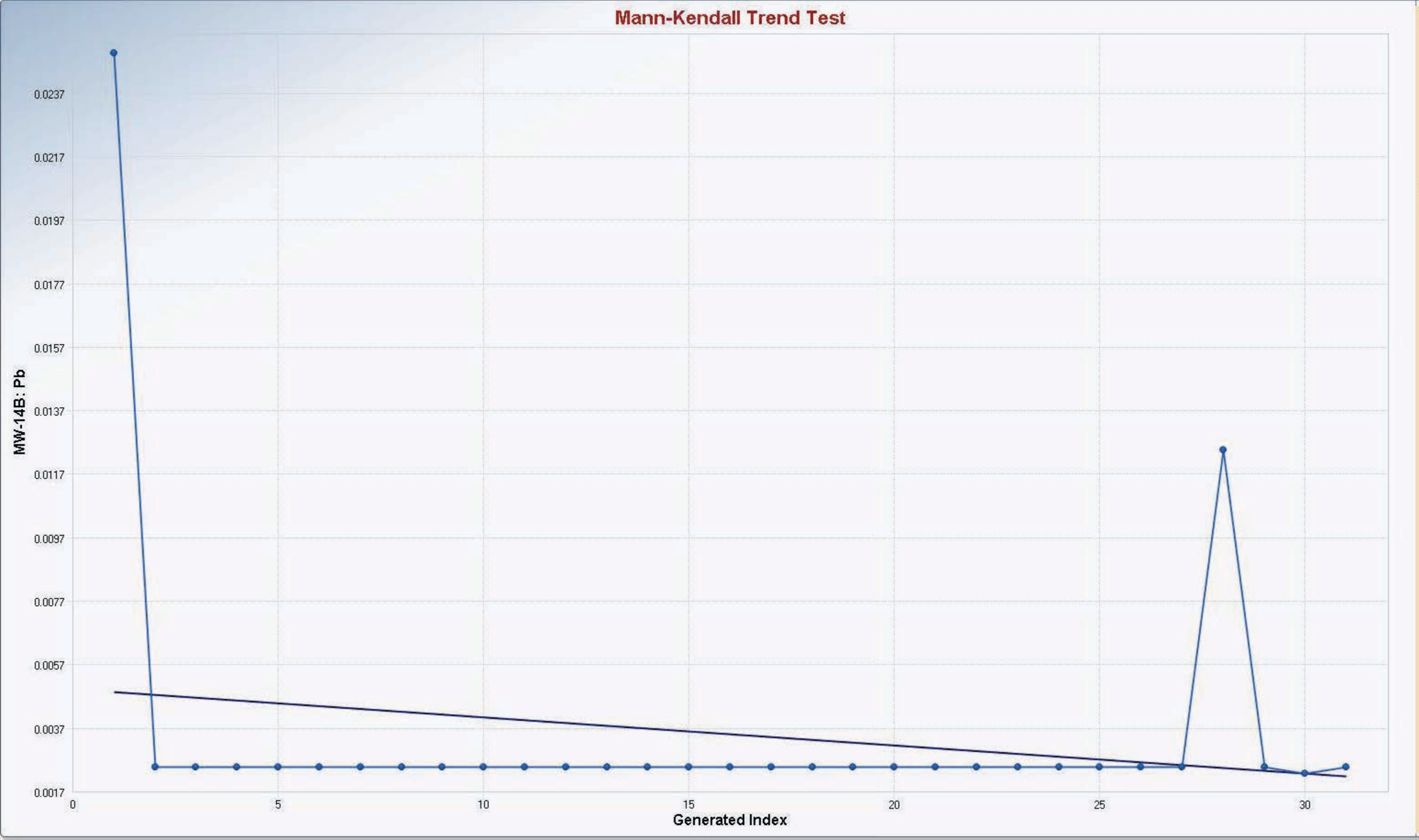
Mann-Kendall Trend Analysis

n	31
Confidence Coefficient	0.9900
Level of Significance	0.0100
Standard Deviation of S	57.3992
Standardized Value of S	0.4355
Test Value (S)	26
Appx. Critical Value (0.01)	2.3263
Approximate p-value	0.3316

OLS Regression Line (Blue)

OLS Regression Slope	0.0001
OLS Regression Intercept	0.0017

Insufficient statistical evidence of a significant trend at the specified level of significance.



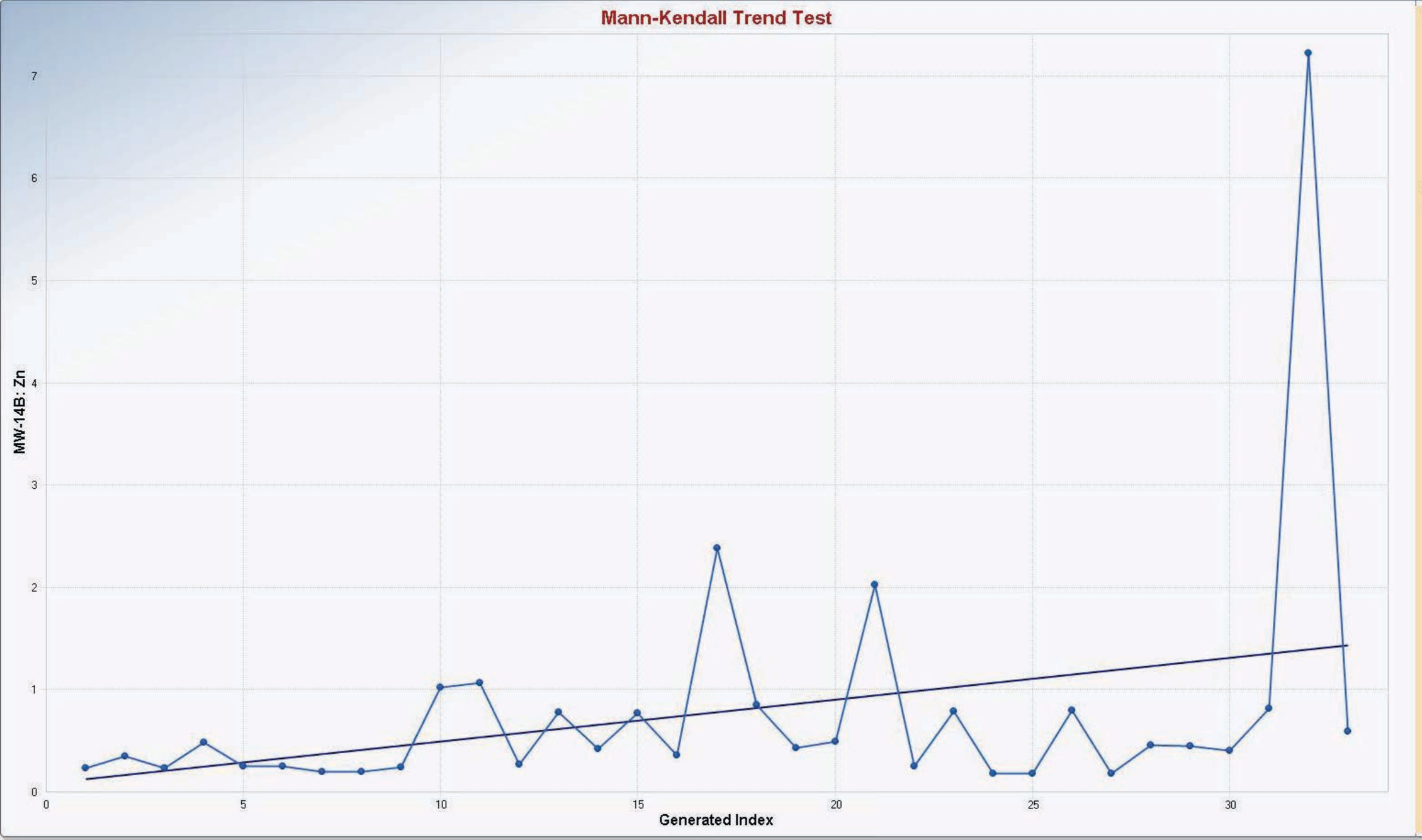
Mann-Kendall Trend Analysis

n	31
Confidence Coefficient	0.9900
Level of Significance	0.0100
Standard Deviation of S	29.9944
Standardized Value of S	-1.0669
Test Value (S)	-33
Appx. Critical Value (0.01)	-2.3263
Approximate p-value	0.1430

OLS Regression Line (Blue)

OLS Regression Slope	-0.0001
OLS Regression Intercept	0.0050

Insufficient statistical evidence of a significant trend at the specified level of significance.



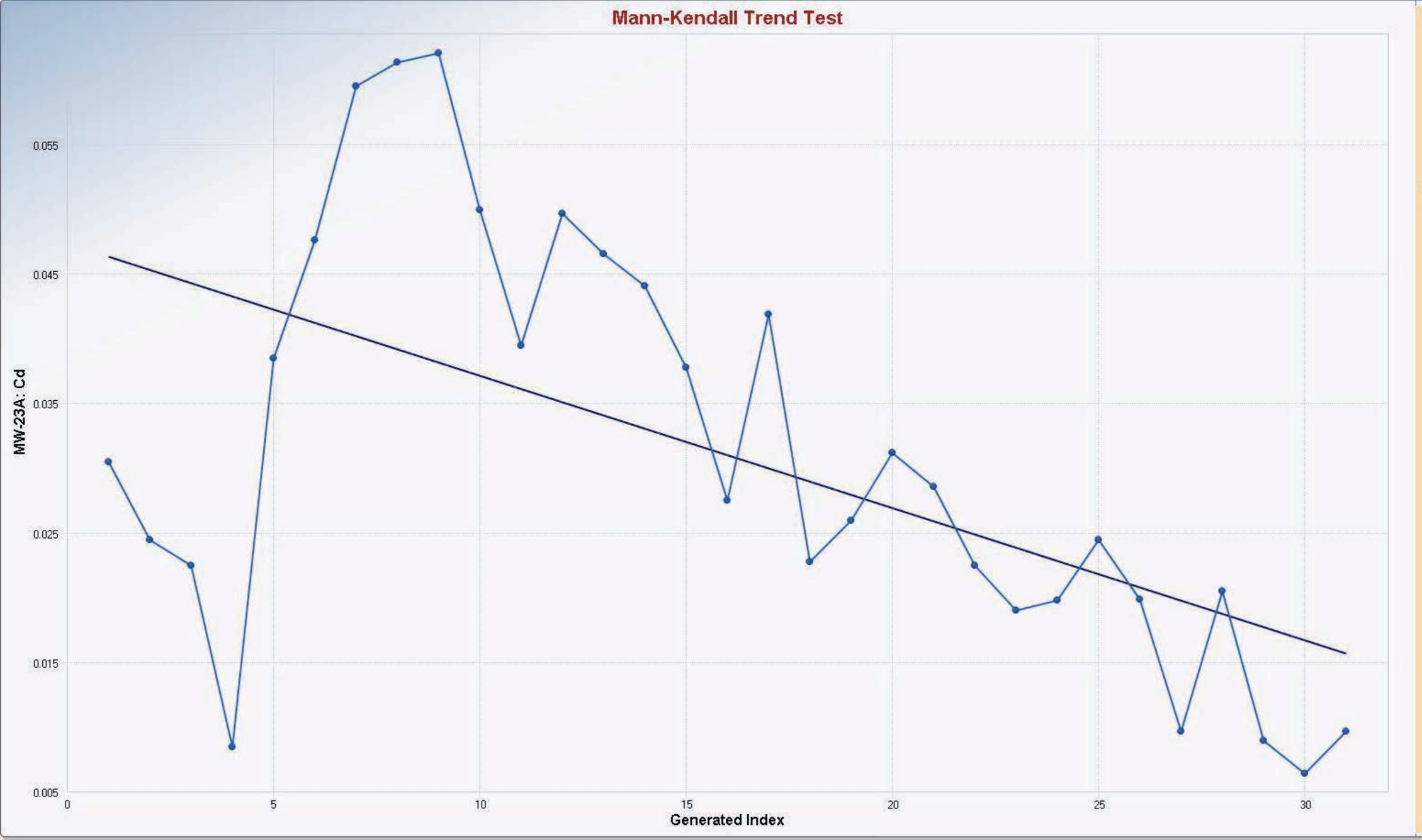
Mann-Kendall Trend Analysis

n	33
Confidence Coefficient	0.9900
Level of Significance	0.0100
Standard Deviation of S	64.4955
Standardized Value of S	1.6745
Test Value (S)	109
Appx. Critical Value (0.01)	2.3263
Approximate p-value	0.0470

OLS Regression Line (Blue)

OLS Regression Slope	0.0410
OLS Regression Intercept	-0.0932

Insufficient statistical evidence of a significant trend at the specified level of significance.



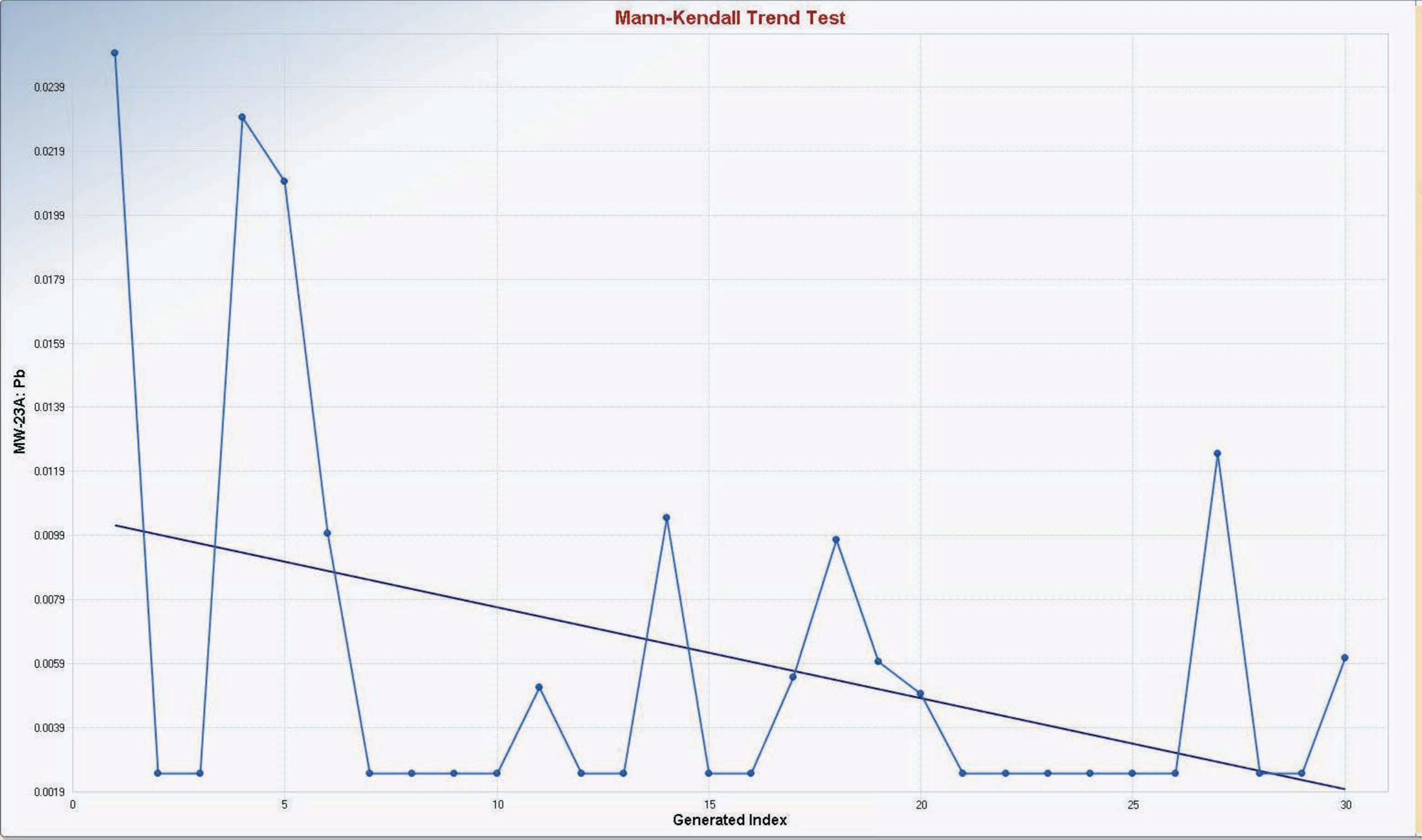
Mann-Kendall Trend Analysis

n	31
Confidence Coefficient	0.9900
Level of Significance	0.0100
Standard Deviation of S	58.8104
Standardized Value of S	-3.8599
Test Value (S)	-228
Appx. Critical Value (0.01)	-2.3263
Approximate p-value	0.0001

OLS Regression Line (Blue)

OLS Regression Slope	-0.0010
OLS Regression Intercept	0.0469

Statistically significant evidence of a decreasing trend at the specified level of significance.



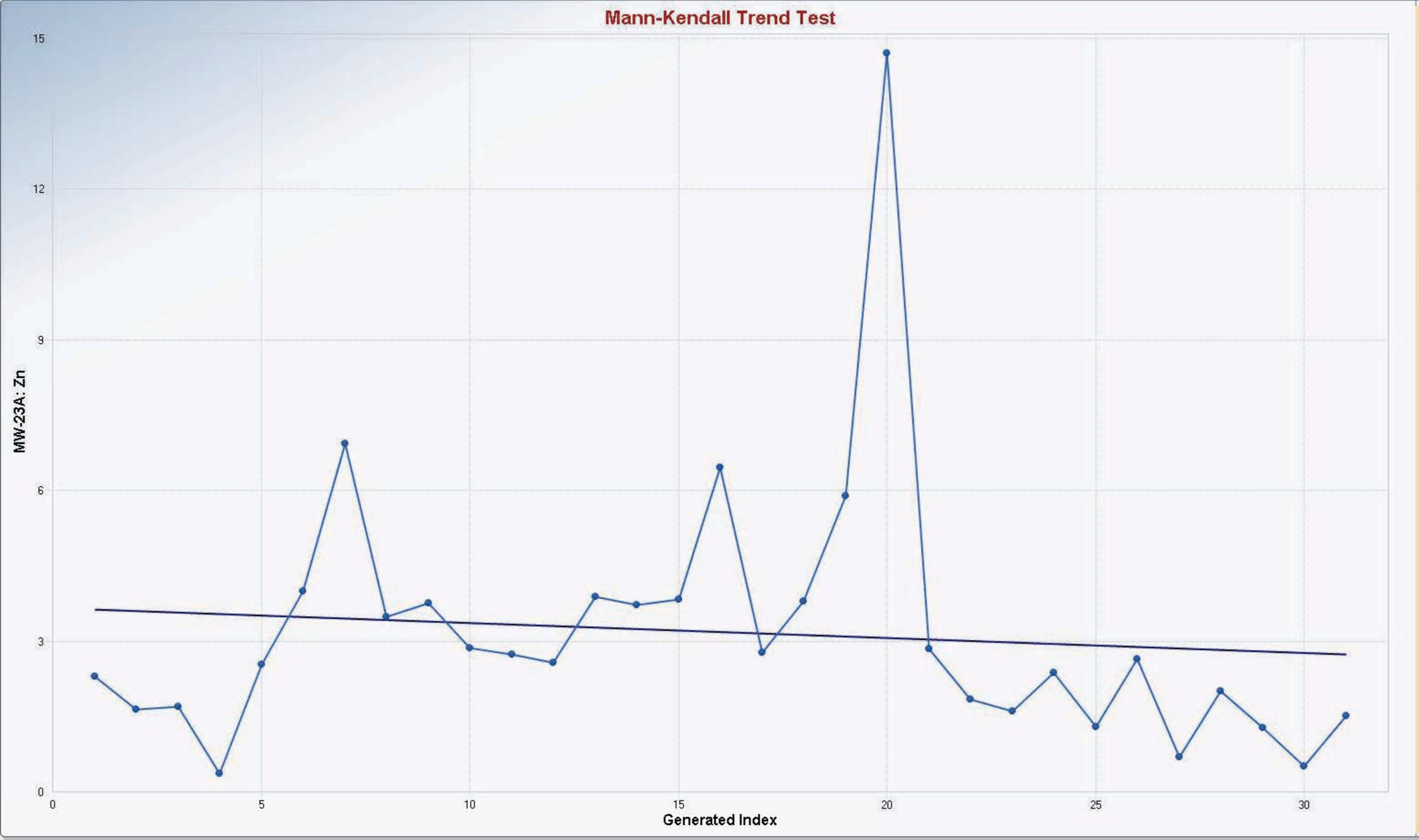
Mann-Kendall Trend Analysis

n	30
Confidence Coefficient	0.9900
Level of Significance	0.0100
Standard Deviation of S	49.4436
Standardized Value of S	-1.1528
Test Value (S)	-58
Appx. Critical Value (0.01)	-2.3263
Approximate p-value	0.1245

OLS Regression Line (Blue)

OLS Regression Slope	-0.0003
OLS Regression Intercept	0.0106

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

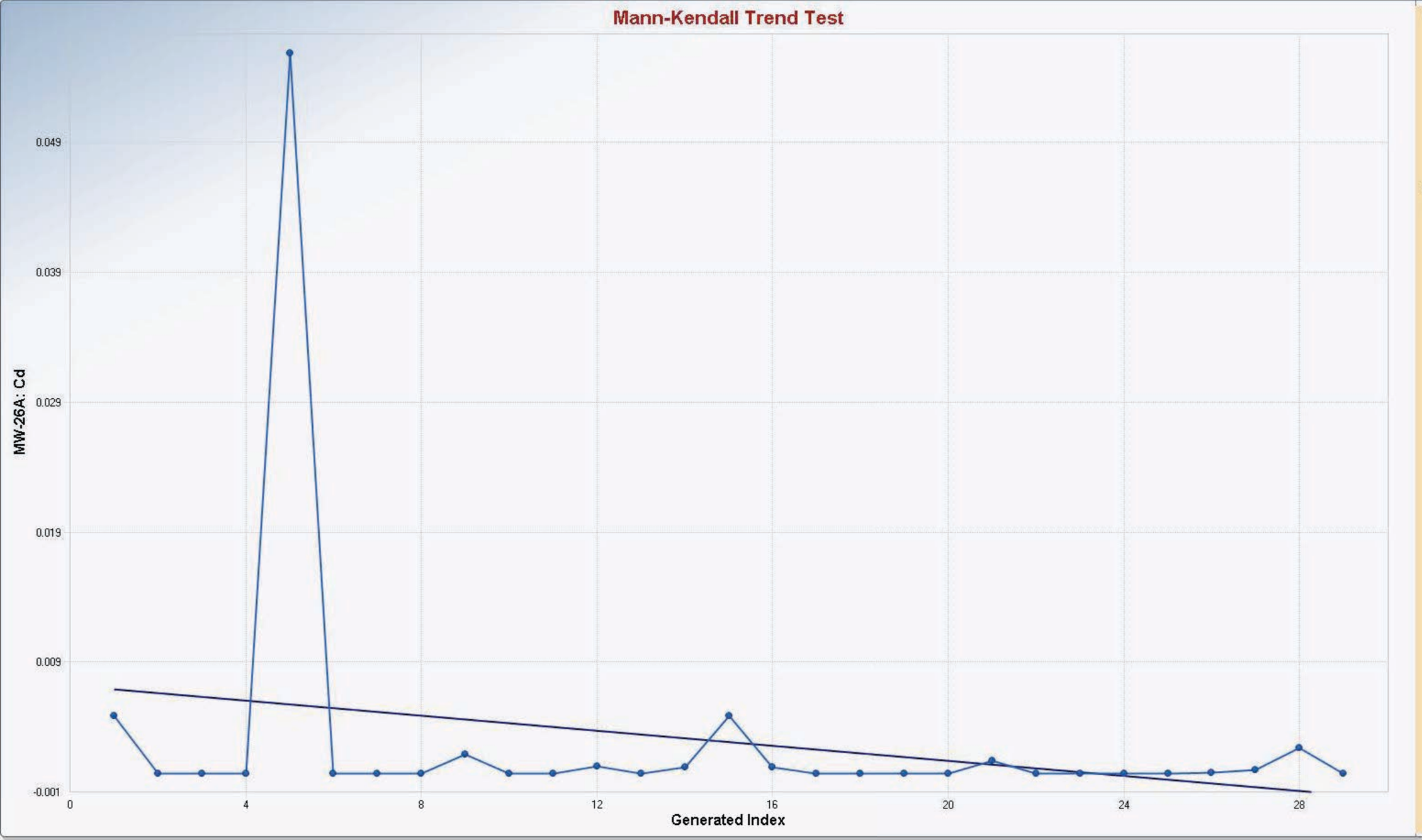
n	31
Confidence Coefficient	0.9900
Level of Significance	0.0100
Standard Deviation of S	58.8359
Standardized Value of S	-1.5977
Test Value (S)	-95
Appx. Critical Value (0.01)	-2.3263
Approximate p-value	0.0551

OLS Regression Line (Blue)

OLS Regression Slope	-0.0296
OLS Regression Intercept	4.1449

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test



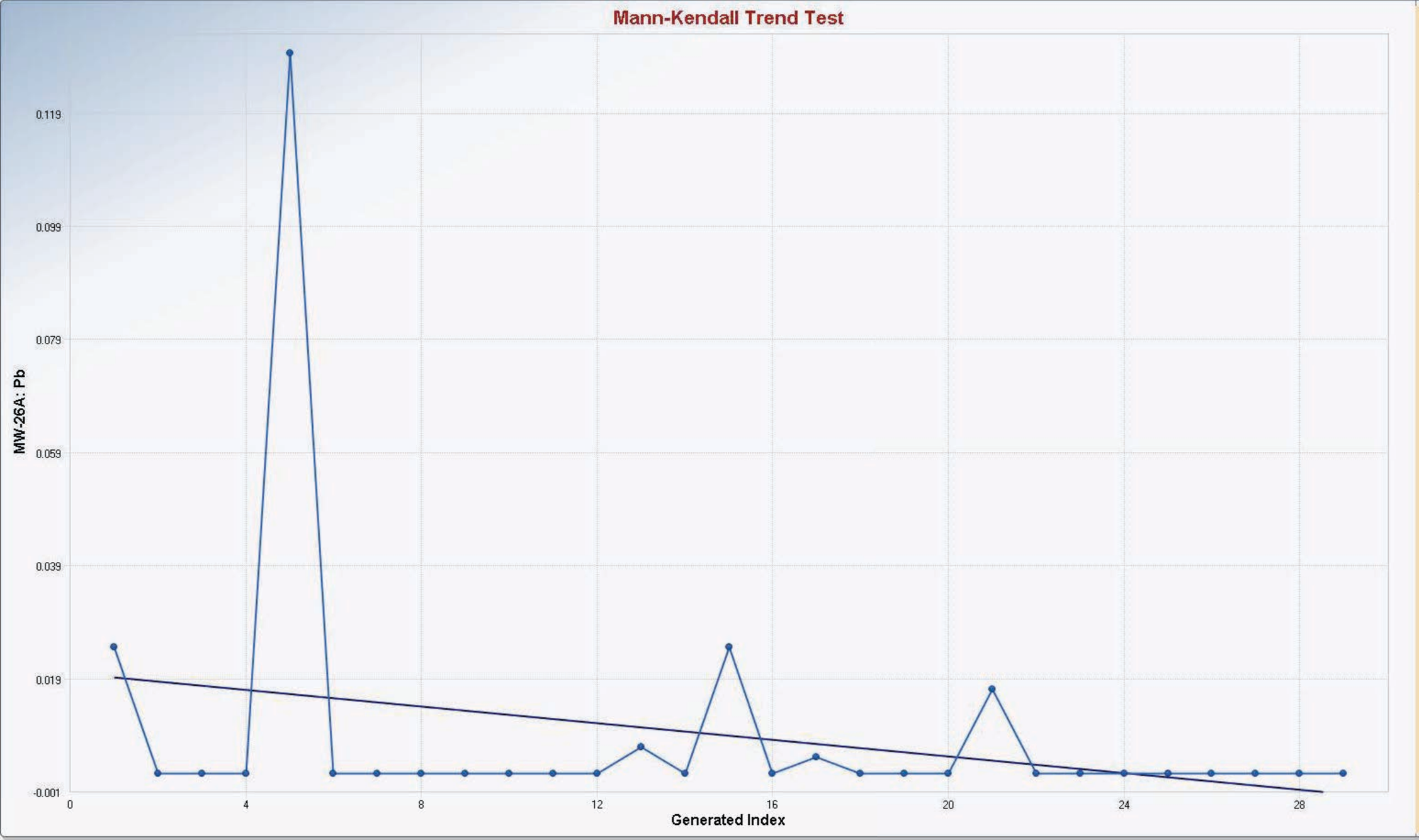
Mann-Kendall Trend Analysis

n	29
Confidence Coefficient	0.9900
Level of Significance	0.0100
Standard Deviation of S	46.2925
Standardized Value of S	-0.0864
Test Value (S)	-5
Appx. Critical Value (0.01)	-2.3263
Approximate p-value	0.4656

OLS Regression Line (Blue)

OLS Regression Slope	-0.0003
OLS Regression Intercept	0.0073

Insufficient statistical evidence of a significant trend at the specified level of significance.



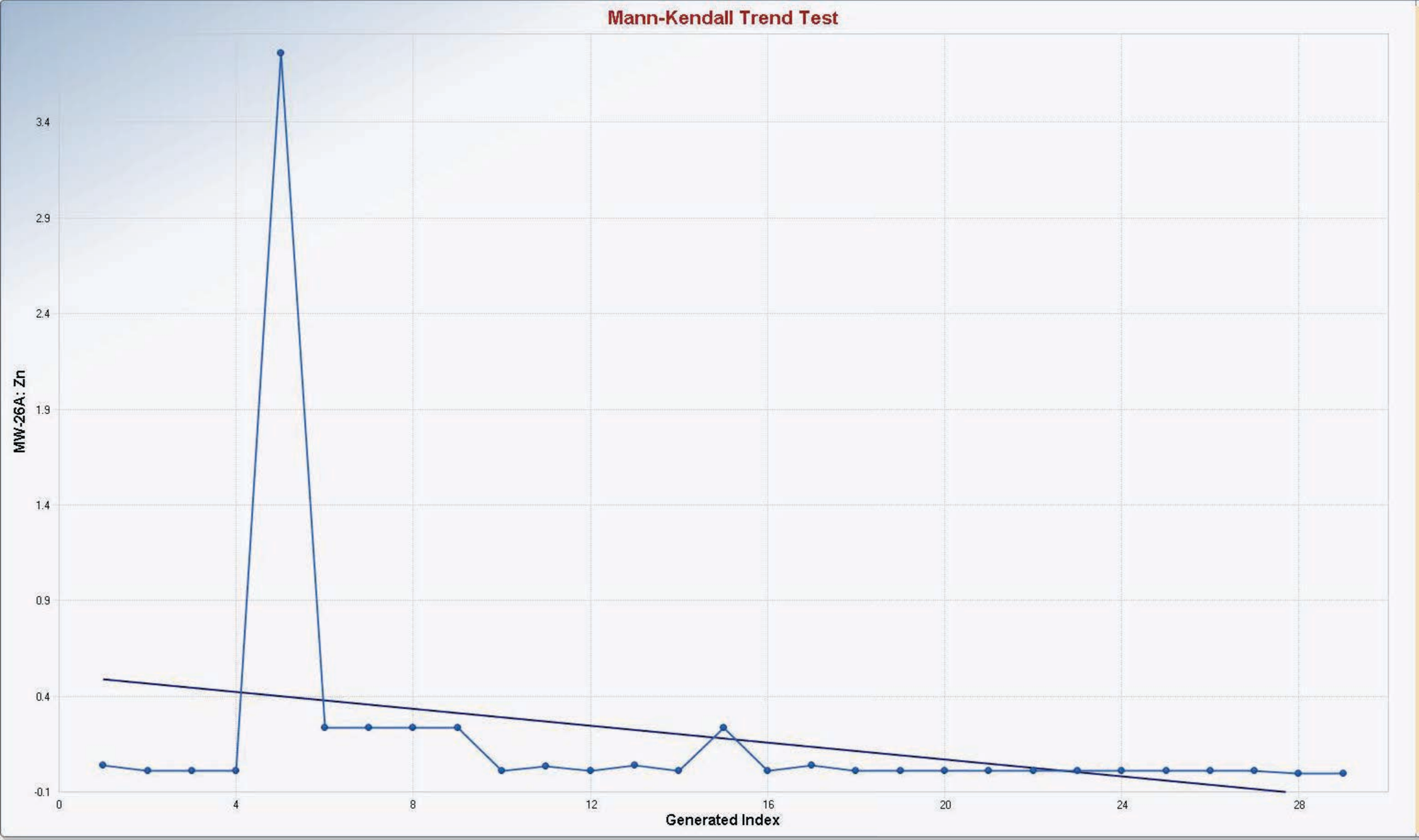
Mann-Kendall Trend Analysis

n	29
Confidence Coefficient	0.9900
Level of Significance	0.0100
Standard Deviation of S	37.5144
Standardized Value of S	-1.0929
Test Value (S)	-42
Appx. Critical Value (0.01)	-2.3263
Approximate p-value	0.1372

OLS Regression Line (Blue)

OLS Regression Slope	-0.0007
OLS Regression Intercept	0.0203

Insufficient statistical evidence of a significant trend at the specified level of significance.



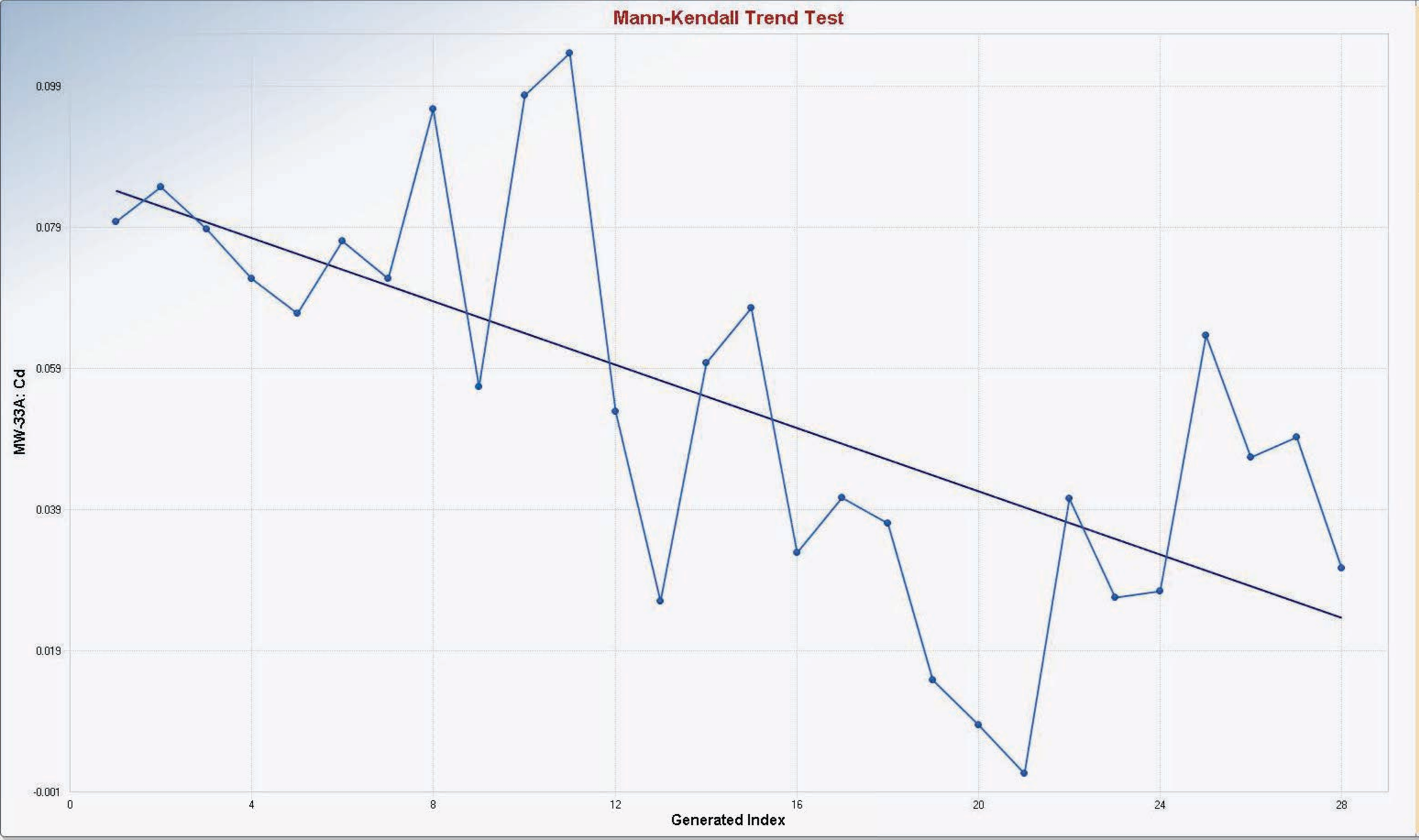
Mann-Kendall Trend Analysis

n	29
Confidence Coefficient	0.9900
Level of Significance	0.0100
Standard Deviation of S	47.2864
Standardized Value of S	-3.3625
Test Value (S)	-160
Appx. Critical Value (0.01)	-2.3263
Approximate p-value	0.0004

OLS Regression Line (Blue)

OLS Regression Slope	-0.0223
OLS Regression Intercept	0.5303

Statistically significant evidence of a decreasing trend at the specified level of significance.



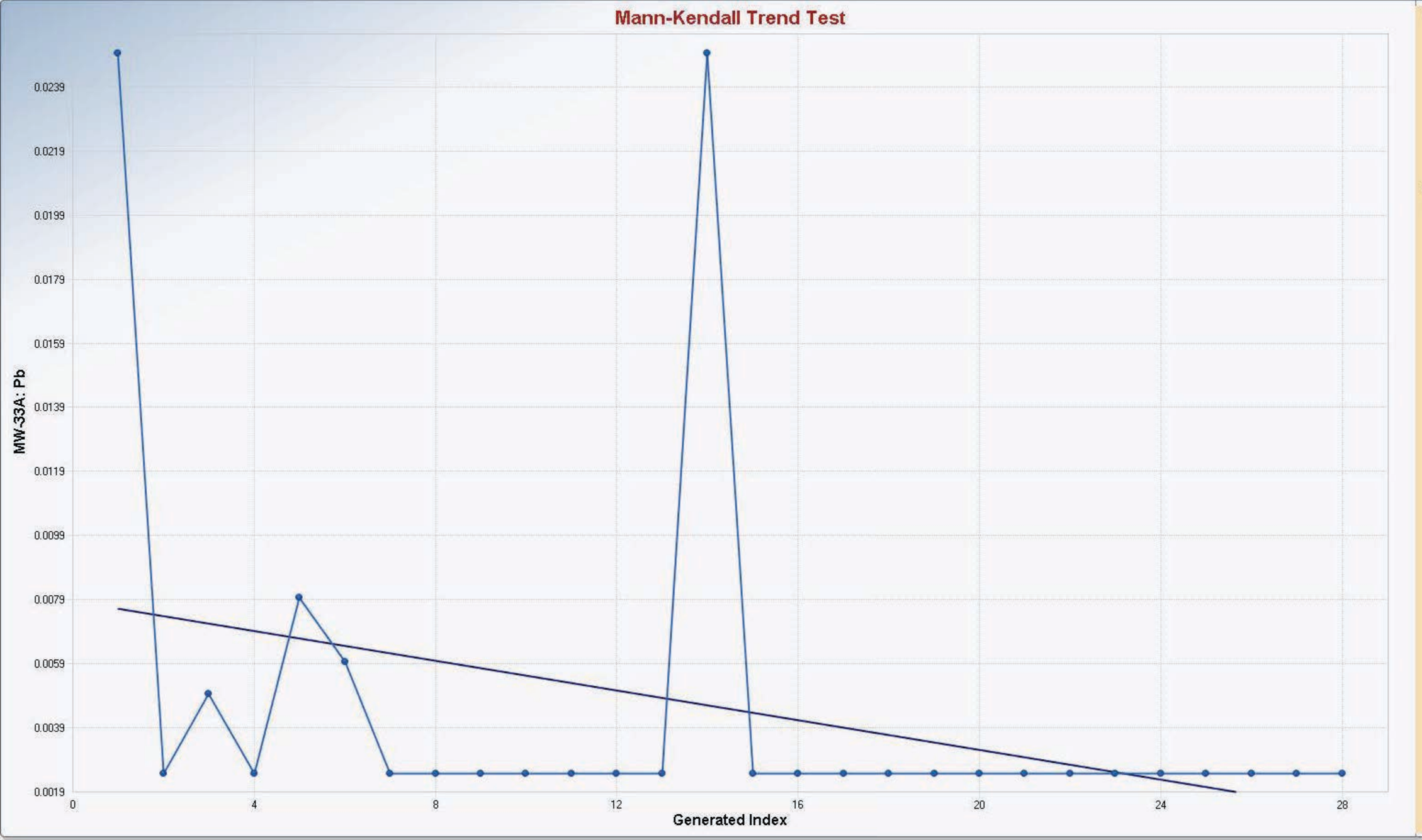
Mann-Kendall Trend Analysis

n	28
Confidence Coefficient	0.9900
Level of Significance	0.0100
Standard Deviation of S	50.6063
Standardized Value of S	-3.5569
Test Value (S)	-181
Appx. Critical Value (0.01)	-2.3263
Approximate p-value	0.0002

OLS Regression Line (Blue)

OLS Regression Slope	-0.0022
OLS Regression Intercept	0.0867

Statistically significant evidence of a decreasing trend at the specified level of significance.



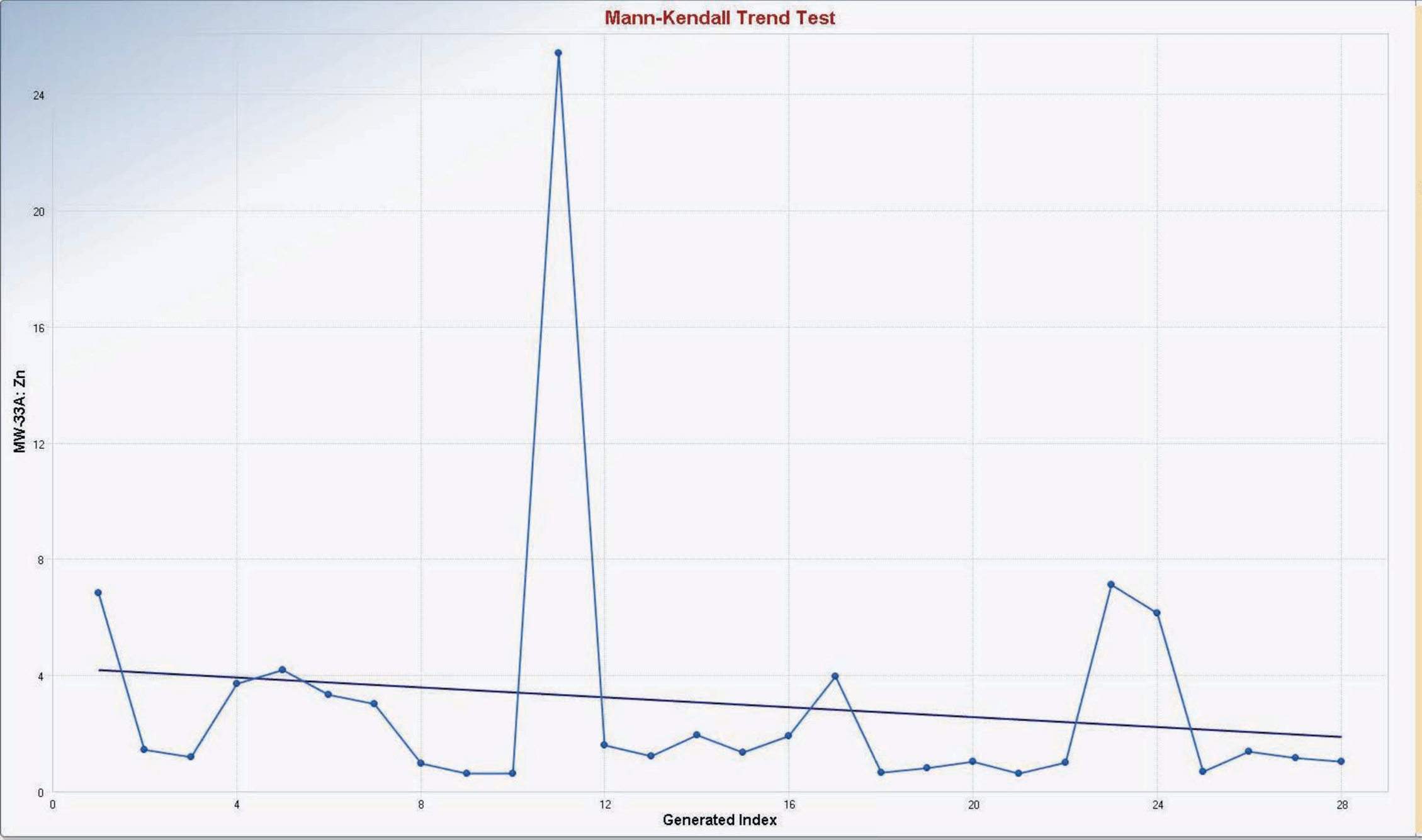
Mann-Kendall Trend Analysis

n	28
Confidence Coefficient	0.9900
Level of Significance	0.0100
Standard Deviation of S	33.5758
Standardized Value of S	-2.5316
Test Value (S)	-86
Appx. Critical Value (0.01)	-2.3263
Approximate p-value	0.0057

OLS Regression Line (Blue)

OLS Regression Slope	-0.0002
OLS Regression Intercept	0.0079

Statistically significant evidence of a decreasing trend at the specified level of significance.



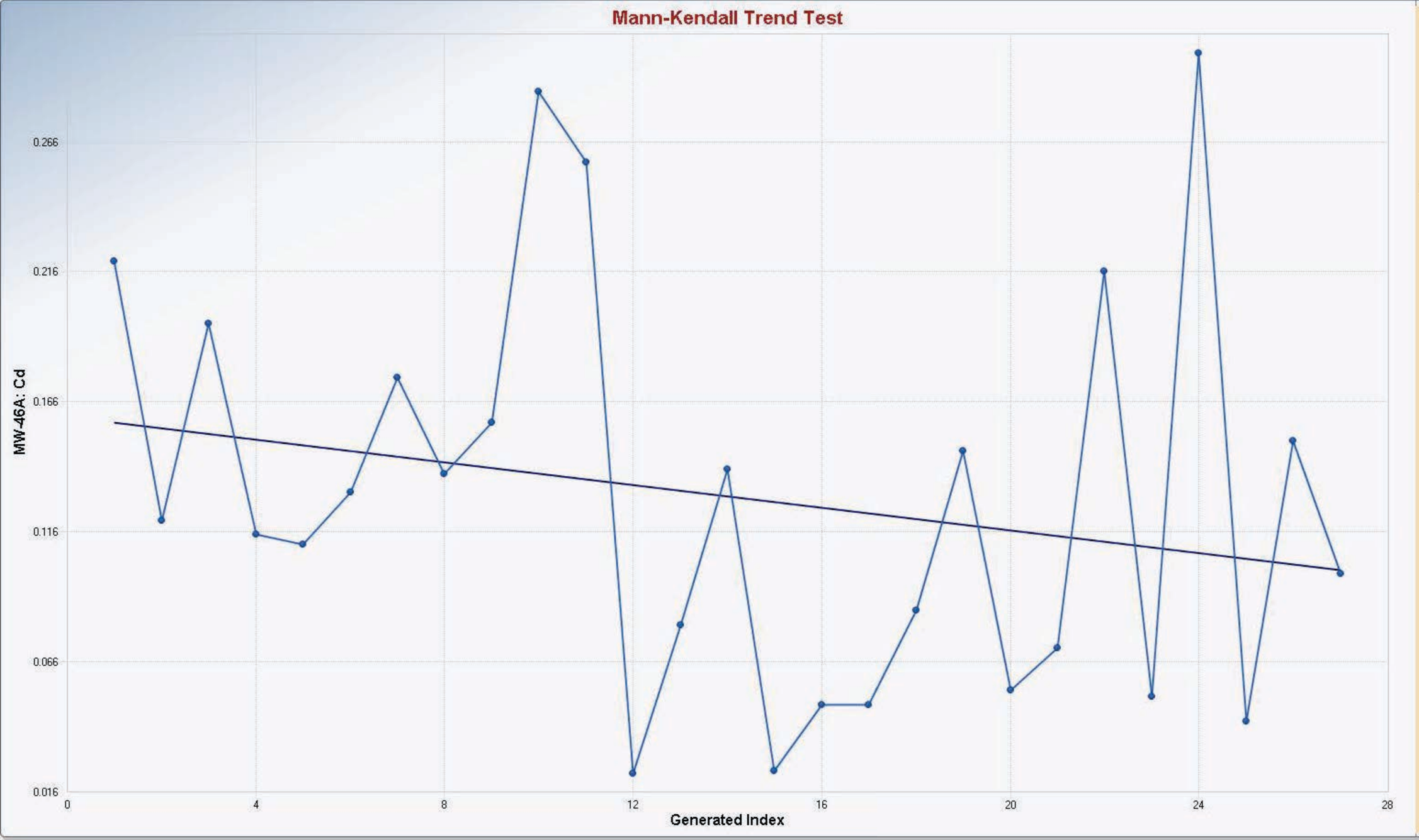
Mann-Kendall Trend Analysis

n	28
Confidence Coefficient	0.9900
Level of Significance	0.0100
Standard Deviation of S	50.6162
Standardized Value of S	-1.3632
Test Value (S)	-70
Appx. Critical Value (0.01)	-2.3263
Approximate p-value	0.0864

OLS Regression Line (Blue)

OLS Regression Slope	-0.0850
OLS Regression Intercept	4.0416

Insufficient statistical evidence of a significant trend at the specified level of significance.



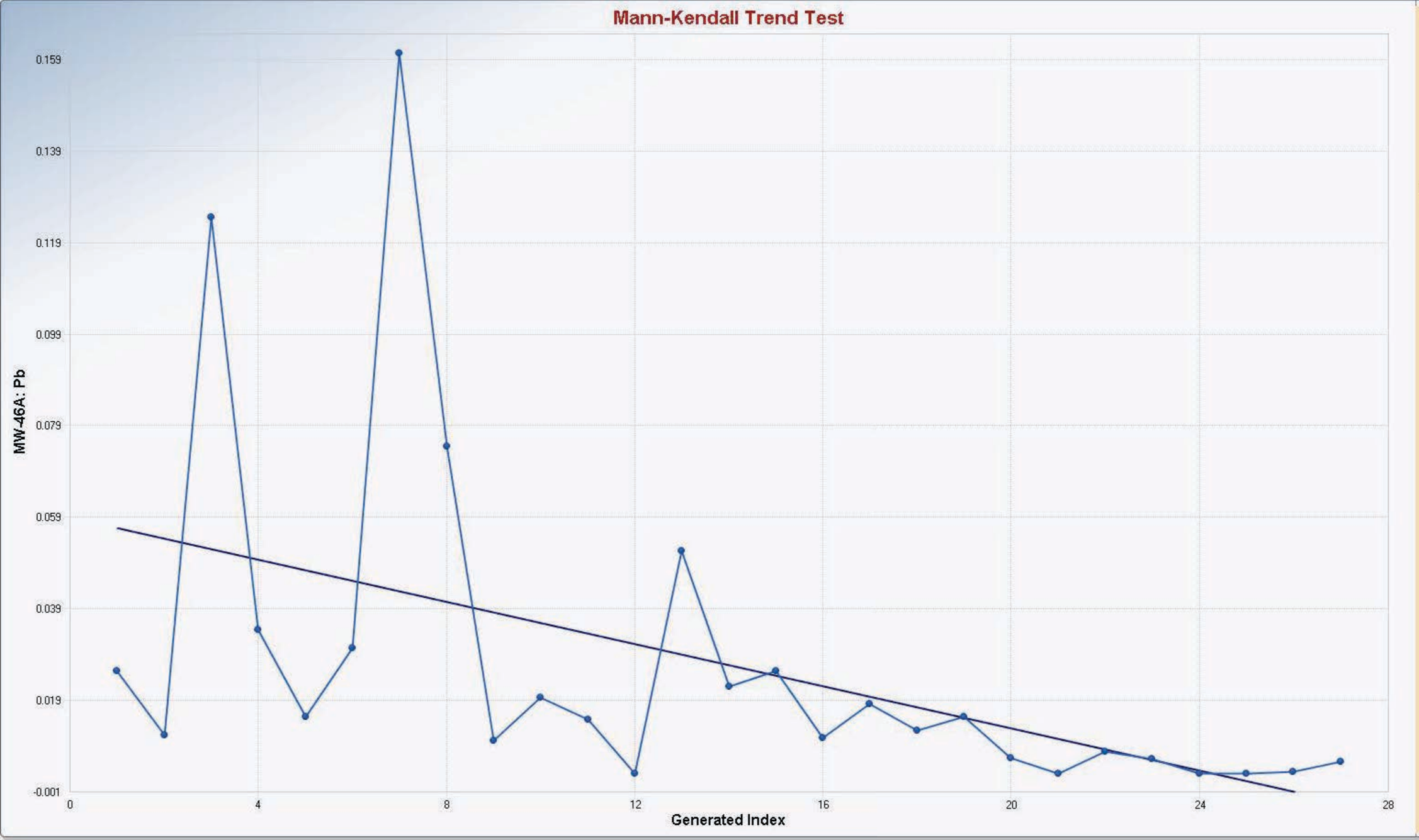
Mann-Kendall Trend Analysis

n	27
Confidence Coefficient	0.9900
Level of Significance	0.0100
Standard Deviation of S	47.9583
Standardized Value of S	-1.1051
Test Value (S)	-54
Appx. Critical Value (0.01)	-2.3263
Approximate p-value	0.1346

OLS Regression Line (Blue)

OLS Regression Slope	-0.0022
OLS Regression Intercept	0.1600

Insufficient statistical evidence of a significant trend at the specified level of significance.



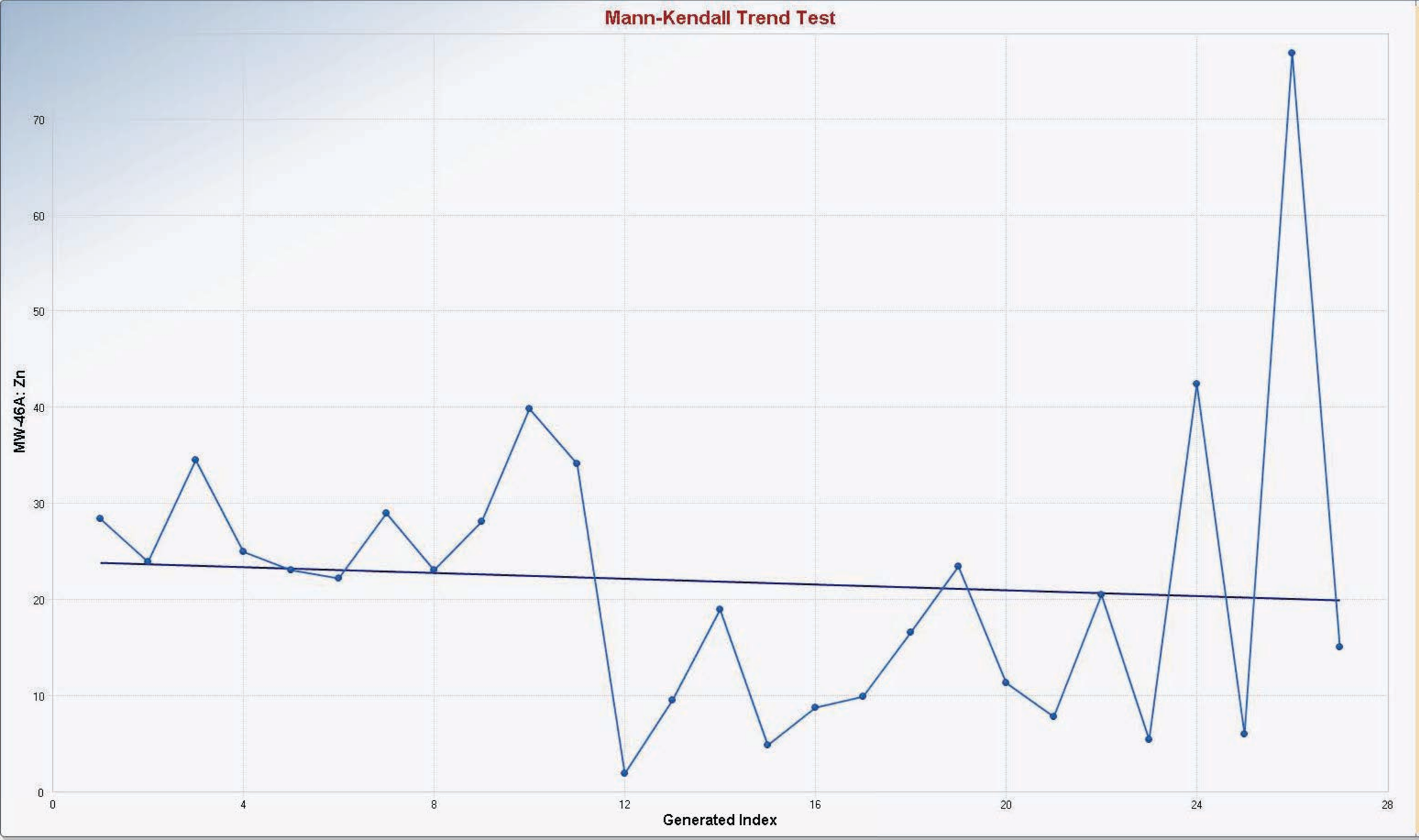
Mann-Kendall Trend Analysis

n	27
Confidence Coefficient	0.9900
Level of Significance	0.0100
Standard Deviation of S	47.9201
Standardized Value of S	-3.7980
Test Value (S)	-183
Appx. Critical Value (0.01)	-2.3263
Approximate p-value	0.0001

OLS Regression Line (Blue)

OLS Regression Slope	-0.0023
OLS Regression Intercept	0.0585

Statistically significant evidence of a decreasing trend at the specified level of significance.



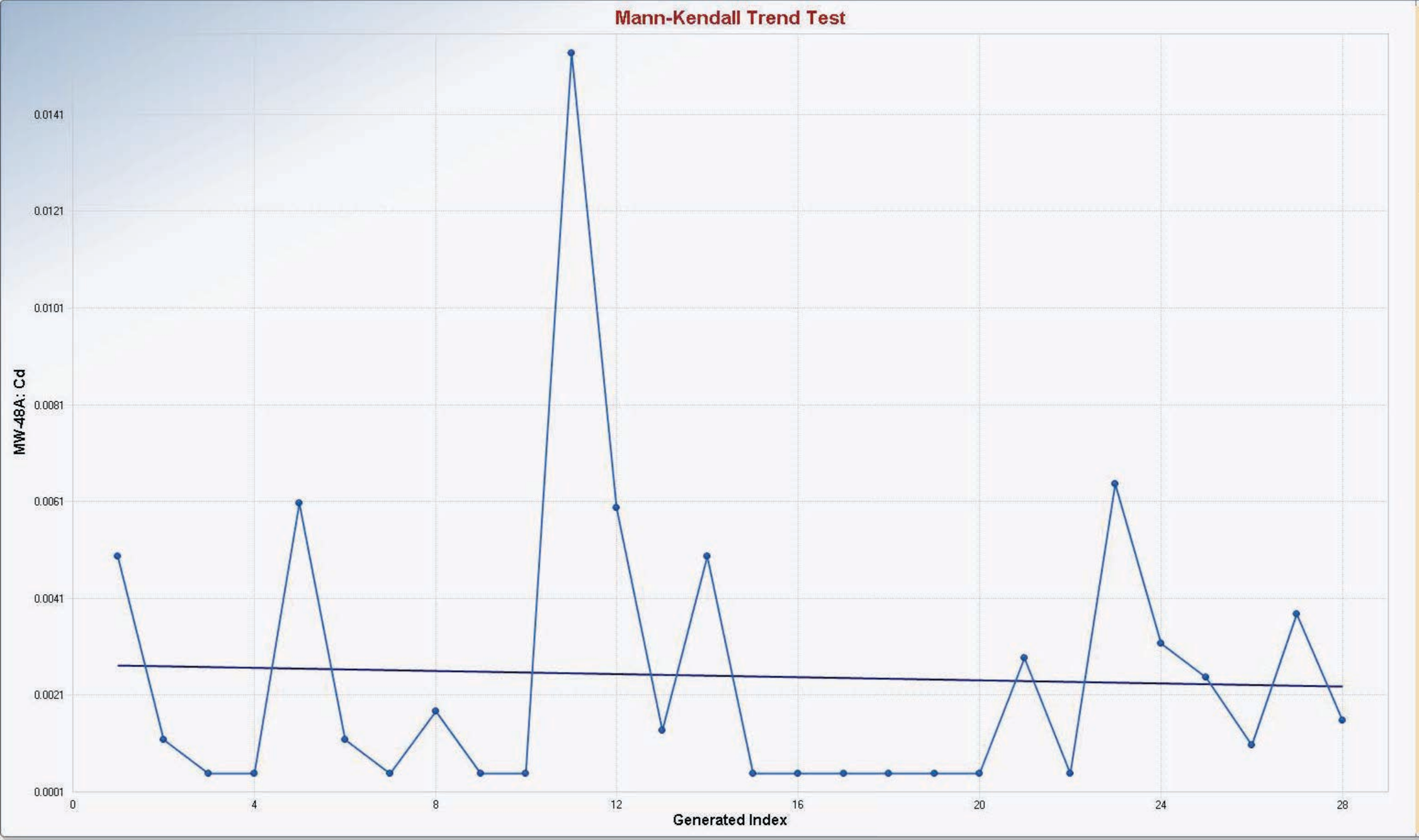
Mann-Kendall Trend Analysis

n	27
Confidence Coefficient	0.9900
Level of Significance	0.0100
Standard Deviation of S	47.9583
Standardized Value of S	-1.6890
Test Value (S)	-82
Appx. Critical Value (0.01)	-2.3263
Approximate p-value	0.0456

OLS Regression Line (Blue)

OLS Regression Slope	-0.1510
OLS Regression Intercept	23.6230

Insufficient statistical evidence of a significant trend at the specified level of significance.



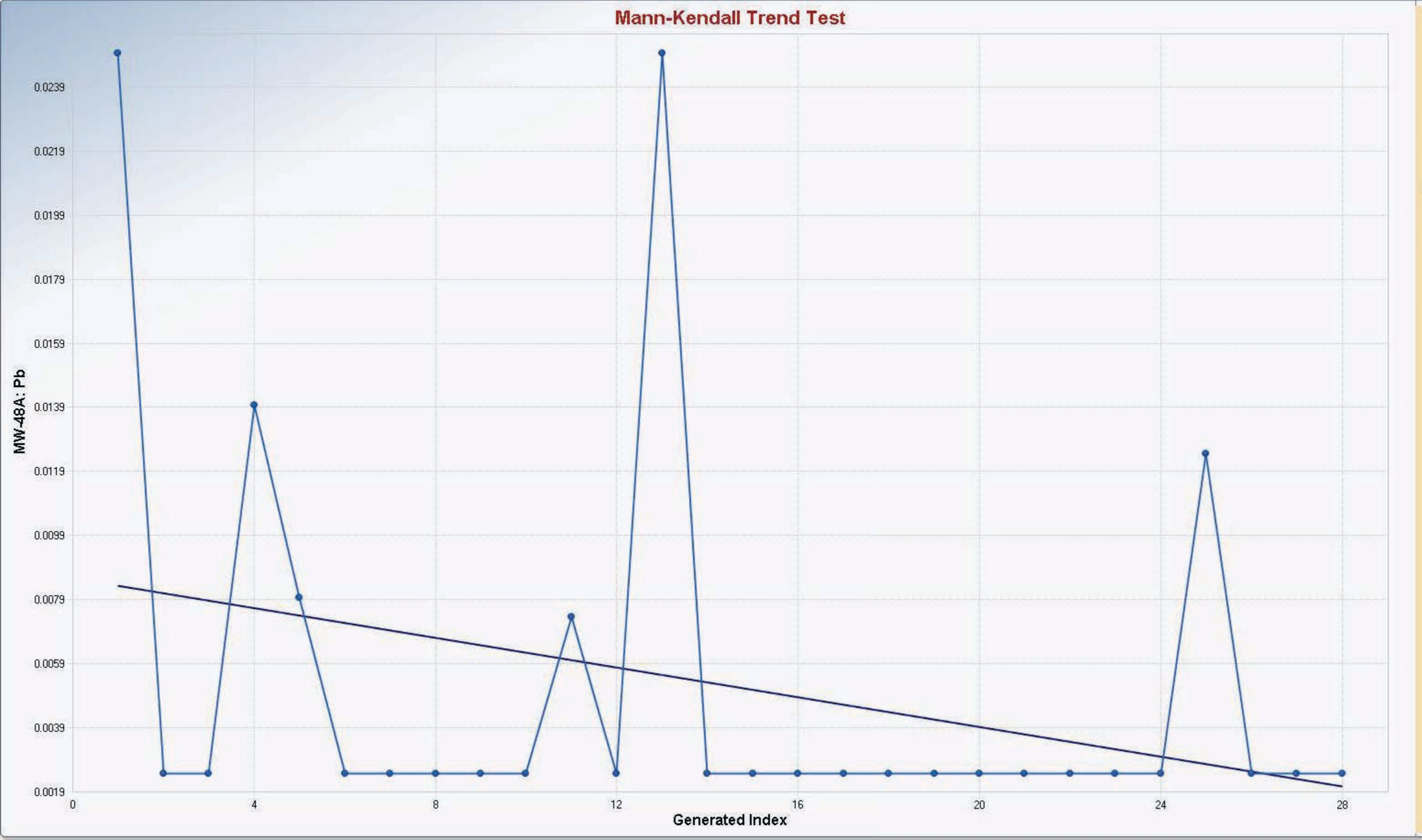
Mann-Kendall Trend Analysis

n	28
Confidence Coefficient	0.9900
Level of Significance	0.0100
Standard Deviation of S	48.4493
Standardized Value of S	0.3096
Test Value (S)	16
Appx. Critical Value (0.01)	2.3263
Approximate p-value	0.3784

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	0.0028

Insufficient statistical evidence of a significant trend at the specified level of significance.



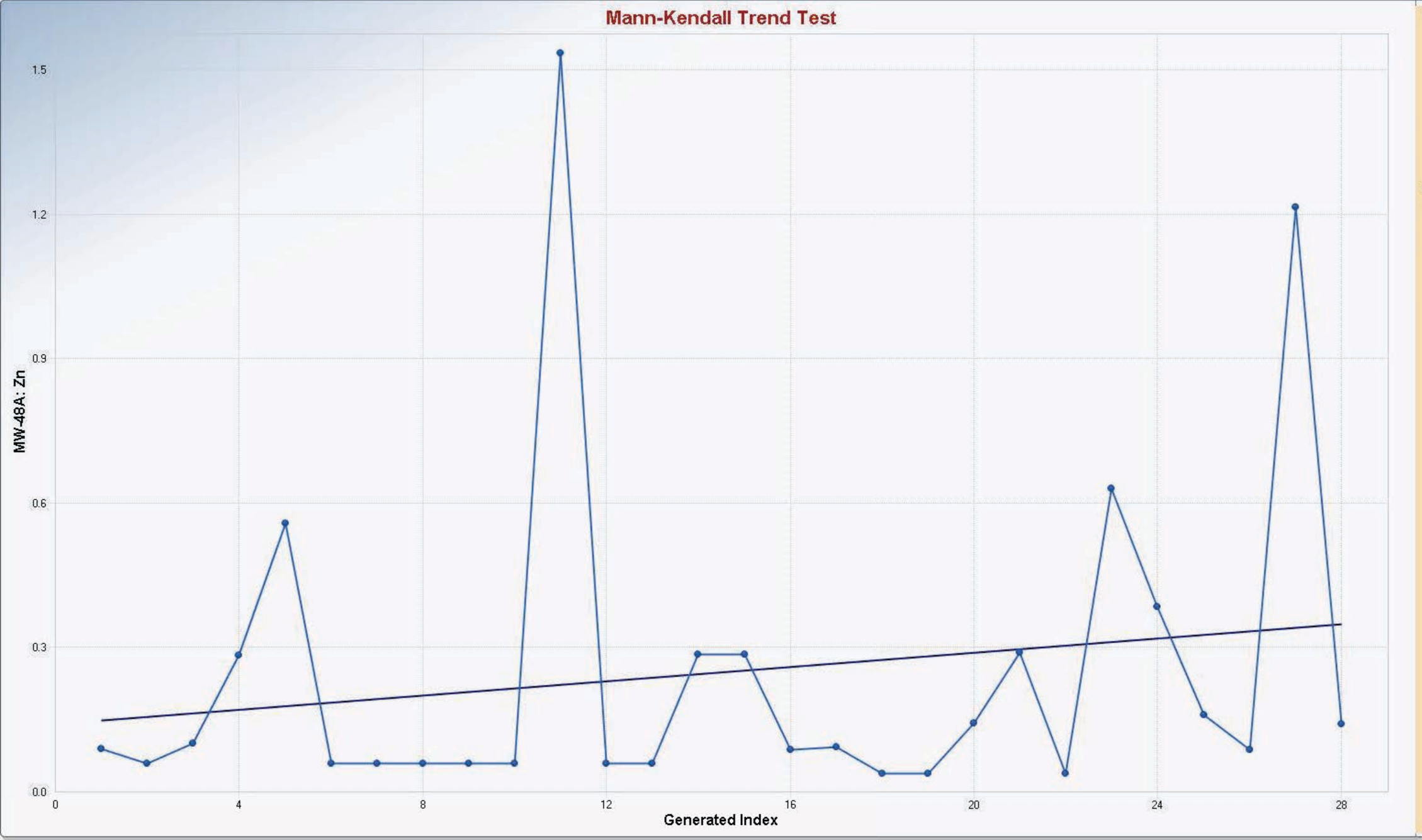
Mann-Kendall Trend Analysis

n	28
Confidence Coefficient	0.9900
Level of Significance	0.0100
Standard Deviation of S	36.1017
Standardized Value of S	-1.6343
Test Value (S)	-60
Appx. Critical Value (0.01)	-2.3263
Approximate p-value	0.0511

OLS Regression Line (Blue)

OLS Regression Slope	-0.0002
OLS Regression Intercept	0.0086

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	28
Confidence Coefficient	0.9900
Level of Significance	0.0100
Standard Deviation of S	49.9300
Standardized Value of S	1.1216
Test Value (S)	57
Appx. Critical Value (0.01)	2.3263
Approximate p-value	0.1310

OLS Regression Line (Blue)

OLS Regression Slope	0.0074
OLS Regression Intercept	0.1069

Insufficient statistical evidence of a significant trend at the specified level of significance.