

PCS / RAP 84069

**Buell, Thomas**

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**Sent:** Friday, July 16, 2021 9:03 AM  
**To:** Buell, Thomas  
**Cc:** Carstens, Keri; Underwood Russell USGR; Overmyer Jay USGR; Darrel Armstrong; William Reeves; Craig Rosenow - Corteva; Mark Bowers  
**Subject:** AltEn Treated Water Land Application Proposal  
**Attachments:** AltEn Treated Water Land Application Proposal - FINAL 07162021.docx

Tom –

As previously discussed, I have attached the AltEn Facility Response Group's proposal for treated water land application. The document focuses on the rationale and basis used to establish limits for seed treatment chemicals and provides relevant limits in an agricultural context. Once agreement is reached on this element, the associated concepts and outputs will be incorporated into a traditional land application permit including standard agronomics-based limits for nutrients and water based on soil and other characteristics of the specific parcels to be included in the program.

Authorization to land apply treated water is critical in order for the Group to meet its commitments under the VCP as you are aware. As a result, we are anxious to initiate discussions in order to help facilitate your review and approval. To that end, Keri Carstens (Corteva), who headed up the work group, is available to meet in-person on July 21 or 23. Other members of the work group will also participate remotely to ensure we are prepared to answer any questions your team may have. Please advise as to your availability and preference, and by all means, should you have questions in the interim, feel free to reach out. I have copied the entire work group here so that you can make ready contact. We look forward to working with your team to gain approval and keep up the Response Group's overall momentum in addressing the complex challenges at the AltEn site. Thanks.

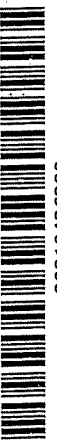
Freundliche Grüße / Best regards,

*Mark Bowers, MS, CIH*  
**Senior Remediation Manager**

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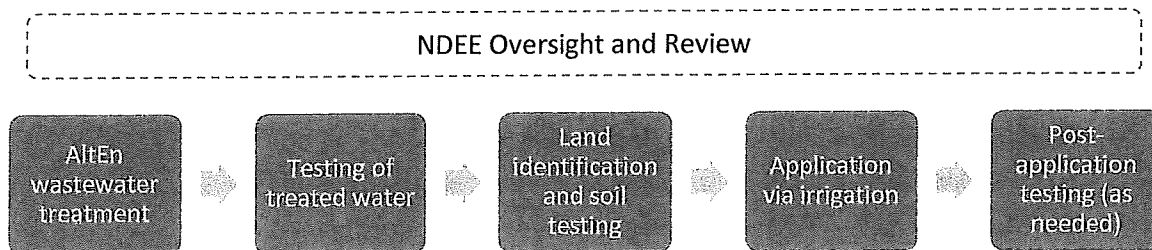
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## Proposed Approach for Management of Water from AltEn Site

### 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 which can then be held in temporary storage while confirmatory testing is performed. Temporary storage capacity is limited and not suitable for long term storage, particularly during freezing temperatures. The treated AltEn water would then be used as agricultural irrigation water, similar to practices in the past as well as throughout the state. The approach would allow uptake of the nutrients present in the treated AltEn water by agricultural crops, while placing any trace pesticide residues into an agricultural system where the pesticide active ingredients are potentially already used or have registrations for comparable uses. The proposed thresholds for pesticides residues remaining in the water would be 10% or less of typical US EPA approved uses of the active ingredients that can be applied to a growing 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 consequences for the agricultural crop other than as a source of water and nutrients and would allow harvest and utilization of the crop as would normally occur.

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.



**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 varying levels of 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. These units have been highly effective in removing pesticides.

Historically, AltEn has obtained permits from NDEE to enable the discharge of water from the plant operation (a most recent version is attached). 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 in 2021, 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, preferably 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 an assessment of filtration efficacy for pesticide active ingredients, as well as an analysis of approved uses, any pesticide residue introduced to the agricultural system through land application of treated water would be consistent with those that can result from typical current farming practices utilizing labelled pesticide applications.

levels, they have already been assessed for safety and environmental impact in corn production. 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.

If levels of analytes are higher than proposed thresholds in treated water (Table 1), the following options could apply:

- Re-filter and re-test water to ensure analyte levels are reduced below agreed threshold levels;
- NDEE/US EPA conduct a review to assess the potential risks of use as irrigation water with a possible outcome that no additional treatment is required and water can be land applied;
- NDEE/US EPA conduct a review to assess the potential risks if used as irrigation water with a possible outcome that additional treatment or limitations (such as no additional pesticide applications during crop production, timing of land application of treated water, etc.) are required to proceed with land application.

**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 (ppm)	Nitrite (ppm)	Total Kjeldahl Nitrogen (TKN)
Nitrates (ppm)	Phosphorus	Total Organic Carbon (TOC)
Ammonia (ppm)	Selenium	Total Suspended Solids (TSS)
pH		

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 existing "AltEn, LLC - Best Management Practices Plan – Revised: March 2020" that was prepared by Nutrient Advisors of West Point, NE. This guidance will focus on requirements related to the pesticide analytes and mitigation of any impacts from trace presence in irrigation water used for field corn crop production.

Table 1: Summary of information related to the active ingredients used as seed treatments on corn or identified at the AltEn site, relevant approved use rates, and proposed thresholds

Pesticide	Pesticide Group (e.g., FRAC, IRAC, HRAC)	Link to US EPA and IUPAC* review summaries	Detected at AltEn?	Registered use on corn?	Sample Seed Treatment Uses				Sample Foliar/Other Uses						Proposed threshold for single application (g/acre)	Proposed threshold for total annual in-crop application (g/acre)
					Example reference label	Example trade name	Corn use on label?	Single Application Seed Treatment (g/acre)**	Example reference label	Example trade name	Corn use on label?	Chemigation use on label?	Max single application (g/acre)	Max annual application (g/acre)		
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	8.6	17.3	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	113.4	908.0	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	113.4	90.8	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	45.4	90.8	3.0	6.0
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	81.7	163.4	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	Gaucha 600 Flowable	Yes	33.5	264-827	Admire Pro	No	Yes	21.2	227.0	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	624.3	3308.5	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	283.8	283.8	0.51	1.0
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	18.6	37.2	1.86	3.7
Sedaxane*** 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	0.0	12.0	0.51	1.0
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	46.4	92.8	4.64	9.3

Pesticide  (e.g., FRAC, IRAC, HRAC)	Link to US EPA and IUPAC* review summaries	Detected at Alten?	Registered use on corn?	Sample Seed Treatment Uses				Sample Foliar/Other Uses					
				Example reference label	Example trade name	Corn use on label?	Seed Application (g/acre)**	Example reference label	Example trade name	Corn use on label?	Chemigation use on label?	Max single application (g/acre)	Max annual application (g/acre)
				100-1399	Avicta Complete	Yes	1.3	N/A	N/A	N/A	N/A	0.0	68.0
Thiabendazole CAS number 148-79-8	3	Yes	Yes	100-1399	Avicta Complete	Yes	1.3	N/A	N/A	N/A	N/A	0.51	0.51
Thiamethoxam CAS number 153719-23-4	4A-I	Yes	Yes	100-1399	Avicta Complete	Yes	12.5	100-938	Actara	No	Yes	28.4	56.8
												2.5	5.0

\*IUPAC summary reference: Lewis, K.A., Tzillivakis, 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  
 \*\*Based on 25,000 seeds planted per acre, and 1680 corn seed per pound, following recent US EPA seed treatment product risk assessments.  
 \*\*\*While plans to test for sedaxane in the analyte panel are being developed, finding analytical labs with this testing capability has proven difficult.

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

1. **Treated Water Testing** - Treated water will be tested by an accredited laboratory for the analytes listed in Table 1. 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 B). Tests shall be completed for each contained storage unit of treated water (~3,000,000 gallons) and based on representative samples obtained during the filling of temporary water storage tanks.
2. **Irrigation Systems** - Treated water from the AltEn site will be contained during delivery to the target field based on the following requirements:
  - a. Delivery to the target field and irrigation system will be through a dedicated pipeline.
  - b. If applicable, delivery systems will have control systems to prevent backflow into municipal/public water systems or ground water.
  - c. If the pipeline has branch lines, these will be isolated by control valves that have locks or access controls that prevent the valves from being changed.
  - d. Irrigation water delivery systems will be monitored for leaks during any irrigation with treated water.
3. **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 (non-cultivated areas). Preferred options are field corn due to high water/nutrient utilization and corn seed being primary source of pesticide residues, or post-harvest fields in preparation for annual crop production. 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 during the crop production cycle and reported to ensure these are factored into overall pesticide load within the field during the growing season.
  - 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 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. Additional testing for analyte residues may be considered on harvested grain if soil testing prior to treated water application indicates greater than expected residues.

- 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.
- b. 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.
- c. Fields must not have seasonal or permanent bodies of water located within the treated water application area.
- d. 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.
- e. Fields will have analysis of nutrient levels to facilitate nutrient loading assessment and planning.
- f. Fields will have soils sampled for testing of analytes in Table 1 prior to application of treated water to develop a baseline of residues present. Additional soil sampling and testing for analytes in Table 1 following harvest will be conducted as needed to confirm no significant changes are observed from the baseline and are within an expected normal range for agricultural land within the production area.

**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 would create minimal disruption in normal agricultural practices and have negligible impact on crops produced from the land where treated water is applied. 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. Formal best management practices will be developed and implemented by professional agronomists with the landowners including appropriate record keeping and reporting to applicable agencies. Deviations from the best management practices will be reported to the applicable agencies, as required.



**Appendix B. 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 (g/acre)*</b>	<b>Allowable concentration in water (µg/L, parts per billion)**</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	0.51	5.0
Prothioconazole CAS number 178928-70-6	1.86	18.1
Sedaxane CAS number 874967-67-6	0.51	5.0
Tebuconazole CAS number 107534-96-3	4.64	45.2
Thiabendazole CAS number 148-79-8	0.51	5.0
Thiamethoxam CAS number 153719-23-4	2.5	24.3

\*From Table 1

\*\*To determine the allowable 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.