



August 9, 2023

Mr. Alan J. York
Associate Director,
Office of Water Quality, DEQ
5301 Northshore Drive
North Little Rock, AR 72118

Submitted via e-mail to alan.york@adeq.state.ar.us

Re: NuStar NH3 Pipeline – 4 inch lateral – Anhydrous Ammonia Release
El Dorado Chemical Company, 4500 North West Ave. Union County, Arkansas
NPDES Permit Number: AR0000752, AFIN: 70-00040
Interim Measures Plan

Dear Mr. York:

This letter comprises El Dorado Chemical Company's (EDC's) Interim Measures Plan in response to your letter dated August 4, 2023. Each of the eight Interim Measures are restated in this letter followed by EDC's plan to implement each measure. Throughout this letter, the "unnamed retention pond" is referenced as Pond 004, which is the EDC name of this pond and the previous outfall.

Interim Measure 1: A cessation of all non-emergency discharges from the wastewater ponds.

Response: EDC has ceased discharges from Lake Killdeer. Having ceased discharges will put Lake Killdeer at risk of overflowing the emergency spillway during rainfall events. Absent rainfall events, cessation of discharges at 16.5 feet will still result in the need for intermittent discharge as current estimates indicate, during routine operations, that there is approximately 12 to 14 days of storage capacity between 16.5 feet and 17.5 feet (spillway crest).

As described in the Corrective Action Plan (Interim Measure 6), EDC has taken steps to minimize the generation of wastewater and loadings to the extent possible with the current wastewater system configuration. Once the Lake Killdeer level is at 16.5 feet or above we will implement the Emergency Contingency Plan as described in Interim Measure 5.

EDC requests a meeting or conference call to discuss the implementation of this Interim Measure.

Interim Measure 2: Conduct daily sampling at the unnamed retention pond, Lake Lee, and Lake Killdeer for Ammonia as Nitrogen and Nitrate as Nitrogen. Sample in-situ parameters when collecting water chemistry (temperature, pH, D.O., conductivity).

Response: EDC has implemented the daily sampling of the parameters identified in Interim Measure 2, above, as of August 5, 2023.

Interim Measure 3: Provide copies of any samples analysis collected in the unnamed retention pond, Lake Lee, and Lake Killdeer since January 1, 2023.

Response: Please see Attachment A for a summary of the parameters that have been collected at Pond 004, Lake Lee, and Lake Killdeer since January 1, 2023. These parameters are: Ammonia as Nitrogen, Nitrate as Nitrogen, Temperature, pH, Dissolved Oxygen, and Conductivity. We have also monitored for Phosphorous and Sulfate, which are also provided. EDC has not collected Conductivity data for Lake Lee or Phosphorous data for Pond 004. Please note that the data for Lake Lee and Pond 004 were collected for process control insights and did not necessarily follow EPA analytical methods. However, all permit-required sampling follows ADEQ's prescribed methods.

Interim Measure 4: Provide details and specifications to DEQ's Office of Air Quality Permits Branch on the Air Stripper currently operating on Lake Lee. Please include date of first operation and any ongoing operating parameters.

Response: EDC provided an air permit application to the DEQ's Office of Air Quality Permits Branch in April 2023 for the Air Stripper. This Air Stripper was then issued a temporary permit. The stripper commenced operation on July 21, 2023 with a pH setpoint of 8.6 and a flowrate of 1,000 gpm. Recent sampling indicates the air stripper is achieving approximately 20% reduction of ammonia on processed water versus a modeled 25% stripping efficiency. Please see Attachment B for a copy of the e-mail submitted to the Air Quality Permits Branch.

Interim Measure 5: Submit an Emergency Contingency Plan to address significant rain events.

Response: EDC has been following a written procedure when making decisions to discharge from Lake Killdeer. Please see Attachment C for the current version of the Emergency Contingency Plan.

Interim Measure 6: Provide weekly updates reports to water-enforcement-reports@adeq.state.ar.us detailing any actions taken to reduce ammonia concentrations. Please include copies of sampling results for the week prior to include any daily maximum exceedances.

Response: This Interim Measures Response essentially includes an update on the Interim Measures. EDC proposes to provide the weekly update on Tuesdays following the reporting week. For example, EDC will provide our first weekly report on Tuesday, August 22 for activities occurring during the week of August 14th.

Interim Measure 7: Develop a Corrective Action Plan in response to all effluent exceedances at all applicable outfalls.

Response: Please see Attachment D for the current Corrective Action Plan. EDC has included summaries of activities we have completed over the last 12 months or so as well as identifying some additional planned activities. Some planned activities still require additional evaluation and planning before we execute these wastewater system improvements. EDC is continuing to seek input from previously engaged external resources (i.e., consultants) to identify additional wastewater control strategies.

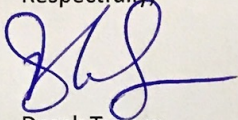
Interim Measure 8: Conduct water column profile measurements with a water quality meter to determine if the ponds are stratified. If so, take hypolimnetic water samples to be analyzed for ammonia and nitrate/nitrite.

Response: EDC has scheduled Alliance Technologies Group (formerly GBMc) to visit the site during the week of August 14 to conduct profiling of Pond 004, Lake Lee and Lake Killdeer. We will provide the results of this profiling once we receive the report from Alliance.

It is our understanding that NuStar Energy will provide a separate response to the ADEQ's August 4th letter. NuStar Energy repaired the leaking ammonia pipeline on or about August 9, 2023.

If you have any comments or would like further discussion of any of this information, please contact me at 870-310-2361 or dturner@lsindustries.com or Charles McDowell at 870-310-6696 or cmcdowell@lsindustries.com.

Respectfully,



Derek Turner
General manager
El Dorado Chemical Company
4500 North West Ave
El Dorado, AR 71730

cc: Dan Tibbits (dan.tibbits@nustarenergy.com)
Richard Healey (healeyr@adeq.state.ar.us)
Don Shandy (donald.shandy@crowedunlevy.com)
Charles McDowell (cmcdowell@lsindustries.com)

Attachment A (Interim Measure 3)

Sample Data Analysis

2023	Lake Killdeer (KD)									Lake Lee							Pond 004										
	KD Grab Sample	KD Grab Sample	KD Composite EDCC LAB	KD Grab Sample	KD Composite EDCC LAB	KD Composite EDCC LAB	KD Composite EDCC LAB	KD Composite EDCC LAB	KD Composite EDCC LAB	LEE Grab Sample	LEE Grab Sample	Lee Composite EDCC LAB	LEE Grab Sample	Lee Composite EDCC LAB	Lee Composite EDCC LAB	Lee Composite EDCC LAB	Lee Composite EDCC LAB	004 Grab	004 Grab	004 Grab	004 Grab	004 Grab	004 Grab	004 Grab	004 Grab		
Date	Time of Grab	Temp °C	pH	DO, ppm	Conductivity	NH _{3-N} , ppm	NO _{3-N} , ppm	P, ppm	SO ₄ ppm	Time of Grab	Temp °C	pH	DO, ppm	NH _{3-N} , ppm	NO _{3-N} , ppm	Phosphorous, ppm	SO ₄ ppm	DATE/ TIME	Temp °C	DO, ppm	pH	Conductivity	NH _{3-N} , ppm	NO _{3-N} , ppm	SO ₄ ppm		
1/1															3.82	341	301										
1/2			6.69		1073	54	70	0.10	107					4.00	296	298	0.36	216									
1/3														3.11	265	289		232									
1/4			7.10		1095	62	71		103					6.95	268	272		255									
1/5														7.60	195	197		105									
1/6			7.21		1114	63	75		103					7.71	178	180		121									
1/7														7.66	126	150		108									
1/8														7.70	73	82		86									
1/9			7.10		1127	64	76	0.65	100					7.42	65	69	0.76	88									
1/10														7.34	92	103		73									
1/11			7.11		1154	71	81		102					7.69	96	101		83			1/10/23		7.64	34410	4720	4741	13
1/12														7.85	83	89		91									
1/13			7.18		1162	70	84		100					8.02	88	92		99									
1/14														8.04	83	83		72									
1/15														7.73	65	72		73									
1/16			7.25		1185	60	89	0.04	97					8.41	88	62	2.31	109									
1/17														8.21	87	53		96									
1/18			7.15		1183	70	90		98					8.36	104	53		107									
1/19														7.94	125	93		87									
1/20			7.27		1202	81	89		94					8.45	225	173		106									
1/21														8.51	234	197		122									
1/22														8.95	232	153		98									
1/23			7.49		1245	89	90	2.28	92					8.87	320	152	5.17	117									
1/24														8.81	342	128		112									
1/25			7.81		1248	82	90		82					8.67	252	158		88									
1/26														8.34	312	182		100									
1/27			7.83		1250	89	87		80					8.10	225	143		127									
1/28														7.94	161	143		100									
1/29														7.78	142	134		82									
1/30			7.78		1286	77	97	2.59	81					7.18	154	167	2.93	79									
1/31														7.45	158	171		79									
2/1			7.60		1280	94	97		76					7.30	149	158		55									
2/2														7.55	194	150		78									
2/3			7.52		1308	99	100		76					7.38	167	158		63									
2/4														7.36	169	176		71									
2/5														7.67	154	179		72									
2/6			7.35		1416	67	112	0.04	73					7.13	82	122	1.80	71									
2/7														7.50	129	121		103									
2/8			7.43		1294	98	100		75					7.52	152	120		130			02/08/23		8.05	47270	6440	6041	<1
2/9														6.93	135	120		292									
2/10			7.46		1315	94	99		76					7.67	150	134		194									
2/11														7.72	192	191		154									
2/12														7.64	208	211		101									
2/13			7.30		1311	100	102	0.02	78					7.80	198	158	2.08	109									
2/14														7.75	207	159		82									
2/15			7.26		1340	110	106		82					7.60	255	161		84									
2/16														7.68	181	160		141									
2/17			7.39		1342	106	107		82					7.99	213	222		112									
2/18														8.53	147	100		109									
2/19														8.00	152	97		101									
2/20			7.50		1446	117	119	0.03	85					7.96	128	122	1.47	81									
2/21														7.70	115	113		93									
2/22			7.48		1438	135	115		82					7.36	105	98		125									
2/23														7.21	114	104		128									
2/24			7.47		1440	118	116		82					7.23	131	126		121									
2/25														7.36	117	152		114									
2/26														7.16	122	153		112									
2/27			7.33		1464	123	119	0.02	83					7.15	108	144	1.30	98									
2/28														6.95	105	135		145									
3/1			7.35		1460	130	116		82					6.88	80	107		151									
3/2														7.17	63	76		125									
3/3			7.26		1463	101	94		81					6.67	105	111		127									
3/4														6.27	238	167		93									
3/5														6.55	186	156		103									
3/6			7.33		1846	131	131	1.67	81					6.59	187	158	3.04	100									
3/7														7.24	173	151		100									
3/8			8.23		1874	152	146		75					6.96	109	107		101									
3/9														7.06	139	123		117									
3/10			7.21		1672	124	137		78					7.08	136	148		131			03/09/23		8.22	54800	11000	7275	26
3/11														6.84	122	149		129									
3/12														6.92	118	144		98									
3/13			7.36		1534	130	125	1.79	76					6.57	225	196	0.14	67									
3/14														7.00	238	212		77									
3/15			7.56		1595	127	133		76					7.35	225	195		100									
3/16														7.62	144	160		111									
3/17			7.38		1599	168	135		79					7.31	154	137		108									
3/18														6.96	132	149		129									
3/19														7.17	123	154		113									
3/20			7.56		1608	135	136	3.07	80					7.33	139	144	0.21	104									
3/21														7.27	118	116		100									
3/22			7.24		1598	131	136		80					7.30													

2023	Lake Killdeer (KD)									Lake Lee							Pond 004											
	KD Grab Sample	KD Grab Sample	KD Composite EDCC LAB	KD Grab Sample	KD Composite EDCC LAB	KD Composite EDCC LAB	KD Composite EDCC LAB	KD Composite EDCC LAB	KD Composite EDCC LAB	LEE Grab Sample	LEE Grab Sample	Lee Composite EDCC LAB	LEE Grab Sample	Lee Composite EDCC LAB	Lee Composite EDCC LAB	Lee Composite EDCC LAB	Lee Composite EDCC LAB	004 Grab	004 Grab	004 Grab	004 Grab	004 Grab	004 Grab	004 Grab	004 Grab			
Date	Time of Grab	Temp °C	pH	DO, ppm	Conductivity	NH _{3-N} , ppm	NO _{3-N} , ppm	P, ppm	SO ₄ ppm	Time of Grab	Temp °C	pH	DO, ppm	NH _{3-N} , ppm	NO _{3-N} , ppm	Phosphorous, ppm	SO ₄ ppm	DATE/ TIME	Temp °C	DO, ppm	pH	Conductivity	NH _{3-N} , ppm	NO _{3-N} , ppm	SO ₄ ppm			
6/21			6.60		1688	115	131		138			7.31		141	153		201											
6/22												6.86		123	130		322											
6/23			6.68		1705	115	133		141			7.17		101	116		287											
6/24												6.84		78	94		200											
6/25												7.14		55	69		199											
6/26			6.69		1690	119	130	1.32	143			6.72		49	54	1.27	184											
6/27												7.02		125	136		180											
6/28			6.75		1672	122	127		142			7.61		195	201		143											
6/29												7.82		192	194		146											
6/30			6.64		1720	119	133		141			7.97		132	164		167											
7/1												7.59		108	126		167											
7/2												7.23		75	100		167											
7/3			6.69		1730	120	137	1.38	144			7.09		72	86	2.21	149											
7/4												7.06		51	67		158											
7/5			6.77		1724	125	133		142			6.82		102	116		152											
7/6												6.96		188	209		172											
7/7			6.74		1720	116	132		140			7.62		186	223		161											
7/8												7.66		134	130		186											
7/9												8.21		132	126		195											
7/10			6.75		1780	130	136	5.24	140			8.16		209	231	3.83	155											
7/11												7.88		157	196		125											
7/12			6.64		1782	102	113		139			5.74		52	66		73											
7/13												8.49		136	215		75											
7/14			7.50		2240	179	69		34			8.22		281	119		36	07/14/23			9.02	24910	4320	2989		2		
7/15												8.29		278	323		109											
7/16												8.50		231	270		110											
7/17			6.98		1890	151	153	6.08	112			8.35		222	229	4.11	124											
7/18												8.03		167	189		122											
7/19			6.95		1820	143	143		104			7.92		133	143		110											
7/20												8.17		128	137		170											
7/21			6.91		1804	140	141		108			8.05		120	129		123											
7/22												7.49		95	93		113											
7/23												6.86		86	82		121											
7/24			6.90		1763	125	136	2.03	110			7.69		86	90	2.89	133											
7/25												7.38		72	79		146											
7/26			6.85		1764	126	134		110			7.22		58	72		125											
7/27												7.43		53	57		101											
7/28			6.84		1753	120	132		110			8.14		36	42		121											
7/29												8.27		16	30		107											
7/30												6.99		10	24		121											
7/31			6.83		1745	128	129	1.96	110			7.19		13	20	1.34	119											
8/1												6.92		64	75		126											
8/2			6.77		1726	114	128		111			7.09		38	51		122											
8/3												8.10		16	32		113											
8/4			6.79		1710	119	126		111			7.44		9	22		143											
8/5	8:53AM	28	6.79	7.65	1703	114	125			6:00AM	26	6.60	6.03	6	17	1.22	147	11:20am	34	10.63	7.14	48920	5280	6293		25		
8/6	9:57AM	29	6.77	8.27	1676	105	123			6:00AM	25	6.45	6.12	6	15		125	9:50AM	28	5.61	7.07	49230	6200	6191		34		
8/7	8:25AM	26	6.80	6.45	1683	115	124	1.75	113	7:00AM	27	6.48	7.69	7	14		115	10:09AM	27	6.02	6.95	49870	6200	6657		20		
8/8	8:45AM	26	6.84	6.13	1678	114	124			7:00AM	26	6.81	6.08	10	18		111	8:40AM	30	6.5	6.84	49750	6240	6216		33		
8/9	8:13AM	27	7.11	7.34	1584	114	120			7:00AM	24	7.26	7.86	102	102		80	8:53AM	25	5.62	6.81	34560	4260	4281		22		
																		8:39AM	25	6.63	6.63	29930	3660	3553		18		

Attachment B
(Interim Measure 4)

E-mail to Air Quality Permits Branch

From: [Charles McDowell](#)
To: [John Mazurkiewicz \(adpce.ad\)](#)
Cc: [Keith Long](#)
Subject: Cooling Tower Update AFIN: 70-00040 0573-AOP-R24
Date: Wednesday, August 9, 2023 3:58:44 PM
Attachments: [image001.png](#)
[image002.png](#)

EDC provided an air permit application to the DEQ's Office of Air Quality Permits Branch in April 2023 for the Air Stripper. This Air Stripper was then issued a temporary permit on May 15th, 2023. The stripper commenced operation on July 21, 2023 with a pH setpoint of 8.6 and a flowrate of 1,000 gpm. Recent sampling indicates the air stripper is achieving approximately 20% reduction of ammonia on processed water versus a modeled 25% stripping efficiency.

Charles McDowell | Environmental Leader | LSB INDUSTRIES, Inc. (NYSE: LXU) | El Dorado Chemical Plant | 4500 North West Avenue, El Dorado, Arkansas 71731

 O: 870-863-1403 |  M: 870-310-6696 |  E: email cmcdowell@lsbindustries.com

Attachment C
(Interim Measure 5)

Emergency Contingency Plan

Emergency Contingency Plan for Significant Rain Events

Introduction

This plan describes El Dorado Chemical's Emergency Contingency Plan for rainfall events and water levels in the Eld Dorado Chemical impoundments.

Pond 004

When rainfall / stormwater runoff allows, El Dorado Chemical will not discharge from Pond 004 to Lake Lee. This is the current normal operating state.

However, in the event of Significant rainfall and stormwater runoff, Pond 004 can overflow into Lake Lee. Since Pond 004 receives stormwater with relatively higher pollutant loadings, EDC is working to minimize the impact Pond 004 has on Lake Lee and Lake Kildeer.

Water level permitting, EDC will sandbag the area around the discharge from Pond 004, effectively limiting flow from Pond 004 into Lake Lee.. This will allow for maximum re-use of KT Weir and Pond 004 process wastewater in the ammonium nitrate production process.

When there is impending or forecasted rainfall that would result in overflow, the sandbags will be removed to allowing flow into Lake Lee.

Lake Lee

Lake Lee is effectively utilized as a "day pond" with some aeration prior to the water being pumped to Lake Killdeer. Lake Lee has two pump systems which move water to Lake Kildeer, a primary 2,500 gpm and a 7,000 gpm surge pump. The primary pump and normal operating scenario sends water to the upstream end of Lake Kildeer. The surge pump sends water to the middle of Lake Kildeer.

When rain has been forecasted or sampling analyses indicate higher levels of ammonia/nitrate, EDC utilizes the primary pump and the surge pump to prevent Lake Lee overflows. When Lake Lee has ammonia/nitrate concentrations lower than the current Outfall 010 discharge limits, we utilize the surge pump to feed Lake Kildeer with water that has less loading and does not require as much treatment.

Lake Kildeer

To maximize holding of wastewater and reduce the chance of emergency conditions, i.e., excessively high depths in Lake Kildeer that have the potential to flow over the emergency spillway, EDC will utilize the following procedure to manage water levels in Lake Kildeer.

1. Review depth reading of Lake Kildeer.
2. When depth is below 16.5 feet, cease flow in accord with ADEQ Interim Measure 1.
3. When Lake Kildeer depth is above 16.5 feet, evaluate the rain fall forecast and current operational status (e.g., how much flow is coming into Lake Killdeer from Lake Lee) and establish a flowrate to protect against wastewater flow over the emergency spillway (which would be an unpermitted discharge) and protect the integrity of the Lake Kildeer levees. Emergency spillway elevation is 17.5.

- a. If significant rainfall is imminent and we predict getting close to 17 feet (see below) consider a proactive call to the Arkansas DEQ wastewater enforcement to notify ADEQ of the status and preventative actions EDC is going to implement.
 - i. Options include but are not limited to:
 1. Increasing flowrate through Outfall 010 up to 2 MGD
 2. If the rainfall prediction is significant over a short period of time, meaning that it is predicted that Outfall 010 will not keep up with the stormwater inflow, consider opening Outfall 001.
 - b. We must notify the ADEQ within 24 hours of any of the following:
 - i. If we have an unpermitted discharge, e.g., overflow over the emergency spillway
 - ii. Exceeding a 24-hour limit
 - iii. If we plan to open Outfall 001 and the pollutant loadings or concentrations exceed discharge limits. ADEQ must be called before opening Outfall 001. If Outfall 001 is opened all monitoring and sampling required by the site's NPDES permit will be completed.
4. When Lake Kildeer depth is above 17 feet, evaluate or re-evaluate, the rain fall forecast. If the rainfall prediction indicates flow over the emergency spill way or damage to Lake Kildeer levees are imminent, consider options above and beyond those listed above.
 - a. Opening Outfall 001 : This requires pre-notification to ADEQ per the permit via phone call and a follow-up e-mail. The opening of Outfall 001 will be taken only if overflowing of the emergency spillway or Lake Kildeer levees is imminent. If Outfall 001 is opened all monitoring and sampling required by the site's NPDES permit will be completed.
 5. As water levels recede, the evaluations described in Steps 1 through 4 will be completed in reverse order and actions implemented based on best available information on predicted rainfall and the effects on the water levels in Lake Kildeer.

Attachment D
(Interim Measure 7)

Corrective Action Plan

Corrective Action Plan

(Interim Measure 7)

Over approximately the last twelve months, El Dorado Chemical Company (EDC) has a continuous improvement strategy to improve the performance of our wastewater treatment system. This strategy is built around four key elements:

- Minimize wastewater contaminant loading
- Minimize wastewater inflow
- Maximize treatment efficiency and capacity
- Maximize compliant discharges

The following areas have received significant attention during the past year and multiple projects mentioned below have been implemented.

Minimize Wastewater Contaminant Loading

EDC is continuing to implement and initiate projects to minimize the process loss of ammonia and nitrate. The following items have been implemented or are in various planning stages to address wastewater loading.

- Process Wastewater Reuse
 - EDC has focused on optimizing the reuse of process wastewater from the two ammonium nitrate prilling plants. We continue to look at potential products that could be manufactured from this concentrated process wastewater stream which will reduce the amount of ammonia and nitrate reaching the wastewater treatment system.
- Improve Stormwater Best Management Practices in Ammonium Nitrate Plants
 - EDC has contracted with an engineering firm to evaluate methods to reduce the contamination of stormwater including redirection of “clean” stormwater to a location that will not increase the load to the wastewater treatment system. One such project includes segregation of stormwater from roofs at the site to stormwater outfalls rather than to the wastewater system. The project is also evaluating elevations, additional grading, and installation of additional solid surfaces, e.g., concrete or asphalt, that can be compliantly directed to a stormwater outfall.
- Ammonium Nitrate Prill Stormwater Procedures
 - EDC has implemented improved Stormwater management practices related to transloading and transportation of Ammonium Nitrate Prill within the plant. These practices minimize impacts to the stormwater. These best practices include 1) methods and equipment to minimize ammonium nitrate spillage when transloading from railcars and 2) spillage cleanup requirements.

Minimize Wastewater Inflow

EDC has completed the following projects focused on minimization of wastewater volume. These efforts will allow the system to more efficiently treat the wastewater. Most projects that minimize wastewater loading will also minimize wastewater flow.

- Completed an initial stormwater runoff study
 - In addition to the Stormwater Best Management Practices described above in the Minimizing Wastewater Contaminant Loading section, EDC completed an initial

stormwater runoff and water balance study in the ammonium nitrate plants in 2nd Quarter 2022. During 3rd Quarter 2022 EDC implemented several stormwater redirection projects including the redirection of the E2 ammonium nitrate plant building roof runoffs to Lake Lee from Pond 004. EDC is also implementing project to redirect stormwater from the Ammonia Storage Spheres and the Ammonium Nitrate Storage Tank area drains directly to Lake Lee. The ongoing Stormwater Best Management Practices project will review and likely implement additional segregation efforts.

- Stormwater Diversion
 - EDC is currently evaluating and, where appropriate, will develop additional projects to redirect uncontaminated stormwater away from the wastewater treatment system in areas of the site outside of the Ammonium Nitrate plants.

Maximize Treatment Efficiency and Capacity

EDC is evaluating and implementing projects that are designed to increase the treatment efficiency and capacity of the current wastewater treatment system.

- Completed Initial Evaluation of Wastewater Treatment System
 - EDC contracted with a consultant in September 2022 to evaluate the wastewater treatment system, looking for immediate improvement opportunities as well as long-term design improvements. The study was completed in March 2022 but did not identify significant opportunities. We currently evaluating additional consulting support with the desire of developing more substantive immediate and long-term treatment options.
- Installed NH3 Stripper
 - In an effort to minimize the amount of ammonia in Lake Lee and the overall loading of nitrogen containing compounds in the wastewater treatment system, EDC completed air permitting and have installed an air stripper on the water in Lake Lee. The air stripper commenced operation on 21 July 2023. Initial testing indicates the stripper is achieving approximately a 20% reduction of ammonia passing through the unit.
- Install Baffles in Lake Killdeer
 - In January 2023 a contractor completed a dye study to determine if channeling was occurring in the flow through Lake Killdeer. This study showed that the mixing in Lake Killdeer was not very uniform. EDC is evaluating bids from multiple contractors to install underwater baffles to direct the flow in Lake Killdeer. This project should achieve a higher residence time and improve treatment in Lake Killdeer. This project is scheduled for installation in 2nd Quarter 2024.
- Biological Treatment
 - EDC is working with a biological supplier to determine if there is any biological product that could be dosed in the wastewater system. If successful, this project would assist in reducing the ammonia and nitrate levels in Lake Killdeer.

Maximize Compliant Discharge

EDC has been implementing projects to ensure that all wastewater activities are properly permitted and that necessary operating data is collected.

- Permit Application for Emergency Spillway
 - In April 2023 EDC submitted a supplement to the current NPDES permit renewal that is pending with the ADEQ. This application contained information on the currently

unpermitted emergency spillway on Lake Killdeer. This emergency spillway was part of the original construction of Lake Killdeer in the late 1970's.

- Emergency Operating Procedures
 - In 3rd Quarter 2022, EDC developed an operating procedure to guide decisions on how to respond to large rainfall events. This operating procedure content has been supplemented over time and has now been turned into the Emergency Contingency Plan requested by ADEQ under Interim Measure 5. EDC is using this Emergency Contingency Plan and will continue to use it to guide wastewater treatment system operating decisions.

2023	Lake Killdeer (KD)									Lake Lee							Pond 004									
	KD Grab Sample	KD Grab Sample	KD Composite EDCC LAB	KD Grab Sample	KD Composite EDCC LAB	KD Composite EDCC LAB	KD Composite EDCC LAB	KD Composite EDCC LAB	KD Composite EDCC LAB	LEE Grab Sample	LEE Grab Sample	Lee Composite EDCC LAB	LEE Grab Sample	Lee Composite EDCC LAB	Lee Composite EDCC LAB	Lee Composite EDCC LAB	Lee Composite EDCC LAB	004 Grab	004 Grab	004 Grab	004 Grab	004 Grab	004 Grab	004 Grab	004 Grab	
Date	Time of Grab	Temp °C	pH	DO, ppm	Conductivity	NH _{3-N} , ppm	NO _{3-N} , ppm	P, ppm	SO ₄ ppm	Time of Grab	Temp °C	pH	DO, ppm	NH _{3-N} , ppm	NO _{3-N} , ppm	Phosphorous, ppm	SO ₄ ppm	DATE/ TIME	Temp °C	DO, ppm	pH	Conductivity	NH _{3-N} , ppm	NO _{3-N} , ppm	SO ₄ ppm	
3/28																										
3/29			7.12		1620	130	134		83			7.13		132	143		178									
3/30												7.16		140	141		140									
3/31			6.98		1622	119	136		85			7.18		126	129		123									
4/1												7.01		87	103		107									
4/2												7.30		68	76		93									
4/3			7.16		1588	122	134	0.04	83			7.92		53	70		127									
4/4												7.10		67	77	1.01	115									
4/5			7.04		1867	164	167		83			7.56		141	134		103		04/04/23			8.33	70340	10060	9506	28
4/6												7.54		139	148		99									
4/7			6.87		1806	159	166		72			6.95		168	170		122									
4/8												6.78		272	294		97									
4/9												6.94		330	343		112									
4/10			7.04		2042	169	188	0.00	72			9.95		164	248		97									
4/11												7.36		175	190	0.24	99									
4/12			7.00		1814	140	162		74			7.02		136	141		154									
4/13												6.58		87	122		149		04/12/23			8.61	39320	4400	5032	20
4/14			6.90		1675	132	146		75			6.47		78	109		138									
4/15												5.86		63	81		231									
4/16												6.24		47	56		182									
4/17			7.18		1598	131	140	1.42	81			6.56		30	44		171									
4/18												5.56		72	82	1.28	205									
4/19			6.75		1615	131	141		83			7.03		64	61		272		04/18/23			7.68	57620	8240	3691	16
4/20												6.94		35	36		233									
4/21			6.82		1580	124	137		84			6.89		19	21		198									
4/22												6.37		18	20		178									
4/23												5.21		75	87		202									
4/24			7.03		1565	130	133	1.41	86			5.42		181	199		187									
4/25												6.26		210	212	2.70	179									
4/26			7.02		1582	121	137		88			6.89		175	177		191									
4/27												6.95		109	117		219									
4/28			6.93		1570	112	135		89			6.65		93	95		184									
4/29												5.71		140	154		162									
4/30												7.63		142	180		174									
5/1			6.87		1611	112	139	1.46	92			6.82		169	204		176									
5/2												5.50		122	169	2.02	189									
5/3			6.82		1633	122	140		93			7.18		133	150		246									
5/4												7.03		95	108		191									
5/5			6.85		1628	120	138		94			6.73		57	68		168									
5/6												4.68		44	51		209									
5/7												6.94		73	89		210									
5/8			6.88		1613	123	139	1.24	95			8.07		95	108		152									
5/9												8.19		81	97	1.50	122									
5/10			6.65		1588	120	132		92			7.58		163	157		75									
5/11												7.55		335	361		82		05/10/23			8.71	34840	5080	4463	26
5/12			6.81		1841	138	161		89			7.60		323	332		139									
5/13												7.02		208	243		90									
5/14												7.19		213	235		171									
5/15			6.80		1805	142	156	1.61	86			7.15		164	187		169									
5/16												7.71		138	156	2.96	192									
5/17			6.86		1812	138	158		86			7.63		103	119		176									
5/18												7.36		81	105		171									
5/19			7.03		1825	145	160		85			7.35		81	95		175									
5/20												7.21		64	75		176									
5/21												6.68		52	65		170									
5/22			6.97		1786	143	155	1.79	86			6.27		111	133		171									
5/23												6.51		182	199	2.72	194									
5/24			7.10		1758	117	153		87			6.78		142	158		221									
5/25												6.72		75	103		206									
5/26			6.73		1760	135	149		111			6.55		68	83		405									
5/27												3.80		63	65		672									
5/28												3.32		46	49		511									
5/29			6.18		1740	122	146	0.32	114			3.17		30	48		432									
5/30												3.14		20	53	1.12	332									
5/31			6.59		1734	119	146		121			3.67		16	32		298									
6/1												4.88		14	20		283									
6/2			6.73		1721	120	147		126			6.67		11	13		275									
6/3												7.24		7	10		234									
6/4												7.25		4	9		199									
6/5			6.68		1680	122	137	1.64	135			7.36		6	9		227									
6/6												7.38		7	10	0.65	205									
6/7			6.06		1674	116	135		139			7.25		7	10		192									
6/8												7.27		8	10		205		06/07/23			7.42	79560	10600	10832	42
6/9			6.22		1655	114	132		141			7.49		6	18		259									
6/10												7.60		5	23		202									
6/11												7.46		3	15		146									
6/12			6.44		1624	116	126	1.31	142			6.35		12	26		190									
6/13												6.70		30	42	0.22	197									
6/14			6.55		1590	111	125		145			6.53		27	42		140									
6/15												6.38		103	120		148									
6/16			6.65		1695	123	139		139																	

2023	Lake Killdeer (KD)									Lake Lee							Pond 004									
	KD Grab Sample	KD Grab Sample	KD Composite EDCC LAB	KD Grab Sample	KD Composite EDCC LAB	KD Composite EDCC LAB	KD Composite EDCC LAB	KD Composite EDCC LAB	KD Composite EDCC LAB	LEE Grab Sample	LEE Grab Sample	Lee Composite EDCC LAB	LEE Grab Sample	Lee Composite EDCC LAB	Lee Composite EDCC LAB	Lee Composite EDCC LAB	Lee Composite EDCC LAB	004 Grab	004 Grab	004 Grab	004 Grab	004 Grab	004 Grab	004 Grab	004 Grab	
Date	Time of Grab	Temp °C	pH	DO, ppm	Conductivity	NH _{3-N} , ppm	NO _{3-N} , ppm	P, ppm	SO ₄ ppm	Time of Grab	Temp °C	pH	DO, ppm	NH _{3-N} , ppm	NO _{3-N} , ppm	Phosphorous, ppm	SO ₄ ppm	DATE/ TIME	Temp °C	DO, ppm	pH	Conductivity	NH _{3-N} , ppm	NO _{3-N} , ppm	SO ₄ ppm	
6/21			6.60		1688	115	131		138			7.31		141	153		201									
6/22												6.86		123	130		322									
6/23			6.68		1705	115	133		141			7.17		101	116		287									
6/24												6.84		78	94		200									
6/25												7.14		55	69		199									
6/26			6.69		1690	119	130	1.32	143			6.72		49	54	1.27	184									
6/27												7.02		125	136		180									
6/28			6.75		1672	122	127		142			7.61		195	201		143									
6/29												7.82		192	194		146									
6/30			6.64		1720	119	133		141			7.97		132	164		167									
7/1												7.59		108	126		167									
7/2												7.23		75	100		167									
7/3			6.69		1730	120	137	1.38	144			7.09		72	86	2.21	149									
7/4												7.06		51	67		158									
7/5			6.77		1724	125	133		142			6.82		102	116		152									
7/6												6.96		188	209		172									
7/7			6.74		1720	116	132		140			7.62		186	223		161									
7/8												7.66		134	130		186									
7/9												8.21		132	126		195									
7/10			6.75		1780	130	136	5.24	140			8.16		209	231	3.83	155									
7/11												7.88		157	196		125									
7/12			6.64		1782	102	113		139			5.74		52	66		73									
7/13												8.49		136	215		75									
7/14			7.50		2240	179	69		34			8.22		281	119		36	07/14/23			9.02	24910	4320	2989	2	
7/15												8.29		278	323		109									
7/16												8.50		231	270		110									
7/17			6.98		1890	151	153	6.08	112			8.35		222	229	4.11	124									
7/18												8.03		167	189		122									
7/19			6.95		1820	143	143		104			7.92		133	143		110									
7/20												8.17		128	137		170									
7/21			6.91		1804	140	141		108			8.05		120	129		123									
7/22												7.49		95	93		113									
7/23												6.86		86	82		121									
7/24			6.90		1763	125	136	2.03	110			7.69		86	90	2.89	133									
7/25												7.38		72	79		146									
7/26			6.85		1764	126	134		110			7.22		58	72		125									
7/27												7.43		53	57		101									
7/28			6.84		1753	120	132		110			8.14		36	42		121									
7/29												8.27		16	30		107									
7/30												6.99		10	24		121									
7/31			6.83		1745	128	129	1.96	110			7.19		13	20	1.34	119									
8/1												6.92		64	75		126									
8/2			6.77		1726	114	128		111			7.09		38	51		122									
8/3												8.10		16	32		113									
8/4			6.79		1710	119	126		111			7.44		9	22		143									
8/5	8:53AM	28	6.79	7.65	1703	114	125			6:00AM	26	6.60	6.03	6	17	1.22	147	11:20am	34	10.63	7.14	48920	5280	6293	25	
8/6	9:57AM	29	6.77	8.27	1676	105	123			6:00AM	25	6.45	6.12	6	15		125	9:50AM	28	5.61	7.07	49230	6200	6191	34	
8/7	8:25AM	26	6.80	6.45	1683	115	124	1.75	113	7:00AM	27	6.48	7.69	7	14		115	10:09AM	27	6.02	6.95	49870	6200	6657	20	
8/8	8:45AM	26	6.84	6.13	1678	114	124			7:00AM	26	6.81	6.08	10	18		111	8:40AM	30	6.5	6.84	49750	6240	6216	33	
8/9	8:13AM	27	7.11	7.34	1584	114	120			7:00AM	24	7.26	7.86	102	102		80	8:53AM	25	5.62	6.81	34560	4260	4281	22	
																		8:39AM	25	6.63	6.63	29930	3660	3553	18	