

300 Ledgewood Place  
Suite 305  
Rockland, MA 02370

July 29, 2022

Thomas Buell  
Division Administrator, Monitoring and Remediation Division  
Department of Environment and Energy  
P.O. Box 98922  
Lincoln, NE 68922

SUBJECT: Submittal of the AltEn Progress Report  
AltEn Facility Response Group VCP Project, Mead, Nebraska  
FACILITY ID: 84069  
PROGRAM ID: PCS/RAP 36-336-4975

Dear Mr. Buell:

The AltEn Facility Response Group is providing this Progress Report to update the Nebraska Department of Energy and Environment on the status of the emergency response measures and interim response being performed at the former AltEn ethanol facility.

As we have discussed with you, we are currently updating the schedule for submitting the Remedial Action Plan(s) for site wastewaters and solids. We will be working with the Department to develop a timetable for public information and community engagement as part of finalization of those plans.

Sincerely,



Donald Gunster  
AltEn Facility Response Project Coordinator

# **Progress Report Voluntary Cleanup Program**

## **Interim Site and Material Management**

### **AltEn Site, Mead, Nebraska**

**July 29, 2022**

***Prepared for:***  
**AltEn Facility Response Group**

***Submitted to:***  
Nebraska Department of Environment and Energy  
PO Box 98922  
Lincoln NE 68509-8922

***Prepared by:***  
 **NewFields**  
Perspective. Vision. Solutions.

***1349 West Peachtree St., Suite 1950  
Atlanta, Georgia 30609***

## TABLE OF CONTENTS

	<u>Page</u>
<b>1.0 INTRODUCTION .....</b>	<b>1</b>
1.1 The AltEn Facility Response Group .....	1
1.2 History of AltEn's Operations at the Site .....	2
1.3 Site Status Encountered by the FRG .....	3
1.4 Overview of Emergency Response and Interim Measures .....	4
<b>2.0 RESPONSE MEASURES FOR REMEDIAL MEDIA 1 (LAGOON WATER).....</b>	<b>5</b>
2.1 Purpose and Objectives .....	5
2.2 Maintenance of Lagoon Design Freeboard .....	6
2.2.1 Deflation of Floating Liner Whales.....	6
2.2.2 Wastewater Treatment System Operation.....	7
2.2.3 Temporary Emergency Tank Storage.....	8
2.2.4 Treated Water Pond System Construction .....	9
2.3 Cleaning and Relining of Emergency Pond.....	10
2.4 Interim Measures for Land Application .....	11
2.5 Compatibility with Final Remedial Action.....	13
<b>3.0 RESPONSE MEASURES FOR REMEDIAL MEDIA 2 (SITE SOLIDS) .....</b>	<b>13</b>
3.1 Purpose and Objectives .....	14
3.2 Consolidation of Site Solids.....	14
3.3 Temporary Cover of Site Solids.....	15
3.4 Compatibility with Final Remedial Action.....	17
<b>4.0 OTHER SITE INTERIM MEASURES.....</b>	<b>17</b>
4.1 Draining of Digester Tanks .....	18
4.2 Draining of Process Unit Liquids .....	18
4.3 Management of Abandoned Chemical Inventory .....	19
4.4 Compatibility with Final Remedial Action.....	19
<b>5.0 REFERENCES.....</b>	<b>19</b>
<b>6.0 DEFINITIONS.....</b>	<b>20</b>

## LIST OF FIGURES

Figure 1	Site Location Map
Figure 2	AltEn Site Features
Figure 3	Northeast Lagoon Whale Deflation November 2021
Figure 4	Location of Temporary Above-ground Storage Tanks
Figure 5	Treated Water Pond System
Figure 6	Emergency Pond Refurbishment
Figure 7	Wet Cake Consolidation
Figure 8	Wet Cake Consolidation: Central Wet Cake Area

---

**LIST OF FIGURES (cont.)**

- |           |  |
|-----------|--|
| Figure 9  | Wet Cake Consolidation: East Wet Cake Pile                               |
| Figure 10 | Wet Cake Consolidation: Consolidated/NW Wet Cake Pile                    |
| Figure 11 | Consolidated/NW Wet Cake Pile, Posi-Shell® Cover and Leachate Collection |

**LIST OF APPENDICES**

**Appendix A Northeast Lagoon Whale Deflation**

**Appendix B Water Treatment System**

**Appendix C Treated Water Pond System As-Constructed Drawings**

**Appendix D Emergency Pond Refurbishment**

**Appendix E Land Application**

**Appendix F Consolidated Wet Cake Pile**

**Appendix G Winterization**



## Progress Report

**Voluntary Cleanup Program, AltEn Ethanol Plant Site**  
**Facility IIS number | Project identifier: 115: 84069 | NE0137634**

### 1.0 INTRODUCTION

This Progress Report is submitted by the AltEn Facility Response Group (“FRG”) in furtherance of its ongoing work at the AltEn Ethanol Facility located at 1344 County Road 10, Mead, Nebraska (“Site”) (Figures 1 and 2). As described in this Progress Report, the FRG has conducted substantial Emergency Response Measures (“ERMs”) at the Site intended to manage and stabilize solids, water and infrastructure. The ERMs have prevented further releases from the Site, following a release that occurred from AltEn’s digester tank in February 2021, and have mitigated risks created by AltEn’s mismanagement of the Site, mishandling of byproducts from the ethanol production process, and cessation of operation and maintenance of the Site.

### 1.1 The AltEn Facility Response Group

The FRG is a group of companies that formerly supplied corn seed to AltEn. It was formed after the Nebraska Department of Environment and Energy (“NDEE”) sought assistance with the agency’s efforts to address environmental issues at the AltEn Site. The companies joined together to address unsafe conditions created by AltEn’s mismanagement of solids and water generated by the ethanol production process and are participating in the Nebraska Voluntary Cleanup Program (“VCP”) pursuant to a Memorandum of Agreement (“MOA”) dated June 30, 2021. The FRG members do not own the Site, have never operated the ethanol facility, and played no role in AltEn’s management of its facility. The Site owner, AltEn, is not a member of the FRG and is not participating in the voluntary measures being implemented by the FRG.

The FRG has made great efforts to understand AltEn’s operations, which were complex and intertwined with several related companies, including Mead Cattle Company. None of these AltEn-related companies are funding or participating in the voluntary response activities at the Site. The statements about these operations contained in this Progress Report are based on the FRG’s understanding at this time after reasonable diligence but should not be construed as the FRG having primary knowledge. The FRG may learn new or different information than what is contained herein and will continue to share that information with NDEE.

## 1.2 History of AltEn's Operations at the Site

In 2011, AltEn began engaging with the Nebraska Department of Environmental Quality (NDEQ) to obtain modifications to the environmental permits held by the prior owner of the Site. After NDEQ issued the modified permits, AltEn opened an ethanol plant in 2015 at the Site and began soliciting corn seed from multiple sources as a feedstock for the ethanol manufacturing process. Byproducts of the ethanol fermentation process included process water and "distiller's grain" a/k/a wet cake. During the period of AltEn's operations, NDEE (and formerly NDEQ) issued and renewed air, compost, and water permits to AltEn, including permits for land application of process water. The Nebraska Department of Agriculture (NDA) also registered AltEn's wet cake as a soil conditioner. State officials subsequently conducted inspections of the Site and received numerous citizen complaints about AltEn, including in public comments and public hearings regarding modifications to AltEn's permits.

In May 2019, the NDA issued an order prohibiting AltEn from the continued sale and use of the wet cake as a soil conditioner. NDEQ followed that Order by informing AltEn via letter dated June 26, 2019, that wet cake could no longer be land applied and would require disposal at a permitted solid waste disposal landfill. Thereafter, on September 13, 2019, NDEE issued a Notice of Violation ("NOV"), requiring the immediate cessation of land application of process water from the lagoons. A subsequent NOV issued by NDEE on September 23, 2019, prohibited AltEn from stockpiling the wet cake on-site and required disposal of the wet cake at a permitted solid waste management facility. However, the production of ethanol and associated byproducts did not cease at that time; instead, AltEn submitted multiple communications to NDEE disagreeing with the NOV's findings and rejecting their requirements. Operations and the accumulation of wet cake and process wastewater continued at the Site until February 8, 2021, a few days after NDEE ordered AltEn to cease discharging process water into the lagoons on February 4, 2021.

Just four days after AltEn shut down operations, on February 12, 2021, a digester at the Site failed due to the shut off of heating capacity to the digester and released approximately four million gallons of thin stillage and manure. The manure was a by-product from the adjacent Mead Cattle Company property. On February 20, 2021, NDEE issued another emergency order prohibiting AltEn from resuming operations until the digester discharge was sufficiently remediated. After AltEn failed to comply with that order, the State of Nebraska filed suit against AltEn in the District Court of Saunders County. The lawsuit against AltEn remains pending while the FRG has been handling the substantial work necessary to mitigate and stabilize the Site. However, on February 23, 2022, NDEE enter into an administrative consent order with AltEn that supersedes the emergency orders issued in February 2021. However, despite the Order, AltEn and its affiliated companies (and their management) continue to evade their obligations to finance or otherwise substantively address the environmental conditions at the Site.

### 1.3 Site Status Encountered by the FRG

The Site conditions encountered by the FRG were challenging due to the presence of more than 180 million gallons of untreated wastewater held in 35 acres of lagoons that risked overtopping. There was also 145,000 cubic yards (CY) of wet cake piled in separate areas across the Site that was not being properly managed. Process materials and chemicals were stored at the facility and remained in tanks and piping. Specifically, the following conditions required immediate management and stabilization:

- Approximately 145,000 CY<sup>1</sup> of uncovered wet cake with physical and chemical characteristics that pose considerable management challenges:
  - Chemical content that restricts land application
  - High moisture content, poor dewatering properties, and low shear strengths that limit stockpiling and landfilling
  - Material distributed over 27 acres in three separate areas.
- Overgrown vegetation which prevented required inspections and potentially compromised dike wall integrity
- Four impoundments (three lagoons and the Emergency Pond) covering approximately 38 acres and containing approximately 175 million gallons of process wastewater<sup>2</sup> including approximately 35,000 CY of entrained sludge<sup>3</sup> and gases:
  - Three impoundments had reached or exceeded the design freeboard
  - Three impoundments had compromised liners
  - At least one impoundment contained a mixture of digester solids and fats
  - Ongoing accumulation of water from direct rainfall and contact water from the overall Site is pumped into impoundments
- Two digesters containing 7.9 million gallons of liquid, stored in potentially unsafe conditions
- A processing plant/facility with tanks and piping containing process liquids, stored in unsafe conditions, and unknown process safety hazards.

---

<sup>1</sup> Based on volume of the Consolidated Wet Cake Pile from April 2022 imagery

<sup>2</sup> The water volume is estimated lagoon volumes based on the water levels observed in April 2021 and the volume of water within the storage vessels of the treatment water plant at that time. All waters contain entrained solids. Water volumes within the Northeast and Northwest Lagoons also include unknown and fluctuating volumes of gas trapped below the liners.

<sup>3</sup> Sludge volume estimates were determined by calculating a sludge layer defined as the difference in the bathymetric surface collected on August 26, 2021, and the lagoon's as built surface. The sludge layer is expected to have a very low solids content, estimated at this time to be approximately 35,000 CY of dewatered solids.

## 1.4 Overview of Emergency Response and Interim Measures

The Site conditions left by AltEn necessitated substantial stabilization and containment actions. To date, the ERMs and interim measures and taken by the FRG include:

- Construction of temporary storage capacity to allow draw down from the three lagoons to decrease the risk of overtopping and to bring them into compliance with design freeboard conditions
- Removal and treatment of lagoon water to ensure lagoons are maintained at or below design freeboard levels and reduce the risk that rainwater would cause an overflow event
- Deflation of a gas-filled bubbles underneath the liner of the Northeast Lagoon to protect the integrity of the lagoon
- Refurbishing the Emergency Pond to provide additional storage capacity and allow for the digesters to be safely drained
- Construction of two supplemental lined cells, collectively termed the Treated Water Pond System, with a capacity to store 52 million gallons of treated water
- Construction or reconstruction of berm structures to contain contact stormwater and prevent it from leaving the Site
- Collection of contact stormwater for treatment and storage
- Consolidation and cover of wet cake with a Posi-Shell® to minimize the potential for stormwater contact and reduce odors
- Winterization of process areas of the plant, including the consolidation of chemicals and other materials, draining of the digesters and process lines, and providing heating for specific process areas
- Characterization of process materials and chemicals abandoned at the Site by AltEn for management at approved off-site facilities;
- Treatment of approximately 27 million gallons of water (as of July 27, 2022) for land application of nutrient-rich water to crops (in accordance with the AltEn ND PES permit NE0137634 and 2022 NDEE-approved Land Application Approach and Best Management Practices (BMP) Plan).

In addition to dedicating substantial resources to undertake the response measures described in this Progress Report, the FRG has also been developing the Remedial Action Plan (RAP) for the Site. Consistent with Nebraska law and the FRG's commitments under the VCP, the RAP will contain a Site investigation report and present proposed actions for long-term remediation of the Site. The RAP will also include a public participation process as required under Nebraska law. As progress on the RAP continues, the FRG will continue working under the direction of NDEE to ensure the safety of employees, the community

and the environment while addressing conditions at the Site caused by AltEn over the course of many years.

## **2.0 RESPONSE MEASURES FOR REMEDIAL MEDIA 1 (LAGOON WATER)**

### **2.1 Purpose and Objectives**

The objective of the response measures for Remedial Media 1 (lagoon or untreated water) was near-term management of potentially contaminated water on-site. This consisted of drawing down and maintaining the lagoon water levels to design freeboard or below, treating water removed from lagoons to maintain freeboard, providing storage for treated water, and managing treated water through land application to allow for future treated water storage capacity.

The priorities for the interim measures, in agreement with NDEE, were as follows:

- 1) Maintain freeboard (vertical distance between lagoon water surface and top of embankment) within the three wastewater lagoons to protect embankment integrity and prevent overtopping. This ERM required several sequential tasks:
  - a) Preparation of an area of the Site for construction of temporary tank storage capacity
  - b) Construction of temporary storage tanks for both treated water and untreated water to allow management of lagoon water levels
  - c) Removal of excess water above design freeboard in the three lagoons.
- 2) Removal and treatment of lagoon water and contact water runoff as necessary to prevent an imminent hazard during emergency response. This ERM required several sequential tasks:
  - a) Treatment of wastewater through the existing AltEn treatment facility, supplemented by additional treatment installed by the FRG to remove pesticides from wastewater
  - b) Identify and implement interim treated water discharge options, including but not limited to land application
  - c) Periodic lagoon embankment inspections.
- 3) Refurbish the Emergency Pond to provide interim storage for remaining digester water. This pond will also be used for other wastewater treatment actions as the remediation of the Site progresses.

- 4) Create additional treated water storage capacity to allow elimination of temporary tank storage and provide storage for future treated water prior to ultimate discharge.

## 2.2 Maintenance of Lagoon Design Freeboard

Many of the ERMs conducted by the FRG were performed to achieve and allow for maintenance of the Site lagoon freeboard. At the initiation of ERMs, the lagoon water levels did not meet the required design freeboard and NDEE determined drawdown of lagoon water was required to reduce the risk of the lagoons overtopping. The currently established freeboard requirements<sup>4</sup> are:

- Northwest Lagoon – 2.1 feet
- Northeast Lagoon – 3.0 feet
- Southeast Lagoon – 3.0 feet.

Drawdown of the lagoons was initiated in April 2021 after the installation of three temporary above-ground tanks (Tanks 1, 2, and 3) to store treated water and commencement of water treatment after the installation of a supplemental carbon adsorption process to the existing wastewater treatment system for removal of pesticides.

### 2.2.1 Deflation of Floating Liner Whales

Along with the threat of overtopping of the lagoons because of excessive water, large gas bubbles had formed under the liner in the Northwest and Northeast Lagoons, reducing the effective water storage capacity. These liner bubbles, referred to as “whales”, extend above the lagoon water surface. The whales are filled with gas above the lagoon surface and lagoon water/gas below the lagoon surface. The gas is a mixture of methane, hydrogen sulfide, and other associated gases from the anaerobic decomposition of organic matter within the lagoon waters and sludges beneath the liner. The whales are not considered an immediate threat when they are in the middle of lagoon, but if they migrate close to a lagoon embankment, a whale could potentially impact the integrity of the embankment and worker safety.

A whale on the eastern side of the Northeast Lagoon began to notably expand and its edge began approaching the eastern embankment in October of 2021. In November 2021, the FRG deflated this whale (see Figure 3). This deflation was conducted to protect the integrity of the lagoon embankment and prevent liner displacement from wind action. The following activities were conducted:

- Accessed the whale using a boom-lift from the embankment

---

<sup>4</sup> NDEE 2021-12-22 Comment #9

- Built a for-purpose deflation device with a ball valve at the user end and a hose that connected to a Dual Phase Extraction and Catalytic Oxidizer unit under a vacuum
- Vacuumed the whale gas/water mixture first through a free water separator followed by the gas passing through the treatment media of “Purple Carbon” HS-600 Vapor Phase, Potassium Permanganate.

Appendix A provides the planning documents for the gas extraction activity. Real-time instantaneous gas monitoring was conducted for worker safety. The area was properly secured during deflation activities and the whale was successfully deflated. To date, no additional whales in the Northeast Lagoon, or the other lagoons, have encroached on the lagoon embankments.

## **2.2.2 Wastewater Treatment System Operation**

NDEE granted permission on April 1, 2021, to begin pilot testing for the treatment of lagoon water with the existing AltEn treatment facility supplemented with carbon treatment (NDEE 2021-04-01). By late April 2021, the FRG wastewater treatment system included a two-stage process consisting of the original existing AltEn components supplemented by FRG-provided filtration units and granular activated carbon (GAC) treatment.

Wastewater was pumped from the lagoon system via the Southeast Lagoon to the treatment facility where initial solids coagulation and removal was performed. Coagulants were added to the wastewater in a mixing tank and then the wastewater was pumped to a Solids Contact Clarifier (with polymer addition) for settling of gross solids. The clarifier blowdown and settled solids were returned to the Southeast Lagoon.

Effluent from the clarifier was stored in a surge tank and then run through bag and sand filters for further solids capture, with solids ultimately returned to the lagoons. The wastewater was then treated by passing through a GAC system and stored as the system effluent. Spent carbon is regenerated and reused and will ultimately be managed at the end of its useful life with other affected media.

From April to September of 2021, approximately 14 million gallons of lagoon water was treated and stored, first in the above ground storage tanks, and subsequently transferred to the Treated Water Pond System (West Cell). An additional 10 million gallons of lagoon water was treated in May and June 2022 and stored in the East Cell of the Treated Water System.

At this time, all the temporary water storage tanks have been removed from the Site. Treated water is stored in either of the two treated water ponds (East or West Cell of the Treated Water Pond System). Wastewater treatment will continue as necessary to meet design freeboard in the lagoons to prevent imminent hazards, as set forth in the VCP MOA, and to meet agreements between the FRG and NDEE (35 million gallons in 2022). The water treatment process is depicted and described in Appendix B.



### **2.2.3 Temporary Emergency Tank Storage**

To support freeboard management, removal of water from the three lagoons began in April 2021. This wastewater was treated in the on-site treatment system and placed in temporary above ground tanks (Tanks 1, 2, and 3 – Figure 4). The Emergency Pond water initially treated and placed in Tank 1 was retreated using the on-site treatment system.

The rate of drawdown of the lagoons was increased in May 2021 with the installation of three additional temporary above ground tanks (Tanks 4, 5 and 6). These tanks received untreated water directly from the lagoons. As a result, the design freeboard was achieved by June of 2021.

Removal of water from the lagoons for treatment continued for the purpose of maintaining the water levels below design freeboard as contact stormwater from the tank area and the wet cake areas was transferred to the lagoons. The focus at this time (June 2021) of additional drawdown beyond the required freeboard was on the Northeast Lagoon due to observed tears in the lagoon liner.

Four additional temporary tanks were installed in July 2021 (Tanks 7, 8, 9, and 10) to store treated water. This allowed continued removal of water from the lagoons to compensate for the regular contact stormwater and direct rainfall inputs. Treatment and storage of lagoon water continued with treated water storage in Tanks 7, 8, 9, and 10 until the fall of 2021, when treatment was suspended until additional treated water storage capacity could be constructed at the Site.

In August 2021, an alternative approach was selected for the storage of treated water in the form of a Treated Water Pond System (see discussion in Section 2.2.4). This approach was selected based on the challenges posed for tank maintenance during the winter (freezing conditions) and the determination that the capacity of on-site storage through the first half of 2022 would not be sufficient even if land application of treated water was possible.

Removal of the temporary tanks to build the Treated Water Pond System required an adjustment to the temporary tank water management approach described above. As a result, the drawdown of the lagoons was suspended and untreated water in Tanks 4, 5, and 6 was returned to the lagoons in September 2021. Tank 4 was cleaned and relined and placed into treated water service. Tanks 5 and 6 were removed from the Site.

The treated water in the tanks was redistributed to Tanks 4, 7, and 10 to allow Tanks 5, 6, 8, and 9 to be dismantled so construction of the Treated Water Pond System could begin. The West Cell of the Treated Water Pond System was completed in January of 2022. The transfer of the treated water from all remaining tanks to the West Cell began in February 2022. By the end of April 2022, all remaining temporary tanks were emptied, dismantled, and removed from the Site.



## **2.2.4 Treated Water Pond System Construction**

The FRG prepared a conceptual plan in August 2021 for the required supplemental storage needed to manage Site water through the winter and spring of 2022 and beyond. The supplemental storage consists of two lined cells, collectively termed the Treated Water Pond System, with a capacity to store 52 million gallons of treated water (Figure 5). This system is used to manage treated water produced since April 2021 and for treated water expected to be produced at the current and/or future on-site water treatment facilities. This includes treated water formerly staged in temporary on-site tanks during the ERMs.

Permit for the Treated Water Pond System included:

- Title 123 Permit for construction of new treated water ponds (NO.2021-0183)
- Construction Stormwater Permit for construction of new treated water ponds (CSW-202105946)
- Nebraska Department of Natural Resources Dam Permit (P-20847)
- Village of Mead Building Permit.

The construction of the Treated Water Pond System West Cell began during the third week of October 2021 and was substantially completed in January 2022. The East Cell construction began in January 2022 and was substantially completed in May 2022. Appendix C includes the as-constructed drawings for the Treated Water Pond System.

Construction of the Treated Water Pond System required drainage and removal of seven of the temporary above ground storage tanks in a methodical manner to assure construction and adequate storage was maintained simultaneously. To minimize the amount of water returned to the lagoons and maintain the design freeboard in the lagoons, water in the tanks was relocated and tanks removed in three phases:

- 1) Phase 1: Untreated water in Tanks 4, 5, and 6 was returned to the lagoons. Due to the volume of water already removed from the lagoons, treated, and stored in the Tanks 1 through 3, and 7 through 10, this could be accomplished without jeopardizing the maintenance of design freeboard.
- 2) Phase 2: Tank 4 was cleaned and prepared for storage of treated water. Following cleaning and relining of this tank, treated water from Tanks 8 and 9 was transferred to Tank 4. Upon completion of the transfer, Tanks 5, 6, 8, and 9 were removed to allow for construction of the West Cell.
- 3) Phase 3: Following completion of the West Cell, treated water in Tanks 4, 7, and 10 was relocated to this cell beginning in early February 2022. This facilitated removal of the remaining temporary storage tanks and the construction of the East Cell. Treated water from Tanks 1, 2, and 3 was then pumped to the West Cell by April 2022. All tanks were dismantled and removed by the end of April 2022.

The detailed plan view of the Treated Water Pond System cells is shown on Figure 5. The combined footprint of both cells is approximately 16 acres. The embankment heights are 16.5 to 22 feet above the inside base of the ponds, with a top of embankment width of 20 feet and a side slope of 4 horizontal to 1 vertical. The cells were lined with a 60-mil HDPE liner and included both a PVC gas collection system and a moisture underdrain system. Both cells were also equipped with concrete sumps in their respective southeast corners for input and removal of treated water using flow rates up to 400 gallons per minute (gpm) for surface discharge. Water removal flow rates for land application will be based on optimal operating conditions for the in-field equipment. For application with a tractor and a drag hose system, optimal flow rate is typically around 3,000 gpm. A floating pump system will be utilized during these periods. A gravel road wearing course road and gas vents were installed on the top of the treated water pond berms.

The pond embankments were constructed with material excavated from within the pond footprints and utilized the existing berms from the Northwest and Southeast Lagoon system. There were approximately 54,000 CY of excess material generated from the excavation that was transported to the former East Wet Cake Pile area. This area was remediated through removal of wet cake and one foot of subsoil in September/October 2021. Also, a portion of the excess soil from excavation of the base of the Treated Water Pond System's cells was used for stabilization in the Consolidated Wet Cake Pile. The excess soil stockpile area and the footprint of the Treated Water Pond construction were diked prior to initiation of material placement. Stormwater runoff from the Treated Water Pond System footprint was collected until the ponds were completed. Stormwater from the excess soil stockpile was managed until covered and stabilized with vegetation.

The West Cell was used to store all previously treated water formerly stored in the temporary storage tanks until a portion was applied to the land in April 2022 (see Section 2.4). Treated water as of the date of this document is being stored in the East Cell. Both cells will maintain a minimum of approximately one million gallons of water to protect the liners from wind uplift.

A new stormwater swale was constructed along the west side of the West Cell and along the south side of both cells of the Treated Water Pond System to promote drainage and to protect the pond berms. The swale was constructed with rock and stone materials. A chain-link fence was installed for access control on both the west and south sides of the Treated Water Pond System in July 2022.

### **2.3 Cleaning and Relining of Emergency Pond**

The FRG refurbished the Emergency Pond at the Site to provide additional storage for untreated water and was originally filled with process water that required removal from the existing Site anaerobic digesters (Figure 6; see Section 4.1 for discussion of the draining of the digesters). Refurbishing was initiated during the third week of September 2021 and was completed by the middle of December 2021.

The Emergency Pond measures approximately 750 feet by 175 feet (approximately 130,000 square feet aurally). Approximately 25,000 CY of sludge and associated solids were removed and consolidated to the NW Wet Cake Pile (aka Consolidated Wet Cake Pile). Approximately 146,000 SF of old liner was removed, and the pond was relined with geotextile and covered with 60-mil HDPE liner. Gas vents were installed at the top of the berm along the perimeter of the pond upon completion of the re-lining. The old liner was power-washed with the wash water sent to the lagoons and the cleaned liner stored on-site awaiting final disposal. This work was performed by the FRG as repair and maintenance of an existing facility. The Work Plan for the refurbishing of the Emergency Pond is included as Appendix D.

Figure 6 shows the Emergency Pond prior to and after refurbishment. Free liquids were pumped to the Southeast Lagoon. Solids were augmented with Power Pellets and hydrated lime to facilitate material handling, and then transported to the NW Wet Cake Pile area for consolidation. All materials were removed from the Emergency Pond by November 10, 2021. After removal of the old liner and grading of the pond bottom, the new geotextile and 60-mil liner were installed beginning in the first week of December 2021.

The current Emergency Pond capacity, based on 1.5 feet freeboard, is approximately 5.0 million gallons.<sup>5</sup> The refurbished Emergency Pond was used to store digester water from December 2021 until July 2022. Digester water stored in the Emergency Pond was transferred to the Southeast Lagoon, with the exception of approximately 800,000 gallons to protect the liner. The Emergency Pond will be incorporated into the wastewater treatment system to manage clarifier underflow.

Upon removal of water from the Emergency Pond in July 2022 several small whales were revealed in the pond liner. Plans for maintenance of the Emergency Pond liner are currently being developed.

## 2.4 Interim Measures for Land Application

The interim measures to remove water from the Site was application of treated water to farmland. Land application is an approved discharge under National Pollution Discharge Elimination System (NPDES) permit No. NE0137634 issued on June 21, 2017, by NDEQ<sup>6</sup>, and reissued by NDEE on June 29, 2022. Through the second half of 2021 and into early 2022, the FRG collaborated with NDEE to identify appropriate additional requirements for land application during interim measures. This effort resulted in a site-specific Land Application Approach, which NDEE approved on January 7, 2022. The Land Application Approach served as a custom framework for discharge of treated water to local farm fields. The framework was developed to ensure that the land application rates of pesticide active ingredients (grams per acre) were lower than rates allowed by pesticide registration. The

<sup>5</sup> Volume capacity based on transfer volume from Emergency Pond to Southeast Lagoon and estimate of remaining volume as of July 2022.

<sup>6</sup> predecessor agency to the NDEE

framework also addressed additional best practices and monitoring issues to the satisfaction of NDEE.

Prior to land application operations, FRG contractors sampled the treated water and farm fields for active ingredients, nutrients, salts, and other agronomic parameters in accordance with requirements of the Land Application Approach. Results for the sampling events were provided to NDEE in a Best Management Practices (BMP) Plan for Land Application of Treated Water. On March 11, 2022, NDEE approved the BMP Plan. The BMP Plan identified fields proposed to receive treated water and described requirements for control and monitoring of water application during land application operations.

Based on treated water and soil sample results, the limiting factor for land application was determined to be the active ingredient thiabendazole. As shown in Appendix E, this chemical limited the maximum land application rate to 29,000 gallons per acre (1.1 inches per acre). Utilizing this calculation, FRG contractors land applied treated water by drag hose systems in the spring of 2022. Detailed documentation of the land application operation is provided in Appendix E, with a summary below.

Drag hose systems consisted of:

- Intake from the West Treated Water Pond
- Initial pumps to develop proper flow rate and pressure
- Hose on the ground surface to convey treated water to farm fields
- Booster pumps to maintain adequate flow and pressure along the hose routes
- Tractor-mounted systems that inject water into small furrows while a tractor pulls hose through the field.

A description of system components, from intake to discharge, is provided in Appendix E. Monitoring for ponding, runoff, and beehives, as well as equipment inspections, was conducted in compliance with the guiding documents listed above (NPDES Permit, Land Application Approach, and BMP Plan). In addition to visual monitoring, a water grab sample was collected during each application event for analysis of agronomic parameters. Application rates were monitored using a John Deere precision agriculture system located on the tractor and connected to the pumps.

In spring of 2022, the FRG applied 8.6 million gallons of treated water to 318 acres of land across four participating fields. Application rates of approximately 1.0 inch per acre were within the Land Application Approach thresholds for all analytes. See Appendix E for additional details.

## 2.5 Compatibility with Final Remedial Action

The emergency response and interim measures conducted in 2021 and 2022 for lagoon waters provide the groundwork for the remedial actions for Remedial Media 1 (lagoon waters) that will be proposed in the Site's RAP. Through July 2022, approximately 27 million gallons have been removed from the lagoons and treated. Approximately 8.6 million gallons of treated water has been removed from the Site through land application. By July 2022, Site wastewaters will have been substantially consolidated into the lagoons within the design freeboards, with the exception of 800,000 gallons remaining in the Emergency Pond. The remaining water in the Emergency Pond will be transferred to the Southeast Lagoon as part of the preparation of this pond for management of sludges generated by the treatment operations. The availability of the Emergency Pond for solids management will provide an improvement to the current recycling of solids back into the lagoons which has been the only available management method.

The pilot water treatment system used in 2021 and 2022 may be incorporated in whole or in part in a modified treatment process that will be implemented in accordance with an approved RAP and associated permits.

The land application interim measure, developed in 2021 and conducted in the spring of 2022, confirmed the viability of this water-removal method and identified the refinements needed to scale the land application process into a final remedial action. The new Treated Water Pond System and refurbished Emergency Pond provide needed treated water storage capacity and sludge handling capabilities, respectively, to manage freeboard of the existing lagoons and the future collection of contact water, while also managing volumes of treated water available when needed for land application.

## 3.0 RESPONSE MEASURES FOR REMEDIAL MEDIA 2 (SITE SOLIDS)

In early 2021 when the FRG first mobilized to the Site, there were three unmanaged piles/areas of wet cake approximately 27 acres in size (Figure 7). The ERM was to consolidate the wet cake to reduce the overall footprint of the waste, thus reducing the volume of contact water produced until a final remedial action could be implemented. This ERM was conducted in three phases:

- Wet cake and one foot of subsoils in the Central Wet Cake Area was consolidated first in the NW Wet Cake Pile to provide a location for temporary tank installation for untreated and treated water management (discussed above)
- Wet cake and one foot of subsoils from the East Wet Cake Pile and solidified sludges from the Emergency Pond were then consolidated into the NW Wet Cake Pile and, following consolidation, is referred to as the Consolidated Wet Cake Pile
- A cement-based cover (Posi-Shell®) was placed as a temporary cover over the Consolidated Wet Cake Pile and a collection system installed to capture rainwater infiltration that may penetrate the cover.

### 3.1 Purpose and Objectives

The objectives of the wet cake consolidation and cover activities effort were:

- Reduce precipitation contact with wet cake
- Prevent seepage through the wet cake from discharging into adjacent ditches
- Provide a stable cover to prevent wet cake migration via stormwater and wind erosion
- Provide odor mitigation
- Isolate material to reduce wildlife exposure
- Achieve the above with a cover that accommodates shifting of the pile with minimal effects to the integrity of the cover.

The consolidation and temporary Posi-Shell® cover were not implemented as a permanent remedy, but rather as an interim measure until final disposition of the wet cake can be implemented.

### 3.2 Consolidation of Site Solids

Solid materials from wet cake areas and from the Emergency Pond were consolidated in the NW Wet Cake Pile (aka Consolidated Wet Cake Pile) as shown on Figure 7. These solid materials consisted of wet cake and the associated underlying soils, other solid substances associated with digester water and manure. Consolidation of wet cake and associated soils/solids from the Central Wet Cake Area into the NW Wet Cake Pile was initiated in May 2021 and completed in June 2021 (Figure 8). Planning documents are included in Appendix F.

Consolidation of materials from the East Wet Cake Pile to the NW Wet Cake Pile was completed in late September 2021 (Figure 9). Sludge from the Emergency Pond, plus solids from other Site activities that were commingled with wet cake, were consolidated into the NW Wet Cake Pile by mid-November 2021 (Figure 10). Wet cake relocation included:

- Installation/reinforcement of berms around the NW Wet Cake Pile (consolidation area) and the East Wet Cake Pile to capture stormwater runoff. Standing water encountered within the wet cake piles throughout operations was collected and transferred into the lagoons or the Emergency Pond.
- Wet cake and a limited amount of underlying surface soil (to a minimum of 1 foot depth and any additional based on visual identification of wet cake material) was removed and transported to the NW Wet Cake Pile. Once at the NW Wet Cake Pile, the material was consolidated with the existing materials. The berm around the former East Wet Cake Pile was left in place to contain stormwater around the excess soil stockpile during Treated Water Pond construction.



- Throughout excavation and transport, dust control was maintained with water application on haul roads. Because of the wet nature of the material and on-site experience moving the material, no observable dust was generated from the wet cake itself. None of the haul routes involved any public roads or right-of-way.
- Odor control using lime was employed when disturbance of the material created a perceptible increase in odor. Ambient odor conditions at the Site were not notably affected by the material relocation activities. Work was suspended during inclement weather and during local high school football games.
- For the Central Wet Cake Area, once the wet cake and visually impacted soils were removed, the area was covered with imported fill in preparation for installation of temporary water tanks. This soil was subsequently removed for construction of the Treated Water Pond System and placed in the former East Wet Cake Pile area.
- Workers at the Site performed the transfer operations in accordance with written health and safety protocols consistent with those required for all operations. Workers used appropriate safety equipment and attire as needed for the various aspects of the work.
- As part of the temporary cover system for the Consolidated Wet Cake Pile (see Section 3.3), a perimeter subsurface French drain was installed with two sumps for the collection of seepage that might be generated. To date, there has been little water collected, a sign that the temporary cover is effective in preventing rainfall and snowmelt from infiltrating and contacting the underlying wet cake.
- The consolidation reduced the wet cake stockpile footprint from approximately 27 acres to approximately 15 acres, or by approximately 45%. The berms eliminated contact stormwater runoff until additional controls were implemented (see Section 3.3).

The former East Wet Cake Pile area has been covered with the excess excavated soils from the Treated Water Pond construction (Section 2.2.4).

### 3.3 Temporary Cover of Site Solids

The Consolidated Wet Cake Pile was, from the outset, identified as temporary storage until a permanent solution for wet cake management could be implemented. A synthetic cover was not technically practical due to the very low shear strength of the wet cake which is insufficient to support the equipment and workers required for conventional synthetic cover installation. Material must have a sheer strength of at least 750 pounds per square foot (psf) for the material to be stockpiled in a stable fashion that allows equipment operation and to eliminate solids pile shifting that would tear and compromise a liner.

During consolidation, the options for providing a temporary synthetic cover were investigated. Field investigations were conducted to determine if specialized equipment could reshape the stockpile and control material movement sufficiently to allow placement

of a temporary synthetic cover. Following considerable analysis and attempts to work the material, it was determined that a graded surface for drainage necessary for a synthetic cover was unattainable.

The option ultimately selected as the best available for temporary cover was an alternative material (Posi-Shell®). This material could be applied to the wet cake 'as is' without the necessity of equipment or personnel operating on the low shear strength stockpiled material. Posi-Shell® is a cement-based product that provides a crust or shell over a waste pile or area that is substantially impervious to stormwater. This system is widely and effectively used for temporary cover of landfills, ash piles, and other systems that are difficult to access.

The Consolidated Wet Cake Pile cover plan, issued to NDEE on November 1, 2021, with addendums on January 11 and February 15, 2022, identified that the Posi-Shell® provides a stable temporary cover to prevent stormwater runoff from becoming contaminated, thereby eliminating the need for collection and treatment (see Appendix F). The cover also reduces odors until a permanent solution can be implemented. The cover was selected because it could be applied by land-based spray applicator or by bucket applicator using a helicopter for areas beyond the range of land-based application. The cover plan was approved by NDEE on January 24, 2022, and the Posi-Shell® cover was applied to the Consolidated Wet Cake Pile between February 14 and February 21, 2022.

A French drain was installed along the perimeter of the area with sumps for collection of any seepage from the pile. The French drain and sumps were installed in January 2022 prior to cover installation. The Posi-Shell® was applied by ground spray application around the perimeter of the area, and then completed with helicopter application in the center of the pile (Figure 11). Once the work was complete, the perimeter berm was breached on the southeast and northeast sides to allow non-contact stormwater to flow from the area to the nearby swale.

The Posi-Shell® material is subject to potential cracking and sloughing of the shell once applied, and slow curing when applied to areas with standing water (as was the case with this application). However, localized cracks or sloughing do not invalidate the benefits provided. Small cracks and sloughing may allow movement of water downward into the underlying material but would not be expected to contribute significant contact runoff.

There will be a propensity for standing water to accumulate in low points on the Posi-Shell® system (see Figure 10). From the time of the February 2022 completion of the cover, through June 2022 (4 months), there was no accumulation that resulted in measurable runoff from the pile. Evaporation has exceeded rainfall, resulting in no net accumulation of water in the puddles. The manufacturer of the cover system represents that Posi-Shell® can be viable in excess of five years with the benefits described. It is expected that a permanent remedy can be implemented before replacement of the



temporary cover would be necessary. An assessment of the cover by the manufacturer was conducted in April 2022 and is provided in Appendix F.

The temporary cover will be monitored, and maintenance is being and will be conducted on an as-needed basis.

### 3.4 Compatibility with Final Remedial Action

The consolidation of the wet cake and associated Site solids into the Consolidated Wet Cake Pile and application of the Posi-Shell® system were conducted as interim management of these materials until the final remedial action is selected and implemented. This consolidation and cover met the interim measure objectives:

- The wet cake storage area with uncontrolled exposure to rainfall has been reduced effectively by 100%.
- Any seepage through the wet cake is being intercepted.
- The temporary Site solids pile (Consolidated Wet Cake Pile) is now contained with a stable cover that reduces, to the extent practical, the movement of material from either stormwater or wind.
- The pile's cover can accommodate shifting of the pile without being compromised over large areas.
- Odors from the solid materials have notably diminished.

The consolidation and cover of the wet cake and other Site solids were conducted as interim management of these materials until the final remedial action can be selected and implemented. Ongoing maintenance is being conducted, including inspection of the Consolidated Wet Cake Pile perimeter by field personnel, periodic aerial inspection of the pile via drone, and pumping of seepage water from sumps into lagoons for eventual treatment.

The decommissioning of the Consolidated Wet Cake Pile and the restoration of the area on which it stands will be described as part of the remedial action for Remedial Media 2 in the RAP.

## 4.0 OTHER SITE INTERIM MEASURES

To avoid uncontrolled releases from the Site, the FRG voluntarily decommissioned abandoned components of the AltEn facility. These measures focused on draining storage tanks and piping systems located in the main process building, the distillation unit, tank farm, and conveyance systems between process areas of the facility. These measures were necessary to reduce the potential for liquid freezing and uncontrolled release of hazardous materials. These interim measures were not identified in the VCP MOA.

The measures were implemented to ensure that other conditions at the AltEn Site did not become an immediate threat to human health or the environment. These interim measures include:

- Draining liquids from the digester tanks
- Decommissioning and draining process unit liquids
- Management of abandoned on-site chemicals.

## 4.1 Draining of Digester Tanks

The February 2021 release resulted from a failure in a digester tank. To prevent a recurrent release, in advance of subzero weather conditions, FRG removed the liquids from the two anaerobic digesters on the Site. With NDEE approval, the digester liquid (7.9 million gallons) was pumped/drained directly from the digesters to either the newly lined Emergency Pond or the Northwest Lagoon. This operation was conducted in December 2021. Liquid was removed to a digester tank elevation below the piping link-seals in each of the digesters, mitigating the risk of uncontrolled release due to freezing conditions. Solid materials were left in the tanks.

## 4.2 Draining of Process Unit Liquids

When it abandoned the facility, AltEn failed to drain, clean or decommission process equipment, resulting in materials left in place in a manner unsuitable for long-term storage. Process materials and water from the piping and equipment in the process area were drained and transferred into the Southeast Lagoon. During the week of November 29, 2021, the following liquids from the process plant and its associated piping were transferred to the Southeast Lagoon:

- Thin stillage (88,000 gallons)
- Whole stillage, influent/effluent piping, and tanks (179,290 gallons)
- 29 containers of beer (8,000 gallons).

In addition, during the first two weeks of December 2021, the following systems from the process unit were drained and associated liquids were managed on-site:

- Fermentation tanks, coolers, and equipment
- Mash tanks, coolers, and equipment
- Variety of process and cooling water tanks and equipment
- Fire sprinkler system
- Nutrient mix tank.

Other process materials were collected in appropriate containers for waste characterization and shipment to an approved off-site facility. This included residual Ansul fire foam (less than 5 gallons).

During the week of November 29, 2021, piping and tank systems in the tank farm were drained and temporarily stored in appropriate containers. Specific systems and tanks include the following:

- Clean ethanol tanks (9,200 gallons)
- Dirty ethanol tanks (1,015 gallons)
- Diesel tanks (1,309 gallons)
- Denaturant (11,286 gallons)
- Corrosion inhibitor (1,338 gallons).

During the week of December 13, 2021, the following systems in the distillation unit were drained and deposited into the lagoon systems:

- Beer stripper and reboiler
- Liquification tanks
- Process water heater
- Digester water heater
- Vent condenser
- Beer preheater #1 and #2.

### 4.3 Management of Abandoned Chemical Inventory

Other process materials and chemicals abandoned by AltEn at the Site were collected and stored in appropriate containers for characterization and management at suitable off-site facilities. A general list of the types of waste and quantities are summarized in Appendix G. The FRG is currently in the process of finalizing the removal and management of these materials at suitable facilities.

### 4.4 Compatibility with Final Remedial Action

All liquids/waters managed on-site were either placed in the Southeast Lagoon directly or were transferred from the Emergency Pond into the Southeast Lagoon. Therefore, these liquids/water have become part of Remedial Media 1 and will be addressed by the final remedial action for that media.

## 5.0 REFERENCES

NDEE. (2021-04-01). Water Filtration System Pilot Test.

NDEE (2021-12-22). NDEE Comments on Interim Remedial Action Plan #1, AltEn Facility Response Group VCP Project, Mead, Nebraska.

## 6.0 DEFINITIONS

The following definitions are provided to reduce redundancy and to ensure the reader has a clear understanding of the terms used in this report. Definitions related to stormwater (e.g., contact water, non-contact water, process water, etc.) are provided in this section for clarity and do not replace definitions in state or federal regulations and statutes. Additionally, some facilities or materials at the Site have been referred to by multiple names in past documents and this list will relate those names to the name used in this document.

**Consolidated Wet Cake Pile:** formerly called NW Wet Cake Pile; this description is used to identify the feature for the consolidated wet cake and associated Site solids after the completion in November 2021 of the consolidation of Site solids from the Central Wet Cake Area, the former East Wet Cake Pile, and the Emergency Pond into the NW Wet Cake Pile.

**Contact water:** water that has been in direct contact with the Site Remedial Media (lagoon water or solids) and/or is water, such as stormwater, that falls in/on Remedial Media or runs across areas where these materials are located.

**Emergency Pond:** also called the Emergency Lagoon within some Site documents.

**Impoundments:** the term “pond” is used for impoundments that have liners with confirmed integrity (the refurbished Emergency Pond and the two new Treated Water Ponds) and the term “lagoon” is used for the existing AltEn impoundments with liners of unknown condition (i.e., the original three AltEn lagoons – Northwest, Northeast, Southeast).

**Lagoons:** the original three AltEn water lagoons: Northwest, Northeast, and Southeast Lagoons.

**Non-contact water:** water that has not come in contact with the Site’s Remedial Media (lagoon water or solids). These waters would typically be stormwater that has been directed away from the remedial media materials, such as rain that falls on an engineered cover or other portions of the Site not associated with Site Remedial Media. Such areas include access roads and adjacent swales, the outside edge of the embankments, the areas between embankments and Site boundaries, covered Consolidated Wet Cake Pile, and the former East Wet Cake Pile area.

**Northwest Lagoon:** also called the West Lagoon and in some documents may have been referred to as a pond. In some reports, particularly inspection reports, it is referred to as Lagoon #3.

**Northeast Lagoon:** also called the North Lagoon and in some documents may have been referred to as a pond. In some reports, particularly NDEE inspection reports, it is referred to as Lagoon #2.

**Process water:** water utilized in the AltEn plant/facility process. This water includes the AltEn treatment system effluent and process waste streams including the liquids from the plant’s anaerobic digesters and other waters from the process that may have been

generated. It is the FRG's understanding that prior to 2021, these waters were treated in the original AltEn water treatment system consisting of equalization, chemical addition, and physical separation.

**Remedial Media 1:** collective term for Site wastewaters that require remediation and is also considered "untreated water" defined below. Remedial Media 1 consist of the ethanol plant process water and wastewaters stored in the lagoons, digester waters, contact water, and other Site-derived waters (e.g., groundwater purge water) that have been transferred into the lagoons. As waters that would classify as Remedial Media 1 are combined into the AltEn lagoon system, these waters will be remediated by treatment in current or future Site water treatment systems.

**Remedial Media 2:** collective term for Site solids that may require remediation. Remedial Media 2 consist of wet cake, lagoon sludges, water treatment sludges, and associated solids, including soils. These solids may be tested and compared to Site remediation goals (to be determined in the Remedial Action Plan) in order to determine if remediation is required.

**Southeast Lagoon:** also called the South Lagoon and in some documents may have been referred to as a pond. In some reports, including certain NDEE inspection reports, it is referred to as Lagoon #1. See Figure 2 for the location of this feature.

**Stillage or whole stillage:** the remaining slurry from the distillers. It is the FRG's understanding that stillage was separated by the distillers into thin stillage (liquid) and wet cake (solids).

**Thin Stillage:** the liquid from the distillers that was sent to the anaerobic digester.

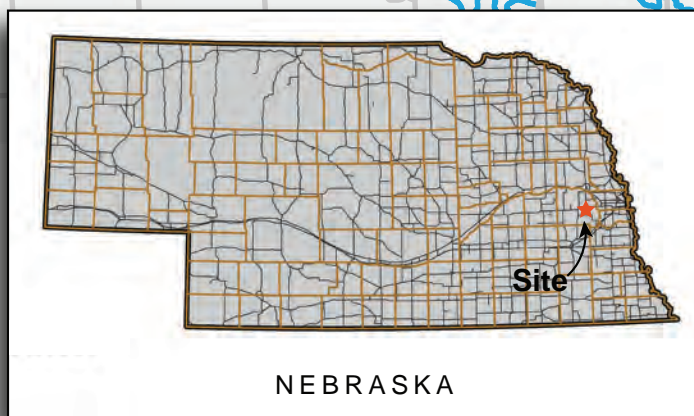
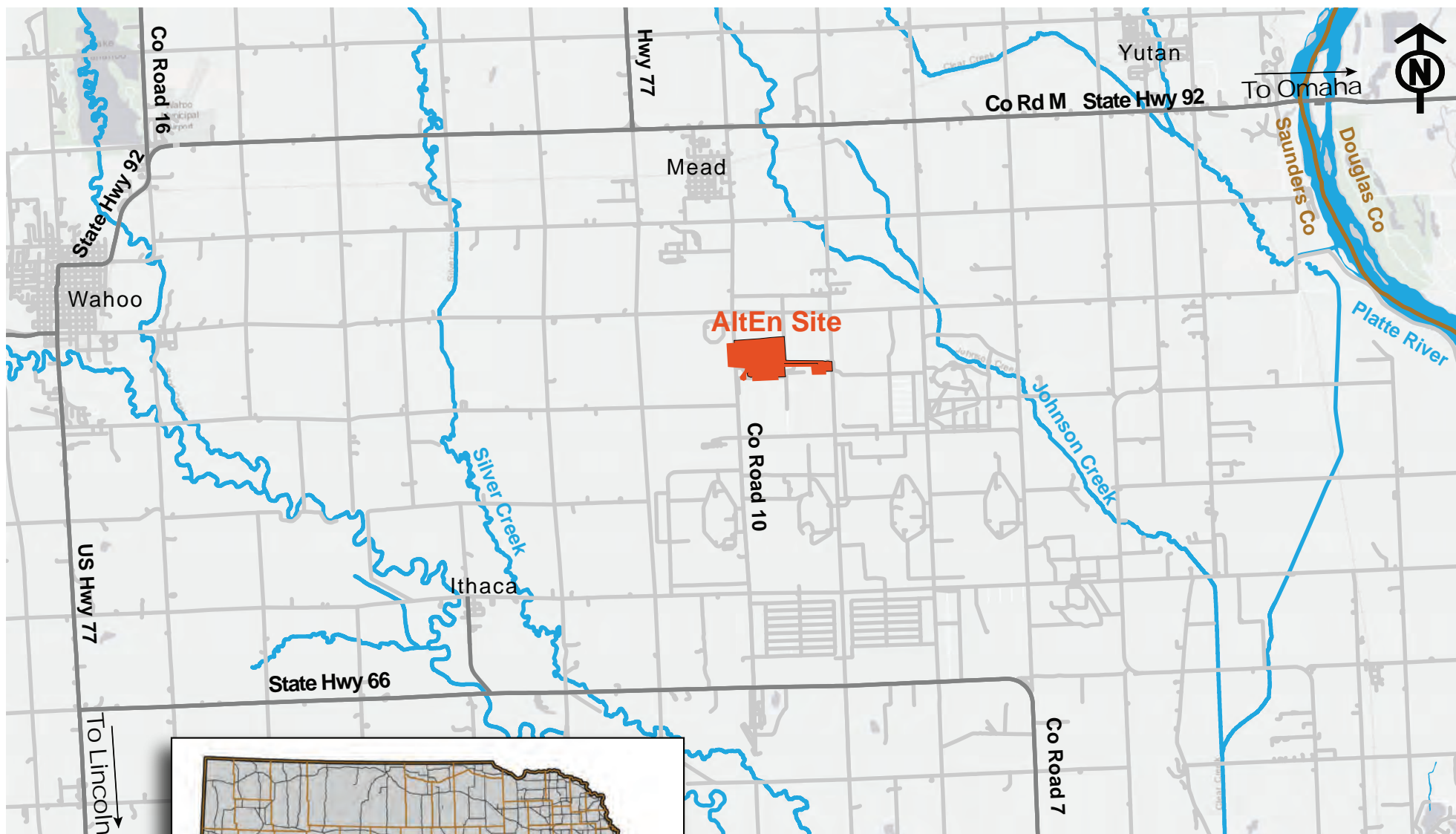
**Treated water:** water that has been treated using the FRG water treatment system.

**Untreated water (water requiring treatment):** untreated water (i.e., Remedial Media 1) at the Site includes waters within the lagoons or from other plant infrastructure (digesters, plant piping, etc.).

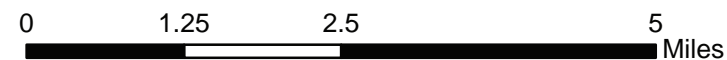
**Wet cake:** also called wet distillers' grain ("WDG"). Wet cake is a descriptive term referring to the solids produced by AltEn's distilling operations at the ethanol plant. AltEn's operations resulted in the wet cake comingling with soil on the Site. The term "wet cake" as used in this document refers to the mixed solid mass of material stockpiled by AltEn on the Site.



## FIGURES



NEBRASKA

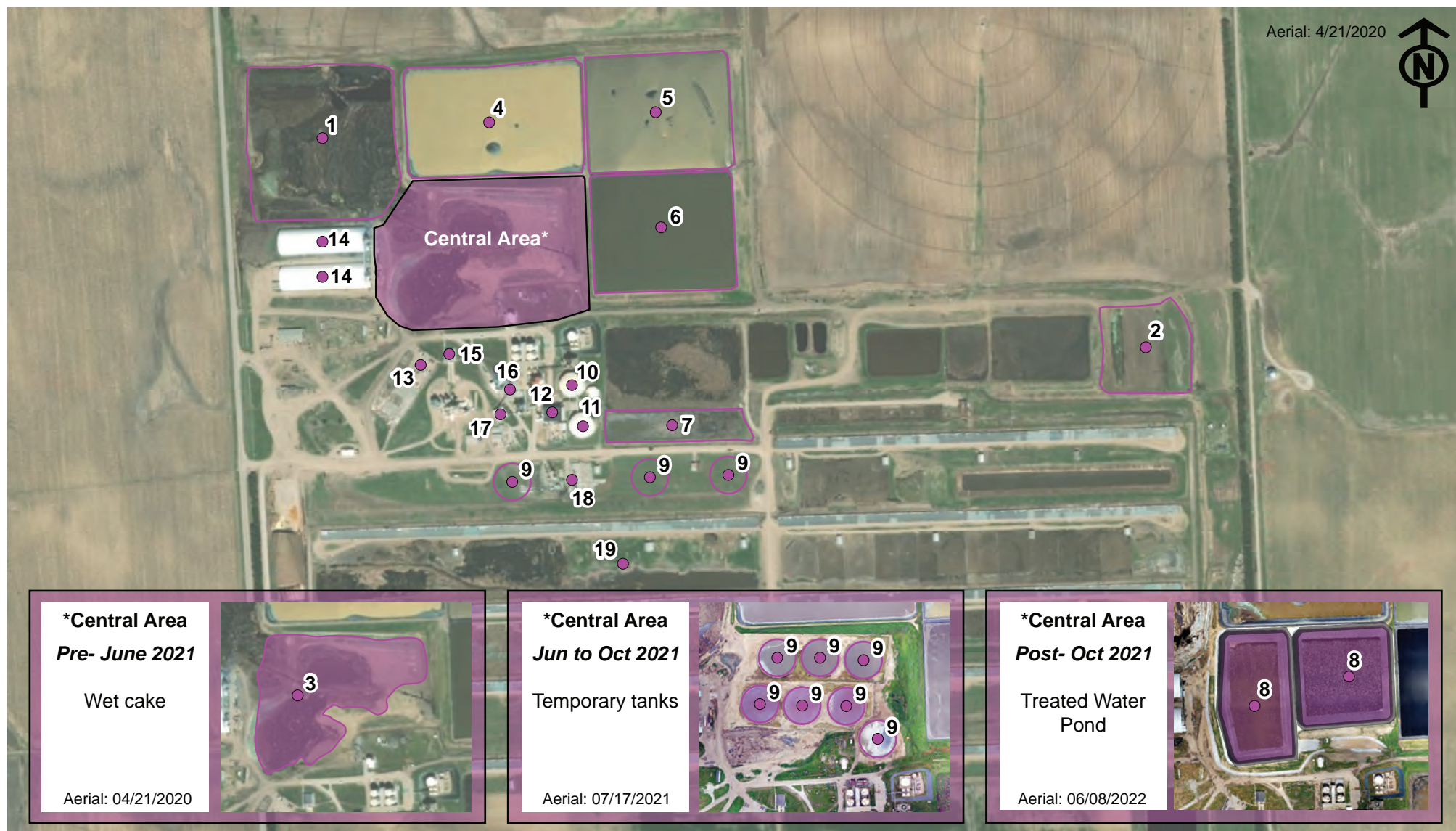


 **NewFields**

Figure  
1

Site Location Map





Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

0 250 500 1,000 1,500 2,000 Feet

- |                                     |   |   |
|-------------------------------------|---|---|
| 1. NW or Consolidated Wet Cake Pile | 8. Treated Water Pond (West and East Cells) | 15. AltEn office building                 |
| 2. East Wet Cake Pile               | 9. Former temporary water storage tanks     | 16. Former grain receiving/unloading area |
| 3. Central Wet Cake Area            | 10. North Digester                          | 17. Former WDG loadout pad                |
| 4. Northwest Lagoon                 | 11. South Digester                          | 18. Former biochar unit                   |
| 5. Northeast Lagoon                 | 12. Water Treatment Facility                | 19. Former composting pad                 |
| 6. Southeast Lagoon                 | 13. Contractor staging area                 |   |
| 7. Emergency Pond                   | 14. Hoop buildings (North and South)        |   |



**A. Whale before deflation**



**B. Safely access the whale to attach vacuum device**

**C. Vacuum the whale gas/water mixture**



**D. Dual Phase Extraction & Catalytic Oxidizer**



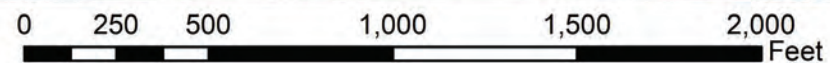
**E. Whale after deflation**







Source: Advanced Aerial Solutions



## Legend



Temporary tanks for treated water



Temporary tanks for untreated water

Temporary tank originally for untreated water, cleaned, relined, and repurposed for treated water

**NewFields**

Figure 4

Location of Temporary Above-ground Storage Tanks

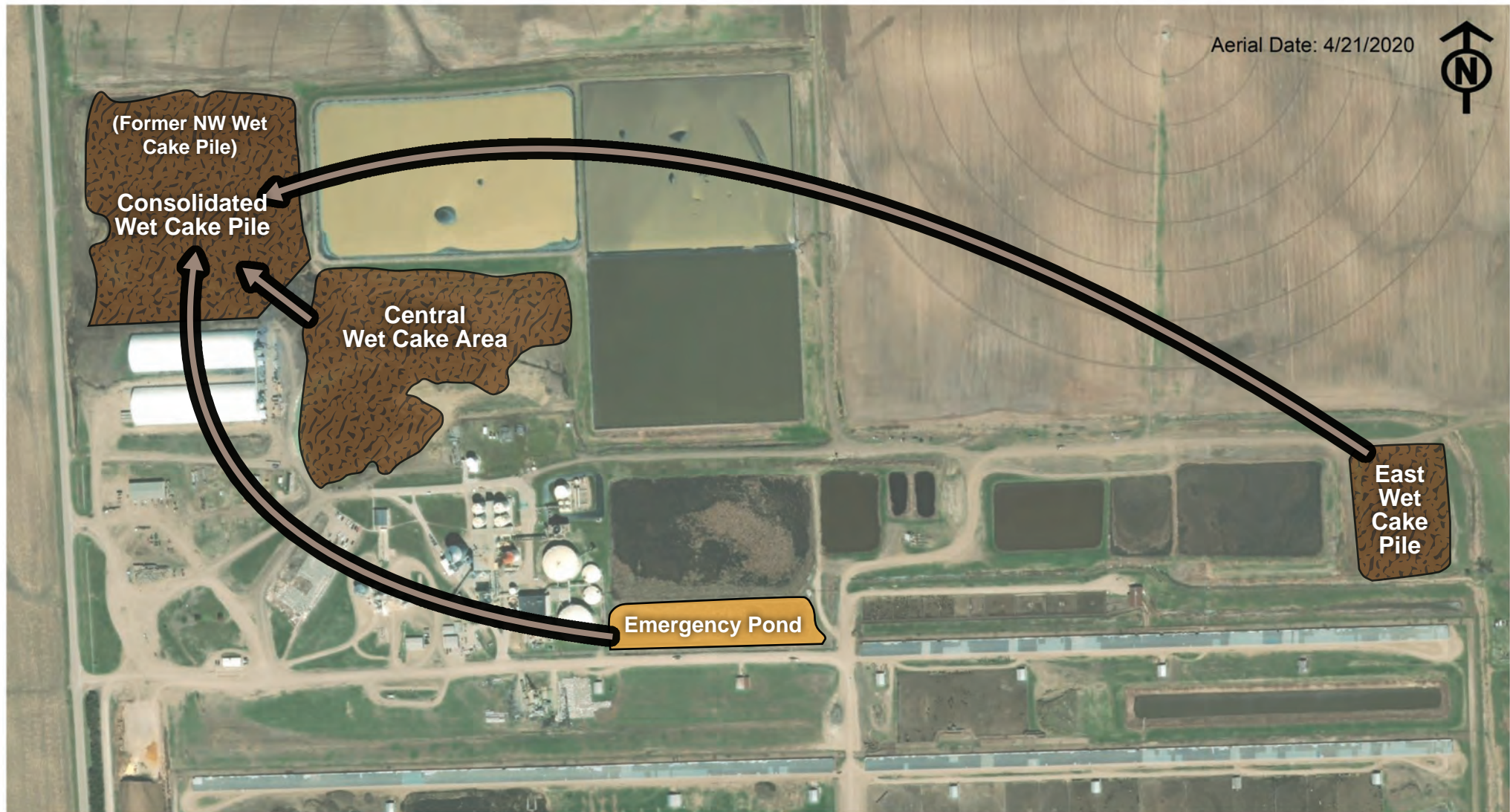















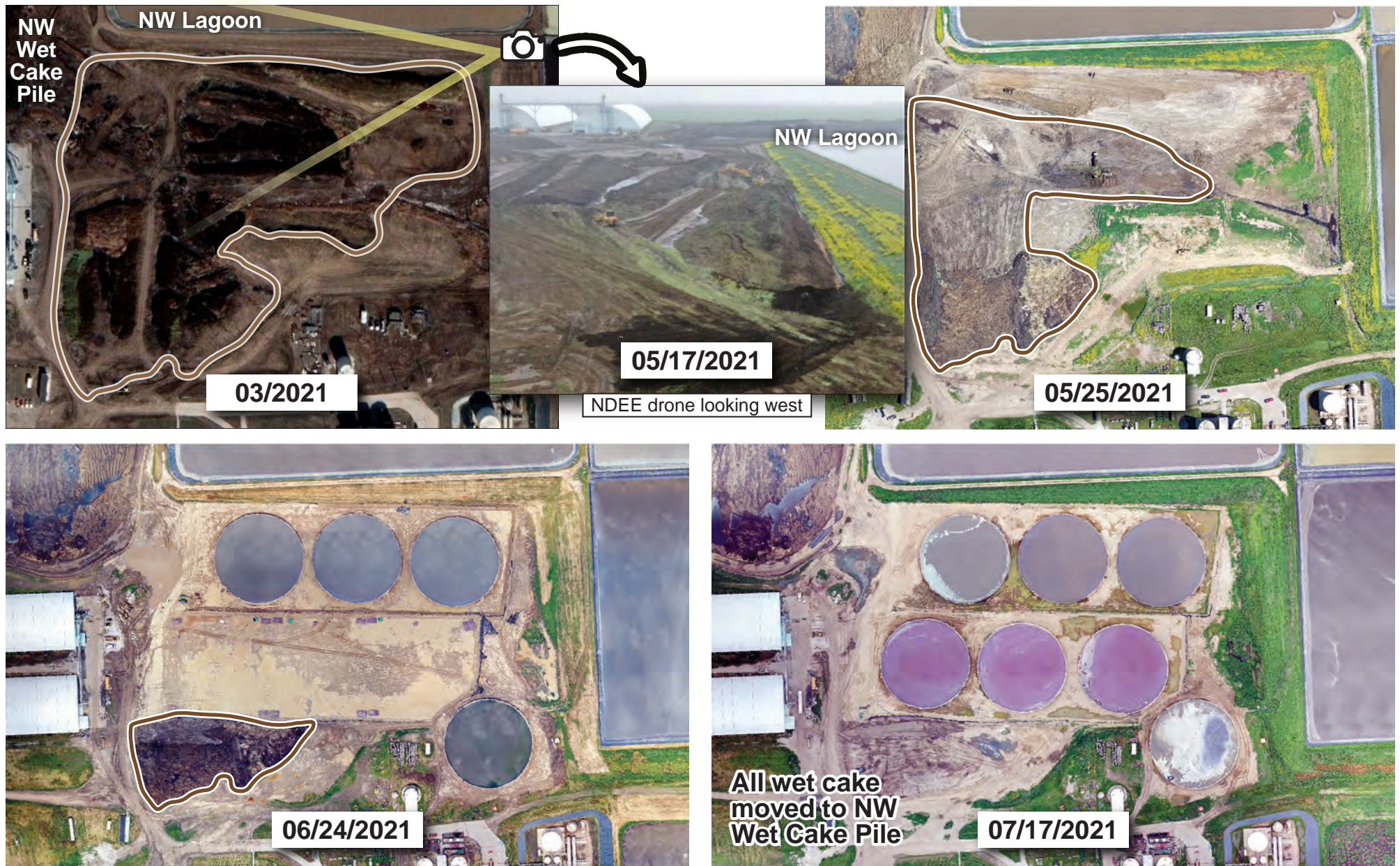
Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

0 250 500 1,000 1,500 2,000 Feet

### Legend

-  Mixture of wet cake and other sludges
-  Areas or piles of wet cake
-  Movement of wet cake and solids





Source: Advanced Aerial Solutions

## Legend



Areas or piles of wet cake



0 125 250 500 750 1,000 Feet



**NewFields**

Figure  
8

Wet Cake Consolidation:  
Central Wet Cake Area

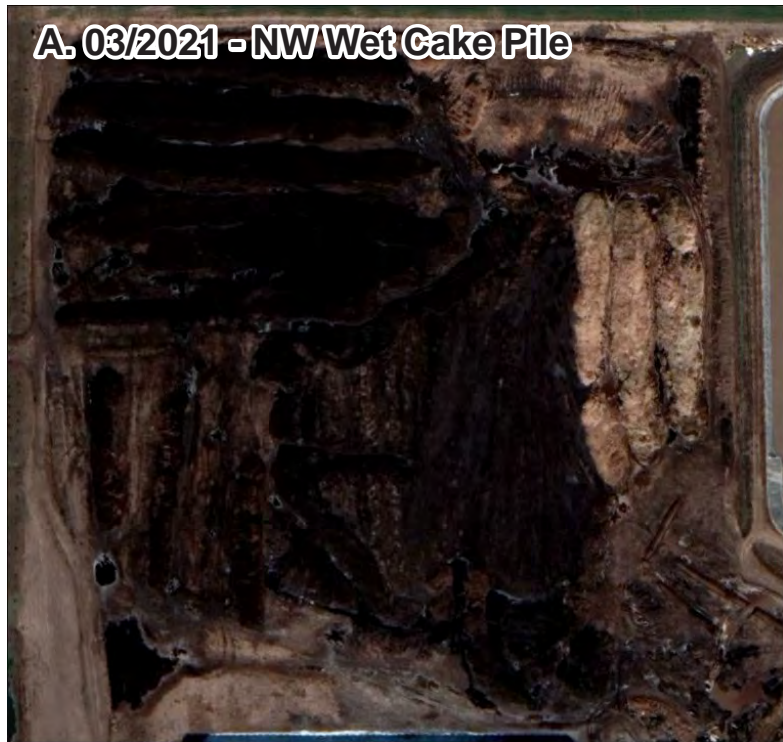




Inset map:  
East Wet Cake Pile







**Legend**

- French drains
- Sumps

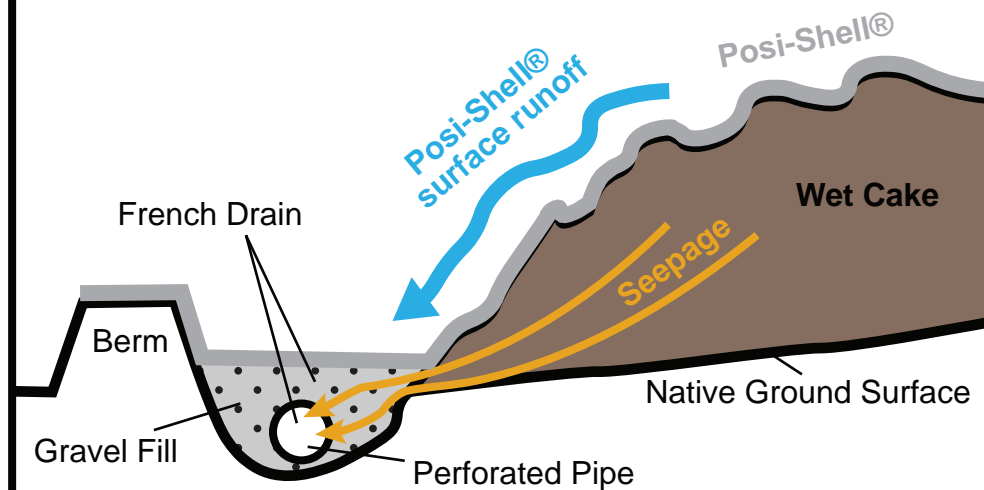




**A. 01/11/2022 - Pre-cover**



**B. Consolidated Wet Cake Pile Cross Section**



**C. 02/15/2022 - Perimeter Application**



**D. 03/08/2022 - Completion**



Source: Advanced Aerial Solutions

**Legend**

- French drains
- Sumps

Inset map:  
Consolidated  
Wet Cake  
Pile



0 125 250 500 750 1,000 Feet



**NewFields**

Figure  
11

Consolidated Wet Cake Pile | Posi-Shell®  
Cover & Seepage Collection



# **APPENDIX A**

## **NORTHEAST LAGOON WHALE DEFLATION**

*North American*

*Remediation Organization*



## **Pond Cell #2 Whale gas extraction and deflation**



*Presented to:*

**Newfields**

November 8, 2021



## Table of Contents

### Contents

BACKGROUND .....	2
SEQUENCE OF WORK .....	3
Planning Phase .....	3
Pre-Mobilization Phase .....	3
Field Work Phase .....	3
Activity Closure Phase .....	4
TIMEFRAME .....	5
PRICING.....	5



## BACKGROUND

Clean Harbors Environmental Services (CHES) has been tasked with the formulation of a proposal to address the large gas pocket (whale) in the northeast corner of the North East Lagoon (aka Cell #2) at the Former AltEn Ethanol Plant in Mead, NE. Over the past six (6) weeks the gas pocket has ballooned into the shape and location it current resides, presenting a risk to the anchors along the eastern bank of the NE Lagoon. Clean Harbors has mobilized its Subject Matter Expert, TetraTech, Inc. (TTI) in liner repair practices to act as lead on the depressurization process while CHES will as SME for the de-risking of the captured gas. The estimated time for completion is currently listed at five (5) days, but this is highly dependent on the nature and composition of the gases found within the pocket. Clean Harbors and its partners will only charge for the work that is needed, understanding that the prevention and planning for a hazardous and potential catastrophic event will take the bulk of the efforts.

**“An ounce of prevention is worth a pound of cure.”**

-Benjamin Franklin, 1736

## WORK SCOPE

The response will consist of four (4) phases: Planning, Pre-Mobilization, Field Work, and Activity Closure. CHES and TTI will operate as a blended expertise deployment group with strategic leadership by CHES and tactical leadership by TTI during the engagement activity. The intent is to deploy a team to Mead, NE to identify environmental risks posed by the gases inside the whale, de-risk the gases if needed, and release the volume of material to remove the risk of damage to the anchors and berm wall. The team will then use the lessons learned from this event to plan any future de-risking activities within the lagoon systems

## SEQUENCE OF WORK

### Planning Phase

CHES will coordinate with TetraTech, Inc. and NewFields to generate detailed work plans and safety plans regarding the specific activities and contingency plans in the event of either a Non-Hazardous or Hazardous (explosive or toxic) environment. Based upon the organic nature of the composition of the liquids in the lagoon system, there is a potential likelihood of either H<sub>2</sub>S or Methane as a constituent by-product gas. Either of these atmospheres would require personnel trained in HAZMAT and be equipped in Level B (Supplied Air) PPE. To access the gas pocket (whale), an access dock will need to be designed to provide the tool operator safe access to flange connection that will be liner taped to the membrane of the pocket. Coordination of step-by-step activities and resources needs to be mapped out and agreed upon by all parties. Pre-designation of exclusion (hot) zone, contamination reduction (warm) zone, and support (cold) zones to be delineated. Coordination between TetraTech's depressurization device and Clean Harbors CatOx/Vapor Filter vessel for connectivity and operational integrity means and methods.

### Pre-Mobilization Phase

CHES and TTI will begin procuring required materials for the lance device and proposed floating dock. The teams will also procure rental equipment needed for the activity (air monitoring, blowers, supplied air, etc.). CHES will also deploy required air filtration (CatOx and Vapor Filter vessel) to the job site to be prepped and loaded with media.

### Field Work Phase

CHES and TTI will mobilize to the site and review existing conditions and review pre-approved work plan. Safety representatives from both teams will review the pre-approved safety plan to make sure existing conditions do not preclude any required changes to the work plan and or safety plan.

A preliminary plan with safety comments by TTI has been reviewed with NewFields and is attached to this proposal.

The liner whale will be punctured in a controlled manner using a lance with isolation valve by TTI. From the connection at the lance, hoses will route gases contained in the whale to the vacuum connection of a thermal catalytic oxidizer (CatOx) packaged unit for management of methane. A moisture separator will eliminate free water prior to the blower and drain back to the lagoon. The blower and initial pressure in the whale motivate the flow through the treatment system.



After moisture separation, the whale gas will pass through a media vessel for pretreatment of potential H<sub>2</sub>S. The filter vessel will be filled with zeolite impregnated with 6% potassium permanganate, see file HS-600 for media specifications. After the gases pass through the media, they will be routed to the CatOx skid oxidizer connection for methane management. Filtered fresh air is blended for temperature control in the catalyst bed; handled by temperature sensors, controller and control valve regulating fresh air flow into the system. The treated air leaves the system through an overhead vent to atmosphere.

### **Activity Closure Phase**

After the initial whale is safely delated, CHES, TTI, and NewFields will meet to discuss the path forward. Recorded data from the event should include, but not be limited to: calculated volume of gas managed, measurable gases detected by %, volume of media spent, time to completion, etc.





# NE Lagoon Gas Venting Proposal

Meade, Nebraska





November 8, 2021

via email to: [cunningham.james@cleanharbors.com](mailto:cunningham.james@cleanharbors.com)

James Cunningham  
Senior Field Project Manager, Remediation  
Clean Harbors  
42 Longwater Drive  
Norwell, MA 02061-9149

Subject: NE Lagoon Gas Venting Proposal

Dear Mr. Cunningham:

Tetra Tech appreciates the opportunity to present this proposal to Clean Harbors Environmental Services, Inc. (CHES) to address the large gas pocket (whale) in the NE Lagoon at the Mead, Nebraska site. We have experienced similar issues as part of a liner repair practice and can depressurize, and thus, shrink the whale. Gas in the whale may contain high concentrations of methane and hydrogen sulfide, therefore, we intend to depressurize the whale using a liner penetration tool and pump the gas from the whale to a Clean Harbors-supplied air filtration device prior to venting to the atmosphere.

We expect that the work to be comprised of 3 tasks:

1. **Planning** – Generation of a work plan and safety plan that defines roles and responsibilities to conduct the work safely.
2. **Premobilization Site Coordination Visit** – Our geomembrane liner expert will finalize the work plan and safety plan after scouting the project site. He will also fabricate the penetration/depressurization tool that will be utilized to address the large gas pocket. Finally, he will coordinate with Clean Harbors personnel to couple the tool to an air filter so gases can be vented to the atmosphere in a safe way.
3. **Field Activities (Deflation/Filtration of Accumulated Gas under Liner)** – Our Tool operator and Field Safety Coordinator will mobilize to the project site for an estimated 5 days to deflate and filter gases from the air pocket. Two additional field crew will be on hand to support. These crew can be supplied by Tetra Tech under the **Optional Supplemental Field Support Task**; otherwise, it is assumed they will be supplied by Clean Harbors.

We look forward to serving CHES on schedule, on budget, and consistent with CHES's safety, quality, and project delivery expectations.

Should you have any questions or require additional information, please contact Bryan Grace at [bryan.grace@tetrattech.com](mailto:bryan.grace@tetrattech.com).

Sincerely,

Tetra Tech, Inc.

A handwritten signature in black ink, appearing to read 'Bryan Grace', with a stylized flourish at the end.

Bryan Grace, PhD  
Principal Environmental Scientist/CHES Account Manager

## PRICING SUMMARY

Proposal Cost is provided in Attachment 1 and presents the Time and Materials price estimate to conduct the project. Note that since the work plan is still being developed, hours and non-labor costs could change. Costs will be monitored closely and unforeseen costs, if any, will be discussed immediately with Clean Harbors.

## DESCRIPTION OF WORK

A draft work plan overview has been provided as attachment 2 of this proposal. The work plan overview describes the work tasks including safety precautions that will be executed.

Schedule			
		Start Date	End Date
<b>Planning Phase</b>			
	Generate Safety Plan Addendum and Work Plans	11/2/2021	11/5/2021
	Determine air monitoring requirements and approach	11/2/2021	11/5/2021
	Coordinate with Clean Harbors air filtration expert regarding required couplings	11/4/2021	11/5/2021
	Generate Technical Drawing of picturing/air depressurization device (both puncturing end and coupling end to the air filter)	11/2/2021	11/5/2021
	Plan the design an access dock to allow the tool operator safe access to the puncture site of the line	11/2/2021	11/5/2021
<b>Premobilization Phase</b>			
	Purchase materials and fabricate Puncturing/air removal tube and access dock.	11/8/2021	11/12/2021
	Rent required equipment (air monitoring, blowers, etc.)	11/8/2021	11/12/2021
	Clean Harbors mobilizes required air filtration equipment	11/8/2021	11/12/2021
<b>Field Work Phase</b>			
	Assume tool operator, Safety Coordinator and 2 field technicians will require 5 workdays to complete the project.	11/15/2021	11/19/2021

## Attachment 2 - Work Plan Overview for Penetrating and Venting the Gas Pocket (Whale) at the northern end of the NE Lagoon

*Note – Health and Safety components are called out in **Red**. Work plan details along with field H&S measures and contingency plans will be added and updated prior to commencement of the work.*

### Personnel

- One Safety Coordinator – Kevin Matherne
- One Penetration Tool Operator – John Beeman
- Two Field Technicians

### Task 1 – Setup

- A penetration point will be selected at the approximate center point along the northern side of the whale.
- An exclusion zone will be marked of by orange temporary construction fencing 50 ft to the east and west of the penetration point. Additionally, the exclusion zone will extent along the northern edge of the access road to the north of NE Lagoon.
- A windsock will be placed approximately 50 ft to the north of the penetration point to determine wind direction.
- Large industrial fans will be placed along the road that runs along the whale's northern side and will be aimed towards the penetration point. **Fans will not be running but will be available as an emergency measure if air is needed to be evacuated from the area. If needed, the fan aiming in the same direction of the wind as identified by the windsock will be activated to disperse potential gas emissions.**
- A Radius BZ1Area Air Monitor (or similar) will be placed on the berm directly north of the penetration point and at 25 feet of the east and east of the penetration point along northern side of the whale (3 monitors in total). **The monitors are intrinsically safe and will be blue tooth connected to the Safety Coordinator's smart phone or tablet.** The monitor will measure Combustible gases (1-100% Lower Explosive Limit (LEL) in 1% increments), hydrogen sulfide (0-500 ppm in 1 ppm increments) and oxygen (0-30% volume by 0.1% increments).
- Clean Harbors will have an air filtration device with an air pump set up on the upwind side of the penetration point, outside the exclusion zone.
- The Penetration tool will be coupled to a vent hose via ball valve assembly. The other end of the hose will be coupled to the air filtration pump.

### Task 2 – Whale Deflation

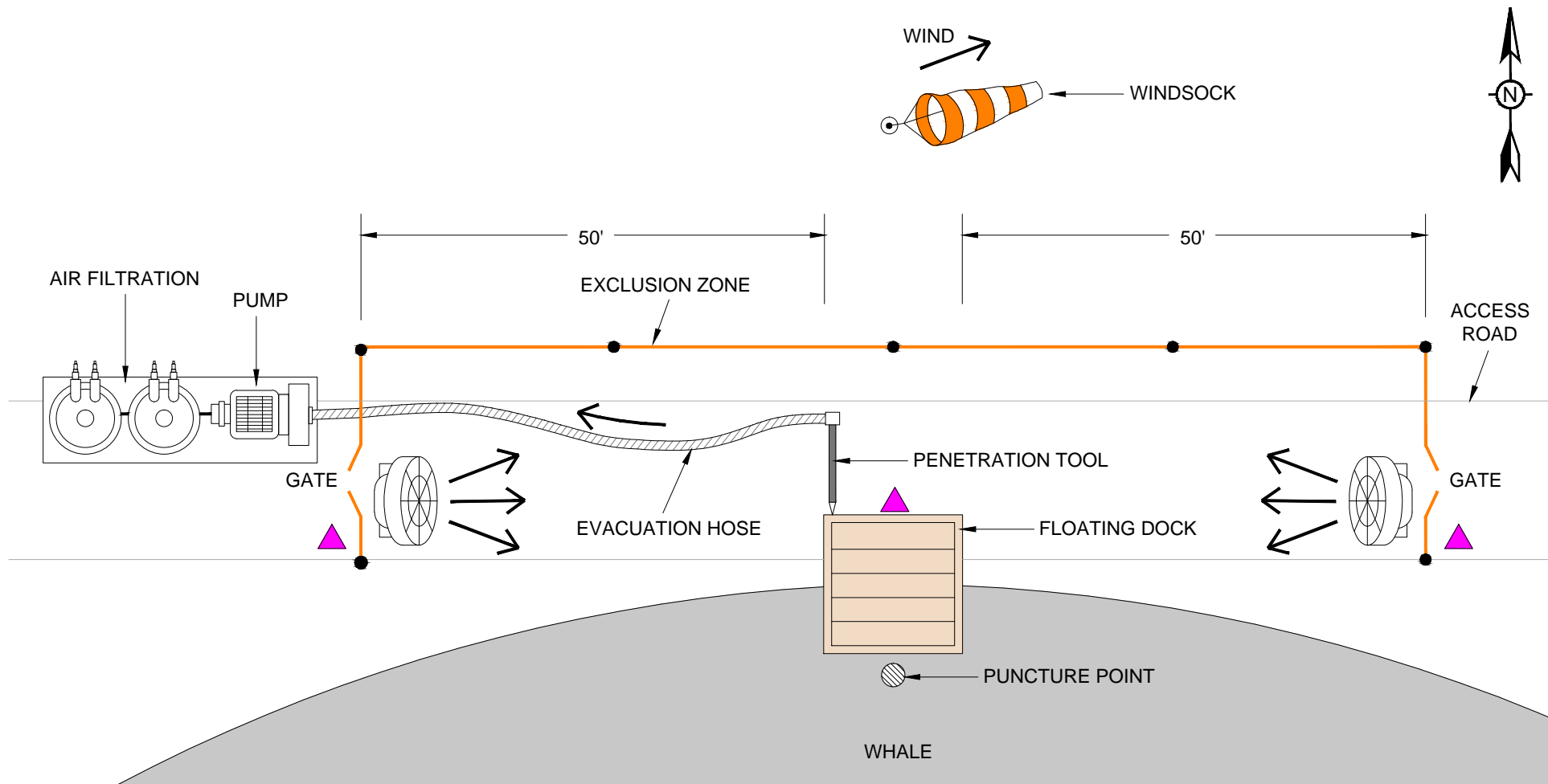
- The Safety Coordinator will verify that support personnel are out of the exclusion zone. The Safety Coordinator will observe the operation from within the exclusion zone to better ascertain safety status. The Tool Operator will prepare to puncture and vent the whale. Field Technicians will be observing 20 feet to the east and west of the Tool Operator. Whale penetration will follow the following order of operations:
  - **All personnel inside the exclusion zone will be in Level B PPE with self-contained breathing apparatuses at the commencement of operations.**

- The Safety Coordinator will signal that the tool is about to puncture the whale by raising a Red Flag.
- The air pump on the air filtration device will be turned on.
- The ball valve on the penetration Tool will be opened.
- The tool will be pushed through the liner to the flange of the tool (about 3 feet from the tip)
- The flange will be secured with liner tape and sealed by double sided liner tape.
- If LEL readings from all 3 monitors are less than 25% for 15 consecutive minutes, all personnel working in the exclusion zone can modify their PPE to Class C with a full-face cartridge respirator to filter hydrogen sulfide and methane.
- The whale should begin to deflate. Operation will continue until water is being pumped out of the whale, or it is determined by the Tool Operator that the operation is not effective at the location. Once the tool is removed, the air will be monitored for LEL, hydrogen sulfide and methane near the hole left behind from removing the tool. Liner tape will be used to patch the hole.
- The Tool Operator will determine if another penetration point should be set, and the operation will start over with a new exclusion zone.
- If at any time the LEL sensor on the air monitors measures at or greater than 25%, work will be stopped, and all personnel will evacuate upwind out of the exclusion zone.

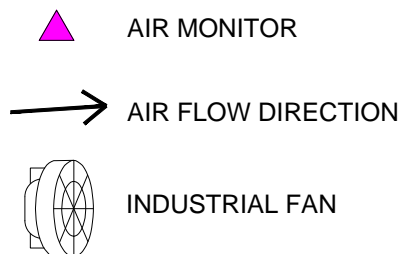
### **Task 3 – Demobilization**

- If the whale is still deflating at the end of the workday, the ball valve on the penetration tool will be closed and the air pump turned off.
- The seal at the penetration point will be monitored for 15 minutes for LEL, hydrogen sulfide and methane. Additional liner tape will be applied until air conditions are acceptable as determined by the Safety Coordinator. When sealed, the air monitors will be secured in a locked building or in the Safety Coordinators vehicle for the following day. Remaining equipment will be left in place overnight (weather permitting). Exclusion zone fencing will remain in place overnight.
- The operation will be repeated until the Tool Operator determine that the whale is no longer an immediate hazard. At such point, The Tool Operator will call Bryan Grace at 504-919-5955 to schedule a call with the client and other stakeholders to determine path forward.





#### LEGEND



TITLE:		EXCLUSION ZONE / WORK SITE	
LOCATION:		Mead, Nebraska	
 <b>TETRATECH</b>	APPROVED	BG	FIGURE <b>1</b>
	DRAFTED	CP	
	PROJECT#		
	DATE	11-06-21	



Tetra Tech is Leading with Science® to provide innovative, sustainable solutions that help our clients address their water, environment, infrastructure, resource management, energy, and international development challenges. We are proud to be home to leading technical experts in every sector and to use that expertise throughout the project life cycle. Our commitment to safety is ingrained in our culture and at the forefront of every project. We combine the resources of a global, multibillion dollar company with local, client-focused delivery. [tetrattech.com](https://www.tetrattech.com)

---





## **APPENDIX B**

### **WATER TREATMENT SYSTEM**

## **Existing Wastewater Pilot Treatment Plant – AltEn Facility, Mead Nebraska**

In support of providing the NDEE (Nebraska Department of Energy and Environment) the needed documentation for wastewater treatment operations at the AltEn facility, documentation is provided, including a process diagram and a narrative of the existing treatment process.

The existing treatment plant is a process that includes the remaining AltEn treatment system and a supplemental system mobilized by Clean Harbors (the current operator) to achieve pesticides treatment. The system can operate at flow rates ranging from 150 gpm to 210 gpm and can treat wastewater from the site lagoons to levels suitable for land application only under the current land application permit.

The current plant is being evaluated now to determine its effectiveness in treating the site wastewater to suitable pesticides levels for NPDES discharge. Also, treatability testing is underway to evaluate potential processes for the removal of BOD and ammonia to NPDES standards.

The AltEn Facilities Response Group (AFRG) plans to operate this system as is until treatability and other evaluation are completed, upon which the AFRG will evaluate the final wastewater solution.

Attachment 1 to this narrative includes a process diagram, depicting the current process in place at the AltEn facility.

### **System Narrative**

This initial system consists of the original AltEn Nutrient Recovery (NR) system, modified to include one 20,000 pound sized vessel filled with sand and gravel and two 20,000 pound sized granular activated carbon (GAC) filters filled with activated carbon (the AltEn System). A second stage of treatment is included after the initial system, currently housed within a separate but nearby structure which includes clarifiers, bag houses, sand filters and four 20K GAC filters (the Clean Harbors System). Additional detail on the major components follows:

- 1) Influent Transfer: Two-20 hp lagoon transfer pumps and 4-inch HDPE (High Density Polyethylene) lines are used to transfer wastewater from the west side of the Southeast Lagoon to a pre-clarified filtrate tank, through a level control valve in the NR building.
- 2) Coagulant Application: At the inlet to the pre-clarified filtrate tank, a level control valve with a single loop controller is used to adjust and maintain the water level in the tank. Ferric Chloride is injected into this tank for coagulation of solids in preparation for solids removal in the following stage of treatment.
- 3) Clarifier Feed: Two-single stage centrifugal feed pumps transport water to a Solids Contact Clarifier. On the influent line to the clarifier, injection of diluted emulsion polymer is performed to enhance settling in the clarifier. After polymer injection, the flow is measured with a flow transmitter-controller and control valve on the 12-inch line leading to the Clarifier. This is the point in the plant where the overall influent flow rate is monitored.
- 4) Clarification: The plant utilizes one (1) Solids Contact Clarifier (Clari-Cone Size 5), with grit and slurry blowdown ports. Overflow from the clarifier completes the first stage of solids separation and removal at the plant. Intermittent blowdown is controlled with a flow transmitter-controller and control valve on a line that leads to a solids hopper and to the sump system which leads to sump 8 (final plant sump) and back to the Southeast Lagoon. Continuous blowdown is completed with on-off valves and one smaller ball valve for flow rate control. Sample ports and points are available for all streams, influent, effluent, and blowdown connections.
- 5) Additional Solids Removal: One continuous blowdown sand filter is the next process (Parkson Dyna-Sand DSF78). This unit uses air injection, air lift, an effluent overflow weir and one backwash flow weir for rate adjustment to complete additional solids removal prior to the filtered effluent tank. The filtered effluent tank holds water at level controlled by a pump with 10 hp variable speed drive, which boosts flow to sand filter #1. Sand filter #1 is a size like a 20K carbon filter vessel and is loaded with 40,000 lbs. of gravel and sand. The

system includes a differential pressure transmitter to measure the bed pressure drop needed to determine when backwash is necessary. Venting is manual and vacuum breaking is automatic. When venting, tubing lines are in place to vent outside of the building.

- 6) Carbon Filtration: GAC filters #1 and #2 (installed by AltEn) can be used either in series or parallel operation. Each GAC filter is approximately 15.0-ft. high (not including legs) and 10.8-ft. in inner diameter. Each of these vessels contain 20,000 lbs. of carbon with an approximate density of 0.46g/cc (28.7 lbs./cf). The total volume of carbon in each vessel is approximately 700 cf and the service flow rate ranges from 1.65 gpm/sf (150 gpm) to 2.31 gpm/sf (210 gpm) in series and 0.83 gpm/sf (150 gpm) and 1.16 gpm/sf (210 gpm) in parallel.
- 7) Backwashing: One-20 hp backwash supply pump is configured to be able to backwash any/all the three previously mentioned filters. One backwash buffer tank with junction points and valves is included to allow controlled drain and to avoid overwhelming the sump system. A typical sand filter backwash is 900 gallons per minute for 12 minutes. The backwash water is from well water, held in a surge tank. The surge tank has capacity of 100,000 gallons. Connections are in place for using this tank for reject water during startup or any upset, and for holding well water for backwash.
- 8) Transfer to Stage 2: The shower water tank receives the effluent from the carbon filters. One pump with a 5 hp variable speed drive is used to maintain water level and to supply water to the second stage clarifiers. One-40 hp fixed speed pump for water jets in the Clarifier is in place with suction from the shower water tank.
- 9) Second Stage Clarification: One wavy inclined plate type clarifier is in place; this will be used for any additional solids separation needed after the first stage of treatment. A second clarifier is in place, flow may be split between the two second stage clarifiers if necessary. The second clarifier is a frac tank with clarifier insert with flat inclined plates. Both clarifiers have perforated pipe sludge headers.
- 10) Solids Handling: Solids from the initial solids contact clarifier (Primary Clarifier at the head of the plant) is transferred through covered drains in the NR building into an underground line into sump 8. The second stage sludge from subsequent clarifiers is transferred to sump 8 using hoses. One vacuum assist diesel driven pump for the transfer of backwash and blowdown volumes is included. A piping system is in place for transfer either to South Lagoon or a filter press feed tank. One air compressor is in place near Sump 8 for blowdown of the reject line to the South Lagoon and for powering the sludge pump.
- 11) Second Stage Polishing and Carbon Filtration: Two-50 hp pumps are used for boosting through remainder of treatment system. The remainder of the treatment system consists of fine solids removal and final carbon filtration, including two bag filter housings with 1 micron and 0.5-micron bags and two 3-pot sand filters and four 20K GAC filters.
- 12) GAC filters #3, #4, #5 and #6 (supplemental system mobilized by Clean Harbors) are approximately 14.2-ft. high (not including legs) and approximately 11.9-ft. in inner diameter. Each of these vessels contain 20,000 lbs. of carbon with an approximate density of 0.46g/cc (28.7 lbs./cf). The total volume of carbon in each vessel is approximately 700 cf and the service flow rate ranges from 1.35 gpm/sf (150 gpm) to 1.88 gpm/sf (210 gpm) and operate in series.
- 13) Final Effluent: A six-inch HDPE line leads from the final carbon filter and effluent meter to the main North/South line. At this junction point flow is sent to the East Treated Water Pond.



## **APPENDIX B**

### **WATER TREATMENT SYSTEM**

## System Photos



Pre-Clarified Filtrate Tank



Solids Contact Clarifier  
(Original from AltEn System)





Solids Hopper





Continuous Blowdown Sand Filter



Filtered Effluent Tank



Sand Filter #1

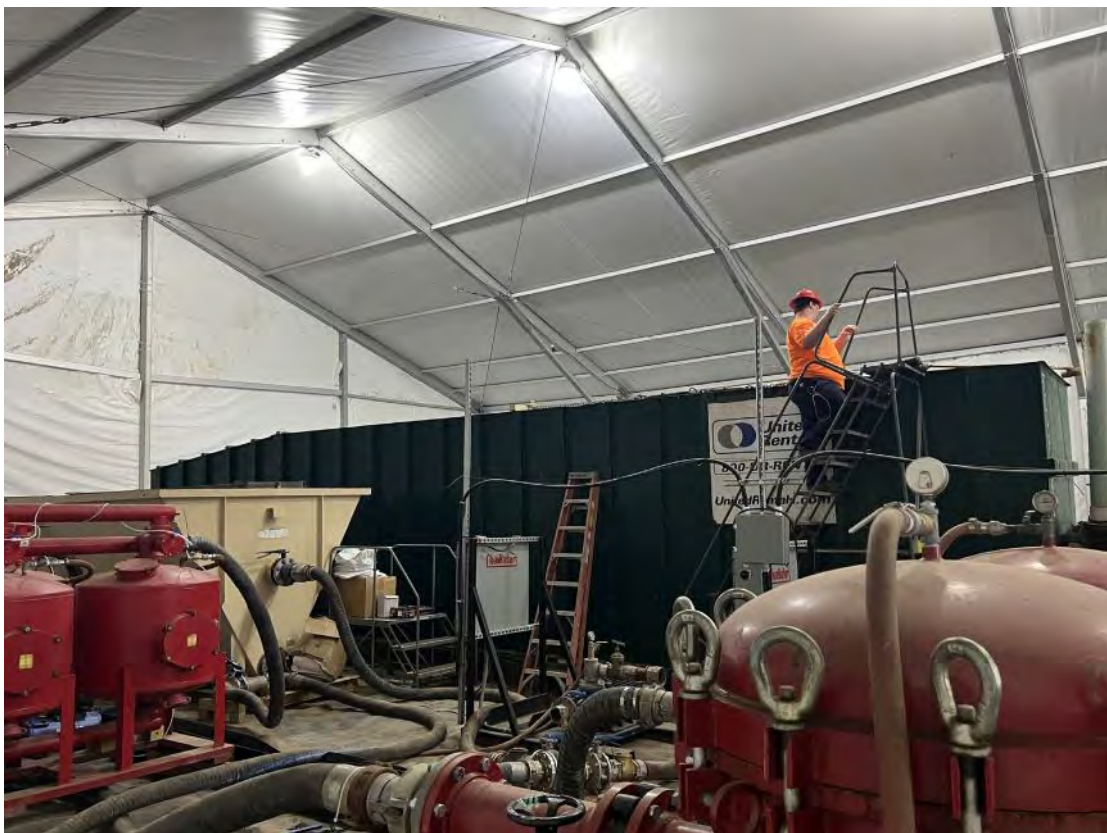
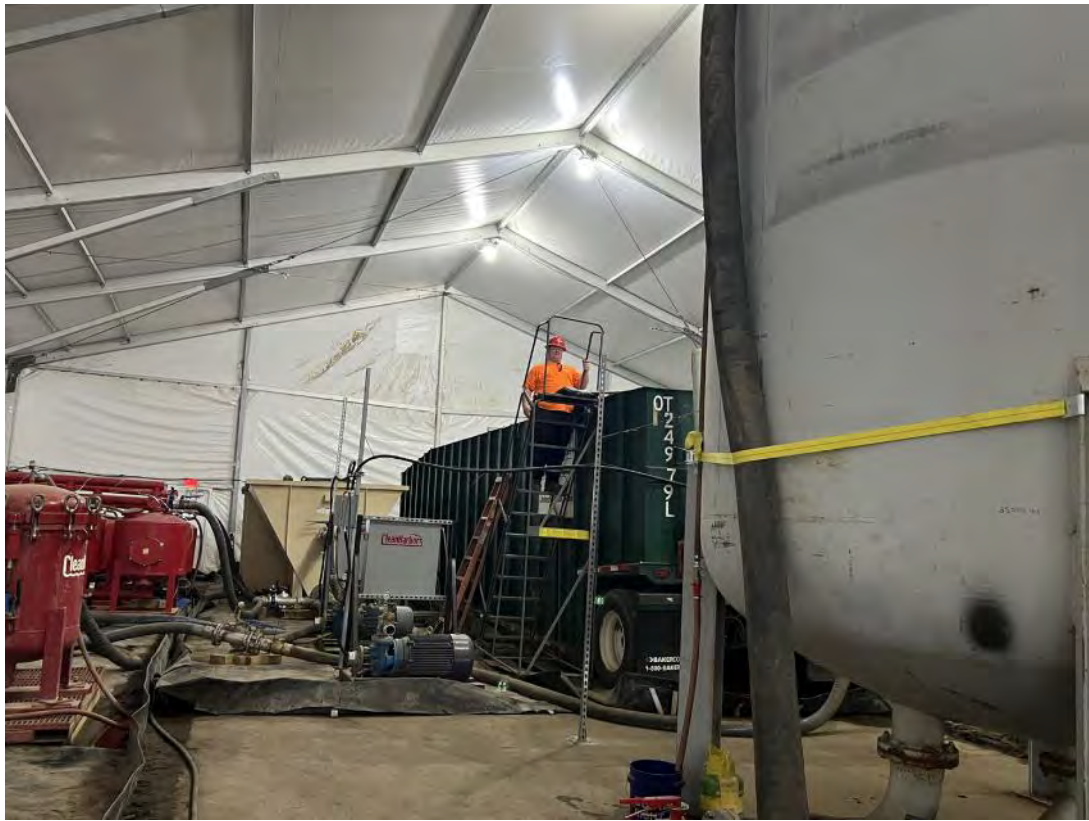




Shower Water Tank



Carbon Filter #1 and Carbon Filter #2



Solids Contact Clarifier #1 and Solids Contact Clarifier #2 (from supplemental Clean Harbors System)





Three Pot Sand Filters



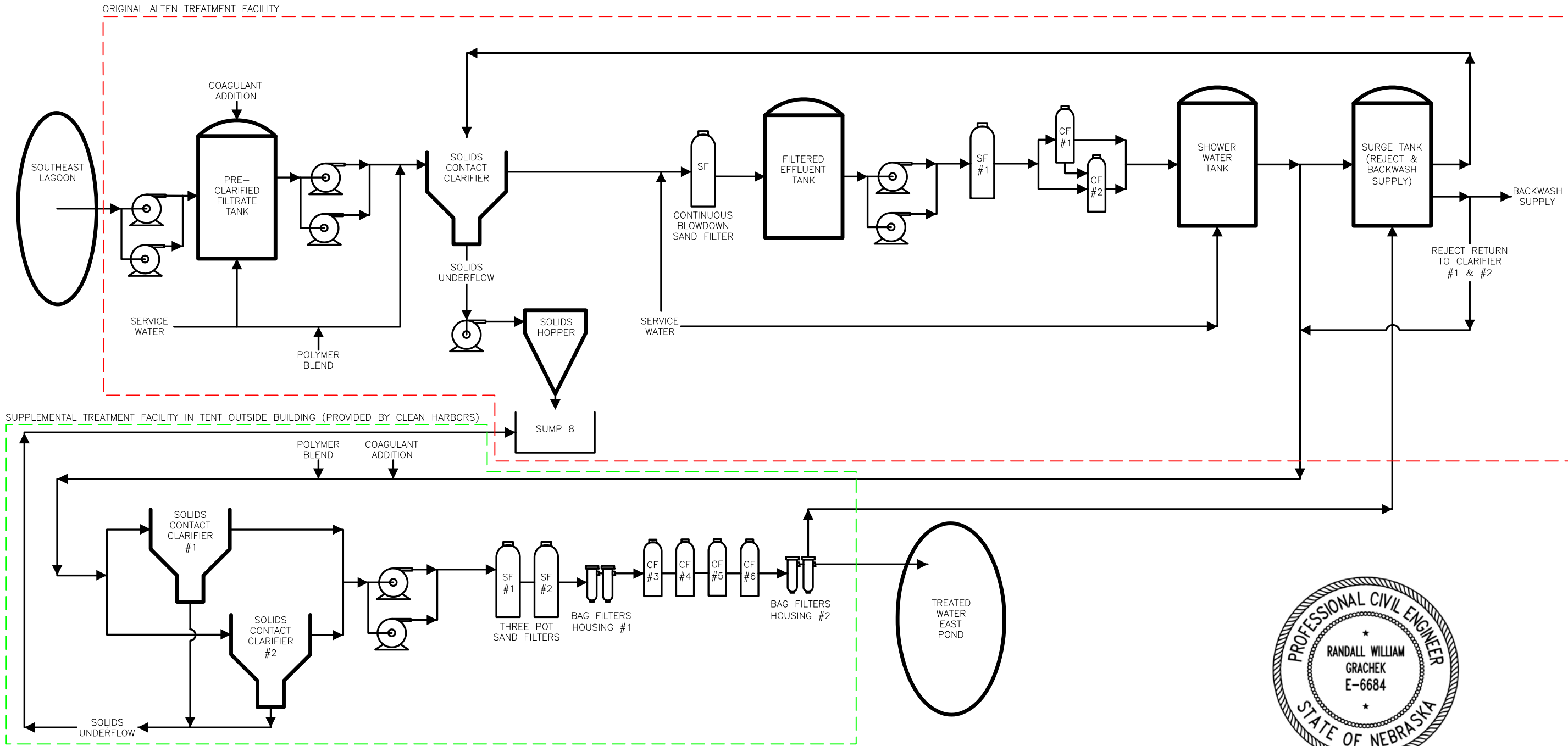
Carbon Filters #3, #4, #5, #6



Bag Filter Housings #1 and #2



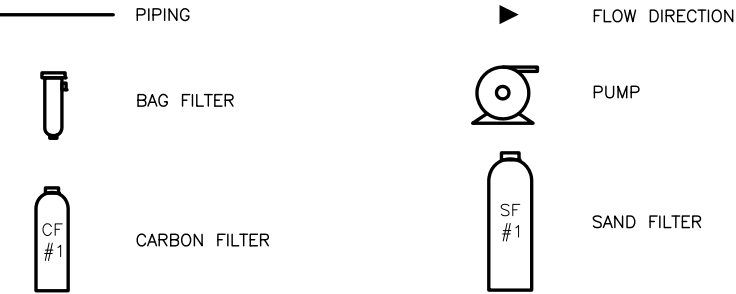
O:\Projects\860.0141 AltEn Water Treatment\05-GIS\A-CAD\DWGS\860.0141.001PD.dwg--6/21/2022 4:22 PM



Engineer in Responsible Charge  
06/24/2022

*Randall W. Grachek, P.E.*

**LEGEND:**



**NOTES:**

1. COAGULANT ADDITION CONSISTS OF 1200 - 2000 mg/L FERRIC CHLORIDE.
2. INSTRUMENTATION NOT SHOWN IN DIAGRAM.
3. DASHED LINES INDICATE DIFFERENT SECTIONS OF FULL PILOT TREATMENT PLANT.

		CLIENT <b>ALTEN</b>	
PROJECT <b>ALTEN PILOT TREATMENT PLANT</b>		FILENAME 860.0141.001PD	
TITLE <b>PROCESS DIAGRAM</b>		FIGURE NO. <b>1</b>	REVISION <b>0</b>



**APPENDIX C**  
**TREATED WATER POND SYSTEM**  
**AS-CONSTRUCTED DRAWINGS**

# NEBRASKA

Good Life. Great Resources.

DEPT. OF ENVIRONMENT AND ENERGY



Pete Ricketts, Governor

October 4, 2021

Tanner Shaw, President of AltEn, LLC  
Capital Corporate Services, Inc.  
1125 South 103<sup>rd</sup> Street, Suite 800  
Omaha, NE 68124

RE: AltEn Treated Water Ponds  
Mead, NE  
NDEE ID: 84069



STATE CONSTRUCTION PERMIT: 2021-0183

Dear Mr. Shaw:

Pursuant to Neb. Rev. Stat. Sec. 81-1506 (2) (Reissue 1994), documents describing this project have been approved and stamped accordingly. One set of construction documents is being retained for the Department's records. A construction certification card sent to the submitting engineer is to be returned to the Department upon project completion.

Compliance with wastewater design standards and regulations was the primary consideration in the review of this project. This permit does not release the owner from the responsibility of providing an operable facility. If changes to the approved plans and specifications are desired, changes shall be submitted to the Department for review and approval as described in Title 123 Chapter 9. Please reference the State construction permit number in all submittals.

**This construction permit does not supersede any required local approvals or substitute for other required Department permits, such as storm water construction or construction dewatering. If construction activity disturbs more than 1.0 acre, then the project must be authorized by a General NPDES Stormwater Construction Permit NER160000. Permit information can be found at [dee.ne.gov](http://dee.ne.gov) or by calling 402-471-4239.**

Pursuant to a Delegation Memorandum dated July 1, 2021 and signed by the Director, the undersigned hereby executes this document on behalf of the Director. **If you have questions, please contact Hillary Stoll at (402) 471-4252 or [hillary.stoll@nebraska.gov](mailto:hillary.stoll@nebraska.gov).**

Sincerely,

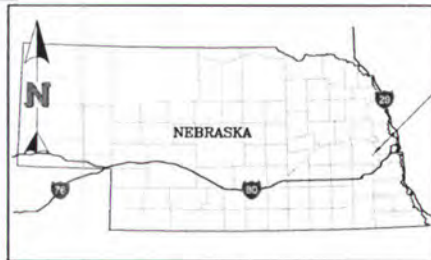
Shelley Schneider, P.E.  
Permitting & Engineering Division Administrator

SS/HJS

Xc: Randy Grachek, P.E., Newfields, w/encl. (ec)





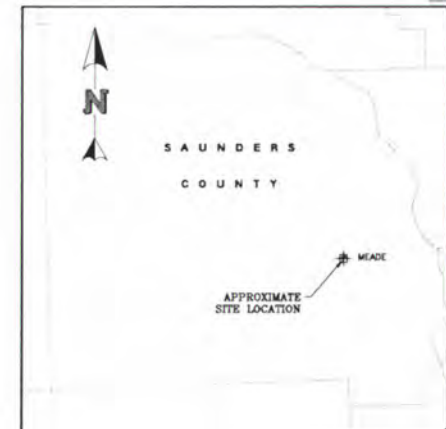


COUNTY MAP

SAUNDERS COUNTY -  
PROJECT SITE LOCATION

## TREATED WATER PONDS

RE-ISSUED FOR PERMIT  
OCTOBER 1, 2021



VICINITY MAP

STATE OF NEBASKA ) ENGINEER'S CERTIFICATE  
Saunders COUNTY )

I certify that the site survey and the design of the AltEn Site Treated Water Ponds represented on these drawings were made under my direction and consist of 12 sheets.

I further certify that this dam was designed to meet the requirements of a LOW hazard structure.

Sheet List Table		
DWG#	TITLE	REV
A000	COVER SHEET	3
A100	EXISTING CONDITIONS	3
A105	WEST CELL PLAN VIEW	3
A110	WEST AND EAST CELL PLAN VIEW	3
A120	GEOMEMBRANE PLAN	3
A125	CELL SECTIONS AND DETAILS (1 OF 2)	3
A130	CELL SECTIONS AND DETAILS (2 OF 2)	3
A140	GAS VENT PLAN VIEW	3
A145	GAS VENT SECTIONS AND DETAILS	3
A150	WEST AND EAST CELL FILLING CURVES	3
A155	EROSION AND SEDIMENT CONTROL PLAN	3
A160	PROPOSED SECURITY FENCE PLAN	3

ENGINEER



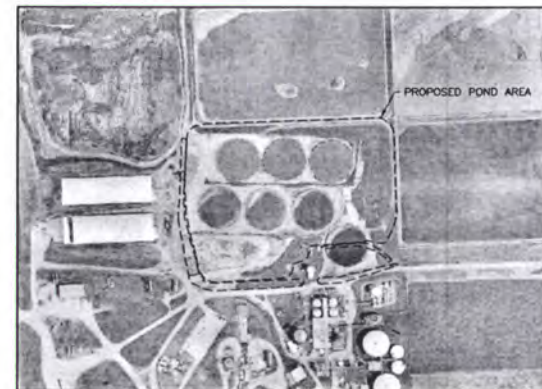
STATE OF NEBASKA ) APPLICANT'S CERTIFICATE  
Saunders COUNTY )

I certify that these drawings were made with my full knowledge and consent.

20

APPLICANT

AltEn FRG

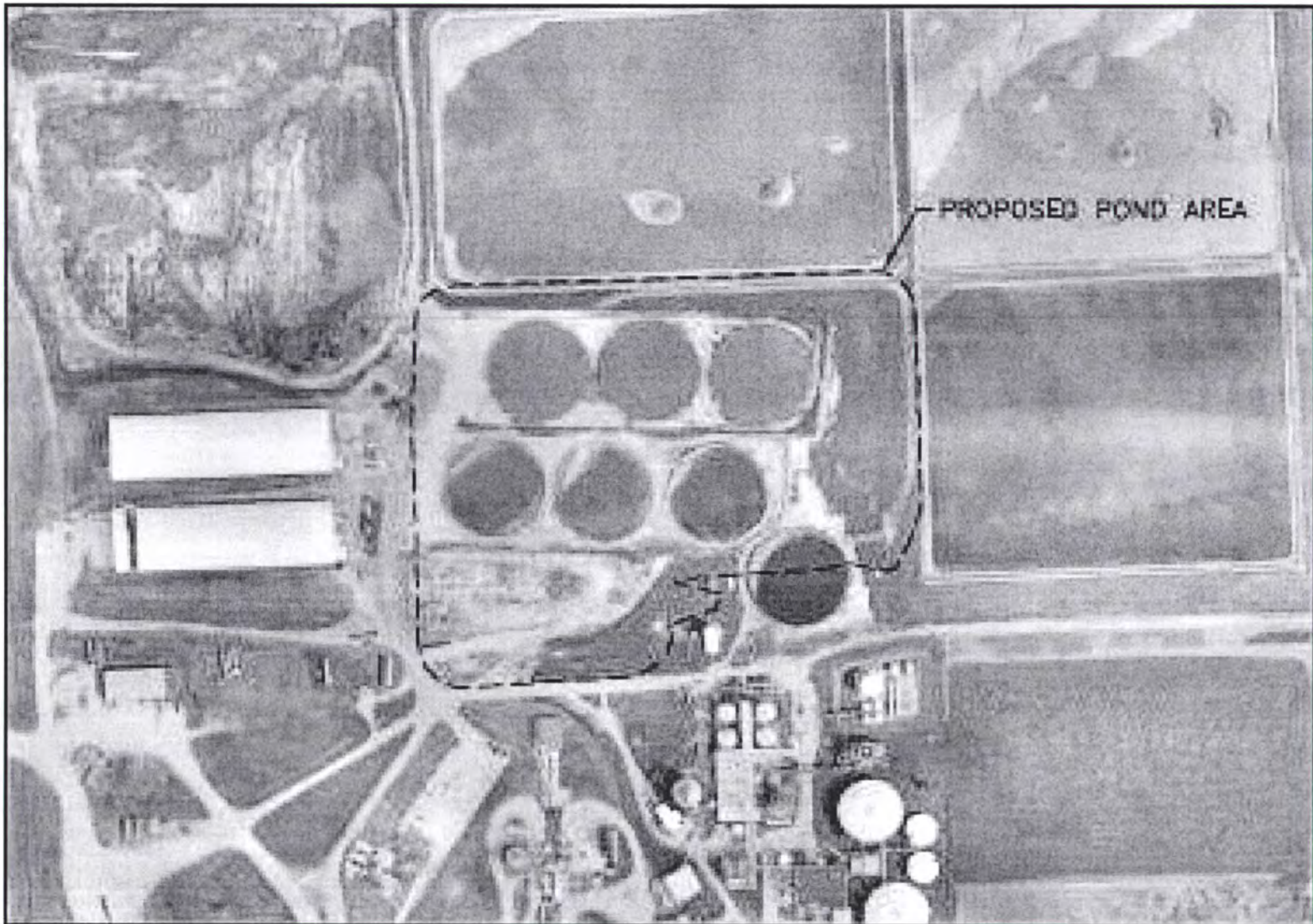


NDEE Project No. 2021-0183  
October 4, 2021



NewFields





AltEn Treated Water Pond Construction  
Specifications  
October 2021

Pollution Control Project  
**NEBRASKA**

Dept. of Environment and Energy

**APPROVED**

*AltEn P.E.*

NDEE Project No. 2021-0183

October 4, 2021





## **APPENDIX D**

### **EMERGENCY POND REFURBISHMENT**

*North American  
Remediation Organization*



# **Emergency Lagoon Cleanout and New Liner Work Plan**



***Presented to:***

**Bayer AG**

July 9, 2021



## Table of Contents

Background .....	2
Work SCOPE .....	2
Sequence of Work .....	3
Work Platform buildout .....	3
Western Waste Stockpile area .....	3
Free Liquid Removal and Berm Installation.....	3
Waste Solidification – Waste Transfer .....	3
Existing Liner Removal .....	4
Liner Installation .....	4
Timeframe.....	4
Pricing .....	5

## **BACKGROUND**

Clean Harbors Environmental Services (CHES) has developed the following work plan to perform solids removal and new liner installation at the Emergency Lagoon at the Former ALT-EN Ethanol Plant located at 1344 County Road 10 Mead, NE. This work plan is in accordance with a directive provided by the Client representative of Bayer AG.

The scope of work identifies an Emergency Lagoon area approximately 140 feet x 700 feet in size. Within the area of containment is estimated to be 18,000 CY to 25,000 CY of waste (process waste water and cow manure). The following scope of work is to be completed by at the direction Bayer AG.

- Removal of all free liquid from the Emergency Lagoon, and treat in the treatment system on-site
- Solidify the remaining solids in the Emergency Lagoon.
- Transfer the solidified waste to the Western Waste Containment area.
- Remove the existing liner in the Emergency Lagoon.
- Install new 60 mil liner in the Emergency Lagoon.

## **WORK SCOPE**

CHES will utilize one (1) Project Manager and one (1) Site Foreman for the overall management of this task. The other on-site personnel will consist of five (4) Equipment Operators. The following equipment will be mobbed for the completion of this task.

- One (1) skid steer loader with attachments.
- Two to Three (2-3) Haul trucks
- Two (2) Excavators
- One (1) Dozer
- One (1) Front end loader
- One (1) Vacuum truck
- Various pumps and hosing as required



## **SEQUENCE OF WORK**

### **WORK PLATFORM BUILDOUT**

CHES will construct 1-2 working pads from clean fill in the southeast and southwest corners of the Emergency Lagoon. These pads will be placed along the slopes of the pond to allow a level access area for the vacuum truck, haul truck, and excavators. This will be the base of the operation for the free liquid removal and solidification in emergency lagoon.

### **WESTERN WASTE STOCKPILE AREA**

CHES will utilize the dozer and one of the excavators to work on the Western Waste Stockpile. The existing wind rows of waste will be re-stacked and moved to consolidate space. This will allow additional space for the Emergency Lagoon waste to be placed there. CHES will ensure the berms around the Western Waste Stockpile are maintained during the entire waste transfer.

### **FREE LIQUID REMOVAL AND BERM INSTALLATION**

CHES will utilize the on-site vacuum truck, and additional pumps as needed, to remove as much free liquid as possible from the Emergency Lagoon. The liquids removed from the Emergency Lagoon will be transferred to the on-site treatment system. As the free liquid is drawn down in the pond, CHES to use the excavator to bring some backfill material into the lagoon to create a berm barrier. This berm will act as a separation weir as the solidification begins.

### **WASTE SOLIDIFICATION - WASTE TRANSFER**

CHES begin processing the sludge material in the eastern side of the Emergency Lagoon. The excavator will turn over the sludge material to aid in the drying process. CHES will add in a drying agent, such as wood power pellets or a calcium agent, to help dry the material in the eastern side of the pond. For the purposes of this work plan, CHES assumes a total of 250 tons of the wooden power pellets to be added to the waste volume. This quantity of drying agent may be adjusted based on performance during the work scope.

As the solidification process continues, the free liquids will be moved into the western side of the Emergency Lagoon. The vacuum trucks and pumps will remove the free liquid from the western side as needed. Once the waste is dry enough to transport and stockpile, the excavator and/or front-end loader will load the haul trucks on the work platform. The haul trucks will transfer the

solidified wastes to the Western Waste Stockpile. The excavator and dozer will continue to stockpile and manage the waste that is brought into this area.

During this solidification process, CHES will continually move sludge from the western side of the Emergency Lagoon into the western side. This will continue until all reasonable sludge can be removed from the liner.

## **EXISTING LINER REMOVAL**

CHES will begin removal of the existing Emergency Lagoon liner by cutting along the top of the berms. The liner will be cut and sized into smaller and manageable pieces. These liner pieces will be loaded into the haul trucks, and placed in the Western Waste Stockpile, or another area designated by Bayer AG. Once the liner has been removed, CHES will evaluate the bottom and sidewalls of the Emergency Lagoon and determine if any areas need to be addressed further (i.e. regrading, compaction, etc.)

## **LINER INSTALLATION**

CHES personnel and subcontractors will install a new 60-mil liner over the Emergency Lagoon. For the purposes of pricing, Clean Harbors assumes an area of roughly 60,000 square feet will need to be covered. CHES will begin by cutting in a 1 foot by 1 foot anchor trench around the top of the berm with the excavator. Geofabric (similar to what was used on the tank farm) will be placed down on the slopes and lagoon floor. 60-mil liner will then be placed along the slopes and lagoon floor and secured within the anchor trench with imported fill.

## **TIMEFRAME**

CHES anticipates the overall project would be completed in approximately 5 weeks. Below is a breakdown of each task:

- Emergency Lagoon and Western Waste Area Preparation work: 2 days
- Lagoon water and sludge removal: 19-20 days
- Existing liner removal: 3 days
- New liner installation 5-6 days



## **APPENDIX E**

### **LAND APPLICATION**

January 7, 2022

Tom Buell  
Monitoring and Remediation Division Administrator  
Nebraska Department of Environment and Energy  
PO Box 98922  
Lincoln, NE 68509-8922

**Subject:      Land Application Proposal  
                  AltEn Facility  
                  Saunders County, Nebraska**

Dear Mr. Buell:

On behalf of the AltEn Facility Response Group, please find attached the revised land application proposal providing background, proposed procedures and requirements for applying filtered water from the Facility onto farmland.

Sincerely,



Donald Gunster  
Partner/Senior Scientist

Enclosure



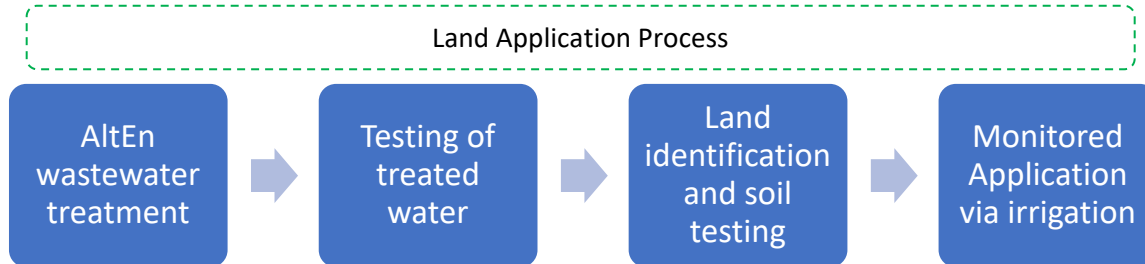
## Proposed Land Application Approach for Management of Water from AltEn Site

### Executive Summary:

A primary goal of current efforts at the AltEn site is to effectively manage water contained in the site's lagoons. The Facility Response Group's proposed plan to meet this goal is to filter the AltEn water and then land apply it at nearby agricultural fields. The plan utilizes a treatment process to significantly reduce pesticide residues and organic material present in AltEn water. The treated AltEn water is proposed to be used as agricultural irrigation water, similar to past practices in the area as well as throughout the state. The approach would place any trace pesticide residues into an agricultural system where the pesticide active ingredients are potentially already used or have registrations for comparable uses, and allow uptake of the nutrients present in the treated AltEn water by crops present.

The proposed thresholds for pesticides residues remaining in the water would be 10% or less of typical US EPA approved uses of the individual active ingredients that can be applied to a crop and would be consistent with those that can result from typical conventional farming practices. Application of the treated water would be intended to have no adverse consequences for crops, the soil, and the subsequent agricultural crop other than as a source of water and nutrients and would allow harvest and utilization of the crop as would normally occur. This approach is protective of the crop, agricultural lands, the environment, and people, as it accounts for approved uses and is based on US EPA scientific assessments of the safety of the individual active ingredients.

The figure below describes the high-level steps proposed as part of the interim action, with more detail included in the document's latter section.



## **Proposed Land Application Approach for Management of Water from AltEn Site**

### **Background on pesticides found at AltEn's site:**

Each pesticide product undergoes thorough evaluation at the federal and state level prior to use, driven by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA; a brief overview of FIFRA and pesticide registration is provided in Appendix A). Federal and state regulators conduct thorough evaluations of the environmental fate and degradation profiles, toxicology and ecotoxicology studies for each compound to determine uses and application rates that pose acceptable risk to humans and the environment. Regulatory data and decision documents were used as part of our analysis as we compiled the proposal herein.

We have reviewed treated water analytical data and the associated seed treatments used on seed by member companies in the relevant time period and have identified the active ingredients listed on Table 1 as the focus for the assessment. In addition, several pesticides which are not used as seed treatments (e.g., herbicides) have been detected in water at the AltEn site and will be considered for inclusion in the focused analyte panel.

The focused analyte panel is intended to be utilized for design of land application. We propose that land application compliance will be based on the focused analyte panel in treated water. The focused analyte panel targets analytes that present the greatest potential presence in treated water or implications for pesticide environmental loading in agricultural systems. Analytes that are part of the focused analyte panel are those that have been detected in treated water plus others that could be expected to be present. Factors that raise the expectation that an analyte could be present are:

- Consistent and high (i.e., greater than 75% frequency of detection and greater than 1000 parts per billion [ppb] average detection) levels of detection in baseline testing of untreated material on site.
- Analytes which are consistently present (greater than 75% frequency of detection) in baseline testing of treated water, particularly if near or above threshold levels proposed.
- Analytes which have increased persistence in the environment.
- In addition to the above considerations, we expanded the panel to include analytes which may have unique or specific considerations when used in agricultural systems, in an effort to be conservative and protective of human health and the environment. This may include:
  - Greater potential for risk to non-target organisms
  - Unique exposure reduction or handling requirements (e.g., greater than standard PPE, gloves, long sleeves/pants, closed footwear)
  - The analytes are also reflective of current seed treatment and seed treatment practices, and those probable to be present at the AltEn site (i.e., those analytes used within the past 5 years and representing more than 95% of the corn seed present on the AltEn site).

Data used to inform this final list are summarized in Appendix B.

Proposed Land Application Approach for Management of Water from AltEn Site

Table 1: Overview of information and sample labels related to the active ingredients used as seed treatments on corn or identified at the AltEn site

Pesticide	Pesticide Group (e.g., FRAC, IRAC, HRAC)	Link to US EPA and IUPAC <sup>a</sup> review summaries	Detected at AltEn?	Registered use on corn?	Sample Seed Treatment Uses				Sample Foliar/Other Uses							Sample Label Information			Proposed threshold for single application (grams/acre)	Proposed threshold for total annual in-crop application (grams/acre)
					Example reference label	Example trade name	Corn use on label?	Single Application Seed Treatment (grams/acre) <sup>b</sup>	Example reference label	Example trade name	Corn use on label?	Chemigation use on label?	Other relevant uses on label (see Appendix C for crops relevant to Nebraska)	Max single application (grams/acre)	Max annual application (grams/acre)	Acceptable Crop Rotations after application	Grazing Restrictions	Re-entry interval following application		
Abamectin CAS number 71751-41-2	6-I	<a href="#">Abamectin EPA Summary</a>	Yes	Yes	100-1399	Avicta Complete	Yes	5.5	100-1351	Agri-Mek SC	No	Yes	Soybean, Potato, Sweet Corn	8.6	17.3	Corn, Soybean, Cereals, Potato, Alfalfa	Do not graze treated crop	12 hours	1.1	2.2
Azoxystrobin CAS number 131860-33-8	11	<a href="#">Azoxystrobin EPA summary</a> <a href="#">Azoxystrobin IUPAC summary</a>	Yes	Yes	100-1399	Avicta Complete	Yes	0.1	100-1098	Quadris/Quilt	Yes	Yes	Soybean, Cereals, Potato, Alfalfa, Sweet Corn	113.4	908.0	Corn, Soybean, Cereals, Potato, Alfalfa	0 – 14 days after application on relevant crops	4 hours	11.30	22.6
Chlorantraniliprole CAS number 500008-45-7	28-I	<a href="#">Chlorantraniliprole EPA summary</a> <a href="#">Chlorantraniliprole IUPAC summary</a>	Yes	Yes	352-841	Lumivia	Yes	18.8	352-729	Coragen	Yes	Yes	Soybean, Cereals, Potato, Alfalfa, Sweet Corn	44.5	90.8	Corn, Soybean, Cereals, Alfalfa, Potato	14 days PHI, grazing not specifically defined	4 hours	4.45	8.9
Clothianidin CAS number 210880-92-5	4A-I	<a href="#">Clothianidin EPA summary</a> <a href="#">Clothianidin IUPAC summary</a>	Yes	Yes	7969-458	Poncho 600	Yes	12.5	59639-150	Belay	No	Yes	Soybeans, Potatoes	45.4	90.8	Corn, Soybean, Cereals, Potato, Alfalfa	Do not graze treated crop	12 hours	2.5	5.0
Fluoxastrobin CAS number 361377-29-9	11	<a href="#">Fluoxastrobin EPA summary</a> <a href="#">Fluoxastrobin IUPAC summary</a>	Yes	Yes	264-1169	Acceleron D-281	Yes	4.1	66330-64	Evito 480 SC	Yes	Yes	Soybeans, Potatoes, Wheat, Sweet Corn	81.7	163.4	Corn, Soybean, Cereals, Potato, Alfalfa	Up to 23 days after application (sweet corn)	12 hours	8.17	16.3
Imidacloprid CAS number 138261-41-3	4A	<a href="#">Imidacloprid EPA Summary</a> <a href="#">Imidacloprid IUPAC Summary</a>	Yes	Yes	264-968	Gaucho 600 Flowable	Yes	33.5	264-827	Admire Pro	No	Yes	Soybeans, Potatoes	21.2	227.0	Corn, Soybean, Cereals, Potato, Alfalfa	21 days PHI, grazing not specifically defined	12 hours	6.7	13.4
Glyphosate CAS number 1071-83-6	9-H	<a href="#">Glyphosate EPA summary</a> <a href="#">Glyphosate IUPAC summary</a>	Yes	Yes	N/A	N/A	N/A	N/A	524-537	Roundup PowerMAX II	Yes	No	Soybeans, Alfalfa, Sweet Corn, Wheat	624.3	3308.5	Corn, Soybean, Cereals, Potato, Alfalfa	7 days after application	4 hours	62.43	124.9
Metalaxyl/Mefenoxam CAS numbers 57837-19-1 and 70630-17-0	4	<a href="#">Metalaxyl EPA Summary</a> <a href="#">Metalaxyl IUPAC Summary</a> <a href="#">Mefenoxam EPA Summary</a> <a href="#">Mefenoxam IUPAC Summary</a>	Yes	Yes	100-1399	Avicta Complete	Yes	0.1	100-1202	RidomilGold SL	No	Yes	Soybean, Potato, Alfalfa	283.8	283.8	Corn, Soybean, Cereals, Potato, Alfalfa	60 days after application (alfalfa)	48 hours	14.2 <sup>c</sup>	28.4
Prothioconazole CAS number 178928-70-6	3	<a href="#">Prothioconazole EPA summary</a> <a href="#">Prothioconazole IUPAC summary</a>	Yes	Yes	264-825	Proline480 SC	Yes	8.1	264-1093	Stratego YLD	Yes	Yes	Soybean, Wheat, Potato, Sweet Corn	18.6	37.2	Corn, Soybean, Cereals, Potato, Alfalfa	No restriction for corn, 30 days for barley/ wheat	12 hours	1.86	3.7
Sedaxane <sup>d</sup> CAS number 874967-67-6	7	<a href="#">Sedaxane EPA Summary</a> <a href="#">Sedaxane IUPAC Summary</a>	Not on original panel	Yes	100-1374	Vibrance	Yes	2.5	N/A	N/A	N/A	N/A	No foliar crops	0.0	12.0	Corn, Soybean, Cereals, Potato,	No restrictions on ST label	12 hours	0.51	1.0

Proposed Land Application Approach for Management of Water from AltEn Site

																Alfalfa (based on ST)				
Tebuconazole CAS number 107534- 96-3	3	<a href="#">Tebuconazole EPA summary</a> <a href="#">Tebuconazole IUPAC summary</a>	Yes	Yes	42750- 130	TebuStar 250 ST	Yes	1.0	264-849	Absolute MAXX	Yes	Yes	Wheat, Sweet Corn	46.4	92.8	Corn, Soybean, Wheat, Alfalfa, Potato	30 days (wheat)	12 hours	4.64	9.3
Thiabendazole CAS number 148-79-8	3	<a href="#">Thiabendazole EPA summary</a> <a href="#">Thiabendazole IUPAC summary</a>	Yes	Yes	100-1399	Avicta Complete	Yes	1.3	N/A	N/A	N/A	N/A	Post-harvest uses on carrot, citrus, potato, pome fruit, and ornamental bulbs and corn <sup>e</sup>	0.0	68.0	Corn, Soybean, Cereals, Potato, Alfalfa	No Restriction	12 hours	0.26	0.52
Thiamethoxam CAS number 153719- 23-4	4A-I	<a href="#">Thiamethoxam EPA summary</a> <a href="#">Thiamethoxam IUPAC summary</a>	Yes	Yes	100-1399	Avicta Complete	Yes	12.5	100-938	Actara	No	Yes	Potatoes	28.4	56.8	Corn, Wheat, Potato, Soybeans, Alfalfa	No grazing of cover crops	12 hours	2.5	5.0

<sup>a</sup> IUPAC summary reference: Lewis, K.A., Tzilivakis, J., Warner, D. and Green, A. (2016) An international database for pesticide risk assessments and management. Human and Ecological Risk Assessment: An International Journal, 22(4), 1050-1064. DOI: 10.1080/10807039.2015.1133242

<sup>b</sup> Based on 25,000 seeds planted per acre, and 1680 corn seed per pound, following recent US EPA seed treatment product risk assessments.

<sup>c</sup> Single application limit set based on 5% of foliar rate vs 20% seed treatment rate due to very wide variance between foliar application rates and seed treatment rates for Metalaxyl/mefenoxam

<sup>d</sup> Within the Syngenta portfolio, multiple SDHI pesticides have been developed that offer complementary benefits and disease control. Although the safety profile for sedaxane could support foliar uses, this active ingredient was determined to be better positioned as a seed treatment. In addition, while plans to test for sedaxane in the analyte panel are being developed, finding analytical labs with this testing capability has proven difficult.

<sup>e</sup> When thiabendazole was registered by Merck, there were foliar applications on the label (e.g., sugar beet, soybean, wheat, rice, and dry beans). After the acquisition of Merck, Novartis (then Syngenta) had developed and were developing many new and highly effective fungicides (strobilurins, triazoles, SDHIs) that were better suited than thiabendazole for foliar uses. Although the safety profile for thiabendazole could support foliar uses, since 1998, the thiabendazole uses have been focused on the seed treatment and post-harvest markets.



**Proposed Land Application Approach for Management of Water from AltEn Site**

Explanatory description of Table 1:

Table 1 provides an overview of sample labels for pesticide active ingredients that are on the focused analyte panel. This table is intended to provide examples of characteristics or considerations from the sample labels associated with formulated products which have undergone rigorous regulatory scientific reviews by U.S. EPA. Information included such as maximum use rates, or restriction from product labels are specifically for the products’ use as a pesticide at the labeled rate and following label instructions and mitigations as applicable. Labeled rates reflect the amount of product a pesticide applicator would apply for the purposes of managing pests or disease on a farmer’s field or a homeowner’s lawn and which are many times higher than the trace amounts that may be present following treatment of the water at the AltEn site. The overview table is intended to provide context for land application guidance of treated lagoon water, which may have unique mixtures of trace levels of pesticides, but not restricted by them as the land application is not a labelled pesticide application. We propose the following mitigations following treated water application which consider representative pesticide labels and are protective of human health and the environment:

- 1. Re-entry interval following treated water application – 12 hours
- 2. Grazing restrictions – no grazing for 14 days on land that has received treated water; follow applicable label restrictions if in-season pesticide applications are made
- 3. Acceptable crop rotations – corn, wheat, potato, soybeans, alfalfa

## **Proposed Land Application Approach for Management of Water from AltEn Site**

**Background on AltEn site:** Water utilized in AltEn ethanol production processes and surface storm water is currently held in storage lagoons and tanks on the AltEn site. This water contains pesticide residues derived from treated seed used in AltEn's ethanol production. In addition, there are some herbicide residues in the water, potentially as a result of vegetation control around the water storage lagoons. The water also contains high nutrient levels due to the presence of manure at the AltEn site. The addition of expired beverages (alcohol and soda) and industrial/food grade starch have unknown contribution to the byproduct material or residues present.

The total untreated water volume currently held on the AltEn site (three primary lined lagoons and the emergency lagoon) exceeds 150 million gallons. The water has accumulated over multiple years of AltEn operations; additional water has been added from on-site storm water collection and recent equipment cleaning by AltEn. Additionally, the leakage of up to 4 million gallons of thin stillage/manure from a digester unit in the late winter of 2021 and the subsequent collection of this water and affected ice have added to the volume held on site.

Although there is likely some ongoing natural degradation of the pesticide components in the stored lagoon water from exposure to sunlight (photolysis), microbial activity (biodegradation), and interaction with water (hydrolysis), these processes are not sufficient to clear the water of the components in a reasonable timeframe. Filtration units have been used to assist in the removal of the pesticides and organic material. Initial site stabilization efforts have treated a substantial volume of water to date, which is currently held in temporary tanks pending construction of a pond for winter storage. The water treatment units have been highly effective in removing pesticides.

Historically, AltEn obtained permits from NDEE to enable the discharge of water from the plant operation. The historical permit and best management plans provide insight on previous permit requirements.

The following is a proposal for the disposition of the treated water to facilitate lagoon stabilization in advance of further site response activities.

### **Proposed Disposition of Treated Water:**

Use as irrigation water is currently the only known disposition for treated water from the AltEn lagoons containing nutrients and potentially trace pesticide residues. Treated irrigation water would be applied by irrigation systems to field corn production, fallow, or post-harvest fields on land in relative proximity to the AltEn site, using an existing irrigation water distribution system or temporary transfer piping. The utilization of the treated water in these situations would allow uptake of the nutrients present in the water by the corn or other vegetation, while placing any pesticide residues into an agricultural system where the pesticide active ingredients have registrations for comparable uses. The proposed application of the treated water would be intended to have no consequences for the corn crop other than as a source of water and nutrients and would allow harvest and utilization of the crop as would normally occur.

Based on treated water testing for pesticide active ingredients, as well as evaluation of approved uses, any pesticide residue introduced to the agricultural system through land application of treated water would be consistent with application rates that can result from typical current farming practices utilizing labelled pesticide applications. Specifically, concentrations of the focused analyte panel in treated water

## Proposed Land Application Approach for Management of Water from AltEn Site

samples collected in accordance with SOP-4 (Standard Operating Procedures; Appendix E) will be multiplied by the volume of water applied and divided by the area receiving the water to determine grams per acre of active ingredient. Design to ensure Table 1 thresholds are not exceeded will be performed prior to application, and verification of volumes and grams per acre applied will be performed at least monthly. These evaluations will be performed on a field-by-field basis.

**Analyte Target Filtration Level:** Raw water held in the AltEn storage lagoons will be treated on-site to remove pesticide residues to the lowest practical levels (based on analyte-specific detection limits) for pesticides identified in Table 1. The Facility Response Group will sample treated water to support land application as described above. Lagoon sampling may be performed for other purposes, but no future sampling of untreated lagoons is proposed to support land application.

- **Focused Analyte List** - The list of analytes for design of land application is primarily based on those present in treated water, and the seed treatment active ingredients identified as being applied to seed delivered to AltEn by feedstock suppliers. Other pesticides identified in initial screening analytical suites utilized to assess material connected to the AltEn site were also considered. Analytes were grouped into families or modes of action to consider cumulative environmental impacts. Degradants or metabolites of concern for a pesticide compound, as determined by US EPA, were considered during development of the analytical suite. The focused analyte list is focused on key analytes identified as having high initial levels of detection in on-site material, increased potential for presence in treated water or greater implications for pesticide environmental loading/impact/persistence in agricultural systems. The utilization of a focused analyte suite enables more efficient testing processes while assessing analytes that have the greatest potential to be present or have a potential impact in the environment. Level of detection for each analyte listed in Table 1 will be communicated to NDEE and will be based on the validated relevant analytical methods and associated detection and quantification limits relevant for the filtered/treated water and threshold context. Total pesticide concentration is defined as dissolved plus sorbed pesticide residues from treated water.
- **Analyte Thresholds** - For each chemical in the focused analyte list, a proposed threshold level was determined to allow use as irrigation water in field corn production or application to post harvest agricultural land. To be further protective of human health and the environment, threshold targets are proposed for each active ingredient that are a fraction of the US EPA-approved application rates for the pesticides and reflect a margin of safety of at least 10X based on US EPA scientific reviews. The threshold targets for an active ingredient will be proposed for a single irrigation application and cumulative total amounts for a crop production cycle. Single irrigation application thresholds will be based on US EPA-approved application rates for corn that represent 10% of foliar rates (20% of seed treatment rates if no foliar rate for corn is established for the active ingredient). Individual active ingredient thresholds may be set at higher rates than guidance above where the maximum allowable annual usage is significantly higher than 10% of foliar rate or 20% of the seed treatment rate, as is the case with metalaxyl. However, the higher rates will not exceed 50% of the foliar rate. Additionally, the combined total of a family grouping (mode of action) will not exceed 200% of the cumulative thresholds. For example, if a family grouping has 3 active ingredients and 2 are detected at their established thresholds, the third active ingredient could not be detected (e.g., 100% + 100% + 0% = 200%).

## Proposed Land Application Approach for Management of Water from AltEn Site

This approach will ensure that cumulative applications of active ingredients belonging to a family grouping will remain below levels that are protective of human health and the environment. A second threshold will be set for the total active ingredient that can be applied in irrigation water in a crop production cycle and will be based on 2X the single application threshold. Appendix D describes an example lookup table for allowable pesticide active ingredient concentrations per application of each acre-inch of water (102,736 liters). Thresholds for degradates or metabolites for a pesticide identified as potentially presenting increased risk are included in the analytical suite and do not exceed the threshold for the pesticide from which it was derived. Ensuring that application rates of focused analytes in treated water are a fraction of US EPA approved application rates provides assurance that this proposal is protective of human health and the environment.

- **Threshold Equivalence** - The comparison to US EPA registered labels is intended to assess existing application methodology, rates, or use patterns to ensure the proposed irrigation application of treated water is within the scope of scientific assessments conducted as part of US EPA reviews for registration for agricultural use. The comparison to US EPA registered labels is not intended to suggest applications would be for any pest control purposes as any residues remaining in the treated water would not reflect a specific registered product or provide such benefit. The equivalence-based method will ensure that where analytes are present at very low levels, they have already been assessed for safety and environmental impact in corn production or presence in agricultural environments. The proposed threshold rates were derived to ensure that any remaining residues in water do not represent a significant addition to the environmental loading or potential crop residues allowed through approved corn pesticide use. The proposed thresholds for individual analytes are intended to accommodate variability in filtration system processes, inconsistent residue levels in untreated water, analytical variability, and to enable expedited reduction in the overall pesticide residues present at the AltEn site while minimizing environmental risks through use of the treated water in an agricultural system where the pesticides would already potentially be present from approved uses.

**Nutrient and Water Quality Target Level:** Raw water held in the AltEn storage lagoons will be treated on site to remove organic and other materials (in solid or flocculated form) resulting in some reduction in total nutrient composition. The filtration process is not expected to remove all nutrients or affect general water quality parameters that need to be considered in establishing land application guidelines. To address these aspects and to ensure adequate soil and surface water protection (as specified by NDEE) for non-pesticide components in the treated water, the analytical suite will also include the following parameters:

BOD5 (parts per million, ppm)	Nitrite (ppm)	Total Kjeldahl Nitrogen (TKN)
Nitrates (ppm)	Phosphorus	Total Organic Carbon (TOC)
Ammonia (ppm)	Selenium	Total Suspended Solids (TSS)
pH	Sodium Adsorption Ratio (SAR) and Electrical Conductivity (EC)	Total Dissolved Solids (TDS)



## Proposed Land Application Approach for Management of Water from AltEn Site

Treated water application rates will be developed in consultation with crop nutrient and irrigation experts (certified agronomists) to ensure individual land applications are made in consideration of land/soil type, existing nutrient/soil profiles, crop production practice, irrigation systems and any other factors that may be deemed critical to minimize environment or crop impacts and meet Nebraska irrigation water requirements.

**Field Irrigation Requirements:** Fields identified to receive treated water applications from the AltEn site will be assessed for suitability for water holding and nutrient management as per the revised AltEn, LLC - Best Management Practices Plan prepared in draft form by Nutrient Advisors of West Point, NE. The Facility Response Group is negotiating with landowners in the vicinity of AltEn lagoons and will update the Best Management Practices (BMP) Plan when landowners have completed participation agreements. Participation agreements will require disclosure of historical applications of material from AltEn by landowner/operator. The extent of land being considered for potential outreach and negotiations is within three miles of the center of the AltEn lagoons (Figure 1), as more-distant fields would be cost prohibitive for the large volume of water.

The BMP Plan focuses on nutrient requirements and avoiding sodium impacts, while staying within the maximum annual applied grams per acre for each analyte listed in Table 1. The table reflects labeled uses and summarizes plant back restrictions. The BMP Plan will be finalized and implemented by professional agronomists in collaboration with the landowners. The BMP Plan for each field will describe history of receiving material from the AltEn facility (lagoon water or wetcake, for example), general description of in-season pesticide use, and data as well as box-and-whisker plots from pre-application soil sampling.

BMP Plans must be submitted to NDEE for review and approval prior to land application to that field. Any cover crops for the post-harvest land application period will have low attractiveness rating to pollinators.

During land application, the Facility Response Group will work with agronomists and crop advisors to monitor the rate of land application (acre inches per management unit), moisture status of the soil, and crop response. Rates of land application will depend on the infiltration and percolation rate, weather, nutrient demands and sodium loading limits, and will not exceed the annual pesticide loading rates listed in Table 1. Implementation of the BMP Plan will include appropriate record keeping and annual reporting to applicable agencies.

### Land suitable for application of treated water by irrigation

- **Agricultural land in annual crop production:** This would include any land currently producing an annual crop which is actively growing, utilizing water and nutrients. Field corn is the preferred crop for application of the treated water due to a large percentage of acreage in the area and the high utilization rate of water and nutrients. In addition, pesticide residues which may potentially be present in the treated water are primarily derived from corn seed treatment uses, therefore are already assessed for use in this crop. The application of the treated water in field corn production will efficiently allow nutrients present in the water to be utilized by the corn, extracting a valuable resource, while limiting the potential for movement off-field and will place any trace pesticide residues into an agricultural system where the products are already present or potentially used. The proposed application of the treated water would be intended to have

## Proposed Land Application Approach for Management of Water from AltEn Site

no consequences for the corn crop in production other than as a source of water and nutrients and would allow harvest and utilization of the crop as would normally occur. Any pesticide residue introduced to the agricultural system on the land would be consistent with those that occur in typical current farm practices utilizing labelled pesticide applications. Typical timing of pest management is at planting via treated seed, early season application for weed management or insect pest management, and later season for disease or insect management as needed and based on agronomics of the crop. Trace levels of pesticides that may be present in the treated water would be a fraction of a labeled application rate and will not provide any pest control value nor effect planned rotational crops (see Table 1 for crop rotation information). Other annual crops could be utilized for irrigation for the treated water once adjusted for the typically lower nutrient utilization and assessment for labelled use of pesticides detected in the treated water.

- **Agricultural land in post-harvest status from annual crop production:** This category includes any land where an annual crop has been harvested and the land is being prepared for the next planting of a crop. The application of treated water to the land would be intended to prepare the next crop with soil moisture and nutrients. Applications rates of treated water would be determined by the water holding capacity of the soil and nutrient needs of the planned crop. The preferred crop for planned planting should be consistent with those typically following field corn (see Table 1 for crop rotation information), as any trace pesticide residue present in the treated water would be a fraction of labeled rate typically used in conventional annual field corn crop agricultural systems and would present no consequences for a typical rotational planted crop or to human health and the environment. Overall, the trace levels of pesticide residues potentially present in treated water would be a fraction of labelled rates typically used in agricultural systems and the cumulative contribution to pesticide residues present in a typical field would not have any impact on human health or the environment.
- Land considered for application falls within Lower Platte North Natural Resource District (NRD). Soil conditions, mapped setbacks for surface water and other features, and crop nutrient demands will be described in the final BMP Plan when landowner participation agreements are finalized. Timing for application will align to NRD requirements, balancing factors such as benefits of cover crops, soil temperature, and general weather (i.e., freezing temperatures).

The following are proposed requirements for target application fields to receive treated water from the AltEn site:

- **Land Management and Selection** – The pesticidal active ingredients found in the wastewater at AltEn have been registered for use in the US and on crops in the state of Nebraska since the early 2000s. These products have been used in Nebraska since that time, and therefore may be present at low levels in soil and surface water. Land selection and management must ensure:
  - a. Areas that may be prone to overland water movement have tillage, berms, or other features to prevent any excess irrigation water from flowing off the application area. In no instance shall slopes exceed 12 degrees.
    - For fields that have tile drainage systems installed, the irrigation applications rates must ensure water holding capacity is not exceeded during irrigation which may allow drainage from the tile system. Treated water will not be applied to fields with

## **Proposed Land Application Approach for Management of Water from AltEn Site**

tile drains that do not have an actively growing crop or cover crops, unless other protections are present.

- a. Fields must not have seasonal or permanent bodies of water located within the treated water application area.
- b. Fields must have an analysis of soil quality, texture and structure for assessment of water holding capacity and potential for leaching and impacts of any water quality aspects (e.g., salt) of the treated water. Standardized multi-aliquot, composite soil sampling protocols will be followed to account for variability across a field.
- c. Fields will have analysis of nutrient levels post-harvest to facilitate nutrient loading assessment and planning. Soil sampling procedures to determine nutrient and salt content are described in SOP-2 (Appendix E). The Facility Response Group will comply with the Lower Platte North NRD requirements for nutrient management, and may repeat soil nutrient sampling in spring to verify nutrients were retained over winter, if requested by NDEE on a field-by-field basis.
- d. Land owners/managers will be required to disclose if the land being considered for selection has previously had water or wetcake from the AltEn site applied.
- e. Soil samples will be collected from fields proposed for land application, and the samples will be analyzed for pesticide residues in candidate fields. Soil sampling procedures to determine pesticide content are described in SOP-3 (Appendix E). Soil pesticide analysis limitations and proposed use of soil data are presented below.

### **Limitations of Testing for Soil Pesticide Residues**

The land in typical conventional agricultural systems would be expected to have detections of pesticide residues, but detections of specific pesticides and levels are anticipated to be variable and dependent on a number of factors.

Different conditions or practices in the field can influence potential pesticide soil residues and have a significant impact on the variability of individual sample test results. These factors include, but are not limited to:

- Temporal and spatial variability in the levels of a pesticide applied to individual fields based on management practices.
- The extraction efficiencies and matrix interferences can be very complex for soil, contributing to an increased level of variability in pesticide detections in soil.
  - o Testing methods for treated water are less complex and prospective sources of variability (i.e., extraction efficiencies, matrix interferences) are far fewer than those required for soil matrices, reducing variability and increasing the precision and accuracy of results.
- Management practices implemented by the grower that influence degradation of pesticides present, which can include tillage practices, crop rotational practices, soil amendments, irrigation practices.
- Pest management practices during crop production that will introduce pesticides to the agricultural environment present in the soil. The type, rate and timing of the pesticide application will all have an influence on levels potentially detected in soil residue testing at a given time. For example, pest management practices that occurred at higher rates and/or just prior to sampling would be anticipated to result in higher detection levels

## Proposed Land Application Approach for Management of Water from AltEn Site

compared to sampling conducted weeks or months after the application. Additionally, if a grower tends to utilize a specific pest control product more frequently, this could contribute to higher detection levels compared to other products. As pest management practices can occur at various points in the crop protection season, residue levels will vary accordingly over the year as pesticides are introduced and degradation occurs.

- Each pesticide product will have different degradation timeframes and environmental fates which can be influenced by the soil types and environmental factors.
- Environmental conditions present in the field during the year will influence the rate of residue degradation. This can include variables like amount of rainfall, temperature, micro-biome, and ground cover present.
- Soil types will vary significantly from field to field and within a field. The soil types present can influence the rate of residue degradation, adsorption/desorption and detection<sup>1</sup>.
- Organic matter typically controls the degree that pesticides adsorb to soil<sup>2</sup>. Organic matter is highly variable laterally and vertically<sup>3</sup> as well as seasonally<sup>4</sup> in a field. Soil testing for pesticides tends to document organic matter variability and related pesticide sorption, rather than accurately measure pesticide

Concentrations of pesticide residues in soil are a function of the application rate, soil type, microbial activity, weather, and the physiochemical properties of the pesticide. In general, soil pesticide levels will increase following applications and decline over time. If a pesticide is used every growing season, it may be present at detectable levels in subsequent seasons. For example, a 2015 study with clothianidin demonstrated that soil levels of this pesticide reach a plateau after several years of use. Additionally, clothianidin became less bioavailable over time, meaning it was sorbed to the soil and not available for plant uptake<sup>5</sup>.

### Proposed Use of Soil Data

Pesticide results for soil samples collected in accordance with SOP-3 (Appendix E) will be inspected as an application screen for participating fields. For each new proposed field, the Facility Response Group will evaluate results for each chemical in the focused analyte panel by comparing box-and-whisker plots

---

<sup>1</sup> U.S. EPA. Undated. Technical Overview of Ecological Risk Assessment. Analysis Phase: Exposure Characterization. <https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/technical-overview-ecological-risk-assessment-1> [Accessed September 27, 2021]

<sup>2</sup> U.S. Department of Agriculture – Natural Resources Conservation Service, January 1998. Soil Quality Concerns: Pesticides. [https://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs142p2\\_052821.pdf](https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052821.pdf) [Accessed September 27, 2021]

<sup>3</sup> VandenBygaart, A.J. et al. 2007. Assessment of the lateral and vertical variability of soil organic carbon. Canadian Journal of Soil Science. <https://cdnsiencepub.com/doi/pdf/10.4141/CJSS06025>

<sup>4</sup> Wuest, S. 2014. Seasonal Variation in Soil Organic Carbon. Soil Science Society of America Journal. <https://www.ars.usda.gov/ARSUserFiles/6233/seasonalVariationInSoilOrganic.pdf>

<sup>5</sup> Xu, T. et al. 2015. Clothianidin in agricultural soils and uptake into corn pollen and canola nectar after multiyear seed treatment applications. Environmental Toxicology and Chemistry. <https://setac.onlinelibrary.wiley.com/doi/10.1002/etc.3281>



## Proposed Land Application Approach for Management of Water from AltEn Site

showing distribution of results for the 15 discrete soil samples from the new field to such plots for data from all previously reviewed fields, and visually inspecting for consistency. For each chemical, box-and-whisker plots will show the following features of the distribution of results for the 15 discrete soil samples from an individual field under consideration: mean, 1st quartile, 3rd quartile, minimum, maximum. Should visual inspection indicate a distribution of any focused analyte that is likely to be higher than for previously-reviewed fields, statistical techniques will be used to confirm or deny the apparent difference. Statistical technique will be t-test or Mann-Whitney u test. Should this type of evaluation be necessary, the Facility Response Group will propose statistical acceptance criteria to NDEE. NDEE will receive laboratory reports and box plots of all data for soil samples collected in the application screen process, and will receive statistical analysis information, where used. Fields that do not have apparent higher concentrations of any of chemicals from the focused analyte panel will be admitted into the land application program.

- **Treated Water Testing** - Treated water will be tested by an accredited laboratory for the 53 pesticides listed in Appendix B. Testing will also include nutrient and water quality parameters. Results from this testing will be utilized to determine volumes of treated water that can be applied without exceeding agronomic rates (for example calculations based on analytes, refer to Appendix D). Tests shall be completed for each contained storage unit of treated water (~3,000,000 gallons). Each tank is mixed continuously at approximately 1,000 gallons per minute, which is near the physical threshold for safe use of the tanks without creating a whirlpool-like circulation pattern. Field personnel collect a vertical composite sample of the circulating, mixed water from the one safe sampling location on each tank, which is at the permanent access stairs. These stairs are on the northwestern part of Tank 1, the southern part of Tank 2, and the southwestern part of Tank 3. The vertical composite sample is collected using a clean decontaminated 3/4-inch diameter, 10-foot-long polyethylene water core sampler (commonly referred to as a Sludge Judge) to ensure coverage of the entire water column in the circulated tank. From each location, field personnel collected one unfiltered sample and one sample passed through a 0.5-micron filter, then repeated the sampling technique to provide sufficient volume for split analysis at a second laboratory. The response group proposes to use data from samples collected August 5, 2021 to support land application in 2021. Additional composite sampling would be performed from the proposed treated water pond to support land application in 2022.
- **Irrigation Systems** - Treated water from the AltEn site will be contained during delivery to the target field based on the following requirements:
  - a. If applicable, delivery systems will have control systems to prevent backflow into municipal/public water systems or ground water.
  - b. If the delivery pipeline has branch lines, these will be isolated by control valves that have locks or access controls that prevent the valves from being changed.
  - c. Irrigation water delivery systems will be monitored for leaks during any irrigation with treated water.
- **Crop Production** – Treated water from the AltEn site will be applied only to fields that have been assessed to ensure the active ingredient residues detected will not impact existing crops/vegetation cover or existing biodiversity. Preferred options are field corn due to high water/nutrient utilization and corn seed being the primary source of pesticide residues, or post-

## Proposed Land Application Approach for Management of Water from AltEn Site

harvest fields in preparation for annual crop production. To be protective of human health and the environment, all fields will be assessed against the following requirements:

- a. Crops or plants in production/growing should have traits that provide tolerance to glyphosate and glufosinate.
  - b. Annual crops can have standard seed treatment packages, but may not have high-rate application (e.g., corn @ 1250 rate) of neonicotinoid seed treatments.
  - c. Applications of fungicide or insecticides will be documented and reported to ensure these are factored into overall pesticide load within the field. In fields that do not have a crop present during water application, analytical data for the applied water will be used to inform management decisions for future crops to ensure protection of human health and the environment.
  - d. Fertilizer applications (i.e., applications prior to or during planting, or prior to field soil testing conducted in advance of application of the treated water) will be disclosed and factored into the nutrient loading that will result from application of treated water. Total nutrient loading or individual applications during the growing season must not exceed agronomic and Nebraska defined requirements.
  - e. Flowering weeds in treated water application area must be controlled to prevent flowering prior to and during the growing season.
  - f. No honey bee hives or other managed pollinators should be located in immediate proximity (closer than 200 feet) of the field irrigated with treated water.
  - g. No applications of treated water should occur within 30 days prior to harvest.
  - h. Growers will follow all state environmental protection standards applicable to crop production.
  - i. Contracts will be in place with each grower outlining any applicable requirements and provide a transparent disclosure of the treated water quality.
  - j. When post-harvest land in annual crop production is receiving treated water, fall cover crops may be planted. Cover crops must not include flowering plants which could attract pollinators. However, it is important to note that pollinator activity is reduced in October and after a hard frost will be negligible due to a lack of viable flowering plants in the landscape, therefore it is unlikely pollinators will be present in post-harvest or cover crop situations. In addition, the trace levels of pesticides which might be present in treated water will not be translocated into plant tissue at levels that would result in potential risk to pollinators that might be present.
- **Irrigation Management** – Treated water may not be applied in volumes exceeding the soil water holding capacity and safeguards must be in place to prevent applied water from moving off the production field. Water applications will consider crop growth stage, previous precipitation, and agronomic conditions, based on expert advice from certified crop advisors.
    - a. No individual application of treated water can exceed 1 inch during a 1-week period. This will equate to approximately 27,143 gallons of treated water applied per acre irrigated.
    - b. A maximum application of up to 2 inches of treated water can be made during the crop production season. This will equate to approximately 54,286 gallons of treated water applied per acre irrigated. Additional treated water can be applied post-harvest, but

## **Proposed Land Application Approach for Management of Water from AltEn Site**

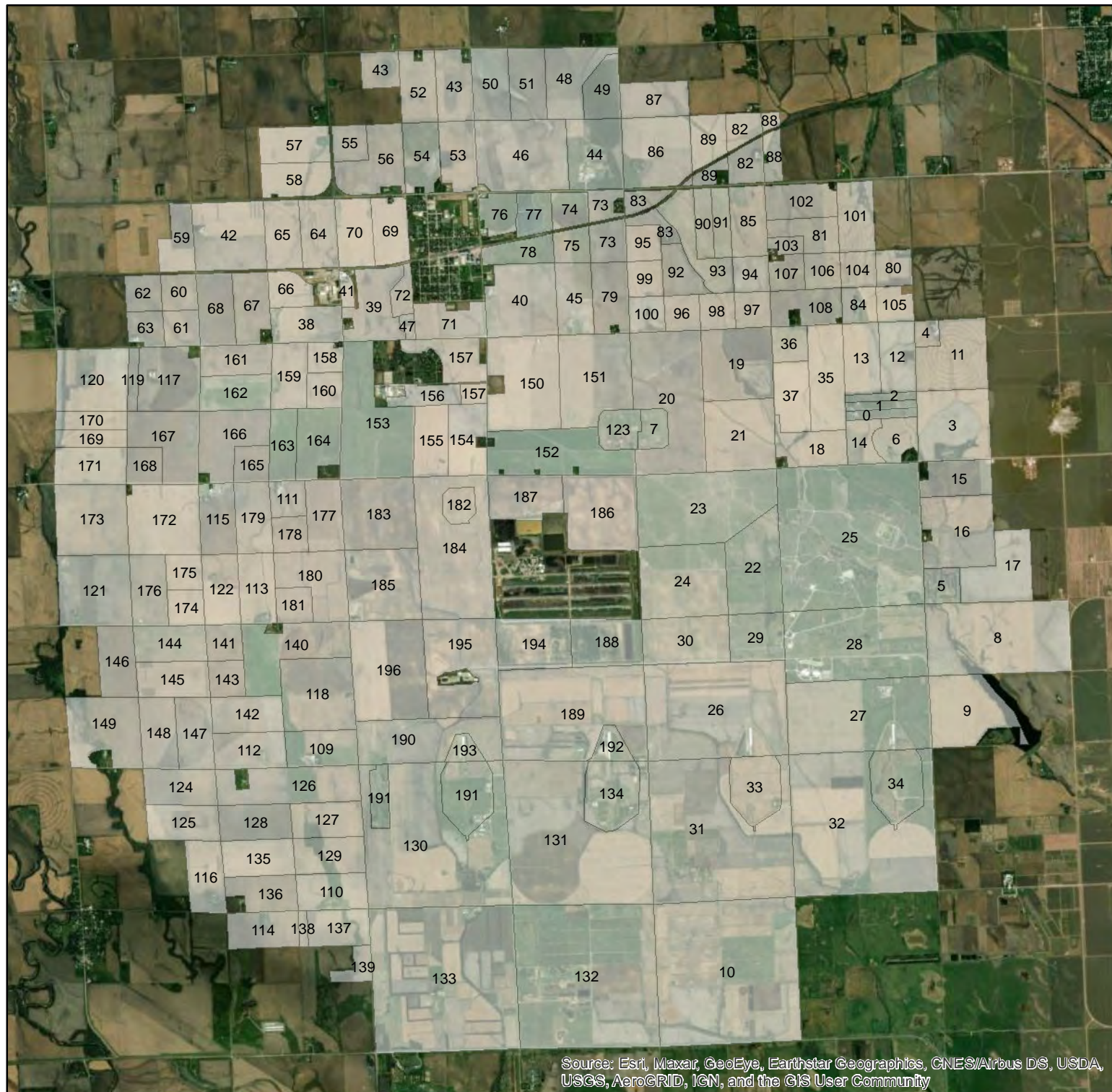
- cannot exceed soil water holding capacities or professional agronomist recommended nutrient levels.
- c. Planned irrigation applications must consider rain events to prevent exceeding the soil water holding capacity and leading to potential surface runoff or ponding.
  - d. Water application should be at volumes/rates that allow for rapid infiltration and prevent the potential for ponding in the field. If ponding is observed, application in that area of the field would cease and rates of application adjusted to prevent ponding in adjacent areas.
  - e. End guns and/or sprinklers must not allow treated water to be applied outside the boundaries of the field or areas not planted for field corn production.
  - f. Treated water application areas require the following setbacks:
    - i. 30-foot vegetative buffer strip to any public right-of-way;
    - ii. 300-foot separation from inhabited dwelling;
    - iii. 300-foot separation from potable water supply well;
    - iv. 1000-foot separation from a community public water supply;
    - v. 200-foot separation from waters of the State.
  - g. Application of treated water may occur for field corn, or post-harvest as applicable, based on advice from certified crop advisors. Application timing will be determined by nutrient levels.

US EPA considers numerous factors impacting a pesticide's environmental fate, including those listed above, in order to ensure approved uses are protective of human health and the environment.

### **Deviations from BMP for Management of Water from AltEn Site**

Deviations from the best management practices for management of water from AltEn site will be reported to the applicable agencies, as required. Although not expected, should actual application rates exceed designed treated water application rates, sampling of the crop will potentially be required to determine compliance with U.S. EPA approved tolerances (e.g., Appendix F).

**Summary:** The proposed land application is intended to be equivalent and consistent with existing agricultural system practices for land in field corn production in the Midwest. The proposed plan is protective of human health and the environment, and would create minimal disruption in normal agricultural practices. The proposed application of treated water is not expected to cause changes in the plant-soil health characteristics or degrade the long-term use of the application area. The primary goal of current efforts at the AltEn site is to effectively manage water (primarily from the site's lagoons), and the proposed plan herein is a critical step toward achieving that goal. This approach is protective of the crop, agricultural lands, the environment, and people, as it accounts for approved uses and is based on US EPA scientific assessments of the safety of the active ingredients.

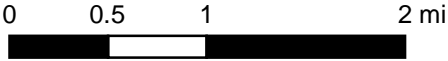



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



# Legend

Parcel within 3-mile radius



<b>Title</b> <b>Parcels within Three Miles of AltEn Site</b>		
<b>Project</b> <b>AltEn Site</b> <b>Mead, Nebraska</b>		
 <div> Two Midtown Plaza  1349 W. Peachtree St., #1950  Atlanta, Georgia 30309  Tel: 404-347-9050 </div>		
<b>Date</b> 09/20/2021	<b>Fig. No.</b> 1	<b>Rev. No.</b> 0



## **Proposed Land Application Approach for Management of Water from AltEn Site**

### **Appendix A – Background on pesticide and treated seed regulation in the US**

The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) requires registration of pesticides with US EPA. Under FIFRA, a pesticide cannot “cause unreasonable adverse effects on the environment,” which is defined as “any unreasonable risk to man or the environment taking into account economic, social and environmental costs and benefits of the use of any pesticide.”

Criteria for pesticide registration include:

- the chemical's composition to warrant the proposed claims for it;
- the chemical's labeling and other material required to be submitted to comply with requirements of the act;
- when used in accordance with widespread and commonly recognized practice, it will not generally cause unreasonable effects on the environment.

Manufacturers must provide test data to the US EPA upon which registration is based, following testing guidelines, which US EPA publishes specifying the kinds of data needed.

Seed treatment products are highly regulated under FIFRA, as are sprayed and soil-applied pesticides. They undergo thorough evaluation by the US EPA, and applicable state agencies, prior to commercialization and periodically thereafter. Only after a seed treatment product is approved by the relevant federal and state agencies, can the product be used per the conditions set by US EPA.

US EPA assesses any potential risks for use of seed treatment products from applying the product and planting the seed (i.e., environmental fate, ecotoxicology, and operator exposures) to the consumption of the harvested commodity by the consumer. US EPA's associated science-based evaluation also considers the application rates, analysis of the quantity “planted per day”, typical seeding/planting rates per acre, etc. All pesticides are subject to review every 15 years to ensure that, as the science advances and/or policies and pesticide use practices change over time, all registered products continue to meet the statutory standard of “no unreasonable adverse effects” on health, safety or the environment.

Under US EPA regulations, 40 CFR §152.25(a), the seeds treated with pesticides are considered “treated articles” if, and only if:

- a. the article contains or is treated with a pesticide;
- b. the pesticide is intended to protect the article itself; and
- c. the pesticide itself is registered for this use by US EPA.

Without this ‘Treated Article Exemption’ designation by US EPA for seed, there would be costly duplication of regulatory effort without any additional benefit to health, safety, or the environment, given US EPA's thorough review of the seed treatment product and its uses.

The Federal Seed Act regulates the labeling, sale, and movement of seed in the U.S., and seed companies must abide by its provisions. The tag on a package of treated seed must include identification of what the seed has been treated with, guidance for safe handling, and other applicable labeling requirements.

## **Proposed Land Application Approach for Management of Water from AltEn Site**

### **Appendix B. Summary of Laboratory Results for Lagoon Water and Treated Water**

1. Summary of Detections in Lagoon and Treated Water
2. Lagoon Water Laboratory Summary Statistics
3. May 24, 2021, Treated Water Laboratory Summary Statistics
4. August 5, 2021, Treated Water Laboratory Summary Statistics (Total)
5. August 5, 2021, Treated Water Laboratory Summary Statistics (Dissolved)

AltEn Site in Saunders County, Nebraska

Summary of Detections in Lagoon and Treated Water

CAS	Chemical Name	Chemical Classification	Pesticide Group (e.g., FRAC, IRAC, HRAC)	In Focused Analyte List	Detected in Lagoon Water	Detected in Treated Water, May 24th	Detected in Treated Water, Aug 5th (Total)	Detected in Treated Water, Aug 5th (Dissolved)
131860-33-8	Azoxystrobin	Fungicide	11-F	Yes	Yes	Yes	No	No
361377-29-9	Fluoxastrobin	Fungicide	11-F	Yes	Yes	Yes	Yes	Yes
57837-19-1	Metalaxyl	Fungicide	4-F	Yes	Yes	Yes	Yes	Yes
178928-70-6	Prothioconazole	Fungicide	3-F	Yes	Yes	No	No	No
107534-96-3	Tebuconazole	Fungicide	3-F	Yes	Yes	Yes	Yes	Yes
148-79-8	Thiabendazole	Fungicide	3-F	Yes	Yes	Yes	Yes	Yes
1071-83-6	Glyphosate	Herbicide	9-H	Yes	Yes	Yes	Yes	Yes
71751-41-2	Abamectin	Insecticide	6-I	Yes	Yes	Yes	Yes	Yes
500008-45-7	Chlorantraniliprole	Insecticide	28-I	Yes	Yes	Yes	Yes	Yes
210880-92-5	Clothianidin	Insecticide	4A-I	Yes	Yes	Yes	No	No
138261-41-3	Imidacloprid	Insecticide	4A-I	Yes	Yes	No	No	No
153719-23-4	Thiamethoxam	Insecticide	4A-I	Yes	Yes	Yes	No	No
133-06-2	Captan	Fungicide	M4-F	No	No	Not tested	No	No
10605-21-7	Carbendazim	Fungicide	1-F	No	No	No	No	No
5234-68-4	Carboxin	Fungicide	7-F	No	Yes	No	No	No
94361-06-5	Cyproconazole	Fungicide	3-F	No	No	No	No	No
119446-68-3	Difenoconazole	Fungicide	3-F	No	Yes	No	No	No
149961-52-4	Dimoxystrobin	Fungicide	11-F	No	No	No	No	No
135319-73-2	Epoxiconazole	Fungicide	3-F	No	No	No	No	No
86386-73-4	Fluconazole	Fungicide	3-F	No	No	No	No	No
131341-86-1	Fludioxonil	Fungicide	12-F	No	Yes	No	Yes	No
125225-28-7	Ipconazole	Fungicide	3-F	No	Yes	No	No	No
241479-67-4	Isavuconazole	Fungicide	3-F	No	No	No	No	No
84625-61-6	Itraconazole	Fungicide	3-F	No	No	No	No	No
125116-23-6	Metconazole	Fungicide	3-F	No	Yes	No	No	No
248593-16-0	Orysastrobin	Fungicide	11-F	No	No	No	No	No
117428-22-5	Picoxystrobin	Fungicide	11-F	No	No	No	No	No
171228-49-2	Posaconazole	Fungicide	3-F	No	No	No	No	No
60207-90-1	Propiconazole	Fungicide	3-F	No	Yes	Yes	Yes	Yes
175013-18-0	Pyraclostrobin	Fungicide	11-F	No	No	No	No	No
182760-06-1	Ravuconazole	Fungicide	3-F	No	No	No	No	No
112281-77-3	Tetraconazole	Fungicide	3-F	No	Yes	No	No	No
23564-05-8	Thiophanate-methyl	Fungicide	1-F	No	No	No	No	No
141517-21-7	Trifloxystrobin	Fungicide	11-F	No	Yes	No	No	No
83657-22-1	Uniconazole	Fungicide	3-F	No	No	No	No	No
137234-62-9	Voriconazole	Fungicide	3-F	No	No	No	No	No
51276-47-2	Glufosinate	Herbicide	10-H	No	Yes	No	No	No
7782-49-2	Selenium	Inorganic		No	Yes	No	No	Not tested
135410-20-7	Acetamiprid	Insecticide	4A-I	No	No	No	No	No

AltEn Site in Saunders County, Nebraska

Summary of Detections in Lagoon and Treated Water

CAS	Chemical Name	Chemical Classification	Pesticide Group (e.g., FRAC, IRAC, HRAC)	In Focused Analyte List	Detected in Lagoon Water	Detected in Treated Water, May 24th	Detected in Treated Water, Aug 5th (Total)	Detected in Treated Water, Aug 5th (Dissolved)
68359-37-5	Baythroid	Insecticide	3A-I	No	No	No	No	No
82657-04-3	Biphenethrin	Insecticide	3A-I	No	No	No	No	No
2921-88-2	Chlorpyrifos	Insecticide	1B-I	No	No	No	No	No
5598-13-0	Chlorpyrifos-methyl	Insecticide	1B-I	No	No	No	No	No
736994-63-1	Cyantraniliprole	Insecticide	28-I	No	Yes	No	No	No
68085-85-8	Cyhalothrin/Karate	Insecticide	3A-I	No	No	No	No	No
52315-07-8	Cypermethrin	Insecticide	3A-I	No	No	No	No	No
52918-63-5	Deltamethrin	Insecticide	3-I	No	No	No	No	No
165252-70-0	Dinotefuran	Insecticide	4A-I	No	No	No	No	No
150824-47-8	Nitenpyram	Insecticide	4A-I	No	No	No	No	No
52645-53-1	Permethrin	Insecticide	3A-I	No	No	No	No	No
111988-49-9	Thiacloprid	Insecticide	4A-I	No	No	No	No	No
7664-41-7	Ammonia	Nutrient		No	Yes	Yes	No	Not tested
BOD	Biological Oxygen Demand	Nutrient		No	Yes	Yes	No	Not tested
14797-55-8	Nitrate (as N)	Nutrient		No	Yes	No	No	Not tested
14797-65-0	Nitrite (as N)	Nutrient		No	No	No	No	Not tested
7727-37-9	Total Kjeldahl Nitrogen (TKN)	Nutrient		No	Yes	Yes	No	Not tested
7723-14-0	Phosphorus (as P)	Nutrient		No	Yes	Yes	No	Not tested
NO3/NO2-N	Total Nitrate/Nitrite	Nutrient		No	Yes	No	No	Not tested
224047-41-0	Brassinazole	Other		No	No	No	No	No
120983-64-4	Desthio-Prothioconazole	Other		No	No	Not tested	Not tested	Not tested
PH	pH	Other		No	Yes	Yes	No	Not tested
TOC	Total Organic Carbon (TOC)	Other		No	Yes	Yes	No	Not tested
TSS	Total Suspended Solids (TSS)	Other		No	Yes	Yes	No	Not tested



AltEn Site in Saunders County, Nebraska  
Lagoon Water Laboratory Summary Statistics

CAS	Chemical Name	Chemical Classification	Pesticide Group (e.g., FRAC, IRAC, HRAC)	In Focused Analyte List	Number of Times Tested	Number of Detections	Percent Detected	Units	Min. Detection	Max. Detection	Average Detection <sup>1</sup>	Average Result (1/2 RL for NDs) <sup>2</sup>	Min. Reporting Limit	Avg. Reporting Limit	Max. Reporting Limit	Min. Sample Date	Max. Sample Date
178928-70-6	Azoxystrobin	Fungicide	11-F	Yes	10	10	100%	ug/L	1.80	581.00	97.73	97.73	1.00	2.50	5	08-Apr-19	06-Jul-21
241479-67-4	Fluoxastrobin	Fungicide	11-F	Yes	9	9	100%	ug/L	1.90	735.00	287.66	287.66	1.00	13.22	50	12-Nov-19	06-Jul-21
125116-23-6	Metalaxyl	Fungicide	4-F	Yes	5	5	100%	ug/L	13.00	2600.00	951.60	951.60	1.00	30.40	50	17-May-21	06-Jul-21
149961-52-4	Prothioconazole	Fungicide	3-F	Yes	9	9	100%	ug/L	7.10	150.00	60.74	60.74	1.00	2.89	5	12-Nov-19	06-Jul-21
131860-33-8	Tebuconazole	Fungicide	3-F	Yes	11	11	100%	ug/L	41.00	2330.00	431.45	431.45	1.00	7.78	50	08-Apr-19	06-Jul-21
10605-21-7	Thiabendazole	Fungicide	3-F	Yes	11	11	100%	ug/L	170.00	39700.00	5500.91	5500.91	1.00	22.33	50	08-Apr-19	06-Jul-21
182760-06-1	Glyphosate	Herbicide	9-H	Yes	11	11	100%	ug/L	116.00	3850.00	804.18	804.18	10.00	18.89	50	08-Apr-19	06-Jul-21
150824-47-8	Abamectin	Insecticide	6-I	Yes	5	5	100%	ug/L	150.00	690.00	312.00	312.00	1.00	35.20	50	17-May-21	06-Jul-21
2921-88-2	Chlorantraniliprole	Insecticide	28-I	Yes	5	5	100%	ug/L	58.00	890.00	483.60	483.60	1.00	35.20	50	17-May-21	06-Jul-21
68359-37-5	Clothianidin	Insecticide	4A-I	Yes	11	10	91%	ug/L	2.80	58400.00	11860.25	10782.09	1.00	13.22	50	08-Apr-19	06-Jul-21
137234-62-9	Imidacloprid	Insecticide	4A-I	Yes	11	6	55%	ug/L	21.00	312.00	91.93	55.36	1.00	2.33	5	08-Apr-19	06-Jul-21
7782-49-2	Thiamethoxam	Insecticide	4A-I	Yes	11	9	82%	ug/L	25.00	35400.00	8082.33	6612.91	1.00	13.22	50	08-Apr-19	06-Jul-21
107534-96-3	Captan	Fungicide	M4-F	No	1	0	0%	ug/L				0.85	1.70	1.70	1.7	06-Jul-21	06-Jul-21
71751-41-2	Carbendazim	Fungicide	1-F	No	5	0	0%	ug/L				0.50	1.00	1.00	1	17-May-21	06-Jul-21
84625-61-6	Carboxin	Fungicide	7-F	No	5	4	80%	ug/L	1.10	6.60	3.90	3.22	1.00	1.00	1	17-May-21	06-Jul-21
175013-18-0	Cyproconazole	Fungicide	3-F	No	10	0	0%	ug/L				1.25	1.00	2.50	5	08-Apr-19	06-Jul-21
361377-29-9	Difenoconazole	Fungicide	3-F	No	9	9	100%	ug/L	1.70	66.20	25.37	25.37	1.00	2.33	5	12-Nov-19	06-Jul-21
5234-68-4	Dimoxystrobin	Fungicide	11-F	No	10	0	0%	ug/L				1.25	1.00	2.50	5	08-Apr-19	06-Jul-21
148-79-8	Epoxiconazole	Fungicide	3-F	No	10	0	0%	ug/L				1.25	1.00	2.50	5	08-Apr-19	06-Jul-21
60207-90-1	Fluconazole	Fungicide	3-F	No	10	0	0%	ug/L				1.25	1.00	2.50	5	08-Apr-19	06-Jul-21
57837-19-1	Fludioxonil	Fungicide	12-F	No	5	5	100%	ug/L	18.00	110.00	50.00	50.00	1.00	1.00	1	17-May-21	06-Jul-21
138261-41-3	Ipconazole	Fungicide	3-F	No	9	9	100%	ug/L	4.10	181.00	64.91	64.91	1.00	2.33	5	12-Nov-19	06-Jul-21
131341-86-1	Isavuconazole	Fungicide	3-F	No	10	0	0%	ug/L				1.25	1.00	2.50	5	08-Apr-19	06-Jul-21
171228-49-2	Itraconazole	Fungicide	3-F	No	8	0	0%	ug/L				1.25	1.00	2.50	5	12-Nov-19	06-Jul-21
1071-83-6	Metconazole	Fungicide	3-F	No	10	3	30%	ug/L	1.20	5.90	3.03	2.20	1.00	2.50	5	08-Apr-19	06-Jul-21
125225-28-7	Orysastrobin	Fungicide	11-F	No	10	0	0%	ug/L				1.25	1.00	2.50	5	08-Apr-19	06-Jul-21
210880-92-5	Picoxystrobin	Fungicide	11-F	No	8	0	0%	ug/L				1.25	1.00	2.50	5	12-Nov-19	06-Jul-21
94361-06-5	Posaconazole	Fungicide	3-F	No	10	0	0%	ug/L				1.25	1.00	2.50	5	08-Apr-19	06-Jul-21
248593-16-0	Propiconazole	Fungicide	3-F	No	10	8	80%	ug/L	1.70	726.00	104.35	93.03	1.00	2.50	5	08-Apr-19	06-Jul-21
119446-68-3	Pyraclostrobin	Fungicide	11-F	No	10	0	0%	ug/L				1.25	1.00	2.50	5	08-Apr-19	06-Jul-21
135319-73-2	Ravuconazole	Fungicide	3-F	No	10	0	0%	ug/L				1.25	1.00	2.50	5	08-Apr-19	06-Jul-21
500008-45-7	Tetraconazole	Fungicide	3-F	No	9	1	11%	ug/L	1.30	1.30	1.30	1.26	1.00	2.33	5	12-Nov-19	06-Jul-21
86386-73-4	Thiophanate-methyl	Fungicide	1-F	No	5	0	0%	ug/L				0.50	1.00	1.00	1	17-May-21	06-Jul-21
133-06-2	Trifloxystrobin	Fungicide	11-F	No	10	8	80%	ug/L	2.20	737.00	115.56	92.55	1.00	2.50	5	08-Apr-19	06-Jul-21
117428-22-5	Uniconazole	Fungicide	3-F	No	10	0	0%	ug/L				1.25	1.00	2.50	5	08-Apr-19	06-Jul-21
153719-23-4	Voriconazole	Fungicide	3-F	No	10	0	0%	ug/L				1.25	1.00	2.50	5	08-Apr-19	06-Jul-21
112281-77-3	Glufosinate	Herbicide		No	10	2	20%	ug/L	10.30	86.70	48.50	16.89	10.00	15.00	50	08-Apr-19	06-Jul-21
23564-05-8	Selenium	Inorganic		No	5	4	80%	ug/L	27.30	42.50	34.70	29.26	15.00	15.00	15	17-May-21	06-Jul-21
83657-22-1	Acetamiprid	Insecticide	4A-I	No	11	0	0%	ug/L				1.17	1.00	2.33	5	08-Apr-19	06-Jul-21
165252-70-0	Baythroid	Insecticide	3A-I	No	6	0	0%	ug/L				2.50	5.00	5.00	5	08-Apr-19	06-Jul-21
111988-49-9	Biphen thrin	Insecticide	3A-I	No	6	0	0%	ug/L				2.00	1.00	4.00	5	08-Apr-19	06-Jul-21
82657-04-3	Chlorpyrifos	Insecticide	1B-I	No	6	0	0%	ug/L				2.00	1.00	4.00	5	08-Apr-19	06-Jul-21
52315-07-8	Chlorpyrifos-methyl	Insecticide	1B-I	No	5	0	0%	ug/L				2.00	1.00	4.00	5	08-Apr-19	06-Jul-21
52645-53-1	Cyantraniliprole	Insecticide	28-I	No	5	2	40%	ug/L	1.60	2.90	2.25	1.20	1.00	1.00	1	17-May-21	06-Jul-21
52918-63-5	Cyhalothrin/Karate	Insecticide	3A-I	No	6	0	0%	ug/L				2.10	1.00	4.20	5	08-Apr-19	06-Jul-21
5598-13-0	Cypermethrin	Insecticide	3A-I	No	6	0	0%	ug/L				2.50	5.00	5.00	5	08-Apr-19	06-Jul-21
68085-85-8	Deltamethrin	Insecticide	3-I	No	6	0	0%	ug/L				2.50	5.00	5.00	5	08-Apr-19	06-Jul-21
135410-20-7	Dinotefuran	Insecticide	4A-I	No	9	0	0%	ug/L				1.17	1.00	2.33	5	12-Nov-19	06-Jul-21
51276-47-2	Nitenpyram	Insecticide	4A-I	No	8	0	0%	ug/L				1.25	1.00	2.50	5	12-Nov-19	06-Jul-21
736994-63-1	Permethrin	Insecticide	3A-I	No	6	0	0%	ug/L				2.13	2.00	4.25	5	08-Apr-19	06-Jul-21
141517-21-7	Thiacloprid	Insecticide	4A-I	No	11	0	0%	ug/L				1.17	1.00	2.33	5	08-Apr-19	06-Jul-21

AltEn Site in Saunders County, Nebraska

Lagoon Water Laboratory Summary Statistics

CAS	Chemical Name	Chemical Classification	Pesticide Group (e.g., FRAC, IRAC, HRAC)	In Focused Analyte List	Number of Times Tested	Number of Detections	Percent Detected	Units	Min. Detection	Max. Detection	Average Detection <sup>1</sup>	Average Result (1/2 RL for NDs) <sup>2</sup>	Min. Reporting Limit	Avg. Reporting Limit	Max. Reporting Limit	Min. Sample Date	Max. Sample Date
14797-55-8	Ammonia	Nutrient		No	5	5	100%	mg/L	473.00	779.00	570.20	570.20	5.00	5.20	6	17-May-21	06-Jul-21
7723-14-0	Biological Oxygen Demand (BOD)	Nutrient		No	5	5	100%	mg/L	3000.00	17700.00	9640.00	9640.00	2.00	2.00	2	17-May-21	06-Jul-21
7664-41-7	Nitrate (as N)	Nutrient		No	5	4	80%	mg/L	0.26	0.26	0.26	0.22	0.10	0.10	0.1	17-May-21	06-Jul-21
BOD	Nitrite (as N)	Nutrient		No	5	0	0%	mg/L				0.05	0.10	0.10	0.1	17-May-21	06-Jul-21
14797-65-0	Phosphorus (as P)	Nutrient		No	5	5	100%	mg/L	130.00	554.00	356.40	356.40	5.00	12.00	20	17-May-21	06-Jul-21
7727-37-9	Total Kjeldahl Nitrogen (TKN)	Nutrient		No	5	5	100%	mg/L	590.00	1090.00	774.20	774.20	20.00	29.00	50	17-May-21	06-Jul-21
NO3/NO2-N	Total Nitrate/Nitrite	Nutrient		No	5	4	80%	mg/L	0.26	0.26	0.26	0.22	0.10	0.10	0.1	17-May-21	06-Jul-21
120983-64-4	Brassinazole	Other		No	10	0	0%	ug/L				1.25	1.00	2.50	5	08-Apr-19	06-Jul-21
224047-41-0	Desthio-Prothioconazole	Other		No	3	0	0%	ug/L				2.50	5.00	5.00	5	12-Nov-19	12-Nov-19
PH	pH	Other		No	5	5	100%	SU	4.80	7.10	5.94	5.94	0.10	0.10	0.1	17-May-21	06-Jul-21
TOC	Total Organic Carbon (TOC)	Other		No	5	5	100%	mg/L	1600.00	7570.00	4074.00	4074.00	500.00	900.00	2000	17-May-21	06-Jul-21
TSS	Total Suspended Solids (TSS)	Other		No	5	5	100%	mg/L	123.00	620.00	327.20	327.20	28.60	97.92	200	17-May-21	06-Jul-21

Notes:

1. Samples where this analyte was not detected are *not* included in this average.

2. Samples where this analyte was not detected *are* included in this average. For those samples, the value used to calculate the average is half the reporting limit.

AltEn Site in Saunders County, Nebraska

May 24, 2021, Treated Water Laboratory Summary Statistics

CAS	Chemical Name	Chemical Classification	Pesticide Group (e.g., FRAC, IRAC, HRAC)	In Focused Analyte List	Number of Times Tested	Number of Detections	Percent Detected	Units	Min. Detection	Max. Detection	Average Detection <sup>1</sup>	Average Result (1/2 RL for NDs) <sup>2</sup>	Min. Reporting Limit	Avg. Reporting Limit	Max. Reporting Limit	Sample Date
131860-33-8	Azoxystrobin	Fungicide	11-F	Yes	3	1	33% ug/L		1.50	1.50	1.50	0.83	1.00	1.00	1	5/24/2021
361377-29-9	Fluoxastrobin	Fungicide	11-F	Yes	3	3	100% ug/L		1.00	8.60	3.67	3.67	1.00	1.00	1	5/24/2021
57837-19-1	Metalaxyl	Fungicide	4-F	Yes	3	3	100% ug/L		24.00	120.00	64.67	64.67	1.00	1.00	1	5/24/2021
178928-70-6	Prothioconazole	Fungicide	3-F	Yes	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
107534-96-3	Tebuconazole	Fungicide	3-F	Yes	3	3	100% ug/L		1.80	8.40	5.50	5.50	1.00	1.00	1	5/24/2021
148-79-8	Thiabendazole	Fungicide	3-F	Yes	3	3	100% ug/L		4.40	14.00	7.63	7.63	1.00	1.00	1	5/24/2021
1071-83-6	Glyphosate	Herbicide	9-H	Yes	3	3	100% ug/L		160.00	270.00	213.33	213.33	10.00	10.00	10	5/24/2021
71751-41-2	Abamectin	Insecticide	6-I	Yes	3	3	100% ug/L		2.80	9.80	6.93	6.93	1.00	1.00	1	5/24/2021
500008-45-7	Chlorantraniliprole	Insecticide	28-I	Yes	3	3	100% ug/L		4.60	78.00	33.20	33.20	1.00	1.00	1	5/24/2021
210880-92-5	Clothianidin	Insecticide	4A-I	Yes	3	2	67% ug/L		1.20	2.70	1.95	1.47	1.00	1.00	1	5/24/2021
138261-41-3	Imidacloprid	Insecticide	4A-I	Yes	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
153719-23-4	Thiamethoxam	Insecticide	4A-I	Yes	3	2	67% ug/L		1.80	2.20	2.00	1.50	1.00	1.00	1	5/24/2021
10605-21-7	Carbendazim	Fungicide	1-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
5234-68-4	Carboxin	Fungicide	7-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
94361-06-5	Cyproconazole	Fungicide	3-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
119446-68-3	Difenoconazole	Fungicide	3-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
149961-52-4	Dimoxystrobin	Fungicide	11-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
135319-73-2	Epoxiconazole	Fungicide	3-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
86386-73-4	Fluconazole	Fungicide	3-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
131341-86-1	Fludioxonil	Fungicide	12-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
125225-28-7	Ipconazole	Fungicide	3-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
241479-67-4	Isavuconazole	Fungicide	3-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
84625-61-6	Itraconazole	Fungicide	3-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
125116-23-6	Metconazole	Fungicide	3-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
248593-16-0	Orysastrobin	Fungicide	11-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
117428-22-5	Picoxystrobin	Fungicide	11-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
171228-49-2	Posaconazole	Fungicide	3-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
60207-90-1	Propiconazole	Fungicide	3-F	No	3	1	33% ug/L		1.60	1.60	1.60	0.87	1.00	1.00	1	5/24/2021
175013-18-0	Pyraclostrobin	Fungicide	11-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
182760-06-1	Ravuconazole	Fungicide	3-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
112281-77-3	Tetraconazole	Fungicide	3-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
23564-05-8	Thiophanate-methyl	Fungicide	1-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
141517-21-7	Trifloxystrobin	Fungicide	11-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
83657-22-1	Uniconazole	Fungicide	3-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
137234-62-9	Voriconazole	Fungicide	3-F	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
51276-47-2	Glufosinate	Herbicide	10-H	No	3	0	0% ug/L					5.00	10.00	10.00	10	5/24/2021
7782-49-2	Selenium	Inorganic		No	3	0	0% ug/L					7.50	15.00	15.00	15	5/24/2021
135410-20-7	Acetamiprid	Insecticide	4A-I	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
68359-37-5	Baythroid	Insecticide	3A-I	No	3	0	0% ug/L					2.50	5.00	5.00	5	5/24/2021
82657-04-3	Bipenthrin	Insecticide	3A-I	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
2921-88-2	Chlorpyrifos	Insecticide	1B-I	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
5598-13-0	Chlorpyrifos-methyl	Insecticide	1B-I	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
736994-63-1	Cyantraniliprole	Insecticide	28-I	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
68085-85-8	Cyhalothrin/Karate	Insecticide	3A-I	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
52315-07-8	Cypermethrin	Insecticide	3A-I	No	3	0	0% ug/L					2.50	5.00	5.00	5	5/24/2021
52918-63-5	Deltamethrin	Insecticide	3-I	No	3	0	0% ug/L					2.50	5.00	5.00	5	5/24/2021

AltEn Site in Saunders County, Nebraska

May 24, 2021, Treated Water Laboratory Summary Statistics

CAS	Chemical Name	Chemical Classification	Pesticide Group (e.g., FRAC, IRAC, HRAC)	In Focused Analyte List	Number of Times Tested	Number of Detections	Percent Detected	Units	Min. Detection	Max. Detection	Average Detection <sup>1</sup>	Average Result (1/2 RL for NDs) <sup>2</sup>	Min. Reporting Limit	Avg. Reporting Limit	Max. Reporting Limit	Sample Date
165252-70-0	Dinotefuran	Insecticide	4A-I	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
150824-47-8	Nitenpyram	Insecticide	4A-I	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
52645-53-1	Permethrin	Insecticide	3A-I	No	3	0	0% ug/L					1.00	2.00	2.00	2	5/24/2021
111988-49-9	Thiacloprid	Insecticide	4A-I	No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
7664-41-7	Ammonia	Nutrient		No	3	3	100% mg/L		347.00	496.00	439.67	439.67	5.00	5.00	5	5/24/2021
BOD	Biological Oxygen Demand (BOD)	Nutrient		No	3	3	100% mg/L		1240.00	3080.00	2206.67	2206.67	2.00	2.00	2	5/24/2021
14797-55-8	Nitrate (as N)	Nutrient		No	3	0	0% mg/L					0.05	0.10	0.10	0.1	5/24/2021
14797-65-0	Nitrite (as N)	Nutrient		No	3	0	0% mg/L					0.05	0.10	0.10	0.1	5/24/2021
7723-14-0	Phosphorus (as P)	Nutrient		No	3	3	100% mg/L		39.70	140.00	90.83	90.83	1.00	5.33	10	5/24/2021
7727-37-9	Total Kjeldahl Nitrogen (TKN)	Nutrient		No	3	3	100% mg/L		353.00	581.00	487.00	487.00	12.50	20.83	25	5/24/2021
NO3/NO2-N	Total Nitrate/Nitrite	Nutrient		No	3	0	0% mg/L					0.05	0.10	0.10	0.1	5/24/2021
224047-41-0	Brassinazole	Other		No	3	0	0% ug/L					0.50	1.00	1.00	1	5/24/2021
PH	pH	Other		No	3	3	100% SU		6.70	7.50	7.13	7.13	0.10	0.10	0.1	5/24/2021
TOC	Total Organic Carbon (TOC)	Other		No	3	3	100% mg/L		855.00	2130.00	1505.00	1505.00	500.00	500.00	500	5/24/2021
TSS	Total Suspended Solids (TSS)	Other		No	3	3	100% mg/L		52.30	97.30	74.33	74.33	14.30	20.63	33.3	5/24/2021

Notes:

1. Samples where this analyte was not detected are *not* included in this average.

2. Samples where this analyte was not detected *are* included in this average. For those samples, the value used to calculate the average is half the reporting limit.



AltEn Site in Saunders County, Nebraska

August 5, 2021, Treated Water Laboratory Summary Statistics (Total)

CAS	Chemical Name	Total or Dissolved	Chemical Classification	Pesticide Group (e.g., FRAC, IRAC, HRAC)	In Focused Analyte List	Number of Times Tested	Number of Detections	Percent Detected	Units	Min. Detection	Max. Detection	Average Detection <sup>1</sup>	Average Result (1/2 RL for NDs) <sup>2</sup>	Min. Reporting Limit	Avg. Reporting Limit	Max. Reporting Limit	Sample Date
131860-33-8	Azoxystrobin	T	Fungicide	11-F	Yes	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
361377-29-9	Fluoxastrobin	T	Fungicide	11-F	Yes	4	1	25% ug/L		3.30	3.30	3.30	1.20	1.00	1.00	1	05-Aug-21
57837-19-1	Metalaxyl	T	Fungicide	4-F	Yes	4	2	50% ug/L		2.00	5.30	3.65	2.08	1.00	1.00	1	05-Aug-21
178928-70-6	Prothioconazole	T	Fungicide	3-F	Yes	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
107534-96-3	Tebuconazole	T	Fungicide	3-F	Yes	4	3	75% ug/L		2.10	9.50	5.77	4.45	1.00	1.00	1	05-Aug-21
1071-83-6	Glyphosate	T	Herbicide	9-H	Yes	4	4	100% ug/L		11.00	93.00	65.50	65.50	10.00	10.00	10	05-Aug-21
71751-41-2	Abamectin	T	Insecticide	6-I	Yes	4	3	75% ug/L		1.50	3.50	2.23	1.80	1.00	1.00	1	05-Aug-21
500008-45-7	Chlorantraniliprole	T	Insecticide	28-I	Yes	4	4	100% ug/L		2.30	100.00	29.75	29.75	1.00	1.00	1	05-Aug-21
210880-92-5	Clothianidin	T	Insecticide	4A-I	Yes	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
138261-41-3	Imidacloprid	T	Insecticide	4A-I	Yes	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
133-06-2	Captan	T	Fungicide	M4-F	No	4	0	0% ug/L					2.50	5.00	5.00	5	05-Aug-21
10605-21-7	Carbendazim	T	Fungicide	1-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
5234-68-4	Carboxin	T	Fungicide	7-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
94361-06-5	Cyproconazole	T	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
119446-68-3	Difenoconazole	T	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
149961-52-4	Dimoxystrobin	T	Fungicide	11-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
135319-73-2	Epoxiconazole	T	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
86386-73-4	Fluconazole	T	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
131341-86-1	Fludioxonil	T	Fungicide	12-F	No	4	1	25% ug/L		1.00	1.00	1.00	0.63	1.00	1.00	1	05-Aug-21
125225-28-7	Ipconazole	T	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
241479-67-4	Isavuconazole	T	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
84625-61-6	Itraconazole	T	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
125116-23-6	Metconazole	T	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
248593-16-0	Orysastrobin	T	Fungicide	11-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
117428-22-5	Picoxystrobin	T	Fungicide	11-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
171228-49-2	Posaconazole	T	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
60207-90-1	Propiconazole	T	Fungicide	3-F	No	4	1	25% ug/L		1.70	1.70	1.70	0.80	1.00	1.00	1	05-Aug-21
175013-18-0	Pyraclostrobin	T	Fungicide	11-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
182760-06-1	Ravuconazole	T	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
112281-77-3	Tetraconazole	T	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
51276-47-2	Glufosinate	T	Herbicide	10-H	No	4	0	0% ug/L					5.00	10.00	10.00	10	05-Aug-21
7782-49-2	Selenium	T	Inorganic		No	4	0	0% ug/L						15.00	15.00	15	05-Aug-21
135410-20-7	Acetamiprid	T	Insecticide	4A-I	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
68359-37-5	Baythroid	T	Insecticide	3A-I	No	4	0	0% ug/L					2.50	5.00	5.00	5	05-Aug-21
82657-04-3	Biphen thrin	T	Insecticide	3A-I	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
2921-88-2	Chlorpyrifos	T	Insecticide	1B-I	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
5598-13-0	Chlorpyrifos-methyl	T	Insecticide	1B-I	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
736994-63-1	Cyantraniliprole	T	Insecticide	28-I	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
68085-85-8	Cyhalothrin/Karate	T	Insecticide	3A-I	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
52315-07-8	Cypermethrin	T	Insecticide	3A-I	No	4	0	0% ug/L					2.50	5.00	5.00	5	05-Aug-21
52918-63-5	Deltamethrin	T	Insecticide	3-I	No	4	0	0% ug/L					2.50	5.00	5.00	5	05-Aug-21
165252-70-0	Dinotefuran	T	Insecticide	4A-I	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
150824-47-8	Nitenpyram	T	Insecticide	4A-I	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
52645-53-1	Permethrin	T	Insecticide	3A-I	No	4	0	0% ug/L					1.00	2.00	2.00	2	05-Aug-21
7664-41-7	Ammonia	T	Nutrient		No	4	0	0% mg/L					341.50	2.00	2.50	4	05-Aug-21
BOD	Biological Oxygen Demand (BOD)	T	Nutrient		No	4	0	0% mg/L					2024.50	2.00	2.00	2	05-Aug-21
14797-55-8	Nitrate (as N)	T	Nutrient		No	4	0	0% mg/L						0.10	0.10	0.1	05-Aug-21
14797-65-0	Nitrite (as N)	T	Nutrient		No	4	0	0% mg/L						0.10	0.10	0.1	05-Aug-21
7723-14-0	Phosphorus (as P)	T	Nutrient		No	4	0	0% mg/L					45.58	1.00	4.00	5	05-Aug-21
224047-41-0	Brassinazole	T	Other		No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
PH	pH	T	Other		No	4	0	0% SU					7.45	0.10	0.10	0.1	05-Aug-21

AltEn Site in Saunders County, Nebraska

August 5, 2021, Treated Water Laboratory Summary Statistics (Total)

CAS	Chemical Name	Total or Dissolved	Chemical Classification	Pesticide Group (e.g., FRAC, IRAC, HRAC)	In Focused Analyte List	Number of Times Tested	Number of Detections	Percent Detected	Units	Min. Detection	Max. Detection	Average Detection <sup>1</sup>	Average Result (1/2 RL for NDs) <sup>2</sup>	Min. Reporting Limit	Avg. Reporting Limit	Max. Reporting Limit	Sample Date
148-79-8	Thiabendazole	T	Fungicide	3-F		4	3	75% ug/L		2.70	6.20	4.07	3.18	1.00	1.00	1	05-Aug-21
23564-05-8	Thiophanate-methyl	T	Fungicide	1-F		4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
141517-21-7	Trifloxystrobin	T	Fungicide	11-F		4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
83657-22-1	Uniconazole	T	Fungicide	3-F		4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
137234-62-9	Voriconazole	T	Fungicide	3-F		4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
111988-49-9	Thiacloprid	T	Insecticide	4A-I		4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
153719-23-4	Thiamethoxam	T	Insecticide	4A-I		4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
7727-37-9	Total Kjeldahl Nitrogen (TKN)	T	Nutrient			4	0	0% mg/L					410.00	20.00	20.00	20	05-Aug-21
NO3/NO2-N	Total Nitrate/Nitrite	T	Nutrient			4	0	0% mg/L						0.10	0.10	0.1	05-Aug-21
TOC	Total Organic Carbon (TOC)	T	Other			4	0	0% mg/L					945.75	100.00	100.00	100	05-Aug-21
TSS	Total Suspended Solids (TSS)	T	Other			4	0	0% mg/L					200.33	9.10	67.85	100	05-Aug-21

Notes:

1. Samples where this analyte was not detected are *not* included in this average.

2. Samples where this analyte was not detected *are* included in this average. For those samples, the value used to calculate the average is half the reporting limit.

AltEn Site in Saunders County, Nebraska

August 5, 2021, Treated Water Laboratory Summary Statistics (Dissolved)

CAS	Chemical Name	Total or Dissolved	Chemical Classification	Pesticide Group (e.g., FRAC, IRAC, HRAC)	In Focused Analyte List	Number of Times Tested	Number of Detections	Percent Detected	Units	Min. Detection	Max. Detection	Average Detection <sup>1</sup>	Average Result (1/2 RL for NDs) <sup>2</sup>	Min. Reporting Limit	Avg. Reporting Limit	Max. Reporting Limit	Sample Date
131860-33-8	Azoxystrobin	D	Fungicide	11-F	Yes	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
361377-29-9	Fluoxastrobin	D	Fungicide	11-F	Yes	4	1	25% ug/L		3.40	3.40	3.40	1.23	1.00	1.00	1	05-Aug-21
57837-19-1	Metalaxyl	D	Fungicide	4-F	Yes	4	2	50% ug/L		2.20	4.50	3.35	1.93	1.00	1.00	1	05-Aug-21
178928-70-6	Prothioconazole	D	Fungicide	3-F	Yes	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
107534-96-3	Tebuconazole	D	Fungicide	3-F	Yes	4	3	75% ug/L		2.40	9.80	5.73	4.43	1.00	1.00	1	05-Aug-21
148-79-8	Thiabendazole	D	Fungicide	3-F	Yes	4	3	75% ug/L		2.50	5.00	3.50	2.75	1.00	1.00	1	05-Aug-21
1071-83-6	Glyphosate	D	Herbicide	9-H	Yes	4	4	100% ug/L		14.00	89.00	64.75	64.75	10.00	10.00	10	05-Aug-21
71751-41-2	Abamectin	D	Insecticide	6-I	Yes	4	3	75% ug/L		2.00	3.60	2.97	2.35	1.00	1.00	1	05-Aug-21
500008-45-7	Chlorantraniliprole	D	Insecticide	28-I	Yes	4	4	100% ug/L		3.20	110.00	33.63	33.63	1.00	1.00	1	05-Aug-21
210880-92-5	Clothianidin	D	Insecticide	4A-I	Yes	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
138261-41-3	Imidacloprid	D	Insecticide	4A-I	Yes	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
153719-23-4	Thiamethoxam	D	Insecticide	4A-I	Yes	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
133-06-2	Captan	D	Fungicide	M4-F	No	4	0	0% ug/L					2.50	5.00	5.00	5	05-Aug-21
10605-21-7	Carbendazim	D	Fungicide	1-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
5234-68-4	Carboxin	D	Fungicide	7-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
94361-06-5	Cyproconazole	D	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
119446-68-3	Difenoconazole	D	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
149961-52-4	Dimoxystrobin	D	Fungicide	11-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
135319-73-2	Epoxiconazole	D	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
86386-73-4	Fluconazole	D	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
131341-86-1	Fludioxonil	D	Fungicide	12-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
125225-28-7	Ipconazole	D	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
241479-67-4	Isavuconazole	D	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
84625-61-6	Itraconazole	D	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
125116-23-6	Metconazole	D	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
248593-16-0	Orysastrobin	D	Fungicide	11-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
117428-22-5	Picoxystrobin	D	Fungicide		No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
171228-49-2	Posaconazole	D	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
60207-90-1	Propiconazole	D	Fungicide	3-F	No	4	1	25% ug/L		1.20	1.20	1.20	0.68	1.00	1.00	1	05-Aug-21
175013-18-0	Pyraclostrobin	D	Fungicide	11-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
182760-06-1	Ravuconazole	D	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
112281-77-3	Tetraconazole	D	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
23564-05-8	Thiophanate-methyl	D	Fungicide	1-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
141517-21-7	Trifloxystrobin	D	Fungicide	11-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
83657-22-1	Uniconazole	D	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
137234-62-9	Voriconazole	D	Fungicide	3-F	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
51276-47-2	Glufosinate	D	Herbicide	10-H	No	4	0	0% ug/L					5.00	10.00	10.00	10	05-Aug-21
135410-20-7	Acetamiprid	D	Insecticide	4A-I	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
68359-37-5	Baythroid	D	Insecticide	3A-I	No	4	0	0% ug/L					2.50	5.00	5.00	5	05-Aug-21
82657-04-3	Biphen thrin	D	Insecticide	3A-I	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
2921-88-2	Chlorpyrifos	D	Insecticide	1B-I	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
5598-13-0	Chlorpyrifos-methyl	D	Insecticide	1B-I	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
736994-63-1	Cyantraniliprole	D	Insecticide	28-I	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
68085-85-8	Cyhalothrin/Karate	D	Insecticide	3A-I	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
52315-07-8	Cypermethrin	D	Insecticide	3A-I	No	4	0	0% ug/L					2.50	5.00	5.00	5	05-Aug-21
52918-63-5	Deltamethrin	D	Insecticide	3-I	No	4	0	0% ug/L					2.50	5.00	5.00	5	05-Aug-21
165252-70-0	Dinotefuran	D	Insecticide	4A-I	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21

AltEn Site in Saunders County, Nebraska

August 5, 2021, Treated Water Laboratory Summary Statistics (Dissolved)

CAS	Chemical Name	Total or Dissolved	Chemical Classification	Pesticide Group (e.g., FRAC, IRAC, HRAC)	In Focused Analyte List	Number of Times Tested	Number of Detections	Percent Detected	Units	Min. Detection	Max. Detection	Average Detection <sup>1</sup>	Average Result (1/2 RL for NDs) <sup>2</sup>	Min. Reporting Limit	Avg. Reporting Limit	Max. Reporting Limit	Sample Date
150824-47-8	Nitenpyram	D	Insecticide	4A-I	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
52645-53-1	Permethrin	D	Insecticide	3A-I	No	4	0	0% ug/L					1.00	2.00	2.00	2	05-Aug-21
111988-49-9	Thiacloprid	D	Insecticide	4A-I	No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21
224047-41-0	Brassinazole	D	Other		No	4	0	0% ug/L					0.50	1.00	1.00	1	05-Aug-21

- Notes:
- 1. Samples where this analyte was not detected are *not* included in this average.
  - 2. Samples where this analyte was not detected *are* included in this average. For those samples, the value used to calculate the average is half the reporting limit.



## Proposed Land Application Approach for Management of Water from AltEn Site

### Appendix C. Registered foliar or soil (non-seed treatment) uses of the focused analytes on crops commonly grown in Nebraska\*

Focused analyte	Corn	Soybeans	Hay & Haylage	Wheat	Potatoes	Sorghum	Millet	Sunflower	Oats	Beans	Sugarbeets	Peas
Abamectin		✓			✓					✓		✓
Azoxystrobin	✓											
Chlorantraniliprole	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Clothianidin		✓			✓							
Fluoxastrobin	✓	✓		✓	✓	✓						
Glyphosate**	✓	✓	✓	✓					✓		✓	
Imidacloprid										✓	✓	✓
Mefenoxam		✓	✓		✓					✓	✓	✓
Prothioconazole	✓	✓		✓								✓
Sedaxane												
Tebuconazole	✓			✓								
Thiabendazole												
Thiamethoxam					✓							

\*From [https://www.nass.usda.gov/Quick\\_Stats/Ag\\_Overview/stateOverview.php?state=NEBRASKA](https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=NEBRASKA)

\*\*Glyphosate, as a pre-plant or post-harvest herbicide, has registrations for uses with nearly all crops

**Proposed Land Application Approach for Management of Water from AltEn Site**

**Appendix D. Lookup table for allowable pesticide active ingredient concentrations per application of each acre-inch of water (102,736 liters)**

<b>Pesticide</b>	<b>Proposed threshold for single application (grams/acre)*</b>	<b>Corresponding concentration in water (µg/L, parts per billion in one acre-inch)**</b>
Abamectin CAS number 71751-41-2	1.1	10.7
Azoxystrobin CAS number 131860-33-8	11.30	110.0
Chlorantraniliprole CAS number 500008-45-7	4.45	43.3
Clothianidin CAS number 210880-92-5	3.0	29.2
Fluoxastrobin CAS number 361377-29-9	8.17	79.5
Imidacloprid CAS number 138261-41-3	6.7	65.2
Glyphosate CAS number 1071-83-6	62.43	607.7
Metalaxyl/Mefenoxam CAS numbers 57837-19-1 and 70630-17-0	14.2	138.2
Prothioconazole CAS number 178928-70-6	1.86	18.1
Sedaxane CAS number 874967-67-6	0.51	5.0

### Proposed Land Application Approach for Management of Water from AltEn Site

Pesticide	Proposed threshold for single application (grams/acre)*	Corresponding concentration in water (µg/L, parts per billion in one acre-inch)**
Tebuconazole CAS number 107534-96-3	4.64	45.2
Thiabendazole CAS number 148-79-8	0.26	2.5
Thiamethoxam CAS number 153719-23-4	2.5	24.3

\*From Table 1

\*\*To determine the target volume of treated water for an individual application, use the equation:

Allowable volume (acre-inch) = ((Threshold value in g/ac × 1,000,000 µg/g) / (analyte concentration in ppb or µg/L) / 102,736 L/acre.

## **Proposed Land Application Approach for Management of Water from AltEn Site**

### **Appendix E. Standard Operating Procedures**

1. Equipment Decontamination
2. Soil Sampling, Agronomic Parameters
3. Soil Sampling, Pesticides
4. Treated Water Sampling





## SOP-I

### EQUIPMENT DECONTAMINATION

#### ALTEN FACILITY, SAUNDERS COUNTY, NEBRASKA

Decontamination of field equipment is necessary to prevent cross-contamination between sites and sampling locations. Decontamination should be performed on all non-dedicated and non-disposable sampling equipment that may contact potentially contaminated media. Field personnel must wear disposable gloves while decontaminating equipment to prevent cross-contamination.

The following should be done to decontaminate field equipment:

- Set-up a decontamination area, preferably upwind and upgradient from the sampling area.
- Prior to initiating decontamination, visually inspect sampling equipment for evidence of contamination; use stiff brush to remove visible material.
- Once rough brushing is complete, decontaminate each piece of equipment following a sequential process of washing with Liquinox or an equivalent degreasing detergent; rinsing with deionized or laboratory grade distilled water; rinsing with 10% dilute methanol; and finally rinsing with distilled water three times. Best procedure is to set up multiple wash tubs for each of the above processes.
- Decontaminated equipment that is used for sampling organics should be wrapped in aluminum foil or another inert material if not used immediately.

Field equipment can be decontaminated by steam cleaning as an alternative. If equipment is steam cleaned, it should still be rinsed with 10% dilute methanol and distilled water.

All disposable items (e.g., paper towels, Nitrile gloves) should be deposited into a garbage bag and disposed in a proper manner. Handling and disposal procedures for the rinse and wash water will depend on the likely presence and type of contaminant in the wash water.

A list of equipment for decontamination is provided in the green box to the right. The amount of deionized/distilled water needed on site will depend on the number of samples to be collected and the sampling methods.

### Purpose

Describe general decontamination procedures for field equipment

### Goal and Objective

To sufficiently clean field equipment to prevent cross-contamination between sites and sample locations

### Equipment Needs

5-gallon Plastic Tub (minimum of four tubs)

Distilled/Deionized Water

1-gallon Container of 10% Nitric Acid

Spray Bottle(s) of 10% Methanol

Liquinox or equivalent

Hard Bristle Brush

Garbage Bags

Disposable Nitrile Gloves

Paper Towels

55-gallon Drums (optional depending on need to containerize wash water)



## **SOP-2**

### **SOIL SAMPLING, AGRONOMIC PARAMETERS ALTEN FACILITY, SAUNDERS COUNTY, NEBRASKA**

Soil sampling procedures to determine nutrient and salt concentrations will be as listed below. This proposed procedure is based on the University of Nebraska-Lincoln publication G1740 Guidelines for Soil Sampling, with additional ASTM specifications to prevent cross-contamination and ensure representative mixing and subsampling.

#### **SAMPLING FREQUENCY**

Twelve soil cores will be collected in a maximum of 40 acres. For practical use on fields near the AltEn facility, this will translate to one set of 12 soil cores for one quarter of a pivot-irrigated area (approximately 32 acres for typical configuration).

#### **DEPTHS OF SAMPLING**

Per publication G1740 guidelines for nutrient testing, the 0 to 8 inch depth range will be tested for all applicable nutrients and salts, and 8 to 24 inch depth will be tested for nitrate only.

#### **HOMOGENIZING AND CONTAINERIZING COMPOSITE SAMPLES**

Soil sampling personnel will use the following procedure, which is generally consistent with ASTM Standard D 6051-15. The field crew will place all subsamples for one area and depth range into a decontaminated stainless steel or glass mixing dish. The material will be mixed in alternating clockwise and counterclockwise directions with a decontaminated stainless-steel trowel for at least 2 minutes. After mixing, extraneous material greater than 0.5 inches in size will be removed by sieve from the composited sample, and the field crew will fill laboratory-provided containers using multiple evenly spaced swaths of a small decontaminated stainless-steel scoop or trowel across the shallow pile. After filling each container, at least 30 seconds of re-mixing will occur.

#### **PARAMETERS**

Soil samples will be analyzed for the agronomic parameters listed below.

- Organic Matter (percent)
- Phosphorus (Week Bray and Strong Bray)
- Ammonium Acetate exchangeable ions (K, Mg, Ca, Na)
- pH
- Cation Exchange Capacity (CEC), Percent Base Saturation for K, Mg, Ca, H, and Na
- Nitrate-nitrogen
- Total Sulfur and Total Zinc
- DTPA-extractable Manganese, Iron, Copper, Boron
- Soluble salts, Chloride
- Sodium Adsorption Ratio (calculated)



## **SOP-3**

### **SOIL SAMPLING, PESTICIDE RESIDUES ALTEN FACILITY, SAUNDERS COUNTY, NEBRASKA**

Field personnel will use the soil sampling procedures listed below to determine concentrations of pesticide residues prior to land application of treated water from the AltEn facility. The procedure uses discrete sampling. Resulting data will illustrate the distribution and average concentration of each pesticide analyte.

#### **NUMBER OF SAMPLES PER MANAGEMENT UNIT**

Using estimates of range and mean (see section titled Statistical Basis for Sampling Rate) for the Focused Analyte List in Table 1, the Facility Response Group proposes 15 discrete samples per management unit as the rate of sampling. Management units would be defined as an area with the same landowner and same rate of water applied, which would typically be one center pivot irrigation system per management unit.

#### **COLLECTING AND CONTAINERIZING COMPOSITE SAMPLES**

Sampling for pesticide residues will be from the 0- to 8-inch depth range. Soil sampling will be performed under the oversight of a certified professional soil scientist or crop advisor. Prior to mobilization, the sampling crew will identify targeted sampling points by selecting random nodes on a grid overlaying the irrigated acres of the field. Sampling personnel will identify the targeted location using GPS accurate to within 3 meters. At the sampling site, the field crew will use a decontaminated soil probe or hand auger to obtain each sample. The soil sample will only contact the decontaminated probe or auger, and new nitrile glove at each sampling point, and will be transferred directly into laboratory-provided sampling container. The samples will be placed in a cooler with ice and shipped under Chain of Custody procedures to the laboratory.

#### **SAMPLE CONTAINERS AND PRESERVATION**

Soil sample containers, preservatives, and hold times are described in the table below.

<b>Method Number</b>	<b>Container</b>	<b>Preservation</b>	<b>Holding Time</b>
EPA 8270D / 8321B	8 oz. glass	Cool to 4°C	14 days to extraction



## STATISTICAL BASIS FOR SAMPLING RATE

The number of samples required to adequately characterize each chemical from the Focused Analyte List in soil prior to the application of treated water was determined based on the formula below<sup>1</sup>. The formula assumes that the constituent concentrations within the fields follow a normal distribution.

$$n = \left[ \frac{t_{1-\alpha, df} S_{total}}{d} \right]^2$$

where

n – recommended sample size

$S_{total}$  – estimated standard deviation

$\alpha$  – maximum acceptable probability that the true mean will not lie in the confidence interval

d – width of confidence interval

$t_{1-\alpha, df}$  – value of Student t distribution with  $df=n-1$  degrees of freedom such that the proportion of the distribution less than  $t_{1-\alpha}$  is  $1-\alpha$

The parameters required to apply the equation were derived by using the estimated Incremental Increase for Residue in Soil as the maximum soil concentration for each analyte. The value of d, width of the confidence interval, for each constituent was assumed equal to 10% of the average concentration of the constituent. The average concentration was determined as the arithmetic mean of the maximum soil concentration listed above and an assumed minimum of either 0 or a soil loading rate expected from a single application. The standard deviation ( $S_{total}$ ) was derived from the following equation<sup>2</sup>:

$$S_{total} = \frac{\text{expected maximum soil concentration} - \text{expected minimum soil concentration}}{6}$$

The number of samples determined by the equation is independent of the size of the unit to be sampled. In general, if the unit to be sampled is homogeneous then the sample size can be applied to the entire unit without compromising information on the variability and representative average concentration of the constituents being investigated. In this analysis the assumption is that application of chemicals as trace constituents of treated water will be done uniformly within each management area and that each management area, regardless of its size, is a homogeneous unit.

Based on the applications of these equations to each constituent, the maximum number of samples required to characterize a field is 47 samples. The minimum number of samples based on the equation is 5 samples. The mean number of required samples across the Focused Analyte List would be 13 samples per management unit. To ensure that an adequate number of samples is available for statistical analysis we propose a minimum sample size of 15 samples per management unit.

---

<sup>1</sup> Visual Sample Plan Version 7.0 PNNL-23211, March 2014. Pacific Northwest National Laboratory (PNNL) Prepared for US Department of Energy. Section 3.2.3.4

<sup>2</sup> Guidance on Choosing a Sampling Design for Environmental Data Collection for Use in Developing a Quality Assurance Project Plan. EPA QA/G-5S, December 2002. USEPA Section 5.5.1





## **SOP-4**

### **TREATED WATER SAMPLING**

#### **ALTEN FACILITY, SAUNDERS COUNTY, NEBRASKA**

Procedures are listed below for sampling treated water from the subject facility. Results of this testing will be used to determine appropriate land application rates of the treated water. Combined with volume monitoring data, treated water results will also be used to calculate mass of nutrients, salts, and pesticides added to soil by land application.

#### **SAMPLING PROCEDURE**

Temporary Tanks in 2021: Each tank is mixed continuously at approximately 1,000 gallons per minute, which is near the physical threshold for safe use of the tanks without creating a whirlpool-like circulation pattern. Field personnel collect a vertical composite sample of the circulating water from the safe sampling location on each tank (permanent access stairs). These stairs are on the northwestern part of Tank 1, southern part of Tank 2, and southwestern part of Tank 3. Before sampling, any reusable equipment that may contact lagoon water is decontaminated in accordance with SOP-1. The vertical composite sample is collected using a decontaminated 3/4-inch diameter, 10-foot-long polyethylene water core sampler (Sludge Judge) to ensure coverage of the entire water column. From each tank, field personnel collect one unfiltered sample and one sample passed through a 0.5-micron filter, then repeat the sampling technique to provide sufficient volume for split analysis at a second laboratory.

Treated Water Ponds after 2021: Sampling procedure will be consistent with the description above, except circulation of the ponds will be driven by flow of incoming treated water, and there will be more accessible sampling locations to ensure lateral coverage of the ponds. To form the composite sample, 10-foot-long water core subsamples will be collected and placed in a bucket that has been decontaminated in accordance with SOP-1. The subsamples will be collected from the middle of each side of the pond. The composited volume will be transferred into laboratory-provided containers, with one unfiltered and one filtered set for each laboratory, per description above.

#### **LABORATORY PARAMETERS**

Treated water samples will be analyzed for the agronomic parameters listed below.

- Biological Oxygen Demand, 5-day
- pH
- Ammonia
- Total Kjeldahl Nitrogen
- Total Phosphorus
- Nitrate/Nitrite
- Total Organic Carbon
- Total Suspended Solids
- Total Dissolved Solids
- Selenium
- Electrical Conductivity
- Sodium Adsorption Ratio

Treated water samples will be analyzed for the 53 pesticides listed in the summary statistics appendix provided with the land application proposal.

## Proposed Land Application Approach for Management of Water from AltEn Site

### Appendix F. US EPA approved tolerances for focused analytes on corn grain from 40 CFR 180

Focused analyte	Tolerance in corn (parts per million, ppm)
Abamectin	0.4
Azoxystrobin	0.05
Chlorantraniliprole	0.04
Clothianidin	0.01
Fluoxastrobin	0.02
Glyphosate*	5.0
Imidacloprid	0.05
Mefenoxam**	0.1
Prothioconazole	0.35
Sedaxane	0.01
Tebuconazole	0.05
Thiabendazole	0.01
Thiamethoxam	0.02

\*Tolerance accounts for the metabolite, AMPA

\*\*As metalaxyl



Tanner Shaw  
AltEn, LLC  
Capital Corporate Services, Inc.  
1125 S 103<sup>rd</sup> Street, Suite 800  
Omaha, NE 68124

RE: AltEn, LLC Land Application Approach Approval  
NDEE ID: 84069  
PROGRAM ID: NE0137634

Dear Mr. Shaw:

The Department received the latest version of the *Proposed Land Application Approach for Management of Water from AltEn Site* on January 7, 2022. This plan submitted by the AltEn Facility Response Group (AFRG) is the most recent version of a land application approach that has been revised in response to multiple comments from NDEE.

The requirements for the land application of effluent are set forth in Part II of NPDES Permit NE0137634. The permit, last modified on October 28, 2020, has requirements for the land application of treated wastewater. These requirements including reporting, setbacks, prohibitions, and sampling. Most importantly, the permit requires that land application of effluent may not cause degradation to the plant-soil characteristics nor degrade the long-term beneficial uses of groundwater. Also, it may not be applied in a method that would negatively impact waters of the State.

The AFRG drafted a land application plan that was first submitted to the Department on July 16, 2021. The Department provided comments, and the plan went through reviews and changes until the Department received the *Proposed Land Application Approach for Management of Water from AltEn Site* on January 7, 2022, which is the current land application of treated effluent plan.

The Department has reviewed the setbacks, management practices, planned application maximums for pesticides and has found that if followed, the *Proposed Land Application Approach for Management of Water from AltEn Site* meets all permit requirements. The plan is approved for use for land application at the site. When treated wastewater is applied at the prescribed rates, meets setbacks, and follows the *Approach*, then the Department does not anticipate negative impact from pesticides. The treated effluent must meet the proposed thresholds for application of pesticides and also meet the nutrient and soil condition requirements of each application site.

In addition to meeting the methodology set forth in the *Proposed Land Application Approach for Management of Water from AltEn Site*, treated wastewater must be applied according to the requirements of permit NE0137634. The AltEn Facility Response Group or site operator must land apply treated wastewater according to the requirements of an approved Best Management Practices (BMP) Plan. This plan, required in Part II.B of permit NE0137634, has requirements that must be submitted to the Department for approval prior to land application. The plan must be prepared in consultation with a professional agronomist or certified crop specialist.

Sites must be reviewed and approved by NDEE prior to land application of treated effluent. In order for sites to be approved, they must follow the requirements of the BMP Plan and Part II of Permit NE0137634. These sites

must be submitted for review along with the BMP Plan. Any land application sites that are proposed after the approval of the BMP plan must meet permit requirements and be approved by the Department.

Land application of treated effluent may not run off of the site and may not negatively impact waters of the State. If the application of treated effluent is found to degrade site conditions, negatively impact water quality, or violates the permit requirements, site approval for land application will be withdrawn.

Please contact the Department if you have any questions or comments. Thank you.

Sincerely,



Shelley Schneider  
Permits and Engineering Division Administrator

SS/pwd

ecc:

Scott Tingelhoff, Vice President, AltEn, LLC  
Don Gunster, M.E.M., NewFields



March 9, 2022

Tom Buell  
Monitoring and Remediation Division Administrator  
Nebraska Department of Environment and Energy  
PO Box 98922  
Lincoln, NE 68509-8922

**Re: Confidentiality of BMP Plans for Land Application of Treated Water  
AltEn Facility  
Saunders County, Nebraska**

Mr. Buell:

The AltEn Facility Response Group (AFRG) has submitted a Best Management Practices (BMP) Plan for applying water from the Facility onto farmland. This BMP includes the Land Application Agreements between the AFRG and the landowners who will be land-applying water from the Facility. This submittal is enclosed.

The information contained within the submittal is part of a private agreement between landowners and the AFRG. A BMP is a required under the Land Application Agreement. One of the listed components is the Agreement between the landowners and the AFRG. The price and compensation structure is not an identified provision required as part of the BMP. For these reasons, the AFRG redacted the price and compensation provisions as confidential trade secrets that should not be required to be disclosed even to NDEE as part of the BMP. Pursuant to Nebraska Administrative Code, Title 115 – Rules of Practices and Procedures, Chapter 4 – Confidentiality for Trade Secrets, the AFRG requests confidentiality for trade secrets.

The assertion of this claim is supported by the following:

- The AFRG continues to maintain this information on file for the sole use of the AFRG;
- The information contained in the BMP and attached Agreements has not been reasonably obtained without the AFRG's consent by other persons (other than governmental bodies) by use of legitimate means; and
- The contents of this BMP and the attached Agreements are not known outside the AFRG and their contractors facilitating land application. The price and compensation structure offered to landowners that is contained in these documents is a trade secret that derives independent economic value from not being known to other persons who can obtain value from its disclosure or use.

Respectfully,



Donald Gunster  
Partner/Senior Scientist





# ALTEN, LLC

NDEEID# - 84069

## BEST MANAGEMENT PRACTICES PLAN FOR LAND APPLICATION OF TREATED WATER

**REVISED MARCH 2022**

Prepared By :



**449 E. Deere Street ■ West Point, NE 68788 ■ Phone: 402.372.2236**

**NUTRIENTADVISORS.COM**

# **Best Management Practices Plan**

## **For:**

### **AltEn, LLC**

#### **1. Application Site Information**

Almost all of the site requirements may be found in the *Application Site Summary* and on the maps in **Appendix A**.

- a. Landowners for each site are listed in **Appendix A**.
- b. AltEn, LLC has application agreements in place with all of the land operators associated with application sites. Copies of these agreements are found in **Appendix B**.
- c. The total number of acres available for land application is 318.84. A specific summary of acres per site is located in **Appendix A**.
- d. There are four treated wastewater application sites on which either center pivot or drag hose application methods may be utilized.

The primary method of application will be drag hose injection pre-plant. This may be supplemented by center pivot application.

- e. The crops grown on the application sites in this BMP Plan period will be corn & corn silage. Crops and production practices on the application sites are intensively managed to obtain maximum yields. The types of practices generally employed include conventional tillage to prepare seedbeds, intensive fertility and pest management, and timely planned irrigations to supply 100% of crop water needs.
- f. None of the application sites received wetcake from the AltEn facility. In 2016, sites 1 and 2 received lagoon water from the AltEn facility applied by drag hose outside the permanent piping network. No other application to land occurred from the AltEn facility onto the proposed sites.

Pesticide use in these fields is generally consistent, depending on the crop (corn or soybeans). For fields planted to corn, general practices include planting treated seed, applying a low-rate insecticide in furrow, and applying a

fungicide post-tassel. Other insecticides may be applied as needed. For fields planted to soybeans, general practices include treated seed and applying a fungicide and insecticide at R3.

Details of soil sampling for pesticides in soil are provided in **Appendix C**. In summary, all four proposed fields have low concentrations of pesticides in soil, and the concentrations are typical of agricultural soil.

## **2. Soil Management Evaluation**

The four application sites include four different soil types that are classified as silt loams and silty clay loams. The soils range from 0 – 11% slopes and have a permeability range from low to moderately high. For reference, **Appendix D** includes a *Soil Type Map* for each site. **Appendix E** includes a *Chemical Soil Properties* Table for each soil type.

- a. For an analysis of soil texture and structure of the soils represented in AltEn, LLC's four application sites, see the *Brief Map Unit Description* and the *Physical Soil Properties* table in **Appendix F**.
- b. Descriptions and permeabilities of each soil type to show internal soil drainage is found in **Appendix F**.
- c. Phosphorus contents in these soils are not excessive and are generally at a medium fertility level. Phosphorus Risk assessments have been calculated for all site acres and are in the low to medium risk ranges of Phosphorus runoff. Any manure or wastewater applications will be balanced to meet the crops nitrogen needs and/or to not exceed the maximum phosphorus allowable by the Phosphorus risk assessments. Recent soil samples for all application sites are included in **Appendix G**.
- d. Soil tests each crop year will include Sodium Adsorption Ratio, Chloride, and soluble salts to monitor the effect of the wastewater applications. Results will be reported as part of the annual report each year. The explanation of SAR and the table of crop tolerances for soluble salts below will provide a guide for soil test results and crop tolerances of future applications:

Sodium adsorption ratio (SAR) is determined by saturated paste extraction and is reported as a special ratio of sodium to calcium plus magnesium.

This test evaluates the sodium content of soil. A value of 13 or greater indicates an excess of sodium will be adsorbed by the soil clay particles. Excess sodium can cause soil to be hard and cloddy when dry, to crust badly, and to take water very slowly.

The gypsum test is conducted if the SAR is greater than or equal to 15. Total gypsum is reported in meq. (milliequivalent)  $\text{CaSO}_4/100\text{g}$ . If sufficient native gypsum is present, sodium-affected soils may be successfully treated without addition of amendments such as gypsum or sulfur. The gypsum supplies soluble calcium to replace the adsorbed sodium. Reclamation can proceed if drainage of the land is possible. A gypsum recommendation is provided if the gypsum test shows insufficient gypsum in sodic soils.

Table 1: Tolerance levels of Crops for soluble salts.	
Test values in mmhos/cm	Interpretation
0-2	Satisfactory for Crops
2-4	Affects sensitive Crops
4-8	High for many Crops
above 8	Very high for most Crops

### 3. Crop Management Evaluation

The application sites will be intensely managed for both crop nutrient needs and crop water use

- a. On December 16, 2021, experienced field personnel from NewFields collected a composite sample of water stored in temporary tanks at the AltEn facility. Sampling procedure was consistent with SOP-4 of the Land Application Approach reviewed by NDEE in 2021 and approved by NDEE in a letter received January 14, 2022. The sample was analyzed for the list of parameters in SOP-4 of the NDEE-approved Approach. To capture all required parameters, aliquots of the composited sample were sent to three laboratories, which are Agvise, Alpha Analytical, and Pacific Agricultural Laboratory. Laboratory reports for this sample are provided in **Appendix H**. As the wastewater analysis in **Appendix H** shows, the nutrient in the wastewater that would require the largest land base for application is nitrogen. This is because corn (and corn silage) requires more nitrogen than phosphorus during the growing season. The wastewater analysis shows a higher level of nitrogen than phosphorus, therefore, managing nitrogen is the most limiting factor. However, when dispersed over all application sites, the wastewater from the storage cells would provide only a portion of the nitrogen needs of an irrigated corn crop. Additional commercial nitrogen or manure fertilizer will be necessary to supplement growing crops.
- b. The sodium tolerance of these crops is measured by the SAR (Sodium Adsorption Ratio) of the irrigation water. A SAR in the range of 6-12 is considered a low hazard if EC (Electrical Conductivity, also known as Specific Conductance) is above 1.9 dS/m. (See *CSU Irrigation Water Quality Criteria Fact Sheet 0.506, Table 4* in **Appendix I**). The most current waste water analysis meets this criteria with a SAR of 9.52 and EC consistently around 5.31 mmhos/cm. Proper management and timing of application can allow this water to be safely applied to without crop damage. Safe applications include the best management practices of: applying pre-plant,



avoiding timing that would affect the germination period of seeds, applying lower application amounts at one time thus shortening the wetting period, and applying to corn after the V8 growth stage. These practices together provide a very safe crop producing cycle with wastewater applications. The University of Nebraska has found that manures and/or effluents can be safely applied up to 12 (EC) with these best management practices.

- c. The wastewater irrigation timing and management will be based on field conditions and crop nutrient uptake. The treated water pond shall be managed to maintain enough capacity to store the wastewater until it can be utilized by growing crops. Additional irrigation well water will be applied through center pivots as needed in order to supply crop water needs. Nutrient budgeting will be performed by Nutrient Advisors using soil test results and the analysis of the wastewater and well water to determine crop available nutrients in the soil, available nutrients in the wastewater and well water applications, and additional fertilizer that may be necessary to supply the crop nutrient needs annually.

The specific timing of the injection and irrigation applications will be determined by the consulting agronomist. The agronomist will use a soil probe in various areas of the field weekly as needed during the growing season. The *Appearance and Feel Method* will be used to determine existing crop available water in the soil root zone. See **Appendix J** for a full description of this process.

The silt loam and silty clay loam soil types included in the proposed wastewater application sites will typically hold 2 inches of plant available water per foot. Once the available water content of the soil is determined then recommendations will be made for necessary weekly irrigations. Examples of the type of site specific nutrient calculations and balances are in **Appendix K**.

#### **4. Subsurface Data**

The registered well data in **Appendix L** shows general soil depth in the area of AltEn, LLC's application sites.

The general direction of groundwater flow over the AltEn, LLC's application sites is from the north to the south.

Maps and descriptions of soil characteristics over these sites can be found in **Appendix D**, **Appendix E**, and **Appendix F**.

## **5. One-Mile Radius**

An aerial photographic map showing a one mile radius around the application sites is included in **Appendix A**. This map gives a general overview of the project boundaries.

## **6. Prevention of Surface and Groundwater Contamination**

### **Nutrients**

AltEn, LLC's treated water pond shall be large enough to hold the post-treatment wastewater until it can be used agronomically for crop water needs. Nitrogen and Phosphorus shall be applied under agronomic crop removal rates, therefore not providing any opportunity for nutrients to leach and/or runoff. With proper management, this efficient system should not contribute to surface or groundwater contamination.

By applying the wastewater based on crop water needs and considering the general flat terrain of the sites, then there should not be any concern for runoff from the sites. The water will not be applied unless there is available room for it in the soil profile and the growing crop can utilize it.

In the event that there would be above normal rainfall and less irrigation water was required to achieve maximum yield potential of the growing crops, then the post-treatment wastewater would continue to be stored in the pond and applied at the first opportunity that the soil profile could absorb the additional water and nutrients, whether that is during the growing season, pre-plant, or as a fall application.

Wastewater will be applied to each land application site by utilizing a drag hose. Rate of application will be controlled by a GPS-connected system in the field. During application, the entire length of the hose will be visually inspected and monitored for leaks. In addition, a daily visual inspection of the fields will take place to monitor for any runoff.

All application sites have a center pivot with existing irrigation wells which may be used to supply additional water for crop needs. If treated wastewater is distributed via a center pivot application, the system will be linked to a constant pressure wastewater line which will include a hose which will connect the pond to the main pipeline supplying the center pivot systems. Each center pivot will include a hand valve and a check valve in which the water supply may be turned on and off at each pivot point. Each center pivot will have an electric valve at the pivot point which will cut off water supply in the event that the pivot would malfunction. This control system will help management to minimize the risk of

over application, wastewater runoff, or discharges caused by equipment malfunction.

### **Pesticides**

Land application of treated wastewater will not exceed the thresholds identified in Table 1 in the state approved land application approach. Based on water quality results (**Appendix H**), annual application to these fields will be 1.05 inches per acre, which is approximately 28,600 gallons per acre. The water will be applied in two separate and equal applications, to allow infiltration and avoid ponding or runoff. Ideally, both applications will be by drag hose before planting (prior to approximately April 5, 2022). If weather or other factors do not allow, the second application would be by pivot.

## **7. Runoff and Right-of-Ways**

Drag hose systems will have GPS-controlled pump systems allowing management to monitor and control rate of application, as well as shut pumps down remotely in the event that a hose would rupture and/or other emergency spill conditions. All center pivot systems will be equipped with end guns that will have auto shutoff when approaching roads, right of ways, and/or landmarks requiring setbacks.

## **8. Setbacks**

A visual display of all setback areas can be found on the site maps in **Appendix A**.

- a. The 30 foot vegetative buffer requirement between application sites and public right of ways currently exists in most areas and will be installed prior to applications in any areas where more vegetative width is needed.
- b. Currently, there are inhabited dwellings near Sites #1, 3, & 4. A 300 foot separation will be maintained between the application area and the dwellings near the site.
- c. There are currently potable water wells within 300 feet of Sites #1 and 3. A 300 foot separation will be maintained between the application area and any potable water supply well.
- d. There are not any wells serving a community water supply within 1000 feet of the application areas, so this setback will not apply.

- e. In areas where there is less than 30 feet of vegetative buffer between a stream and proposed application area, a 200 foot separation will be maintained.

BMP Appendices have been  
previously provided



# NEBRASKA

Good Life. Great Resources.

DEPT. OF ENVIRONMENT AND ENERGY



Pete Ricketts, Governor

3/14/2022

Tanner Shaw  
AltEn, LLC  
Capital Corporate Services, Inc.  
1125 S 103<sup>rd</sup> Street, Suite 800  
Omaha, NE 68124

RE: AltEn, LLC Land Application Plan and Site Review  
NDEE ID: 84069  
PROGRAM ID: NE0137634

Dear Mr. Shaw:

The Department received the revised *BMP Plan for Land Application of Treated Water* on March 11, 2022. This plan is an addendum to the *Proposed Land Application Approach for Management of Water from AltEn Site* approved by the Department on January 14, 2022. This *BMP Plan* contains four proposed sites to receive treated wastewater through land application.

If the wastewater is applied at rates that are protective of the Department approved pesticide thresholds, according to the nutrient budget, and application follows management practices, the *BMP Plan for Land Application of Treated Water* is approved. Sites 1-4 are approved for land application. These sites meet the setback and management requirements that are protective of waters of the State. Upon receipt of this review letter, the permittee may commence land application.

Land application of treated effluent is not to run off of the site and is not to negatively impact waters of the State. If the application of treated effluent is found to degrade site conditions, negatively impact water quality, or violates the permit requirements, site approval for land application will be withdrawn.

Please contact the Department if you have any questions or comments. Thank you.

Sincerely,

A handwritten signature in blue ink that reads "Shelley Schneider".

Shelley Schneider  
Permitting and Engineering Division Administrator

SS/pwd

ecc:  
Scott Tingelhoff, Vice President, AltEn, LLC  
Don Gunster, M.E.M., NewFields

Department of Environment and Energy

P.O. Box 98922  
Lincoln, Nebraska 68509-8922

Jim Macy, Director

OFFICE 402-471-2186 FAX 402-471-2909  
ndee.moreinfo@nebraska.gov





# Land Application Report

## Spring 2022

AltEn Facility  
Saunders County, Nebraska

***Prepared for:***

*AltEn Facility Response Group c/o:*

*AgReliant Genetics, LLC*

*Bayer Production Supply LLC*

*Beck's Superior Hybrids, Inc.*

*Corteva Agriscience LLC*

*Syngenta Seeds, LLC*

*Winfield Solutions, LLC*

***Prepared by:***

*NewFields Companies, LLC*

*115 2<sup>nd</sup> Ave N, Suite 100*

*Edmonds, WA 98020*



June 2022

Project 860.0141.000



## TABLE OF CONTENTS

<b>1.0 INTRODUCTION.....</b>	<b>2</b>
1.1 HISTORICAL WATER MANAGEMENT.....	2
1.2 PREPARATION FOR WATER MANAGEMENT UNDER VOLUNTARY CLEANUP PROGRAM.....	2
<b>2.0 CHARACTERIZATION OF TREATED WATER AND RECEIVING MEDIUM (ON-FARM SOIL) .....</b>	<b>3</b>
<b>3.0 IMPLEMENTATION AND MONITORING .....</b>	<b>4</b>
3.1 LAYOUT OF LAND APPLICATION SYSTEM.....	4
3.2 VOLUMES AND SEQUENCE OF LAND APPLICATION.....	5
3.3 MONITORING .....	5
<b>4.0 SUMMARY AND RECOMMENDATIONS .....</b>	<b>6</b>
<b>5.0 REFERENCES.....</b>	<b>7</b>

## LIST OF FIGURES

Figure 1	Location Map
Figure 2	Vicinity Map Showing Participating Fields

## LIST OF TABLES

Table 1	Maximum Land Application Rates for Active Ingredients
Table 2	Daily Volumes Applied to Participating Fields
Table 3	Actual Land Application Rates, Spring 2022
Table 4	Water Sample Results During Land Application

## LIST OF APPENDICES

Appendix A	Diagram of Water Intake System
Appendix B	Field Notes
Appendix C	Laboratory Reports for Water Samples During Application



## 1.0 INTRODUCTION

This report describes application of treated water to land in spring 2022 under a National Pollution Discharge Elimination System (NPDES) permit (No. NE-137634) for the AltEn Facility (Site) located in Mead, Nebraska (**Figures 1 and 2**). NewFields Companies, LLC (NewFields) prepared this report for the AltEn Facility Response Group (FRG). Land application was performed in accordance with requirements of the NPDES permit, as well as the Land Application Approach (NewFields, 2022) and Best Management Practices (BMP) Plan (Nutrient Advisors, 2022) approved by the Nebraska Department of Environment and Energy (NDEE).

### 1.1 HISTORICAL WATER MANAGEMENT

The Site is in Saunders County at 1332 County Rd 10, Mead, Nebraska, approximately 40 miles west of Omaha, NE (**Figure 1**). The Site is approximately 230 acres. Adjacent land includes Mead Cattle Company, LLC (**Figure 2**) and farmland typically rotated between corn and soybeans annually. Water utilized in AltEn ethanol production processes and selected surface storm water was stored in three lagoons on the Site, which are the Northwest, Northeast, and Southeast lagoons (**Figure 2**). The lagoon water contains nutrients, pesticide and herbicide residues. NDEE's predecessor agency, the Nebraska Department of Environmental Quality, issued NPDES permit No. NE0137634 to apply lagoon water to farmland as a source of nutrients. When ethanol production ended at the Site, the lagoons contained more than 150 million gallons of untreated process water (NewFields, 2021).

### 1.2 PREPARATION FOR WATER MANAGEMENT UNDER VOLUNTARY CLEANUP PROGRAM

At the time the FRG members began work on the Site, participating in the Nebraska Voluntary Cleanup Program (VCP), the primary lined lagoons were in danger of overtopping (NewFields, 2021). In a Memorandum of Agreement dated June 30, 2021, the FRG committed to maintain safe freeboard in the AltEn lagoons. To meet this commitment, the FRG installed ten temporary aboveground water storage tanks, treated wastewater from the lagoons through a system of flocculation, sand filtration, and carbon filtration, and stored the treated water in the temporary aboveground tanks. Prior to spring 2022 land application, the temporary tanks held approximately 12.3 million gallons of treated water.

As a longer-term solution for water storage, the FRG designed and constructed two ponds to store treated water. The East and West Ponds of the Treated Water Pond System (**Figure 2**) increased treated water storage capacity to 52 million gallons. The NDEE issued a construction permit on October 4, 2021, through Title 123 – Rules and Regulations for the Design, Operation and Maintenance of Wastewater Works, which allowed the FRG to begin construction. The West Pond was built in winter 2021-2022. Starting February 2022, the FRG transferred stored treated water (12.3 million gallons) from the temporary tanks into the West Pond then removed the temporary tanks from the Site. Construction of the East Pond was ongoing during land application in March and April 2022.

On January 7, 2022, NDEE approved a site-specific Land Application Approach (NewFields, 2022), which served as a framework for the discharge of treated water to local farm fields. On March 11, 2022, NDEE approved the Best Management Practices (BMP) Plan for Land Application of Treated Water (Nutrient



Advisors, 2022). The BMP Plan identified fields receiving treated water and described requirements for control and monitoring of application of water during land application.

## 2.0 CHARACTERIZATION OF TREATED WATER AND RECEIVING MEDIUM (ON-FARM SOIL)

Prior to land application, NewFields and subcontractors sampled water to determine allowable water application rate per acre, and sampled soil to confirm levels of nutrients, salts, and pesticides. Pre-application sampling efforts were consistent with Standard Operating Procedures (SOPs) from the NDEE-approved Land Application Approach (NewFields, 2022).

Treated process water was sampled in December 2021 per SOP-4 of the Land Application Approach (NewFields, 2022). A composite sample from the temporary tanks was tested for nutrients, salts, and pesticides. Sampling a significant time prior to land application was necessary to support calculations of appropriate application rate. No additional water was treated after sampling and before land application.

Two types of soil samples were collected in January 2022 from participating fields: composite samples for evaluation of agronomic parameters such as nutrients and salts, and discrete samples for evaluation of pesticides. When collecting samples for agronomic testing, the FRG's consultants and contractors followed SOP-2, which specified one composite sample for areas up to 40 acres. When testing for pesticides, the FRG's contractors collected one set of 15 discrete soil samples per field following SOP-3 (NewFields, 2022). Laboratory results for treated water and on-farm soil were reported in the BMP Plan (Nutrient Advisors, 2022).

Based on results from water and soil samples, the FRG determined allowable gallons per acre for land application considering nutrient demand, salt tolerance, and pesticide thresholds. The following summary of these factors is paraphrased from the BMP Plan (Nutrient Advisors, 2022). Nitrogen was the nutrient with the greatest addition needed to meet crop demand. Water application rates that would meet the full nitrogen demand of corn ranged from 99,330 to 123,857 gallons per acre (3.66 to 4.56 inches per acre), depending on the field. Potential for salt or sodium effects from the AltEn treated water was low, because the SAR value for the water (9.52) was within the recommended range of 6 to 12. NewFields calculated rates of water application that would not exceed pesticide loading thresholds (grams per acre) from the Land Application Approach, based on the December 2021 treated water sample results. The most-limiting pesticide analyte was thiabendazole. As shown in **Table 1**, water application of 29,000 gallons per acre (1.1 inches per acre) would reach the thiabendazole threshold.

Rates of water application needed to meet nitrogen demand exceeded the allowable maximum land application rates based on pesticide concentrations in the treated water (**Table 1**). Therefore, maximum land application rate was limited to the thiabendazole threshold from the Land Application Approach.

As required by the Land Application Approach, the FRG evaluated baseline residues of pesticides in soil of each participating farm (**Figure 2**). Sampling details and data evaluation were included in the BMP Plan (Nutrient Advisors, 2022). In summary, clothianidin, glyphosate, imidacloprid, and thiabendazole were detected. Of these analytes, clothianidin and glyphosate were detected in more than one sample. All





concentrations of pesticides in soil were lower than calculated concentrations that would result from normal pesticide use at rates allowed by product registration. Tables, references, and discussion of pesticide residues in soil were provided in Appendix C of the BMP Plan (Nutrient Advisors, 2022).

### 3.0 IMPLEMENTATION AND MONITORING

In spring 2022, the FRG land applied treated water to four participating farms (**Figure 2**). NewFields personnel and subcontractors mobilized as soon as possible after NDEE approval of BMP Plan, in order to allow land application prior to mid-April corn planting. NewFields subcontractors Frosty's Dragline, LLC and Knee Deep, LLC applied treated water to participating fields by incorporation with drag hose systems. Details of the drag hose systems are described below, followed by summary of land application sequence, and description of monitoring performed to meet requirements of the NPDES permit, Land Application Approach, and BMP Plan.

#### 3.1 LAYOUT OF LAND APPLICATION SYSTEM

Drag hose systems consist of intake pumps, hose laid on the ground surface to convey treated water to the farm field, booster pumps used to ensure adequate flow and pressure, and tractor-mounted systems that inject water into small furrows while the tractor pulls hose through the field. These systems are able to apply water rapidly in short time windows before planting or after harvest, and apply to custom areas that can account for required setbacks set forth in the permit, such as around bodies of water. Description of system components is below, from intake to discharge.

Intake for the drag hose system consisted of two 160-foot 8-inch styrene-butadiene rubber (SBR) discharge pipes with metal intake guards to prevent suction onto the pond liner (**Appendix A**). The intake hoses were connected to a John Deere Model 6135HF485 (600 horsepower) diesel pump with vacuum assist. The first 60 feet of intake pipe were attached to plastic barrels for flotation, and secured with taglines to prevent pipe movement due to wind.

The vacuum pump supplied water through 8-inch hose to lead pumps operated by the drag hose firms. Lead pumps were Puck Enterprises Model FF5069 (550 horsepower). From the lead pump, 10-inch diameter distribution hose in lengths of 660 feet (1/8 mile) was run across the ground on the routes shown in **Figure 2**. The hose was made of polyurethane or nitrile rubber. Approximately every 1 mile of hose, a Puck Enterprises Model PT5069 booster pump was placed to maintain flow rate and pressure. See **Figure 2** for locations of booster pumps for both Frosty's Dragline, LLC and Knee Deep, LLC hose routes.

Once treated water from the facility reached the field, pressurized water was applied to the soil through a DSI, Inc. manure injection system. The injection system consisted of 30-foot toolbar with 12-inch sweeps (Dietrich 70 Series) carried on a John Deere Model 9630 tractor. Photo of the injection system is in the field notes for March 31, 2022 (**Appendix B**). As described in the following section, the injection system measured and controlled flow rate (gallons per minute (gpm)), tractor driving speed, and duration to determine the application rate.



## 3.2 VOLUMES AND SEQUENCE OF LAND APPLICATION

Land application rate and sequence between fields depended on pumping rate, available weather window and soil moisture conditions to make two separate applications that together stayed under the maximum application rates in **Table 1**. The dates and volumes of applications are listed on **Table 2**, and calculated loading of pesticides to soil (grams per acre) is shown on **Table 3**.

## 3.3 MONITORING

Inspection of land application equipment, including lead/booster pumps and entire hose route, were conducted before and at the start of pumping into the receiving field. Throughout each day of operation, frequent inspections of equipment were completed for any leaks or weak points that needed to be repaired. Additionally, inspection for ponding, runoff, and presence of nearby beehives were completed at least once per day, as required by the NPDES permit. Land application operations were stopped immediately if ponding or runoff occurred. No beehives were observed. All field notes and photos are available in **Appendix B**, including Daily Field Report narrative, Land Application checklists for NPDES permit compliance, and Daily Volume Agreement forms signed by NewFields and the drag hose subcontractors.

As required by the NPDES permit, a representative from Nutrient Advisors staff collected a grab sample for analysis during each application event. Eight grab were samples in spring 2022 by filling bottles directly from a port on a booster pump during land application. The samples were analyzed at Agvise Laboratories for the parameters specified in Part II, Item E of the NPDES permit. Laboratory reports for the water samples collected during land application are in **Appendix C**, and results are summarized on **Table 4**. The NPDES permit does not have limits for these agronomic analytes.

Flow and duration of application, along with calculated gallons-per-acre application rate, were determined using a John Deere Rate Controller 2000 in the tractor cab. The drag hose operators set the targeted application rate to 14,250 gallons per acre for a single application prior to application. During application, the Rate Controller integrated tractor driving speed and flow rate to the injection sweeps to determine instantaneous gallons per acre, average gallons per acre over the entire day, and total gallons for the day. Speed was automatically adjusted if there was a fluctuation in flow, and speed could also be adjusted manually. Operators were able to monitor and control the lead and booster pumps through John Deere Precision Ag software from the cab of the tractor to ensure appropriate flow and pressure was delivered to the tractor. Each pump was equipped with 8-inch electromagnetic Krohn flow meters, giving instantaneous readout to the Rate Controller software. In addition to controlling flow rates, the Rate Controller can start or stop pumps and open or close valves, if needed. As a protective measure in case of substantial or catastrophic loss in pressure, the operator can use the Rate Controller to set all pumps to idle and close all at-pump valves to minimize loss of water. Spring 2022 land application did not have a catastrophic loss in pressure or a blowout. Throughout application, John Deere Precision Ag technology reported total gallons applied, gallons per acre, date, and time.

Flow rates to the tractor were typically 2,600 gpm. Instantaneous and average daily rates were near 14,250 gallons per acre (0.52 inches per acre) in each application. Daily volumes shown on **Table 2** totaled to 26,400 gallons per acre (0.97 inches) to field 16 DJ, and 27,700 gallons per acre (1.02 inches) to the



other three participating fields (**Figure 2**). As shown in **Table 3**, these application rates were within the Land Application Approach thresholds for all analytes.

## 4.0 SUMMARY AND RECOMMENDATIONS

The AltEn FRG complied with all requirements of the NPDES permit, Land Application Approach, and BMP Plan. Drag hose operators performed two applications of approximately 0.50 inches per acre each to the participating fields (**Figure 4**). NewFields personnel and subcontractors performed monitoring and sampling as required by the guiding documents listed above. Based on experiences with spring 2022 Land Application operations, NewFields recommends the following optimization steps for future seasons:

- Evaluate the thiabendazole threshold and determine if a higher threshold would be protective of human health, ecological receptors, and crops; and
- Match the annual cycle of land application thresholds to growers' annual nutrient budget cycle (harvest to harvest).



## 5.0 REFERENCES

**NewFields, 2021.** Interim Remedial Action Plan #1 Voluntary Cleanup Program. November.

**NewFields, 2022.** Proposed Land Application Approach for Management of Water from AltEn Site.  
January.

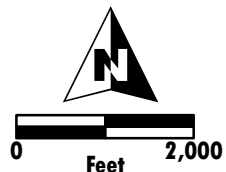
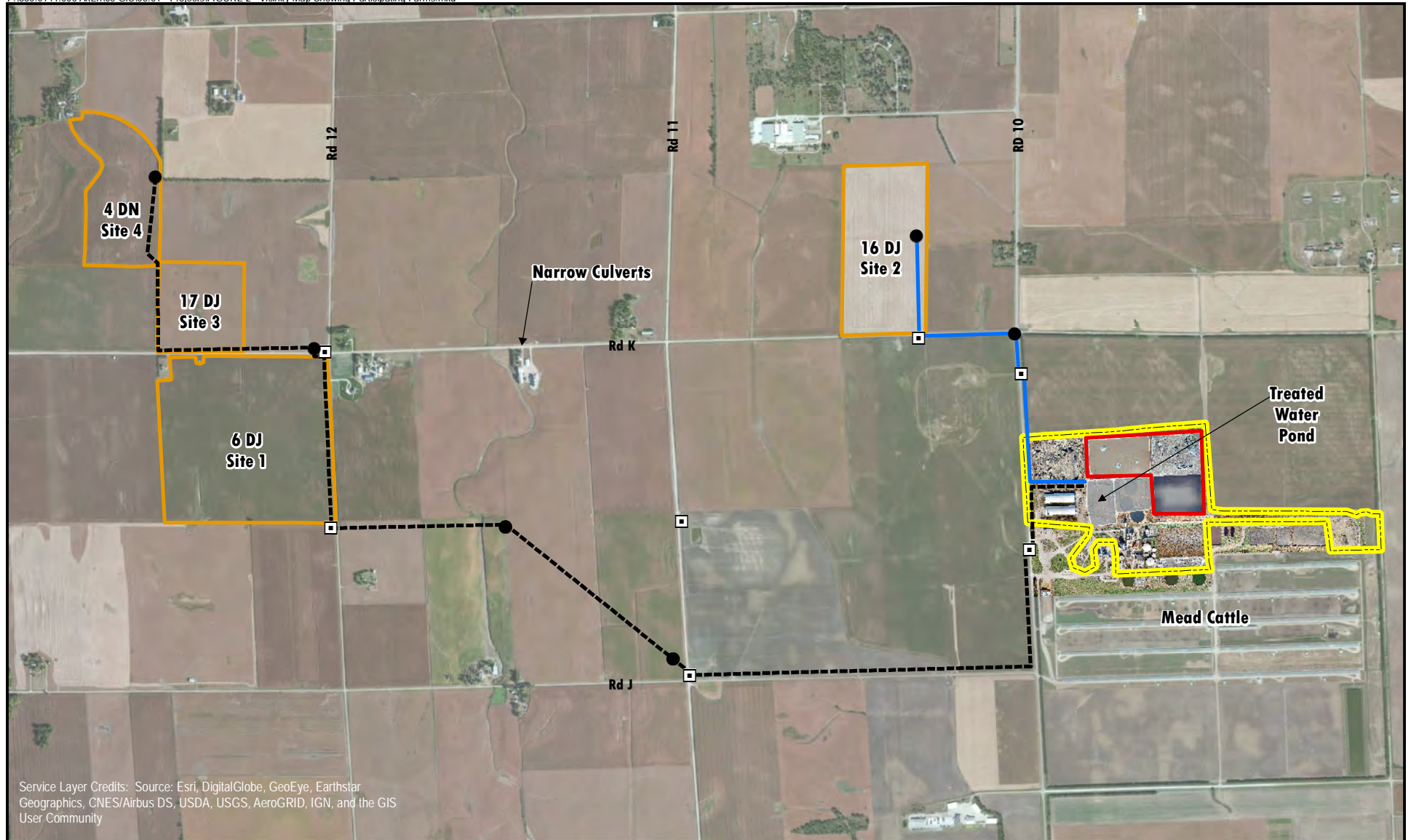
**Nutrient Advisors, 2022.** Best Management Practices Plan for Land Application of Treated Water.  
February.



## FIGURES







**NewFields**

- Culvert (Approximate)
- Booster Pumps
- Hose Route #1 (Frosty's Dragline, LLC.)
- - - Hose Route #2 (Knee Deep, LLC.)

- Untreated Water Lagoons
- Participating Farms
- - - Site Boundary

Vicinity Map Showing Participating Farms  
 AltEn Land Application  
 Spring 2022  
 AltEn Project  
 Mead, Nebraska  
 FIGURE 2



## TABLES



**Table 1: Maximum Land Application Rates for Active Ingredients**

Analyte	Loading Threshold*	Aqueous Concentration**		Maximum Water Application Rate		
	Grams Per Acre	µg/L	Detected?	Liters Per Acre	Gallons Per Acre	Acre Inches
Abamectin	2.2	0.39	Yes	5.6E+06	1.5E+06	55
Azoxystrobin	22.6	0.19	Yes	1.2E+08	3.1E+07	1,157
Chlorantraniliprole	8.9	12	Yes	7.4E+05	2.0E+05	7.2
Clothianidin	5.0	0.35	Yes	1.4E+07	3.8E+06	139
Fluoxastrobin	16.3	0.03	No	5.4E+08	1.4E+08	5,286
Imidacloprid	13.4	0.03	No	4.5E+08	1.2E+08	4,345
Glyphosate	124.9	26	Yes	4.8E+06	1.3E+06	47
Metalaxyl***	28.4	1.5	Yes	1.9E+07	5.0E+06	184
Prothioconazole	3.7	0.05	No	7.4E+07	2.0E+07	720
Sedaxane	1.0	0.57	Yes	1.8E+06	4.6E+05	17
Tebuconazole	9.3	3.3	Yes	2.8E+06	7.4E+05	27
Thiabendazole	0.52	4.8	Yes	1.1E+05	2.9E+04	1.1
Thiamethoxam	5.0	0.03	No	1.7E+08	4.4E+07	1,621

**Notes:**

\*Annual threshold based on small fraction of registered uses, see Table 1 of NDEE-approved Land Application Proposal.

\*\*Composite sample collected December 16, 2021 from all treated water tanks. Where the analyte was not detected, 1/2 the reporting limit is shown as the concentration.

\*\*\*Combined concentration of metalaxyl and mefenoxam, which the laboratory could not quantify separately.

Gray Highlighting = Controlling factor for land application in Spring 2022.

**Table 2: Daily Volumes Applied to Participating Fields**

Date	Volume (gal)	Receiving Field*
3/31/2022	1,081,739	16 DJ (Site 2), First Application
4/4/2022	1,084,824	16 DJ (Site 2), Second Application
4/5/2022	830,446	4 DN (Site 4), First Application
4/6/2022	823,712	6 DJ (Site 1), Part of First Application
4/7/2022	1,087,791	6 DJ (Site 1), Remainder of First Application
4/8/2022	591,894	17 DJ (Site 3), First Application
	63,897	4 DN (Site 4), Part of Second Application
4/9/2022	653,991	4 DN (Site 4), Remainder of Second Application
4/11/2022	1,018,419	6 DJ (Site 1), Part of Second Application
4/12/2022	860,050	6 DJ (Site 1), Remainder of Second Application
	213,061	17 DJ (Site 3), Part of Second Application
4/14/2022	287,986	17 DJ (Site 3), Remainder of Second Application
<b>Total</b>	<b>8,597,810</b>	

**Notes:**

\* Frosty's Dragline, LLC applied water to field 16 DJ. Knee Deep, LLC applied water to all other fields



**Table 3: Actual Land Application Rates, Spring 2022**

<i>Analyte</i>	<b>Loading Threshold† Grams Per Acre</b>	<b>Actual Loading to Soil, Grams Per Acre</b>		<b>Percent of NDEE-Approved Threshold</b>	
<b>Field ID:</b>	<b>4 DN, 6 DJ, 16 DJ, 17 DJ</b>	<b>16 DJ*</b>	<b>4 DN, 6 DJ, 17 DJ**</b>	<b>16 DN*</b>	<b>4 DN, 6 DJ, 17 DJ**</b>
<i>Abamectin</i>	2.2	0.04	0.04	2%	2%
<i>Azoxystrobin</i>	22.6	0.02	0.02	0.1%	0.1%
<i>Chlorantraniliprole</i>	8.9	1.20	1.26	13%	14%
<i>Clothianidin</i>	5.0	0.03	0.04	1%	1%
<i>Fluoxastrobin</i>	16.3	0.003	0.003	0.02%	0.02%
<i>Imidacloprid</i>	13.4	0.003	0.003	0.02%	0.02%
<i>Glyphosate</i>	124.9	2.59	2.73	2%	2%
<i>Metalaxyl***</i>	28.4	0.15	0.16	1%	1%
<i>Prothioconazole</i>	3.7	0.005	0.005	0.1%	0.1%
<i>Sedaxane</i>	1.0	0.06	0.06	6%	6%
<i>Tebuconazole</i>	9.3	0.33	0.35	4%	4%
<i>Thiabendazole</i>	0.52	0.48	0.50	92%	97%
<i>Thiamethoxam</i>	5.0	0.003	0.003	0.1%	2%

**Notes:**

†Annual threshold based on small fraction of registered uses, see Table 1 of NDEE-approved Land Application Proposal

\*0.97 inches per acre in two applications by Frosty's Dragline, LLC

\*\*1.02 inches per acre in two applications by Knee Deep, LLC

\*\*\*Combined concentration of metalaxyl and mefenoxam, which the laboratory could not quantify separately.

**Table 4: Water Sample Results During Land Application**

<i>Parameter</i>	<b>Field ID</b>							
	<b>4 DN</b>		<b>6 DJ</b>		<b>16 DJ</b>		<b>17 DJ</b>	
<b>Application:</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>2</b>
<i>Ammonia as Nitrogen* (mg/L)</i>	309.2	319.7	340.2	312.1	362.3	335.1	343.0	347.7
<i>Nitrogen (Nitrate+Nitrite) (mg/L)</i>	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<i>Total Kjeldahl Nitrogen (mg/L)*</i>	316.1	319.9	340.7	315.4	382.7	342.1	343.2	347.9
<i>Total Phosphorus (as Phosphate) (mg/L)*</i>	38.8	38.3	38.1	42.5	61.0	39.3	37.0	42.6
<i>Total Alkalinity (mg/L)*</i>	1477	1420	1420	1435	1442	1435	1420	1449
<i>Conductivity (µmhos/cm)</i>	5770	6030	5940	6420	5810	5790	6100	6100
<i>Chloride (mg/L)</i>	1320	1300	1340	2000	1300	1280	1300	1360
<i>Sodium Adsorption Ration (SAR)</i>	10.10	10.01	10.11	10.24	10.96	10.39	10.07	10.18
<i>pH</i>	8.1	8.0	8.1	7.9	8.1	7.9	8.0	8.0

**Notes:**

\*Samples exceeded holding times.



## **APPENDIX A DIAGRAM OF WATER INTAKE SYSTEM**





## **APPENDIX B FIELD NOTES**



Site Information					
Project Location: South side of West Treated Water Pond			Weather Conditions: Clear 54 deg F		
Field Activity: Install intake and suction pump from treated water pond.					
Comments:					
Personnel					
Name		Company		Time In	Time Out
Clifton		CleanHarbors		08:00	17:30
Matt O'Brien		CleanHarbors		08:00	17:30
Safety Checklist					
Yes	Steel Toed Boots	Yes	Hard Hat	Yes	Traffic Vest
Yes	Gloves	Yes	Safety Goggles	No	Ear Protection
Yes	Tailgate Safety	Yes	HASP		JSA
Field Log					
Time	Description of Work Performed				
10:30	Clean Harbors team began working on intake and suction pump system.				
11:56	First intake line was partially installed.				
12:00	First route of hose laid down from the AltEn facility to field16 DJ.				
13:49	Second intake line partially installed				
15:30	Both lines fully installed and tied off.				

## Photo Log



10:30 - Intake hose assembled outside the treated water pond.



10:30 - Closeup on intakes





11:56 - Moving first intake into treated water pond.



11:56 - Extending first intake into the water.





13:49 - Placing second intake into the pond.



15:30 - Both intakes placed and tied off, view to northwest.

for AltEn Land Application Monitoring  
on 03/28/2022



15:30 - Both intakes placed and tied off, view to northeast.



15:30 - Both intakes placed and tied off, view to northwest showing stake for lines preventing wind drift.



for AltEn Land Application Monitoring  
on 03/28/2022



12:00 - Booster pump assembled  
slightly west of Road 10 and Road K  
intersection.



12:00 - Hose through culvert beneath  
Road K, view to north.



12:00 - Hose on eastern edge of Road  
10, view to south.

Site Information					
Project Location: AltEn Facility, Saunders County, Nebraska			Weather Conditions: Snow 29 deg F		
Field Activity: Land Application					
Comments: Today is the first day of applying water to farmland.					
Personnel					
Name		Company		Time In	Time Out
Willy Welzenbach		NewFields		06:50	18:00
Brian Frost		Frosty's Dragline, LLC		08:00	23:30
Ed Bruwer		Frosty's Dragline, LLC		08:00	23:30
Safety Checklist					
Yes	Steel Toed Boots	Yes	Hard Hat	Yes	Traffic Vest
Yes	Gloves	Yes	Safety Goggles		Ear Protection
Yes	Tailgate Safety	Yes	HASP		JSA
Field Log					
Time	Description of Work Performed				
Background:	Three weeks ago, Frosty's Dragline inspected hose and couplings, repaired where needed.				
09:29	Clean Harbors begins construction of trench with steel plate cover as route for land application hose. This structure allows uninterrupted access to hoop houses.				
09:42	Final setup of hoses, booster pump, and tractor in first field (16 DJ).				
10:15	Start pump.				
10:32	Couplings pressurized (sealed by pressure).				
11:55	Hose to full pressure.				
12:41	Shut down operations to establish containment. 13:00 hrs communicate with Brian Frost to fix booster pump at Road 10 and Road K intersection. Brian obtained small containments and repaired gasket. Temporary containment used today, with long term containment planned (Spillguards from Rain for Rent).				
15:20	Restart pumping system. As of 16:10, pumping at 2600 gallons per minute.				
16:20	Stop pumping system for Brian to fix in-field hose (small leak near tractor). Restart at 16:27.				
20:00	Shut down system to repair pin hole in hose. Restart system at 20:27. No leaks visible.				
21:43	Field 16 DJ complete. Turn off pumping system and push air through the hose to clear the hose. Signed Daily Volume Agreement (attached).				



## Photo Log



09:29 - Completed trench  
beneath access road to hoop  
houses.



09:42  
Hose west of culvert, approx. 100  
yards south of intersection between  
Road 10 and Road K.



09:42 - Tractor attached to hose in the field.



09:42 - Hose route running on west edge of AltEn property. Wet cake pile and hoop houses visible in background.



for AltEn Land Application Monitoring  
on 03/31/2022



09:42 - Disced southern edge of field 16 DJ. Improves infiltration near the edge of the field, and helps prevent runoff.



09:42 - Booster pump near corner of Road 10 and Road K.



09:42 - Booster pump.



09:42 - Loop of hose adjacent to  
culvert at south end of field 16 DJ.



for AltEn Land Application Monitoring  
on 03/31/2022



09:42 - Hose route running south towards facility along east edge of Road 10.



09:42 - Closeup of tractor connected to hose.

for AltEn Land Application Monitoring  
on 03/31/2022



09:42 - Booster pump  
in field 16 DJ.



09:42 - Lead pump owned by  
Frostys Dragline, on the AltEn  
facility.





09:42 - Hose loop on south side of culvert in Road K. Culvert in passes from Rainer Holdings property north to field 16 DJ.



09:42 - Hose route running north on west edge of AltEn property toward intersection of Road 10 and Road K.





09:42 - Hose east of Road 10,  
entering culvert approx. 100 yards  
south of intersection between Road  
10 and Road K.



10:32 - Straight fitting  
in land application  
hose on the AltEn  
facility. No leak.

for AltEn Land Application Monitoring  
on 03/31/2022



10:32 - Pressurized coupling on west side of culvert, south of intersection between Road 10 and Road K. No leak, as seen from undisturbed snow.



10:32 - Pressurized hose on the facility, view to west-northwest.



for AltEn Land Application Monitoring  
on 03/31/2022



10:32 - Pressurized fitting south of intersection between Road 10 and Road K. No leak, as seen by undisturbed snow.



11:55 - Pressurized hose running on west side of AltEn property, view to north.

for AltEn Land Application Monitoring  
on 03/31/2022




12:41 - Temporary water  
containment at booster pump near  
intersection of Road 10 and Road K.



12:41 - Temporary containment for  
the primary pump along southern  
hoop house.



for AltEn Land Application Monitoring  
on 03/31/2022



**DAILY VOLUME AGREEMENT: ALTEN LAND APPLICATION**

Date: 03/31/2022

Volume Applied:

Field ID	Volume (Gallons)	Comments
16DJ - Site 2	1,081,739	

Signature below confirms agreement with the quantities documented above.

NewFields Sediment Management & Marine Sciences, LLC Subcontractor: Frosty's Dragline, LLC

Signature: [Signature] Signature: [Signature]

Printed Name: Sarah Benson Printed Name: Brian Frost

Title: Staff Scientist Title: Owner

21:43 - Land application Volume Agreement form, end of first application to field 16 DJ.



## AltEn Land Application

for 16DJ - NW of Feedyard  
on 03/31/2022

Weather						
Temperature (deg F):		32.0				
Wind Direction/Speed:		Northwest, 14 mph				
Cloud Cover (%):		100.0				
Precipitation:		Clear				
Observations						
16 DJ southeastern corner. 41.20548, -96.48906						
Time	Soil Moisture	Ponding Observed?	Runoff Observed?	Honey Bees On Site?	Ground Cover	Ground Cover Comment
12:12	Slightly moist	No	No	No	Stubble	Corn

**16 DJ southeastern corner.**



Photo Looking Northwest  
Photo Comment:  
Frosty's Dragline, LLC



## AltEn Land Application

for 16DJ - NW of Feedyard  
on 03/31/2022

Weather						
Temperature (deg F):		44.0				
Wind Direction/Speed:		Southeast, 11 mph				
Cloud Cover (%):		5.0				
Precipitation:		Clear				
Observations						
Middle of 16 DJ. As of 5:31 PM 2700-2800 gpm. 41.19679, -96.47944						
Time	Soil Moisture	Ponding Observed?	Runoff Observed?	Honey Bees On Site?	Ground Cover	Ground Cover Comment
17:09	Slightly moist	No	No	No	Stubble	Corn



**Middle of 16 DJ. As of 5:31 PM 2700-2800 gpm.**



Photo Looking Northwest  
Photo Comment:  
See change in water level.



Photo Looking Northwest  
Photo Comment:  
Tractor applying water to 16 DJ

**Middle of 16 DJ. As of 5:31 PM 2700-2800 gpm.**



Photo Looking North

Photo Comment:

Western side of culvert, hose running north towards 10th and K St intersection.



Photo Looking North

Photo Comment:

Fixed coupling and pressurized hose line running on the western side of the facility going to 16 DJ.



**Middle of 16 DJ. As of 5:31 PM 2700-2800 gpm.**



Photo Looking West  
Photo Comment:  
Primary pump along southern hoop house



Photo Looking Northwest  
Photo Comment:  
Pump, start point of pumping system.

Site Information					
Project Location:			Weather Conditions: Clear 60 deg F		
Field Activity: Post Land Application Operations					
Comments:					
Personnel					
Name		Company		Time In	Time Out
Kyle Luckey		Knee Deep, LLC		16:00	16:15
Andrew		Rain for Rent		15:10	15:35
Safety Checklist					
Yes	Steel Toed Boots	Yes	Hard Hat	Yes	Traffic Vest
Yes	Gloves	Yes	Safety Goggles	N/A	Ear Protection
N/A	Tailgate Safety	Yes	HASP	Yes	JSA
Field Log					
Time	Description of Work Performed				
15:38	Oversight of spillguard delivery from Rain for Rent.				
16:00	Coordinate with pumpers of spillguard deployment (Monday 4/4/22) and next land application (Tuesday 4/5/22, weather permitting). Relay to Clean Harbors.				
17:40	Inspect hose route from 3/31 application to ensure couplings are in ditch/away from Rainer Holdings land.				



Site Information					
Project Location:			Weather Conditions: Clear 60 deg F		
Field Activity: Containment placement for lead pump and booster.					
Comments: Spillguards in place for Monday (4/4/22) land application to 16 DJ for second pass through.					
Personnel					
Name		Company		Time In	Time Out
Edward Bruwer		Frosty's Dragline, LLC		09:40	12:00
Safety Checklist					
Yes	Steel Toed Boots	Yes	Hard Hat	Yes	Traffic Vest
Yes	Gloves	Yes	Safety Goggles	N/A	Ear Protection
N/A	Tailgate Safety	Yes	HASP	Yes	JSA
Field Log					
Time	Description of Work Performed				
12:00	Inspect spillguards placed under lead pump and booster.				

**Photo Log**


12:00  
Booster near 10th and K St  
intersection. Photo direction northeast.



12:00  
Primary pump along southern hoop  
house. Photo direction northeast.



for AltEn Land Application Monitoring  
on 04/02/2022



12:00

Primary pump along southern hoop house. Photo direction southwest.



12:00

Booster near 10th and K St intersection. Photo direction east.



for AltEn Land Application Monitoring  
on 04/02/2022



12:00

Booster near 10th and K St  
intersection. Photo direction  
southwest.



12:00

Primary pump along southern hoop  
house. Photo direction east.



Site Information					
Project Location:			Weather Conditions: Cloudy 34 deg F		
Field Activity: Land Application - Second pass through on 16 DJ					
Comments:					
Personnel					
Name		Company		Time In	Time Out
Brian Wellington		NewFields		07:00	
Edward Bruwer		Frosty's Dragline, LLC		07:00	
Brian Frost		Frosty's Dragline, LLC		07:00	
Safety Checklist					
Yes	Steel Toed Boots	Yes	Hard Hat	Yes	Traffic Vest
Yes	Gloves	Yes	Safety Goggles	N/A	Ear Protection
N/A	Tailgate Safety	Yes	HASP	Yes	JSA
Field Log					
Time	Description of Work Performed				
07:00	Frosty's Dragline, LLC on site making adjustments and repairs.				
08:10	Inspected hose route, ensured hose and couplings are on planned route and off Rainer Holdings land.				
08:16	Start pump				
08:35	Inspect hose line, now pressurized, check for leaks on pumps, hose, and couplings. Complete land app form. Running at 2500 gallons per minute as of 0908.				
10:04	Jake Bracht with NA collected water sample from lead pump.				
10:27	Inspect hose line. Coordinate with Clean Harbors and pumpers regarding hose rinse after land application today.				
11:27	Turn pump off for Brian to switch lines for the other half of the field.				
11:42	Turn pump back on to finish the last half of the field.				
12:32	Coordination with Clean Harbors and Kyle Luckey of Knee Deep, LLC for hose rinse procedure after all land application operations.				
13:19	Hose line inspection with Brian Wellington.				
14:56	Turn off pump, land application is complete. Setting up to push air through hose.				
16:01	Daily Volume Agreement signed.				

## Photo Log



08:35

Found holes in hose on permitted 16 DJ. Repair was made and moved further into the field to eliminate ponding.

Inspect hose line, now pressurized, check for leaks on pumps, hose, and couplings. Complete land app form. Running at 2500 gallons per minute as of 0908.



10:27


Small drips being contained in spillguard at booster pump located near the intersection of 10th and K St. Photo direction to the southeast. Inspect hose line. Coordinate with Clean Harbors and pumpers regarding hose rinse after land application today.

for AltEn Land Application Monitoring  
on 04/04/2022



10:27

Pressurized hose line running on northern side of Rainer Holdings plot towards 16 DJ. Photo direction west. Inspect hose line. Coordinate with Clean Harbors and pumpers regarding hose rinse after land application today.

 **NewFields**  
Perspective. Vision. Solutions.

**DAILY VOLUME AGREEMENT: ALTEN LAND APPLICATION**

Date: 4/4/2022

Volume Applied:

Field ID	Volume (Gallons)	Comments
16 DJ	1,024,824	

Signature below confirms agreement with the quantities documented above.

NewFields Sediment Management & Marine Sciences, LLC Subcontractor: Frosty's Dragline, LLC

Signature: [Signature] Signature: [Signature]

Printed Name: Sarah Benson Printed Name: Brian Frost

Title: Staff Scientist Title: Owner

16:01

Daily Volume Agreement signed.



## AltEn Land Application

for 16DJ - NW of Feedyard  
on 04/04/2022

Weather						
Temperature (deg F):		34.0				
Wind Direction/Speed:		South, 3 mph				
Cloud Cover (%):		100.0				
Precipitation:		Clear				
Observations						
Southern edge of 16 DJ 41.20617, -96.48850						
Time	Soil Moisture	Ponding Observed?	Runoff Observed?	Honey Bees On Site?	Ground Cover	Ground Cover Comment
08:45	Dry to slightly moist	No	No	No	Stubble	Corn



**Southern edge of 16 DJ**

Photo Looking North

Photo Comment:

Final booster pump on eastern edge of 16 DJ. Edward Bruwer of Frosty's Dragline, LLC in front loading tractor to the east of the booster pump.



Photo Looking Northwest

Photo Comment:

Brian with Frosty's Dragline, LLC applying to 16 DJ at 2500 gallons per minute



## AltEn Land Application

for 16DJ - NW of Feedyard  
on 04/04/2022

Weather						
Temperature (deg F):		53.0				
Wind Direction/Speed:		Northwest, 4 mph				
Cloud Cover (%):		25.0				
Precipitation:		Clear				
Observations						
Southeastern area of 16 DJ 41.19659, -96.47953						
Time	Soil Moisture	Ponding Observed?	Runoff Observed?	Honey Bees On Site?	Ground Cover	Ground Cover Comment
13:19	Dry	No	No	No	Stubble	Corn



**Southeastern area of 16 DJ**



Photo Looking Northwest  
Photo Comment:  
Corn stubble and dry soil.



Photo Caption:  
Brian of Frosty's Dragline, LLC  
applying water to 16 DJ. Tractor is  
visible in the distance.  
Looking Northwest  
Photo Comment:

Site Information					
Project Location:			Weather Conditions: Cloudy 57 deg F		
Field Activity: Land Application to Field 2 (4 DN)					
Comments:					
Personnel					
Name	Company			Time In	Time Out
Chris	Knee Deep, LLC			09:00	18:56
Seth Strom	Knee Deep, LLC			09:00	18:56
Kyle Luckey	Knee Deep, LLC			09:00	18:56
Connor Klitz	Nutrient Advisors			10:50	11:06
Safety Checklist					
Yes	Steel Toed Boots	Yes	Hard Hat	Yes	Traffic Vest
Yes	Gloves	Yes	Safety Goggles	N/A	Ear Protection
No	Tailgate Safety	Yes	HASP	Yes	JSA
Field Log					
Time	Description of Work Performed				
08:21	Complete a hose check before operations begin				
09:00	Pumpers on site, making final adjustments before starting pump.				
09:42	Start pump. Turn off at 9:50 to address leaks on the lead pump.				
09:55	Restart pump. Stop at 10:01. Repair gasket on lead pump.				
10:18	Restart pump. Stop at 10:21. Adjust gasket to stop leak.				
10:38	Restart pump. Check hose route with Kyle starting at 10:42.				
11:09	Tractor has flow, roughly a half hour after pump was started.				
11:59	Rate at 2500 gallons per minute. ETA of completion around 5:00pm CST.				
12:50	NDEE expressed setback violations, went to boundary between 17 DJ and 6 DJ on K St near the NW corner residence of 6 DJ to address NDEE concerns and questions. AltEn water has not yet been applied to either 17 DJ or 6 DJ in this effort, currently soaking into plots is manure that was applied over the weekend and into yesterday morning (4/1/22-4/4/22). Reassured NDEE Kyle from Knee Deep, LLC has copies of the maps with setbacks and is aware of the setback boundary.				
13:35	Water collected in containment at lead pump being pumped into tote to be put into sump 8 due to minor amount of gasoline (from refueling the pump). Water no longer able to return to West Treated Lagoon.				
13:42	Attempt to contact residents of NW residence of 6 DJ for an introduction with Kyle of Knee Deep, LLC and address their concerns/questions about the upcoming application. Residents were not home or did not answer the door. Attempt will be made later today to see if they are home.				
14:00	Hose route check. No leaks visible.				
14:53	Shut down pump to switch hose lines for last portion of the field. Make repairs to hoses while shut down.				
15:59	Restart pump to complete land application to 4 DN.				
16:04	Hose route check to go perform second land application observation.				
16:10	Due to high winds (25-35 mph with gusts of 55 mph), leak from intake not in containment. Containment not under booster pump blown into the booster pump, Knee Deep, LLC is aware and working on mending.				
16:23	Jerry with Knee Deep, LLC going to containments under boosters to removed water collected.				



for AltEn Land Application Monitoring  
on 04/05/2022

Time	Description of Work Performed
16:26	300 foot boundary to accommodate setbacks of potable water source and residence at northwest corner of 6 DJ in preparation for land application of AltEn treated water 4/6/22.
17:27	Turn off pump. Operations are complete.
19:25	Daily Volume Agreement signed.

## Photo Log



09:55

Lead pump along southern hoop house. Containment under pump to collect any water leaking. Water present mainly from Monday's (4/4/22) application and rain. Photo direction west.

Restart pump. Stop at 10:01. Repair gasket on lead pump.



09:55

Lead pump along southern hoop house. Containment under pump to collect any water leaking. Water present mainly from Monday's (4/4/22) application and rain. Photo direction south.

Restart pump. Stop at 10:01. Repair gasket on lead pump.

for AltEn Land Application Monitoring  
on 04/05/2022



10:38

Kyle from Knee Deep, LLC in tractor. Brian Wellington and Sarah Benson in car following. Both parties investigating hose line for any areas of concern. Photo direction south, along 10th, just south of the facility. Restart pump. Check hose route with Kyle starting at 10:42.



10:38

Hose route running along plot boundary, permission was given, with booster pump in the background. Facility is barely visible in the right hand side near the booster. Photo direction east  
Restart pump. Check hose route with Kyle starting at 10:42.



for AltEn Land Application Monitoring  
on 04/05/2022



10:38

Hose route across Dale Nygren's plot, permission was granted. Photo direction northwest.

Restart pump. Check hose route with Kyle starting at 10:42.



10:38

Hose route through Dale Nygren's plot, permission granted. Tractor disk holding pressurized hose for a small leak repair.

Restart pump. Check hose route with Kyle starting at 10:42.





10:38

Kyle with Knee Deep, LLC in tractor inspecting booster pump and line through plot, owned by Dale Nygren and permission granted. Restart pump. Check hose route with Kyle starting at 10:42.



10:38

First booster pump along the route. Minor leaks being collected by containment. Photo direction northwest. Hose line runs diagonal across a plot Duane owns, permission granted. Restart pump. Check hose route with Kyle starting at 10:42.

for AltEn Land Application Monitoring  
on 04/05/2022



11:59

Seth with Knee Deep, LLC applying  
AltEn water to 4 DN.  
Rate at 2500 gallons per minute. ETA  
of completion around 5:00pm CST.



16:04

Hose route running west along  
southern edge of Rainer Holdings.  
Hose route check to go perform  
second land application observation.



for AltEn Land Application Monitoring  
on 04/05/2022



16:10

Booster pump located at corner intersection of 11th and J St. Leak visible from intake coupling, without wind, leak is contained within spillguard. Containment pushed by the wind and wrapped around booster hitch. Field the booster is on is owned by Duane Johnson.


Due to high winds (25-35 mph with gusts of 55 mph), leak from intake not in containment. Containment not under booster pump blown into the booster pump, Knee Deep, LLC is aware and working on mending.

for AltEn Land Application Monitoring  
on 04/05/2022



16:26

Disced plot (dark brown soil) to establish 300 foot boundary around potable water source and residence. Photo direction southwest. 300 foot boundary to accommodate setbacks of potable water source and residence at northwest corner of 6 DJ in preparation for land application of AltEn treated water 4/6/22.



DAILY VOLUME AGREEMENT: ALTEN LAND APPLICATION

Date: 4/5/2022

Volume Applied:

Field ID	Volume (Gallons)	Comments
<u>4DJ - Site 4</u>	<u>830,446</u>	

Signature below confirms agreement with the quantities documented above.

NewFields Sediment Management & Marine Sciences, LLC

Signature: *Sarah Benson*

Printed Name: Sarah Benson

Title: Staff Scientist

Subcontractor: Knee Deep, LLC

Signature: *Scott A. Spron*

Printed Name: Scott A. Spron

Title: Marine Location Specialist

19:25

Daily Volume Agreement signed.





## AltEn Land Application

for 4DN - Big Pivot East  
on 04/05/2022

Weather						
Temperature (deg F):		51.0				
Wind Direction/Speed:		Southwest, 15 mph				
Cloud Cover (%):		100.0				
Precipitation:		Clear				
Observations						
Middle of 4 DN. Inspection while inside of tractor cab with pumper actively applying. 41.19645, -96.47991						
Time	Soil Moisture	Ponding Observed?	Runoff Observed?	Honey Bees On Site?	Ground Cover	Ground Cover Comment
11:50	Dry	No	No	No	Stubble	Corn

**Middle of 4 DN. Inspection while inside of tractor cab.**



Photo Looking Southwest

Photo Comment:

Visible land that had water applied  
versus land that had not been applied  
to.



Photo Looking Northeast

Photo Comment:

While inside of tractor cab, moist soil  
visible from injection with no ponding  
or runoff.



## AltEn Land Application

for 4DN - Big Pivot East  
on 04/05/2022

Weather						
Temperature (deg F):		54.0				
Wind Direction/Speed:		Northwest, 22 mph				
Cloud Cover (%):		50.0				
Precipitation:		Clear				
Observations						
Northern section of 4 DN. Field is difficult to get to as surrounding areas are farming fields. 41.21606, -96.53368						
Time	Soil Moisture	Ponding Observed?	Runoff Observed?	Honey Bees On Site?	Ground Cover	Ground Cover Comment
16:51	Dry	No	No	No	Stubble	Corn

**Northern portion of field 4 DN.**



Photo Looking South  
Photo Comment:  
Land application on to 4 DN



Site Information					
Project Location:			Weather Conditions: Partly Cloudy 45 deg F		
Field Activity: Land Application Operations					
Comments:					
Personnel					
Name		Company		Time In	Time Out
Kyle Luckey		Knee Deep, LLC		09:23	20:00
Sarah Benson		NewFields		06:41	10:41
Chris		Knee Deep, LLC		09:23	20:00
Safety Checklist					
Yes	Steel Toed Boots	Yes	Hard Hat	Yes	Traffic Vest
Yes	Gloves	Yes	Safety Goggles	N/A	Ear Protection
N/A	Tailgate Safety	Yes	HASP	Yes	JSA
Field Log					
Time	Description of Work Performed				
07:30	Hose route inspection				
07:42	Inspection of operation set up. Setback boundaries established yesterday by Kyle of Knee Deep, LLC.				
08:36	Knee Deep team on site, making final preparations and repairs for operations.				
10:29	Start pump to begin operations.				
10:41	Hose route inspection with pressurized hose.				
11:03	Conversation with Kyle Luckey of Knee Deep regarding their due diligence this morning on pumps and hose line repairs, and application plans the remainder of the week. Hand over responsibility to Brian Wellington of NewFields.				

**Photo Log**

07:30

Rainer Holdings cows near hose line.  
Photo direction north, hoop houses  
visible.

Hose route inspection



07:30

Hose running west along southern  
boundary of Rainer Holdings with  
some of their cows visible. Photo  
direction northwest.

Hose route inspection

for AltEn Land Application Monitoring  
on 04/06/2022



07:42

Pivots on 6 DJ. Start of setback boundary visible in bottom right hand corner.

Inspection of operation set up.  
Setback boundaries established yesterday by Kyle of Knee Deep, LLC.



07:42

Injection tractor sitting in 6 DJ for application today. Dragline visible behind tractor.

Inspection of operation set up.  
Setback boundaries established yesterday by Kyle of Knee Deep, LLC.



for AltEn Land Application Monitoring  
on 04/06/2022



07:42

300' setback boundary around wetland area at southeast edge of 6 DJ.  
Inspection of operation set up.  
Setback boundaries established yesterday by Kyle of Knee Deep, LLC.



10:41

Booster pump near 11th and J St,  
hose route going northwest across  
Duane Johnson's field, permission  
was granted. Photo direction  
northwest.  
Hose route inspection with pressurized  
hose.



**DAILY VOLUME AGREEMENT: ALTEN LAND APPLICATION****Date:**4/6/2022**Volume Applied:**

Field ID	Volume (Gallons)	Comments
605 - Site 1	823,712	

Signature below confirms agreement with the quantities documented above.

**NewFields Sediment Management & Marine Sciences, LLC****Subcontractor:**Knee Deep LLC**Signature:**Brian Wellington**Printed Name:**Brian Wellington**Title:**Snr. Engineer**Signature:**Kyle J. Luckey**Printed Name:**Kyle J. Luckey**Title:**Application Manager





## AltEn Land Application

for 6DJ - West of Home Qtr  
on 04/06/2022

Weather						
Temperature (deg F):		51.0				
Wind Direction/Speed:		Northwest, 28 mph				
Cloud Cover (%):		100.0				
Precipitation:		Clear				
Observations						
Along eastern edge of 6 DJ near wetland boundary. 41.19910, -96.52274						
Time	Soil Moisture	Ponding Observed?	Runoff Observed?	Honey Bees On Site?	Ground Cover	Ground Cover Comment
11:04	Slightly moist	No	No	No	Stubble	Corn

**Along eastern edge of 6 DJ near wetland**



Photo Looking West  
Photo Comment:  
Tractor actively applying water.



Photo Looking West  
Photo Comment:  
Seth in tractor on 6 DJ.



## AltEn Land Application

for 6DJ - West of Home Qtr  
on 04/06/2022

Weather						
Temperature (deg F):		49.0				
Wind Direction/Speed:		Northwest, 19 mph				
Cloud Cover (%):		60.0				
Precipitation:		Clear				
Observations						
At field observing application. 41.19911, -96.52264						
Time	Soil Moisture	Ponding Observed?	Runoff Observed?	Honey Bees On Site?	Ground Cover	Ground Cover Comment
16:13	Dry	No	No	No	Stubble	Corn



**At field observing application.**



Photo Looking West  
Photo Comment:  
Application on field

Summary Data		
Synopsis of Day:	High winds prevented work on the liner. Winds uplifted a portion of liner and inlet pipe being installed in the east cell and deposited them into the SE lagoon, a roll of liner was also uplifted and deposited into the SE lagoon. Land application was performed on field 6 DJ	
Progress Status:	Total of 1,087,791 gallons applied to field 6DJ	
Incident Occur Today?	Yes	
Were Visitors on Site Today?	No	
Incidents		
Incident Time	Incident Tag(s)	Description
11:37	Treatment Ponds	Wind blew off a portion of SE corner of the newly installed liner from new east cell and the inlet pipe being installed in the cell. They were both deposited into the existing SE lagoon. A whole roll of liner was also blown into the lagoon.
Field Log		
Time	Field Log Tag(s)	Description of Work Performed



**DAILY VOLUME AGREEMENT: ALTEN LAND APPLICATION****Date:**4/7/2022**Volume Applied:**

Field ID	Volume (Gallons)	Comments
603 - Site 1	1,087,791	

Signature below confirms agreement with the quantities documented above.

**NewFields Sediment Management & Marine Sciences, LLC**

Signature:

Brian Wellington

Printed Name:

Brian Wellington

Title:

Sr. Engineer

Subcontractor:

Knee Deep LLC

Signature:

Kyle J. Luckey

Printed Name:

Kyle J. Luckey

Title:

Application Manager





## AltEn Land Application

for 6DJ - West of Home Qtr  
on 04/07/2022

Weather						
Temperature (deg F):		41.0				
Wind Direction/Speed:		Northwest, 41 mph				
Cloud Cover (%):		80.0				
Precipitation:		Clear				
Observations						
Observing application in field 6DJ 41.19645, -96.47958						
Time	Soil Moisture	Ponding Observed?	Runoff Observed?	Honey Bees On Site?	Ground Cover	Ground Cover Comment
10:14	Dry	No	No	No	Stubble	Corn



**Observing application in field 6DJ**



Photo Looking South  
Photo Comment:  
Application in progress



## ALTEN DAILY FIELD RECORD

by Brian Wellington  
on Friday , 04/08/2022

Summary Data			
Synopsis of Day:	Treated water Tank #1 being emptied out. Repair of inlet pipe to west cell. Land application to field 17DJ and partial to 4DN		
Progress Status:	Total applied 655,791 gallons		
Incident Occur Today?	No		
Were Visitors on Site Today?	Yes		
Visitors			
Name	Company	Time In	Time Out
Matt Brauch	NDEE	11:50	12:40
Visit Reason: Inspection Comments: None			
Connor Klitz	Nutrient Advisors	13:15	13:25
Visit Reason: Land App Effluent Sampling			
Field Log			
Time	Field Log Tag(s)	Description of Work Performed	

**DAILY VOLUME AGREEMENT: ALTEN LAND APPLICATION****Date:**4/8/2022**Volume Applied:**

Field ID	Volume (Gallons)	Comments
17 DS / 40 N	655,791	

Signature below confirms agreement with the quantities documented above.

**NewFields Sediment Management & Marine Sciences, LLC****Subcontractor:**Knee Deep LLC**Signature:**Brian Walling**Signature:**Kyle J. Lucky**Printed Name:**Brian Walling**Printed Name:**Kyle J. Lucky**Title:**Sur Eng**Title:**Application Manager



## AltEn Land Application

for 17DJ - Duane's 40  
on 04/08/2022

Weather						
Temperature (deg F):		52.0				
Wind Direction/Speed:		Northwest, 22 mph				
Cloud Cover (%):		5.0				
Precipitation:		Clear				
Observations						
Eastern corner of field 41.20603, -96.52343						
Time	Soil Moisture	Ponding Observed?	Runoff Observed?	Honey Bees On Site?	Ground Cover	Ground Cover Comment
13:08	Dry	No	No	No	Stubble	Corn



**Eastern corner of field**



Photo Looking West  
Photo Comment:  
Pump area and felld application



## ALTEN DAILY FIELD RECORD

by Brian Wellington  
on Saturday , 04/09/2022

Summary Data			
Synopsis of Day:	Land application to field 4DN. Liner work completed. Measured water levels in ponds and reset base levels in loggers. Treated water tank #1 is empty currently being cleaned.		
Progress Status:	Total of 653,991 gallons applied to 4DN. Main liner work completed in west cell.		
Incident Occur Today?	No		
Were Visitors on Site Today?	Yes		
Visitors			
Name	Company	Time In	Time Out
Connor Klitz	Nutrient Advisors	23:00	11:11
Visit Reason: Land App water sample			
Field Log			
Time	Field Log Tag(s)	Description of Work Performed	
10:59	Treatment Ponds	Measured side slopes NW lagoon @ stilling well liner 14.2 degrees. Depth to water 37.62ft. NE lagoon side slopes from stilling well 17.4 degrees. At 22 mark varied from 14.6 degrees to 22.3 degrees. Depth from 22 mark 19.59feet. SE lagoon side slope from 23 mark 17.7 degrees at stilling well 13.4 degrees. Depth to water at 23 mark 11.75 ft at stilling well 12.45 feet	

**DAILY VOLUME AGREEMENT: ALTEN LAND APPLICATION**

**Date:**

4/9/2022

**Volume Applied:**

Field ID	Volume (Gallons)	Comments
40N S. 69	653,991	

Signature below confirms agreement with the quantities documented above.

**NewFields Sediment Management & Marine Sciences, LLC**

Signature:

Printed Name:

Title:

Brian Wellington  
Brian Wellington  
Sr Engineer

Subcontractor:

Signature:

Printed Name:

Title:

Kree Deep LLC  
Kyle J. Lucky  
Kyle J. Lucky  
Application Manager



## AltEn Land Application

for 4DN - Big Pivot East  
on 04/09/2022

Weather						
Temperature (deg F):		48.0				
Wind Direction/Speed:		Southeast, 12 mph				
Cloud Cover (%):		0.0				
Precipitation:		Clear				
Observations						
SE corner of field 41.20608, -96.53272						
Time	Soil Moisture	Ponding Observed?	Runoff Observed?	Honey Bees On Site?	Ground Cover	Ground Cover Comment
10:37	Slightly damp	No	No	No	Cover Crop	Corn



**SE corner of field**

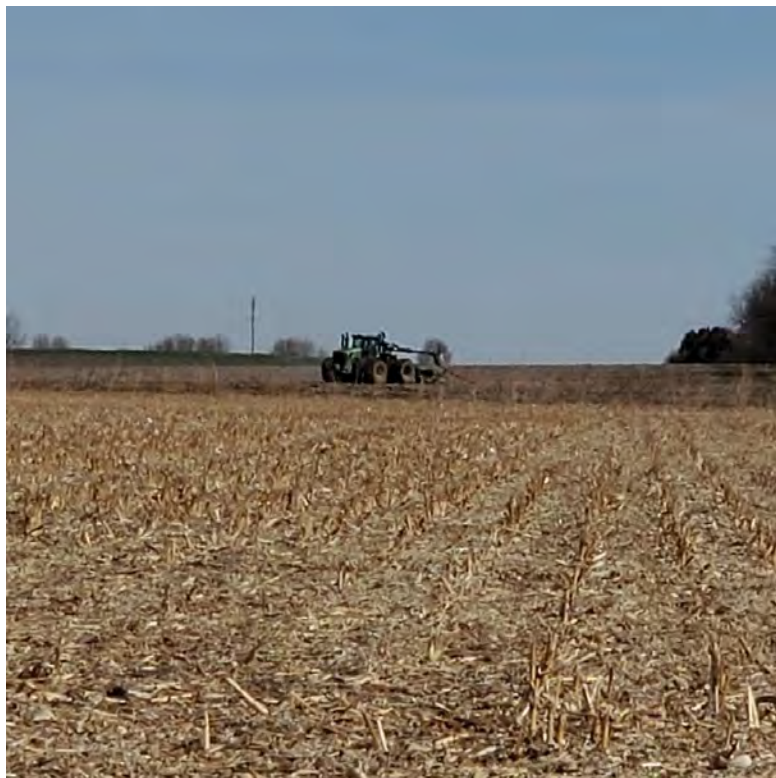


Photo Looking North  
Photo Comment:  
Application

DAILY VOLUME AGREEMENT: ALTEN LAND APPLICATION

Date:

4/11/2022

Volume Applied:

Field ID	Volume (Gallons)	Comments
6 DJ	1,018,419	Pumped 12:30 PM - 10:00 PM

Signature below confirms agreement with the quantities documented above.

NewFields Sediment Management & Marine Sciences, LLC

Subcontractor: Knee Deep LLC

Signature:

[Signature]

Signature:

[Signature]

Printed Name:

Randall W. Grachek

Printed Name:

Kyle J. Luckey

Title:

Sr. Engineer

Title:

Application Manager



## AltEn Land Application

for 6DJ - West of Home Qtr  
on 04/11/2022

Weather						
Temperature (deg F):		67.0				
Wind Direction/Speed:		Northwest, 10 mph				
Cloud Cover (%):		0.0				
Precipitation:		Clear				
Observations						
Field 6 DJ 41.20182, -96.52694						
Time	Soil Moisture	Ponding Observed?	Runoff Observed?	Honey Bees On Site?	Ground Cover	Ground Cover Comment
15:30		No	No	, ft from application area	Stubble	

**Field 6 DJ**



Photo Looking Northeast  
Photo Comment:  
LA Pump 4-11-22



Photo Looking Northwest  
Photo Comment:  
Drag Line Application 4-11-22



DAILY VOLUME AGREEMENT: ALTEN LAND APPLICATION

Date:

4/12/2022Volume Applied:

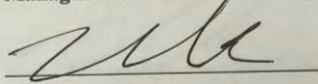
Field ID	Volume (Gallons)	Comments
6 DJ	1,073, 111	Pumped until 7:00 Tornado Warning

Signature below confirms agreement with the quantities documented above.

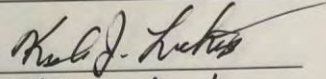
NewFields Sediment Management &amp; Marine Sciences, LLC

Subcontractor: \_\_\_\_\_

Signature:



Signature:



Printed Name:

Randall W Graehke

Printed Name:

Kyle J. Lucky

Title:

Sr. Engineer

Title:

Appl Manager



## AltEn Land Application

for 6DJ - West of Home Qtr  
on 04/12/2022

Weather						
Temperature (deg F):		90.0				
Wind Direction/Speed:		Southwest, 35 mph				
Cloud Cover (%):		0.0				
Precipitation:		Light Rain				
Observations						
Continued LA - Over 1 M gallons applied on 4/11/22 41.20262, -96.52468						
Time	Soil Moisture	Ponding Observed?	Runoff Observed?	Honey Bees On Site?	Ground Cover	Ground Cover Comment
18:43		No	No	No	Bare Soil	

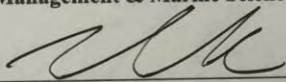
DAILY VOLUME AGREEMENT: ALTEN LAND APPLICATION**Date:**4/14/2022**Volume Applied:**

Field ID	Volume (Gallons)	Comments
4DN	287,986	Pumped from 1:00 <sup>pm</sup> - 4:00 Am
		Flushing hoses scheduled
		for Friday 4/15/22
		Dismantle Pumps 4/16/22

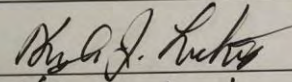
Signature below confirms agreement with the quantities documented above.

**NewFields Sediment Management & Marine Sciences, LLC****Subcontractor:**

Signature:



Signature:



Printed Name:

Randall W. Grachek

Printed Name:

Kyle J. Luckey

Title:

Sr. Engineer

Title:

Appl Manager



## AltEn Land Application

for 4DN - Big Pivot East  
on 04/14/2022

Weather						
Temperature (deg F):		42.0				
Wind Direction/Speed:		Northwest, 35 mph				
Cloud Cover (%):		0.0				
Precipitation:		Clear				
Observations						
Over 1M applied on 4/12/22, 0.29M applied on 4/14/22 41.21036, -96.56250						
Time	Soil Moisture	Ponding Observed?	Runoff Observed?	Honey Bees On Site?	Ground Cover	Ground Cover Comment
18:14		No	No	No	Bare Soil	





## **APPENDIX C LABORATORY REPORTS, WATER SAMPLES DURING APPLICATION**

## AGVISE Water Characterization Report

Submitting Account	=	NE0821
Submitting Firm	=	NEWFIELDS
Grower Name	=	ALT EN
Sample ID	=	ALTEN 16DJ1 3/22 2
Date Received	=	04-06-2022
Date Reported	=	04-11-2022

### AGVISE Lab No. 97

pH	8.1
Potassium	849 ppm
Calcium	43 ppm
Magnesium	44 ppm
Sodium	428 ppm
Hardness	292 mg equivalent CaCO <sub>3</sub> /L
Conductivity	5.81 mmhos/cm
Total Dissolved Solids(calc)	3718 ppm
Sodium Adsorption Ratio (SAR)	10.96
Alkalinity	1442 mg CaCO <sub>3</sub> /L
Carbonates	0.00 meq/L
Bicarbonates	29.00 meq/L
Sulfate-Sulfur	24 ppm
Total Nitrogen	382.7 ppm
Nitrogen (Nitrate+Nitrite)	0.2 ppm
Nitrogen (Ammoniacal) Analyzer	362.3 ppm
Total Phosphorus (as PO <sub>4</sub> <sup>-3</sup> )	61.0 ppm
Phosphorus (by ICP)	6.8 ppm
Zinc	0.2 ppm
Iron	0.6 ppm



804 Highway 15 West  
P.O. Box 510  
Northwood, ND 58267  
  
(701) 587-6010  
FAX (701) 587-6013  
  
northwoodlab@agvise.com  
www.agvise.com

## AGVISE Water Characterization Report

Submitting Account	=	NE0821
Submitting Firm	=	NEWFIELDS
Grower Name	=	ALT EN
Sample ID	=	ALTEN 16DJ1 3/22 2
Date Received	=	04-06-2022
Date Reported	=	04-11-2022

AGVISE Lab No. 97

Manganese	0.2 ppm
Copper	1.9 ppm
Boron	0.7 ppm
Chloride	1300.0 ppm

## AGVISE Water Characterization Report

Submitting Account	=	NE0821
Submitting Firm	=	NEWFIELDS ENVIRONMENTAL
Grower Name	=	ALT EN
Sample ID	=	ALTEN 16DJ2 4/22 2
Date Received	=	04-07-2022
Date Reported	=	04-11-2022

AGVISE Lab No. 108

pH	7.9
Potassium	830 ppm
Calcium	49 ppm
Magnesium	46 ppm
Sodium	422 ppm
Hardness	316 mg equivalent CaCO <sub>3</sub> /L
Conductivity	5.79 mmhos/cm
Total Dissolved Solids(calc)	3706 ppm
Sodium Adsorption Ratio (SAR)	10.39
Alkalinity	1435 mg CaCO <sub>3</sub> /L
Carbonates	0.00 meq/L
Bicarbonates	28.86 meq/L
Sulfate-Sulfur	40 ppm
Total Nitrogen	342.1 ppm
Nitrogen (Nitrate+Nitrite)	0.2 ppm
Nitrogen (Ammoniacal) Analyzer	335.1 ppm
Total Phosphorus (as PO <sub>4</sub> <sup>-3</sup> )	39.3 ppm
Phosphorus (by ICP)	8.1 ppm
Zinc	Below detection limit of 0.1 ppm
Iron	0.8 ppm





804 Highway 15 West  
P.O. Box 510  
Northwood, ND 58267  
  
(701) 587-6010  
FAX (701) 587-6013  
  
northwoodlab@agvise.com  
www.agvise.com

## AGVISE Water Characterization Report

Submitting Account	=	NE0821
Submitting Firm	=	NEWFIELDS ENVIRONMENTAL
Grower Name	=	ALT EN
Sample ID	=	ALTEN 16DJ2 4/22 2
Date Received	=	04-07-2022
Date Reported	=	04-11-2022

AGVISE Lab No. 108

Manganese	0.3 ppm
Copper	0.1 ppm
Boron	0.7 ppm
Chloride	1280.0 ppm

## AGVISE Water Characterization Report

Submitting Account	=	NE0821
Submitting Firm	=	NEWFIELDS
Grower Name	=	ALT EN
Sample ID	=	ALTEN 4DN1 4/22 2
Date Received	=	04-08-2022
Date Reported	=	04-15-2022

### AGVISE Lab No. 110

pH	8.1
Potassium	714 ppm
Calcium	34 ppm
Magnesium	36 ppm
Sodium	354 ppm
Hardness	235 mg equivalent CaCO <sub>3</sub> /L
Conductivity	5.77 mmhos/cm
Total Dissolved Solids(calc)	3693 ppm
Sodium Adsorption Ratio (SAR)	10.10
Alkalinity	1477 mg CaCO <sub>3</sub> /L
Carbonates	0.00 meq/L
Bicarbonates	29.86 meq/L
Sulfate-Sulfur	17 ppm
Total Nitrogen	316.1 ppm
Nitrogen (Nitrate+Nitrite)	0.2 ppm
Nitrogen (Ammoniacal) Analyzer	309.2 ppm
Total Phosphorus (as PO <sub>4</sub> <sup>-3</sup> )	38.8 ppm
Phosphorus (by ICP)	5.0 ppm
Zinc	Below detection limit of 0.1 ppm
Iron	0.5 ppm



804 Highway 15 West  
P.O. Box 510  
Northwood, ND 58267  
  
(701) 587-6010  
FAX (701) 587-6013  
  
northwoodlab@agvise.com  
www.agvise.com

## AGVISE Water Characterization Report

Submitting Account	=	NE0821
Submitting Firm	=	NEWFIELDS
Grower Name	=	ALT EN
Sample ID	=	ALTEN 4DN1 4/22 2
Date Received	=	04-08-2022
Date Reported	=	04-15-2022

AGVISE Lab No. 110

Manganese	0.2 ppm
Copper	0.1 ppm
Boron	0.6 ppm
Chloride	1320.0 ppm



804 Highway 15 West  
P.O. Box 510  
Northwood, ND 58267

(701) 587-6010  
FAX (701) 587-6013

northwoodlab@agvise.com  
www.agvise.com

## AGVISE Water Characterization Report

Submitting Account	=	NE0821
Submitting Firm	=	NEW FIELDS
Grower Name	=	ALT EN
Sample ID	=	ALTEN 6DJ1 4/22 4
Date Received	=	04-14-2022
Date Reported	=	04-19-2022

### AGVISE Lab No. 123

pH	8.1
Potassium	791 ppm
Calcium	50 ppm
Magnesium	44 ppm
Sodium	408 ppm
Hardness	311 mg equivalent CaCO <sub>3</sub> /L
Conductivity	5.94 mmhos/cm
Total Dissolved Solids(calc)	3802 ppm
Sodium Adsorption Ratio (SAR)	10.11
Alkalinity	1420 mg CaCO <sub>3</sub> /L
Carbonates	0.00 meq/L
Bicarbonates	29.00 meq/L
Sulfate-Sulfur	26 ppm
Total Nitrogen	340.7 ppm
Nitrogen (Nitrate+Nitrite)	0.2 ppm
Nitrogen (Ammoniacal) Analyzer	340.2 ppm
Total Phosphorus (as PO <sub>4</sub> <sup>-3</sup> )	38.1 ppm
Phosphorus (by ICP)	9.2 ppm
Zinc	0.1 ppm
Iron	1.2 ppm





804 Highway 15 West  
P.O. Box 510  
Northwood, ND 58267  
  
(701) 587-6010  
FAX (701) 587-6013  
  
northwoodlab@agvise.com  
www.agvise.com

## AGVISE Water Characterization Report

Submitting Account	=	NE0821
Submitting Firm	=	NEW FIELDS
Grower Name	=	ALT EN
Sample ID	=	ALTEN 6DJ1 4/22 4
Date Received	=	04-14-2022
Date Reported	=	04-19-2022

AGVISE Lab No. 123

Manganese	0.3 ppm
Copper	0.2 ppm
Boron	0.8 ppm
Chloride	1340.0 ppm

## AGVISE Water Characterization Report

Submitting Account	=	NE0821
Submitting Firm	=	NEW FIELDS
Grower Name	=	ALT EN
Sample ID	=	ALTEN 17DJ2 4/22 2
Date Received	=	04-14-2022
Date Reported	=	04-19-2022

### AGVISE Lab No. 124

pH	8.0
Potassium	805 ppm
Calcium	54 ppm
Magnesium	45 ppm
Sodium	415 ppm
Hardness	324 mg equivalent CaCO <sub>3</sub> /L
Conductivity	6.10 mmhos/cm
Total Dissolved Solids(calc)	3904 ppm
Sodium Adsorption Ratio (SAR)	10.07
Alkalinity	1420 mg CaCO <sub>3</sub> /L
Carbonates	0.00 meq/L
Bicarbonates	29.14 meq/L
Sulfate-Sulfur	27 ppm
Total Nitrogen	343.2 ppm
Nitrogen (Nitrate+Nitrite)	0.2 ppm
Nitrogen (Ammoniacal) Analyzer	343.0 ppm
Total Phosphorus (as PO <sub>4</sub> <sup>-3</sup> )	37.0 ppm
Phosphorus (by ICP)	10.7 ppm
Zinc	Below detection limit of 0.1 ppm
Iron	1.4 ppm



804 Highway 15 West  
P.O. Box 510  
Northwood, ND 58267  
  
(701) 587-6010  
FAX (701) 587-6013  
  
northwoodlab@agvise.com  
www.agvise.com

## AGVISE Water Characterization Report

Submitting Account	=	NE0821
Submitting Firm	=	NEW FIELDS
Grower Name	=	ALT EN
Sample ID	=	ALTEN 17DJ2 4/22 2
Date Received	=	04-14-2022
Date Reported	=	04-19-2022

AGVISE Lab No. 124

Manganese	0.3 ppm
Copper	0.2 ppm
Boron	0.8 ppm
Chloride	1300.0 ppm



804 Highway 15 West  
P.O. Box 510  
Northwood, ND 58267  
  
(701) 587-6010  
FAX (701) 587-6013  
  
northwoodlab@agvise.com  
www.agvise.com

## AGVISE Water Characterization Report

Submitting Account	=	NE0821
Submitting Firm	=	NEW FIELDS
Grower Name	=	ALT EN
Sample ID	=	ALTEN 4DN2 4/22 4
Date Received	=	04-14-2022
Date Reported	=	04-19-2022

AGVISE Lab No. 125

pH	8.0
Potassium	795 ppm
Calcium	53 ppm
Magnesium	45 ppm
Sodium	410 ppm
Hardness	321 mg equivalent CaCO <sub>3</sub> /L
Conductivity	6.03 mmhos/cm
Total Dissolved Solids(calc)	3859 ppm
Sodium Adsorption Ratio (SAR)	10.01
Alkalinity	1420 mg CaCO <sub>3</sub> /L
Carbonates	0.00 meq/L
Bicarbonates	29.29 meq/L
Sulfate-Sulfur	27 ppm
Total Nitrogen	319.9 ppm
Nitrogen (Nitrate+Nitrite)	0.2 ppm
Nitrogen (Ammoniacal) Analyzer	319.7 ppm
Total Phosphorus (as PO <sub>4</sub> <sup>-3</sup> )	38.3 ppm
Phosphorus (by ICP)	10.8 ppm
Zinc	Below detection limit of 0.1 ppm
Iron	1.4 ppm





804 Highway 15 West  
P.O. Box 510  
Northwood, ND 58267  
  
(701) 587-6010  
FAX (701) 587-6013  
  
northwoodlab@agvise.com  
www.agvise.com

## AGVISE Water Characterization Report

Submitting Account	=	NE0821
Submitting Firm	=	NEW FIELDS
Grower Name	=	ALT EN
Sample ID	=	ALTEN 4DN2 4/22 4
Date Received	=	04-14-2022
Date Reported	=	04-19-2022

AGVISE Lab No. 125

Manganese	0.3 ppm
Copper	0.2 ppm
Boron	0.8 ppm
Chloride	1300.0 ppm

## AGVISE Water Characterization Report

Submitting Account	=	NE0821
Submitting Firm	=	NEWFIELDS
Grower Name	=	ALT EN
Sample ID	=	ALTEN 6DJ2 4/22 6
Date Received	=	04-15-2022
Date Reported	=	04-20-2022

### AGVISE Lab No. 126

pH	7.9
Potassium	810 ppm
Calcium	52 ppm
Magnesium	45 ppm
Sodium	418 ppm
Hardness	318 mg equivalent CaCO <sub>3</sub> /L
Conductivity	6.42 mmhos/cm
Total Dissolved Solids(calc)	4109 ppm
Sodium Adsorption Ratio (SAR)	10.24
Alkalinity	1435 mg CaCO <sub>3</sub> /L
Carbonates	0.00 meq/L
Bicarbonates	29.57 meq/L
Sulfate-Sulfur	24 ppm
Total Nitrogen	315.4 ppm
Nitrogen (Nitrate+Nitrite)	0.2 ppm
Nitrogen (Ammoniacal) Analyzer	312.1 ppm
Total Phosphorus (as PO <sub>4</sub> <sup>-3</sup> )	42.5 ppm
Phosphorus (by ICP)	9.9 ppm
Zinc	Below detection limit of 0.1 ppm
Iron	1.2 ppm



804 Highway 15 West  
P.O. Box 510  
Northwood, ND 58267

(701) 587-6010  
FAX (701) 587-6013

northwoodlab@agvise.com  
www.agvise.com

## AGVISE Water Characterization Report

Submitting Account	=	NE0821
Submitting Firm	=	NEWFIELDS
Grower Name	=	ALT EN
Sample ID	=	ALTEN 6DJ2 4/22 6
Date Received	=	04-15-2022
Date Reported	=	04-20-2022

AGVISE Lab No. 126

Manganese	0.3 ppm
Copper	0.2 ppm
Boron	0.7 ppm
Chloride	2000.0 ppm



804 Highway 15 West  
P.O. Box 510  
Northwood, ND 58267

(701) 587-6010  
FAX (701) 587-6013

northwoodlab@agvise.com  
www.agvise.com

## AGVISE Water Characterization Report

Submitting Account	=	NE0821
Submitting Firm	=	NEWFIELDS
Grower Name	=	ALT EN
Sample ID	=	ALTEN 17DJ2 4/22 4
Date Received	=	04-15-2022
Date Reported	=	04-20-2022

### AGVISE Lab No. 127

pH	8.0
Potassium	810 ppm
Calcium	54 ppm
Magnesium	45 ppm
Sodium	418 ppm
Hardness	322 mg equivalent CaCO <sub>3</sub> /L
Conductivity	6.10 mmhos/cm
Total Dissolved Solids(calc)	3904 ppm
Sodium Adsorption Ratio (SAR)	10.18
Alkalinity	1449 mg CaCO <sub>3</sub> /L
Carbonates	0.00 meq/L
Bicarbonates	29.29 meq/L
Sulfate-Sulfur	20 ppm
Total Nitrogen	347.9 ppm
Nitrogen (Nitrate+Nitrite)	0.2 ppm
Nitrogen (Ammoniacal) Analyzer	347.7 ppm
Total Phosphorus (as PO <sub>4</sub> <sup>-3</sup> )	42.6 ppm
Phosphorus (by ICP)	10.7 ppm
Zinc	Below detection limit of 0.1 ppm
Iron	1.4 ppm





804 Highway 15 West  
P.O. Box 510  
Northwood, ND 58267

(701) 587-6010  
FAX (701) 587-6013

northwoodlab@agvise.com  
www.agvise.com

## AGVISE Water Characterization Report

Submitting Account	=	NE0821
Submitting Firm	=	NEWFIELDS
Grower Name	=	ALT EN
Sample ID	=	ALTEN 17DJ2 4/22 4
Date Received	=	04-15-2022
Date Reported	=	04-20-2022

AGVISE Lab No. 127

Manganese	0.3 ppm
Copper	0.2 ppm
Boron	0.8 ppm
Chloride	1360.0 ppm



804 Hwy 15 W  
PO Box 510  
Northwood, ND 58267  
(701) 587-6010

[northwoodlab@agvise.com](mailto:northwoodlab@agvise.com)

902 13th St N  
PO Box 187  
Benson, MN 56215  
(320) 843-4109

[bensonlab@agvise.com](mailto:bensonlab@agvise.com)

## Interpreting Water Quality Reports

A water quality analysis encompasses fundamental water properties like pH, electrical conductivity, and dissolved ions. Six ions comprise the majority of dissolved constituents in water. The major positive charged ions (cations) are calcium, magnesium, and sodium. The major negative charged ions (anions) are bicarbonate, chloride, and sulfate. Additional common ions are potassium, iron, and nitrate.

**pH:** pH is the measure of hydrogen and hydroxyl ion activity in water. Water pH below 7 is acidic, at 7 is neutral, and above 7 is alkaline. Water pH determines the solubility and reactivity of dissolved ions, minerals, and chemicals. For pesticide carrier water, the pH may need to be adjusted for optimal pesticide activity and efficacy.

**Hardness:** Hardness is the measure of calcium and magnesium in water. It is reported in milligrams per liter of calcium carbonate equivalent (mg/L  $\text{CaCO}_3$ ). To convert units from mg/L  $\text{CaCO}_3$  to grains/gallon, multiply mg/L  $\text{CaCO}_3$  by 17.1. In general, household water sources should have hardness less than 100 mg/L  $\text{CaCO}_3$  or about 6 grains/gallon.

**Electrical Conductivity (EC, soluble salts):** The total concentration of salt in water is measured as the electrical conductivity (EC). It is reported in deciSiemens per meter (dS/m) or millimhos per centimeter (mmhos/cm). It may also be reported as total dissolved solids (TDS) in the unit parts per million (ppm). The TDS level of a water sample can be estimated by multiplying the EC by 640. Electrical conductivity is a general, nonspecific indicator of water quality, where the lower the value, the better. In the upper Midwest, typical well water sources have EC ranging from 1.0 to 2.5 dS/m. High-quality irrigation water should have EC less than 0.75 dS/m. In general, water sources with EC greater than 2 dS/m are not recommended for irrigation.

**Sodium Adsorption Ratio (SAR):** High sodium in irrigation water can impair soil structure and create water infiltration problems. The sodium adsorption ratio (SAR) is the proportion of sodium to calcium and magnesium, indicating the sodicity risk. In general, water sources with SAR greater than 6 are not recommended for irrigation.

**Nitrate-nitrogen:** Nitrate-nitrogen in water exceeding 10 ppm  $\text{NO}_3\text{-N}$  is a human health concern. High nitrate concentrations are also a concern for livestock and poultry drinking the water. For human drinking water, a certified laboratory should test for other parameters such as coliform bacteria.

**AMS Requirement:** The ammonium sulfate (AMS) requirement is the amount of AMS added to condition spray water and overcome antagonistic ions (e.g. calcium, magnesium, potassium, sodium, iron) that may reduce pesticide efficacy. Some pesticides require AMS or UAN (28-0-0) to enhance pest control, even if the salt (EC) concentration is not high. Always read and follow the pesticide label for proper AMS or UAN usage.



## **APPENDIX F**

### **CONSOLIDATED WET CAKE PILE**



## **AltEn East Wet Cake Pile Consolidation Plan**

AltEn Facility Response Group

Facility ID: 84069

August 16, 2021

The AltEn FRG has voluntarily agreed to relocate the AltEn east wet cake pile to the northwest wet cake pile without increasing the existing footprint of the latter. The following are the primary objectives for this work:

- Consolidation of this material into one area, reducing the environmental exposures of the wet cake left on-site by AltEn.
- Eliminating the east wet cake pile area as a source of contact stormwater requiring management.

The following summarizes the work to be performed during the AltEn east wet cake pile relocation:

- AltEn wet cake and a limited amount of surface soil/berm material will be removed from the east wet cake pile and transported to the northwest wet cake pile using a combination of excavators and off-road haul trucks. Once at the northwest wet cake pile, the material will be consolidated with the existing materials using bulldozers and front-end loaders.
- The approximate duration of the transfer of wet cake to the northwest pile is 28 days. Additional time will be needed for lining, soil placement, and seeding. The project is anticipated to begin during the week of August 16, 2021. Work will be performed up to 7 days/week during daylight hours and will be suspended during inclement weather.
- Any standing water encountered within the AltEn east wet cake pile will be collected and deposited in the emergency pond for treatment.
- Once the wet cake and the contact soils have been removed from the east pile, soil in the remaining area will be sampled and analyzed for site constituents. A work plan for sampling is being developed to provide results representative of the east pile area post-removal conditions. After completion of sampling, the area will be covered by an impermeable synthetic liner followed by clean fill. The final surface will be graded to drain and seeded to ensure clean stormwater runoff from the area.
- The haul routes for this work will not involve any public roads or rights-of-way.
- During wet cake transfer operations, vehicle dust from unpaved AltEn roads will be controlled by water and/or dust suppressant. Due to the wet nature of the AltEn wet cake material, prior on-site experience moving material has demonstrated that no observable dust is generated from the wet cake itself.



- The movement of the AltEn wet cake will be conducted in a manner to minimize odor generation. Where possible the work will be scheduled to not negatively impact critical community functions with objectionable odors.
- Workers at the site performing the transfer operations will adhere to the health and safety protocols that the contractor requires for all operations. Workers will use appropriate safety equipment and attire as needed for the various aspects of the work at all times.

The work outlined in this plan is being performed as part of the agreed measures under Section 6(a) of the Voluntary Cleanup Program Memorandum of Agreement between NDEE and the AltEn FRG dated June 7, 2021. As indicated above, the AltEn FRG intends to initiate these efforts the week of August 16, 2021 with 24 hour notice provided to the agency prior to commencement. If you should have any questions, please let us know.

Donald Gunster  
NewFields Project Coordinator  
On behalf of the AltEn Facility Response Group

## **PLAN FOR TEMPORARY COVER AND STABILIZATION OF THE NORTHWEST WET CAKE PILE**

**AltEn Facility  
November 1, 2021**

The AltEn Facility Response Group (FRG) is completing wet cake consolidation work at the AltEn Site in Mead, Nebraska. All of the wet cake from the East and Central Wet Cake Piles (EWC and CWC) has been relocated to the Northwest Wet Cake Pile (NWWCP). Transfer of materials from the Emergency Lagoon (EL) to the NWWCP is expected to be completed by November 6, 2021. After the completion of materials transfer from the EL, all wet cake and miscellaneous sludges at the site will have been relocated to the NWWCP.

Once the consolidation is complete, the materials in the NWWCP will be covered for the purposes of minimizing storm water contact with waste, reducing odor, and managing storm water and material seepage.

The FRG plans to install a drainage system below the waste (perforated and wrapped PVC pipes) for the purpose of continued collection of water draining from the waste. This water will be collected in sumps and will be subsequently pumped to the lagoon system.

After installation of the drainage system, the area will be graded to the extent possible to route drainage towards the southeast corner of the NWWCP area. Once this is completed, the entire area, including the exterior berms, will be covered with a spray applied mortar product (Posi-Shell®) which will provide a stable cover that greatly reduces contact water production, mitigates odors, and provides a cover that is not subject to wind damage. This system will be subject to a maintenance program consisting of periodic inspections and respraying of any areas where cracks have occurred. After completion, storm water that falls on the Posi-Shell® layer will be discharged to the new storm water swale which is being constructed as part of the new Treated Water Pond System and discharge into Outfall 001 (General NPDES Permit Number NER910000)

The strategy herein is intended to provide a cover that would remain stable for at least 5 years. Appropriate worker health and safety protection will be followed using the same protocols as were defined in the NDEE-approved plans for the wet cake consolidation work (AltEn East Cake Proposed Consolidation Plan, August 12, 2021). It is anticipated that this work will be conducted over a 6-8 week period beginning in December 2021.

RAP/PCS 84069

**Buell, Thomas**

---

**From:** Don Gunster <[dgunster@newfields.com](mailto:dgunster@newfields.com)>  
**Sent:** Tuesday, November 9, 2021 7:55 AM  
**To:** Buell, Thomas  
**Cc:** Tanya Ambrose; Borovich, Jim; Stoll, Hillary  
**Subject:** RE: AltEn: Wet Cover Plan

Thank you Tom. We will review the comments and update our plan to address your comments.

Thank you,

Don

**From:** Buell, Thomas <[thomas.buell@nebraska.gov](mailto:thomas.buell@nebraska.gov)>  
**Sent:** Tuesday, November 9, 2021 8:52 AM  
**To:** Don Gunster <[dgunster@newfields.com](mailto:dgunster@newfields.com)>  
**Cc:** Tanya Ambrose <[tambrose@newfields.com](mailto:tambrose@newfields.com)>; Borovich, Jim <[jim.borovich@nebraska.gov](mailto:jim.borovich@nebraska.gov)>; Stoll, Hillary <[Hillary.Stoll@nebraska.gov](mailto:Hillary.Stoll@nebraska.gov)>  
**Subject:** RE: AltEn: Wet Cover Plan

Don:  
Please see the attached review comments on the wet cake cover plan.

Please let me know if you have any questions.

**Tom Buell**  
DIVISION ADMINISTRATOR, MONITORING AND REMEDIATION DIVISION

**Nebraska Department of Environment and Energy**  
**P.O. Box 98922**  
**Lincoln, Nebraska 68509-8922**

DIRECT: (402) 471-4270 / MAIN OFFICE (402) 471-2186

**From:** Don Gunster <[dgunster@newfields.com](mailto:dgunster@newfields.com)>  
**Sent:** Tuesday, November 2, 2021 7:16 PM  
**To:** Buell, Thomas <[thomas.buell@nebraska.gov](mailto:thomas.buell@nebraska.gov)>  
**Cc:** Tanya Ambrose <[tambrose@newfields.com](mailto:tambrose@newfields.com)>  
**Subject:** AltEn: Wet Cover Plan

Tom,

Attached is the wet cake cover plan for your review. We can discuss further tomorrow.

Thank you,

Don

---

Donald G. Gunster, M.E.M.  
Partner/Senior Scientist





## **NDEE Comments**

### **Plan for Temporary Cover and Stabilization of the Northwest Wet Cake Pile**

#### **AltEn Facility, Mead, Nebraska**

1. The plan discusses the installation of “a drainage system below the waste...for the purpose of continued collection of water draining from the waste.” NDEE requests more specificity regarding the drainage system in the following areas:
  - a. Will the piping system be installed via horizontal drilling methods, excavation/trenching, some other methodology, or some combination of methods?
  - b. What will be the areal/lateral extent of the collection system? Please provide a figure with the proposed layout of the piping system.
  - c. The plan provides in general terms that collected water will be “pumped to the lagoon system.” As the AltEn Facility Response Group (FRG) is currently in the process of constructing additional lagoon cells on-site that are intended to hold treated wastewater, the plan should specify that water collected from the subsurface collection system will be pumped to one of the lagoons currently used to hold untreated wastewater.
2. The plan discusses the use of a spray-applied mortar product (Posi-Shell®) over the area to provide a stable cover that will reduce odors from the pile and reduce contact water production. NDEE requests more specificity regarding the cover operation in the following areas:
  - a. While the plan clearly states that the entire area, including the exterior berms, will be covered by the spray-applied mortar product, NDEE requests a figure be included in the plan that pictorially provides the areal extent of mortar coverage.
  - b. cursory internet searches performed by NDEE indicate that the Posi-Shell® material may be available or applied in adjusted formulations or application thickness. While NDEE recognizes that the specifics regarding the application process are still a “work-in-progress”, it would help to include any available product-specific literature as an attachment to the plan.
  - c. Please provide additional specifics for the proposed maintenance program, including a proposed inspection schedule. NDEE also suggests that a specific Operation and Maintenance (O&M) Plan be prepared for review and comment.
  - d. Please provide a discussion as to how the use of such a spray-applied mortar may impact any final actions (e.g., incineration) for the removal/disposal of the wet cake waste.
  - e. The plan states that “[t]he strategy herein is intended to provide a cover that would remain stable for at least 5 years.” NDEE believes this verbiage may be



taken by third party reviewers to indicate a five-year time frame to complete final actions for removal/disposal of the wet cake waste. Please re-work this statement to indicate that this cover will be protective over the time frame necessary to complete final actions for disposal of the wet cake waste.

## **Northwest Wet Cake Pile Cover**

### **January 11, 2022**

#### **Revision Changes**

- This addendum incorporates changes to the Posi-Shell placement approach necessitated by technical issues revealed during initial site preparation regarding operation of heavy equipment on the pile.
- Aerial placement of Posi-Shell by helicopter will be conducted in areas that cannot be accessed by the truck mounted Posi-shell spray apparatus.

#### **Posi-Shell Description**

The Posi-Shell product selected for this project is LSC Environmental Products' Posi-Shell EC® formulation. The formulation consists of a clay based mineral product with polyester fibers applied in a combination with Portland cement. This specific formulation was chosen as it has been used on remediation projects over the last 15 years and has been extremely effective for many cover applications. Projects include:

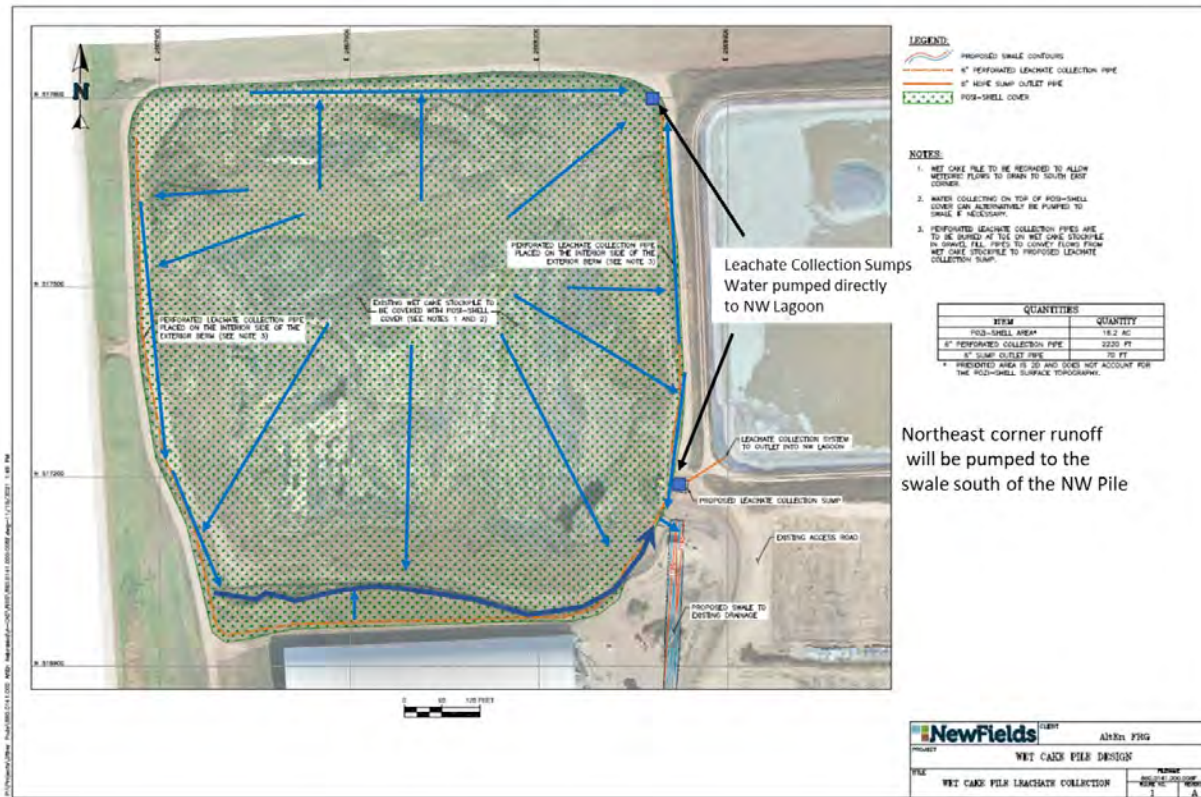
- Hanford Nuclear Waste EPA Superfund Site
- Iron King Mine – Humboldt Smelter EPA Superfund Site
- Quanta Resources EPA Superfund Site
- American Cyanamid EPA Superfund Site

On the sites referenced above, LSC utilized its long-term formulation consisting of one-part Posi-Shell® to four-parts Portland cement. This exact formulation was recommended for the NW Wet Cake Pile Project because it is the most durable long-term coating offered by LSC Environmental Products. Although a final remedy for the wet cake will be selected as part of the Remedial Action Plan (RAP), we have chosen a product that has proven to last up to 10 years to assure a high level of durability.

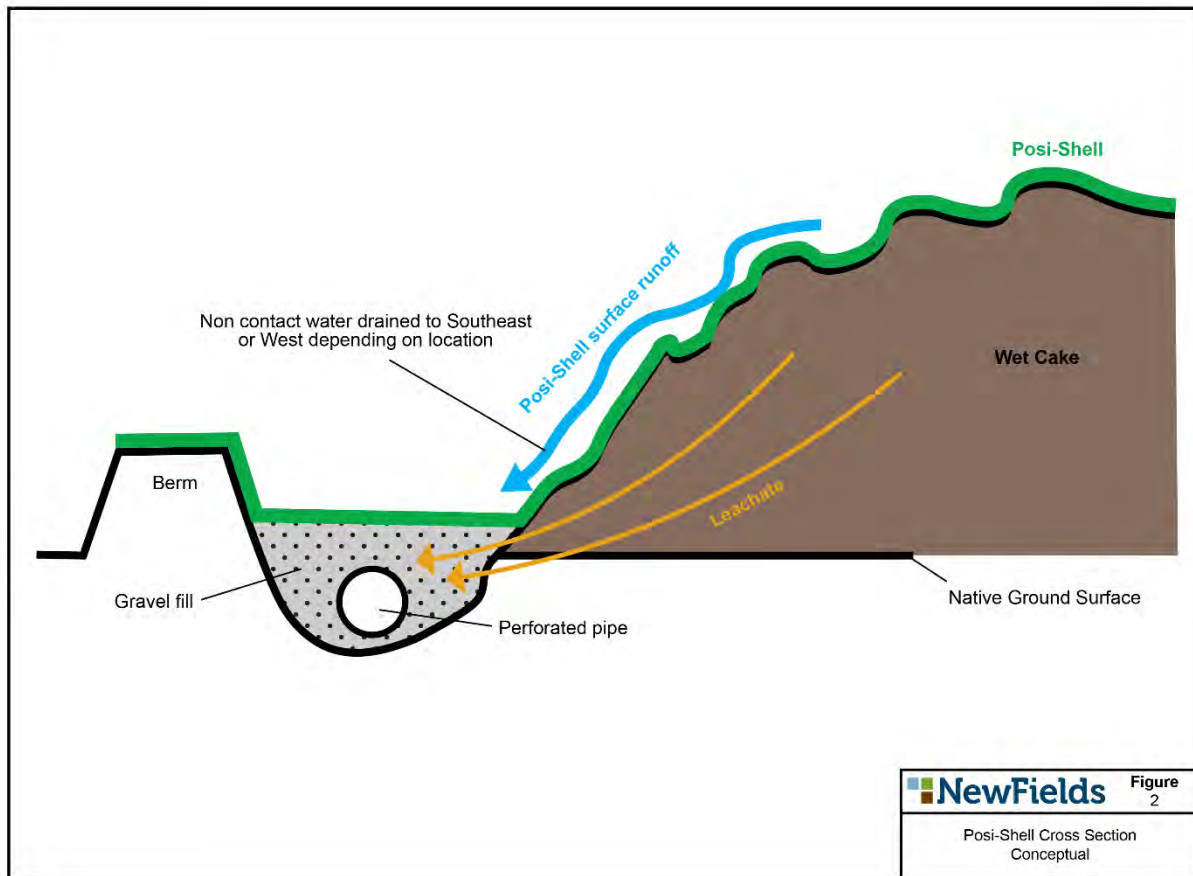
Also, this product is specially designed to provide containment to handle high winds and heavy precipitation and has proven to be durable as a cover for low shear strength material subject to movement.

#### **Underdrain and Surface Drainage**

The underdrain system is intended to intercept leachate along the perimeter of the wet cake pile, on the inside toe of the perimeter dike. The 6-inch schedule 40 perforated PVC pipe underdrain will be placed around the periphery and covered with gravel. This underdrain is intended for transport of leachate to sump(s). Any leachate collected in sumps will sent to the lagoon system. The invert of this drain will be below the invert of the wet cake. The location of the drains along with the surface runoff flow direction is shown in Figure 1.



The underdrain and gravel will be covered with the Posi-Shell as shown in Figure 2. Non-contact stormwater from the Posi-Shell will flow to the ditches on the east and west side of the piles. The invert of the perimeter ditches will be above the underdrains. Cuts will be made in the perimeter berms in multiple locations to enhance the drainage of the non-contact stormwater to the adjacent stormwater swales and permitted discharge locations.



### Posi-Shell Placement

- Existing ponding of water in the Northwest Stockpile Area will be removed by trenching from the perimeter with available equipment to the extent practicable prior to the Posi-Shell application.
- Posi-Shell coating will be applied from the perimeter truck mounted equipment along the edges of the stockpile (8 to 12 acres)- see Figure 3.
- Helicopter mounted equipment staged from the Alten parking area will be used to apply Posi-Shell for the remainder of the area (4 to 8 acres).





**Figure 3- Truck Mounted and Aerial Application Zones.**

### **Management of Gas Build- up**

The Posi-Shell is not intended to be air-tight. Gases will be released, albeit at a lower rate than has occurred throughout the existence of the wet cake piles. Any excessive build up of gases will occur at high points in the pile and may create small cracks in the shell. Periodic inspections and repair as described in the Inspection and Maintenance below will address any significant cracks.

### **Implementation Sequence**

- Mobilization.
- Trenching around the toe of the stockpile.
- Installation of approximately 2,230 linear feet of 6-inch perforated pipe
- Backfill trenches with drain stone.
- Installation of leachate collection sumps and leachate outlet lines to the Northwest Lagoon.
- Application of Posi-Shell coating to the northwest stockpile material (estimated 16.2 acres).

## Health and Safety Plan

Health and Safety Plans have been prepared by the helicopter operator, Gwinnup Restoration Inc, the cover vendor, LSC Environmental, and the site contractor, Clean Harbors. The Health and Safety plan has been reviewed by the NewFields Site Engineer. Local authorities and the neighboring cattle company will be notified before the commencement of helicopter application.

## Inspection and Maintenance

After completion of the Posi-Shell installation, the system will be periodically inspected to assure that the system is performing as intended. It is not expected that significant maintenance will be needed.

This document is submitted to provide the NDEE with the overview plan for near term action for the NW Wet Cake Pile.



Engineer in Responsible Charge

01/11/22

*Randall W. Grachek*

# NEBRASKA

Good Life. Great Resources.

DEPT. OF ENVIRONMENT AND ENERGY

JAN 24 2022



Pete Ricketts, Governor

Mr. Don Gunster  
Project Manager, AltEn Facility Response Group  
NewFields, Inc.  
300 Ledgewood Place  
Suite 305  
Rockland, MA 02370

RE: NDEE Comments on January 11, 2022 Northwest Wet Cake Pile Cover Addendum  
AltEn Facility Response Group VCP Project, Mead, Nebraska  
Facility ID: 84069  
Program ID: RAP 36-336-4975

Dear Mr. Gunster:

The Nebraska Department of Environment and Energy (Department) has reviewed the Northwest Wet Cake Pile Cover Addendum dated January 11, 2022, prepared by NewFields, Inc. for the AltEn Facility Response Group (AFRG) under the state Voluntary Cleanup Program (VCP). The Department agrees that covering the wet cake pile will reduce odor, eliminate contaminated stormwater that would need to be treated at a later date, and minimize exposure. However, the Department does not see covering the wet cake as a long-term remedial action. The wet cake material is a waste and the final Remedial Action Plan (RAP) must propose either treatment or disposal. In addition, given timeframes proposed in the interim RAP and lack of a liner under the wet cake pile the Department is requesting groundwater monitoring near the wet cake pile; please see the attached comments for additional information.

If you have any questions, please contact me at (402)471-4270 or [thomas.buell@nebraska.gov](mailto:thomas.buell@nebraska.gov). Thank you in advance for your cooperation.

Sincerely,

Thomas Buell  
Division Administrator, Monitoring & Remediation Division

Enclosure

jb





## **NDEE Comments**

### **Northwest Wet Cake Pile Cover Addendum (January 11, 2022)**

#### **AltEn Facility, Mead, Nebraska**

1. The Nebraska Department of Environment and Energy (Department) has no additional comments on the proposed leachate/drainage collection system as provided in the Addendum. Final construction and operational details regarding this system should be included in the required future Interim Remedial Action Report (IRAR) associated with this Voluntary Cleanup Program (VCP) project.
2. The plan discusses the use of a spray-applied mortar product (Posi-Shell®) over the area to provide a stable cover that will reduce odors from the pile and reduce contact water production. Based on the information provided in the Addendum, the Department has no further issues with the use of this product. However, the AltEn Facility Response Group (AFRG) has failed to adequately address other comments provided by the Department in response to the original November 1, 2020 Cover Plan, including:
  - a. Specifics for the proposed maintenance program, including a proposed inspection schedule. Based on the nature of the wet cake material (low shear strength, high water content, etc.), the Department is concerned that shrinkage or shifting of piled material after placement of the mortar could affect the integrity of the cover with time. A compromised cover could lead to increased odors or generate potentially contaminated storm water. AFRG needs to provide a specific inspection schedule (minimally set at monthly inspections initially), specifics on how the inspections will be performed (e.g., manual inspection, use of drones, etc.), a mechanism for recording the results of the inspection, and a plan for addressing any compromised locations within the cover area. This requirement would best be addressed by drafting a specific Operation and Maintenance (O&M) Plan for the Department's review and comment.
  - b. No discussion or statement as to how the use of the spray-applied mortar may impact any final actions (e.g., incineration) for the removal/disposal of the wet cake waste has been provided; please address this deficiency.
3. The Department has concerns regarding the lack of liner, the undefined timeline for removal of the Wet Cake Pile, and the lack of baseline groundwater monitoring data under the Northwest Wet Cake Pile area. The Department believes this is sufficient grounds to request a groundwater monitoring plan to:
  - a. Assess and establish a baseline of potential pesticide-contaminant concentrations in groundwater related to storage of contaminated wet cake material at this location, and,



- b. Assess any potential effect over time that the cover operation might have on the leaching of pesticide contaminants from the wet cake to groundwater (to the extent that the wet cake remains in place; see Comment #4 below).
- 4. The original plan stated that "[t]he strategy herein is intended to provide a cover that would remain stable for at least 5 years." The Department previously commented that this verbiage could be taken by third party reviewers to indicate a five-year time frame to complete final actions for removal/disposal of the wet cake waste. The Cover Addendum now includes a statement that AFRG has "chosen a product that has proven to last up to 10 years" that assures "a high level of durability." The Department understands this statement to be a demonstration of the durability of the product and not reflective of a remedial timeframe for wet cake treatment or disposal.

## Technical Memorandum

**DATE:** February 15, 2022

**TO:** Thomas Buell, NDEE

**FROM:** AltEn Facility Response Group  
Donald Gunster, Project Coordinator - NewFields

**SUBJECT:** Response to January 24, 2022 NDEE Comments on Northwest Cake Pile Cover Addendum (January 11, 2022) AltEn Facility, Mead, Nebraska

---

This memorandum provides the AltEn Facility Response Group's (AFRG) responses to the Nebraska Department of Environment and Energy (NDEE) comments received on January 24, 2022 titled "NDEE Comments on Northwest Cake Pile Cover Addendum AltEn Facility, Mead, Nebraska" (dated January 11, 2022). The AFRG's response is provided after each comment or partial comment.

### NDEE Comments:

1. The Nebraska Department of Environment and Energy (Department) has no additional comments on the proposed leachate/drainage collection system as provided in the Addendum. Final construction and operational details regarding this system should be included in the required future Interim Remedial Action Report (IRAR) associated with this Voluntary Cleanup Program (VCP) project.

### Response: No response required

2. The plan discusses the use of a spray-applied mortar product (Posi-Shell®) over the area to provide a stable cover that will reduce odors from the pile and reduce contact water production. Based on the information provided in the Addendum, the Department has no further issues with the use of this product. However, the AltEn Facility Response Group (AFRG) has failed to adequately address other comments provided by the Department in response to the original November 1, 2020 Cover Plan, including:
  - a. Specifics for the proposed maintenance program, including a proposed inspection schedule. Based on the nature of the wet cake material (low shear strength, high water content, etc.), the Department is concerned that shrinkage or shifting of piled material after placement of the mortar could affect the integrity of the cover with time. A compromised cover could lead to increased odors or generate potentially contaminated storm water. AFRG needs to provide a specific inspection schedule (minimally set at monthly inspections initially), specifics on how the inspections will be performed (e.g., manual inspection, use of drones, etc.), a mechanism for recording the results of the inspection, and a plan for addressing any compromised



locations within the cover area. This requirement would best be addressed by drafting a specific Operation and Maintenance (O&M) Plan for the Department's review and comment.

**Response:** The Posi-Shell is a highly durable and stable material used in similar applications to this one. The AFRG is committed to conducting inspection and maintenance of the Posi-Shell coating as required. An initial inspection will be conducted by an engineer based on aerial photography gathered by drone overflight. This initial inspection will be conducted within one month completion of the Posi-Shell placement. Inherent to the overall activities at the Site, the AFRG maintains an engineering presence overseeing multiple projects and maintenance activities. Part of these activities will be periodic inspections of the Posi-shell cover and the collection sumps. While it is true that the material in the NW wet cake pile may be soft, there will be no static or dynamic loadings exerted on the pile after application, and as such, it is unlikely that there would be any compromise of the cover beyond minor cracks.

Up to today, the area has been uncovered, and after the Posi-Shell application, the surface area will be sealed. Data will identify any locations of Posi-Shell cracking. Any such areas identified will be further inspected as necessary and feasible. Minor cracks in the material over time will not be a source of significant odor release and any minor cracks will be managed and repaired. As such, there is no need for a comprehensive operation and maintenance program for this application. An additional inspection using the similar methodology will be conducted in three months. If the Posi-shell remains intact with no areas needing repair, the inspection intervals will be increased to once every 6 months.

As this cover is temporary in nature, it will not be covered by the type of comprehensive operation and maintenance program suitable for permanent actions.

- b. No discussion or statement as to how the use of the spray-applied mortar may impact any final actions (e.g., incineration) for the removal/disposal of the wet cake waste has been provided; please address this deficiency.

**Response:** The Posi-Shell coating is comprised of an inert clay-based mineral product with polyester fibers combined with Portland cement. This product will not interfere with the removal or disposal options being considered for the wet cake. It will add a small volume to the total material being remediated.

3. The Department has concerns regarding the lack of liner, the undefined timeline for removal of the Wet Cake Pile, and the lack of baseline



groundwater monitoring data under the Northwest Wet Cake Pile area. The Department believes this is sufficient grounds to request a groundwater monitoring plan to:

- a. Assess and establish a baseline of potential pesticide-contaminant concentrations in groundwater related to storage of contaminated wet cake material at this location, and,
- b. Assess any potential effect over time that the cover operations might have on the leaching of pesticide contaminants from the wet cake to groundwater (to the extent that the wet cake remains in place; see Comment #4 below).

**Response:** The AFRG has entered Nebraska's Voluntary Cleanup Program (VCP), which includes as part of this program a Site-wide investigation. At this time, it is premature to initiate a groundwater monitoring program specific to the Northeast Wet Cake Pile or to conduct any other investigations until such time when the investigation can be developed consistent with the VCP.

4. The original plan stated that "[t]he strategy herein is intended to provide a cover that would remain stable for at least 5 years." The Department previously commented that this verbiage could be taken by third party reviewers to indicate a five-year time frame to complete final actions for removal/disposal of the wet cake waste. The Cover Addendum now includes a statement that the AFRG has "chosen a product that has proven to last up to 10 years" that assures "a high level of durability." The Department understands this statement to be a demonstration of the durability of the product and not reflective of a remedial timeframe for wet cake treatment or disposal.

**Response:** The statements identified by the Department were intended to expound on the durability of the Posi-Shell cover and is not a reflection of the remedial timeframe.





## **APPENDIX G**

### **WINTERIZATION DOCUMENTATION**

## Waste Types and Quantity

Profile Waste Code	Profile/Waste Code Waste Description	Quantity
A22K	Low BTU Organic Liquids	5 - 55 Gallon Drums
A22K	Low BTU Organic Liquids	2 Tote Tank < 300 g
A31	Specification Oils	1 - 55 Gallon Drum
A31	Specification Oils	2 - 5 Gallon Buckets
A99DB	High Hazard Liquids for Direct Feed Incineration	200 Pounds
B22A	Concentrated Acids 21-49%	4 - 55 Gallon Drums
B22A	Concentrated Acids 21-49%	3 Tote Tanks
B22AC	Concentrated Acids 50-100%	1 - 55 Gallon Drum
B28	Oxidizer Solutions	1 - 55 Gallon Drum
B28	Oxidizer Solutions	1 -10 Gallon Drum
B28	Oxidizer Solutions	1 Tote Tank < 300 g
B28I	Oxidizer Solutions for Incineration	1 Tote Tank < 300 g
B35	Glycols	4 - 55 Gallon Drums
B40R	Special Handling Halogenated Organics	1,051 Pounds
CAXI	Oxidizers for Incinerations	2 Tote Tanks < 300 g
CBP	Solids to Hazardous Landfill	1 -55 Gallon Drum
CBP	Solids to Hazardous Landfill	2 Tote Tanks < 300 g
CBPS	Semi-Solids to Hazardous Landfill	1 Tote Tank < 300 g
CCRC	Corrosive Incinerables	6 - 55 Gallon Drums
CCRC	Corrosive Incinerables	5 Tote Tanks < 300 g
CCRCK	Corrosive Incinerable Acids	1 Tote Tank < 300 g
CCRKS	Sludges and Liquis/Solids for Incineration	5 Tote Tanks < 300 g
CCSS	Semi-Solids for Stabilization	17 Tote Tanks < 300g
CNOS	Non-Hazardous Semi-Solids	10 Tote Tanks < 300 g
CNOS	Non-Hazardous Semi-Solids	2 - 55 Gallon Drums
LCCR	Labpack for Incineration	3 - 30 Gallon Drums
LCCR	Labpack for Incineration	1 -16 Gallon Drum
LCCR	Labpack for Incineration	13- 55 Gallon Drums
LCCR	Labpack for Incineration	1 - 20 Gallon Drum
LCCR	Labpack for Incineration	1 - 5 Gallon Bucket
LCCRQ	Aerosols for Incineration	1 - 5 Gallon Bucket
LCCRU	Labpack Unknowns for Incineration	1 - 5 Gallon Bucket
LCCRU	Labpack Unknowns for Incineration	1 - 20 Gallon Drum
LCY1	Propane Cylinders for Recycling	1 Lecture Bottle
FBI	Liquid for Fuel	20 - 55 Gallon Drums