

## Richard Healey (adpce.ad)

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**From:** Charles McDowell <CMcDowell@lsbindustries.com>  
**Sent:** Friday, October 6, 2023 11:42 AM  
**To:** Water-Enforcement-Report  
**Cc:** Richard Healey (adpce.ad); Keith Long; Derek Turner  
**Subject:** RE: 10/6/2023 Weekly Update  
**Attachments:** Pond Stratification MEMO.pdf; 2023 Waste Water Data.xlsx; EDC Weekly Update 6 Oct 2023.docx

Please find attached the weekly update, stratification memo, and updated 2023 water parameters for El Dorado Chemical Company.

If you have any questions or concerns, please do not hesitate to contact me.

**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](mailto:cmcdowell@lsbindustries.com)

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**From:** Charles McDowell  
**Sent:** Friday, September 29, 2023 10:05 AM  
**To:** 'water-enforcement-report@adeq.state.ar.us' <water-enforcement-report@adeq.state.ar.us>  
**Cc:** 'Richard Healey (adpce.ad)' <Richard.Healey@adeq.state.ar.us>; Keith Long <klong@lsbindustries.com>; Derek Turner <DTurner@lsbindustries.com>  
**Subject:** RE: 9/29/2023 Weekly Update

Please find attached the weekly update, and updated 2023 water parameters for El Dorado Chemical Company.

If you have any questions or concerns, please do not hesitate to contact me.

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

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**From:** Charles McDowell  
**Sent:** Tuesday, September 19, 2023 2:25 PM  
**To:** 'water-enforcement-report@adeq.state.ar.us' <[water-enforcement-report@adeq.state.ar.us](mailto:water-enforcement-report@adeq.state.ar.us)>  
**Cc:** 'Richard Healey (adpce.ad)' <[Richard.Healey@adeq.state.ar.us](mailto:Richard.Healey@adeq.state.ar.us)>; Keith Long <[klong@lsbindustries.com](mailto:klong@lsbindustries.com)>; Derek Turner <[DTurner@lsbindustries.com](mailto:DTurner@lsbindustries.com)>  
**Subject:** RE: 9/5/2023 Weekly Update

Please find attached the weekly update, and updated 2023 water parameters for El Dorado Chemical Company.

If you have any questions or concerns, please do not hesitate to contact me.

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

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**From:** Charles McDowell

**Sent:** Tuesday, September 12, 2023 4:23 PM

**To:** [water-enforcement-report@adeq.state.ar.us](mailto:water-enforcement-report@adeq.state.ar.us)

**Cc:** Richard Healey (adpce.ad) <[Richard.Healey@adeq.state.ar.us](mailto:Richard.Healey@adeq.state.ar.us)>; Keith Long <[klong@lsbindustries.com](mailto:klong@lsbindustries.com)>; Derek Turner <[DTurner@lsbindustries.com](mailto:DTurner@lsbindustries.com)>

**Subject:** RE: 9/5/2023 Weekly Update

Please find attached the weekly update, and updated 2023 water parameters for El Dorado Chemical Company.

If you have any questions or concerns, please do not hesitate to contact me.

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

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**From:** Charles McDowell

**Sent:** Tuesday, September 5, 2023 2:22 PM

**To:** 'water-enforcement-report@adeq.state.ar.us' <[water-enforcement-report@adeq.state.ar.us](mailto:water-enforcement-report@adeq.state.ar.us)>

**Cc:** 'Richard Healey (adpce.ad)' <[Richard.Healey@adeq.state.ar.us](mailto:Richard.Healey@adeq.state.ar.us)>; Keith Long <[klong@lsbindustries.com](mailto:klong@lsbindustries.com)>; Derek Turner <[DTurner@lsbindustries.com](mailto:DTurner@lsbindustries.com)>

**Subject:** 9/5/2023 Weekly Update

Please find attached the weekly update and updated 2023 water parameters for El Dorado Chemical Company.

If you have any questions or concerns, please do not hesitate to contact me.

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

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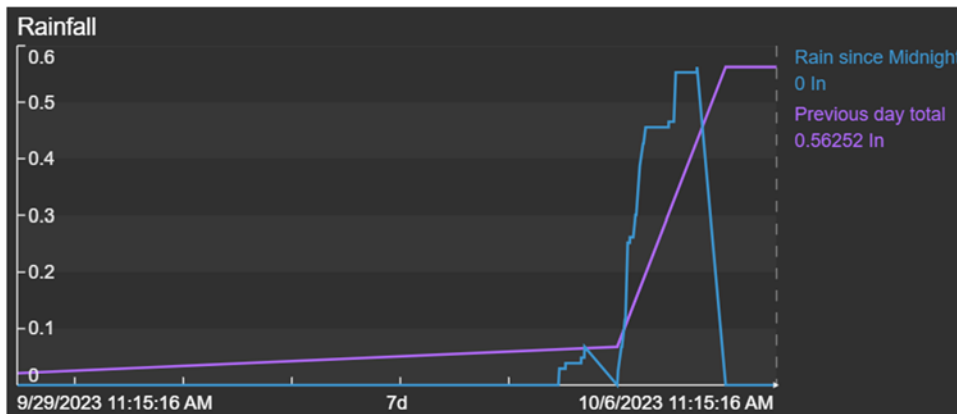
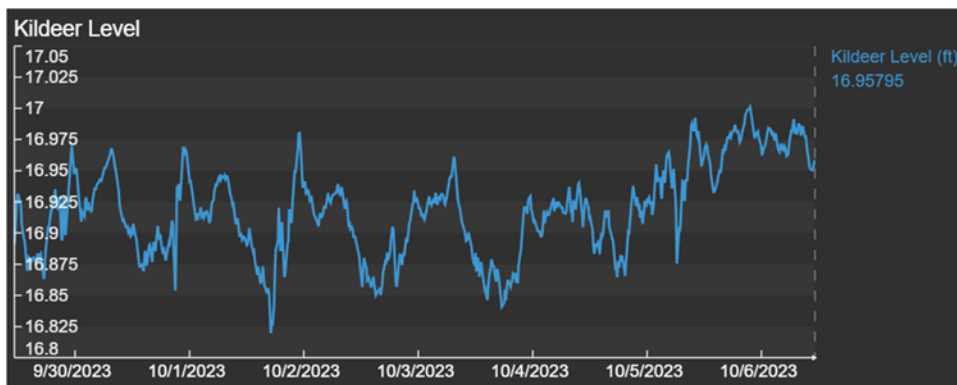
## Weekly Report Required by Interim Measures Letter dated 8/4/2023

El Dorado Chemical Company, NPDES Permit Number: AR0000752, AFIN: 70-00040

Weekly Report Date: October 6, 2023 Updated portions are underlined.

### Discharges and Implementation of Emergency Action Plan

EDC has not discharged any water through Outfall 001, Outfall 010, or the emergency spillway between when our interim measures plan was initiated on August 9th, 2023 and the 28<sup>th</sup>. Over the last week, the facility received 0.58 inches of rainfall. Killdeer levels are currently at 16.95 feet. EDC is attempting to keep the levels of Kildeer below 17.0 feet. During the week we have been able to maintain Kildeer levels by discharging 1.0 MGD. In the event of additional rain, EDC will manage the discharge from Kildeer as necessary to ensure water does not overtop the emergency spillway in accordance with the August 4, 2023 Interim Measures letter.



### Conduct Daily Sampling of Lake Lee, Lake Killdeer, and Pond 004

EDC commenced this required sampling on August 5, 2023. Updated Information is in the attached 2023 spreadsheet.

### Provide Copies of Sampling of Lake Lee, Lake Killdeer, and Pond 004 Since January 1, 2023

Please see the EDC Interim Measures response dated August 9, 2023.

### Corrective Action Plan Activities [updates from the previous week are underlined]

During our August 17<sup>th</sup> conference call we discussed that these proposed activities may trigger a communication to the ADEQ and possible permit changes. We will continue to communicate plans and improvements to obtain ADEQ's guidance on proper permitting.

### Minimize Wastewater Contaminant Loading

#### Water Reuse:

EDC has evaluated its processes to assess locations where water can be reutilized in processes. Currently we are reusing as much wastewater as possible, that would otherwise flow into Pond 004, and are reusing some water from Pond 004 when the opportunity arises.

### Minimize Wastewater Inflow

EDC has diverted approximately 15% of the water flowing into Pond 004. We are currently evaluating additional steps that can be taken. However, these steps will require engineering assessments to ensure that we do not create unforeseen second-order challenges. EDC has utilized frac tanks to increase the storage capacity of Ammonia Nitrate water to reduce the overflow into Pond 004 from rain events. During the previous rain event it did not appear that any process water overflowed into 004.

### Maximize Treatment Efficiency and Capacity

#### Lake Lee Ammonia Stripper

EDC continues to operate the ammonia stripper with an approximate 20% efficiency.

### Short Term Treatment of Pond 004

EDC has met with Clean Harbors to develop a short-term treatment system (approximately one year) to provide treatment pending implementation of a permanent solution. EDC has collected samples for Clean Harbors to develop a short-term biological treatment system. The biological treatment system proposed is not viable due to the volume of solid waste that would be generated (16,000 lbs per day). Clean Harbors proposed a secondary solution utilizing membrane filtration. This may be a viable alternative; however, it will create a further concentrated waste water stream that will have to be managed.

EDC has contracted GBMc to conduct a bathometric survey of Pond 004.

EDC met with Black & Veatch, a wastewater consulting firm, to determine the best treatment possibilities for Pond 004. Based on these initial conversations a biological system seems to be the best path forward. EDC has received the report and is assessing options provided by Black & Veatch.

Based on review of the Black and Veatch data, EDC is proceeding with biological treatment of 004, but we are still assessing how to address treatment barriers such as predilution, carbon addition, and sludge generation. Next week, we are evaluating two existing package plants that would be moved to El Dorado to facilitate biological treatment. This methodology will allow us to slowly treat the water in 004 and allow 004 to be a holding basin that will effectively operate as a stormwater retention pond.

Additionally, we are evaluating possibilities of reuse of the water as an input into a product.

### Increased Efficiency in Lake Killdeer Biological Activity

Based upon discussion with supplier of nitrification/denitrification bacteria, EDC will begin dosing Lake Killdeer with calcium carbonate or magnesium carbonate to increase the available of carbon and alkalinity in Lake Killdeer. Increasing available carbon should promote additional biological activity to reduce the amount of ammonia in Lake Killdeer and the effluent discharge. EDC has also ordered one ton of lime and will begin dosing Lake Lee with the lime in efforts to increase alkalinity in Lake Lee which flows into Lake Killdeer.

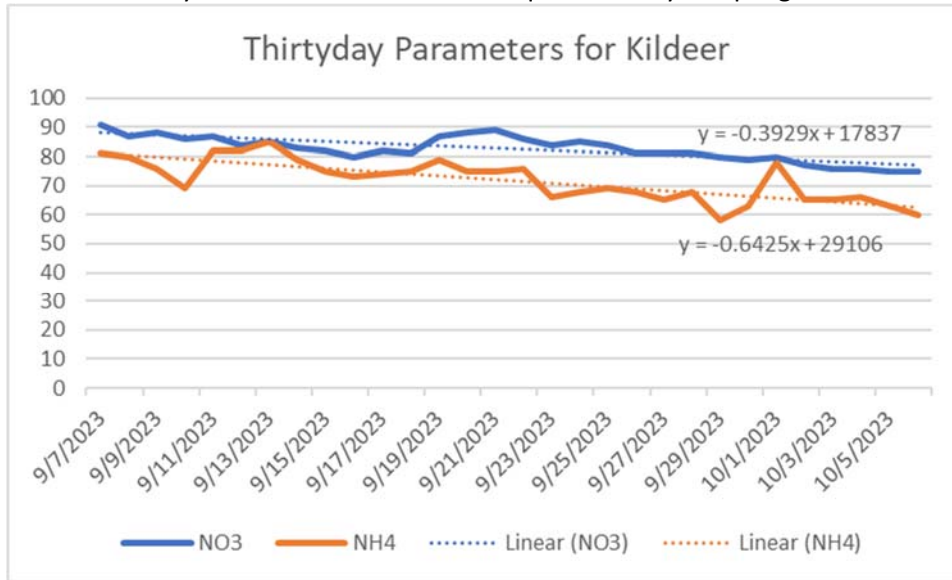
### Baffles in Lake Killdeer

EDC selected a vendor to install baffles in Lake Killdeer. As discussed in our August 17<sup>th</sup> conference call, this should promote longer residence time and further increase biological activity to reduce the amount of ammonia in Lake Killdeer and the effluent discharge.

## Water Quality Sampling Results

Water quality sampling required by the Interim Measures letter are included in the attached 2023 spreadsheet. For the ammonia data for 004, on the 6<sup>th</sup> through the 10<sup>th</sup>, the sample testing did not result in complete release of ammonia, resulting in lower levels of ammonia being reported.

Previous 30 day data trendline for ADEQ requested daily sampling at Lake Killdeer.



## Water Column Profile Measurements

EDC has contracted with Alliance Technology Group (formerly GBMc) to complete the profile and sampling of Pond 004, Lake Lee, and Lake Killdeer. The field work was completed on the 28<sup>th</sup>, final results are attached.

## Other Actions

In this call EDC was informed we need to obtain a wastewater operator's license as quickly as possible. Charles McDowell has completed the wastewater operator course work has successfully passed the testing for industrial wastewater operator on the 27<sup>th</sup> of this month. Additionally, we have had a second operator receive the industrial wastewater license. Second, ADEQ advised that EDC should

coordinate with other Joint Pipeline members regarding discharges and volumes. We have initiated this communication.

EDC has contracted Alliance Technology to conduct a bathometric survey of 004. This was conducted last week. The survey was conducted to get better estimation of the volume of water that 004 can contain.

EDC plans to continue all measures outlined in the interim measure response submitted to ADEQ. We request to shift from weekly reports to the reporting outlined in the Notice of Non-Compliance Corrective action plan. In that report we will update the information listed in this weekly report in addition to the data identified in the Notice of Non-Compliance Corrective Action Plan.

## MEMORANDUM

DATE: September 21, 2023  
TO: Charles McDowell, EDCC  
FROM: Nicki Johnson, Alliance Technical Group *Nicki Johnson*  
RE: Pond Stratification Study

El Dorado Chemical Company (EDCC) requested assistance to conduct water column profile measurements with a multi-parameter meter to determine if the ponds (Lake Lee, Lake Killdeer, and Lake 004) at the facility were stratified.

Project objectives for the stratification evaluation were as follows:

1. Provide in situ measurements at varying depths at all three ponds.
2. Collect water samples to analyze for ammonia and nitrate-nitrite above and below a thermocline, if present. If not present, one sample was collected.

The project objectives were achieved by following the methods and procedures described in this memorandum. On August 28<sup>th</sup>, Alliance Technical Group staff completed the pond stratification study. At Lake Killdeer (the largest pond) cross-sectional transects were completed in the deepest part of the lake. A map of each sampling location at all 3 ponds is included in Attachment 1. A YSI multi-parameter was used to measure temperature and dissolved oxygen in two-foot increments along two transects at Lake Killdeer. The multi-parameter meter was calibrated in the laboratory before departing the office that morning. Table 1 contains the Lake Killdeer in situ measurements that were collected.

Dissolved oxygen and temperature recordings were analyzed as those two measurements are needed to determine if a thermocline and hypolimnion are present. Table 2 contains the in-situ measurements from Lake Lee and Lake 004. A water sample was collected at each location as well. A Kemerer, vertical water column sampler was used to collect the water quality samples that were analyzed for ammonia and nitrate. We collected two samples at each sampling location in Lake Killdeer. It was requested that ATG staff collect a water sample above the thermocline and below. No thermocline or hypolimnion were present at Lake Killdeer and at Lake Lee and Lake 004, stratification is not possible due to the shallow depth. One water sample was collected from both Lake Lee and Lake 004. All nitrate-nitrite and ammonia concentration data are presented below in Table 3.

Table 1. In situ measurements from Lake Killdeer.

LK-1			LK-2			LK-3			LK-4		
Depth (ft)	DO (mg/L)	Temp (°C)	Depth (ft)	DO (mg/L)	Temp (°C)	Depth (ft)	DO (mg/L)	Temp (°C)	Depth (ft)	DO (mg/L)	Temp (°C)
1	2.68	32.5	1	1.32	32.6	1	2.33	32.2	1	0.87	32.1
3	1.31	32.44	3	1.19	32.4	3	1.89	32.3	3	0.83	32.2
5	1.11	32.3	5	1.17	32.5	5	1.17	32.3	5	0.84	32.3
7	1.13	32.3	7	0.98	32.3	7	1.04	32.3	7	0.8	32.3
9	1.03	32.4	9	0.87	32.2	9	0.95	32.3	9	0.75	32.2
11	1	32.2	11	0.76	32.3	11	0.88	32.2	11	0.34	32.1
13	0.6	31	13	0.45	30.3	13	0.36	31.2	13	0.27	31.2
						15	0.27	30.2	15	0.23	30.7
						17	0.23	29.1			
LK-5			LK-6			LK-7			LK-8		
Depth (ft)	DO (mg/L)	Temp (°C)	Depth (ft)	DO (mg/L)	Temp (°C)	Depth (ft)	DO (mg/L)	Temp (°C)	Depth (ft)	DO (mg/L)	Temp (°C)
1	1.22	32.5	1	1.14	32.5	1	1.16	32.6	1	0.91	32.5
3	1.15	32.5	3	1.03	32.5	3	1.05	32.5	3	0.92	32.5
5	0.98	32.3	5	0.8	32.6	5	1	32.5	5	0.85	32.4
7	0.94	32.3	7	0.74	32.3	7	0.94	32.4	7	0.81	32.4
9	0.69	32.1	9	0.69	32.3	9	0.9	32.4	9	0.78	32.3
11	0.2	31.6	11	0.65	32.2	11	0.81	32.3	11	0.71	32.1
15	0.2	32.1	13	0.22	30.7	13	0.76	32.2	13	0.64	32
			15	0.15	30.6	15	0.37	31.5	15	0.14	30.4
			17	0.11	30.4	17	0.19	30.8	17	0.13	29.9
						19	0.12	30.1			

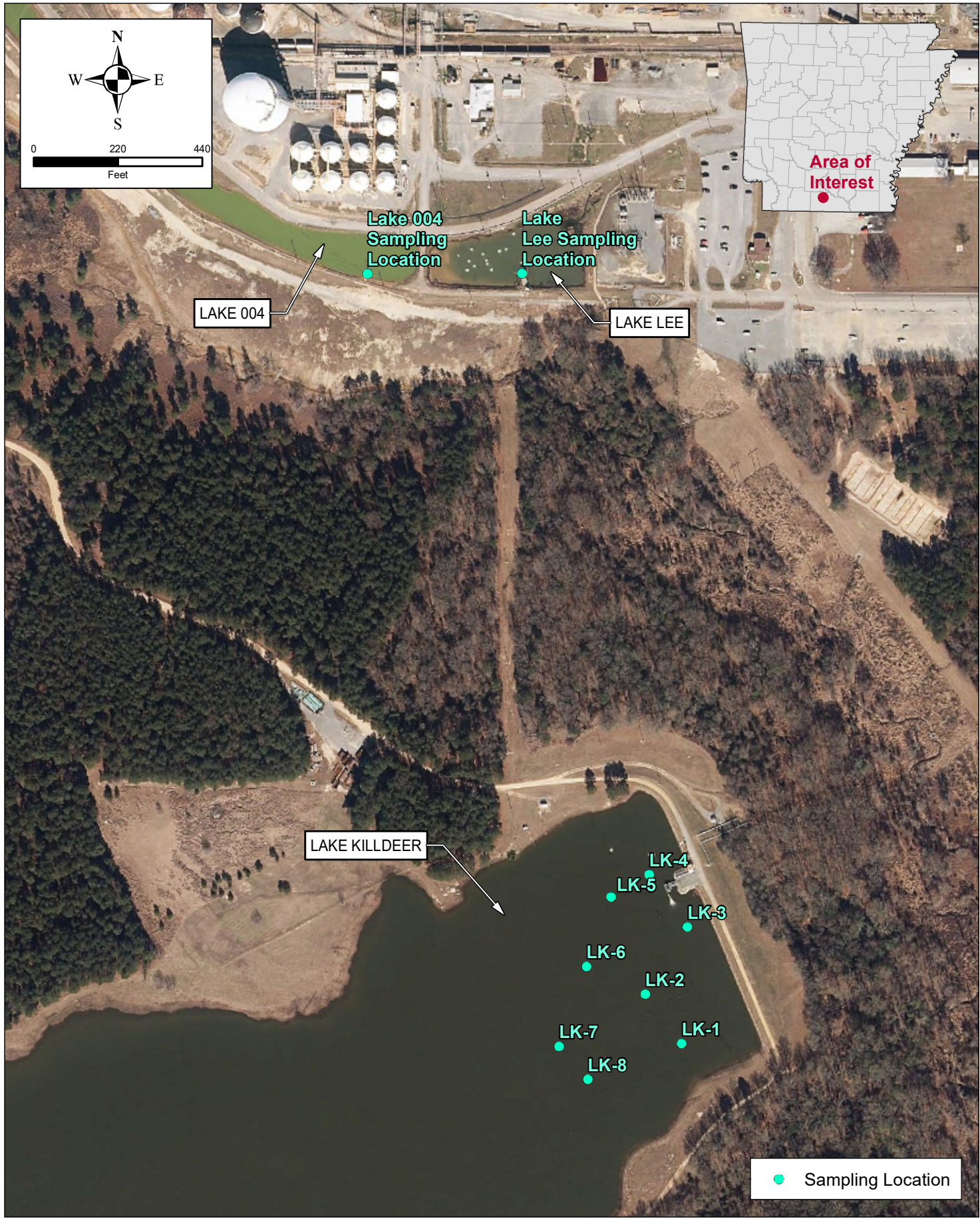
Table 2. Dissolved Oxygen (DO) and Temperature measured at Lake Lee and Lake 004.

Lake Lee			Lake 004		
Depth (ft)	DO (mg/L)	Temp (°C)	Depth (ft)	DO (%)	Temp (°C)
1	0.46	37.1	1	4.5	31.9
3	0.33	35.6	3	4.4	31.8
5	0.26	35.4	4	4.4	31.8
6	0.23	35.2			



Table 3. Nitrate-nitrite and ammonia concentrations from the water quality samples collected in Lake Killdeer, Lake Lee and Lake 004.

Pond	Sample ID	Depth (ft)	Date	Time	Nitrate nitrite (mg/L)	Ammonia (mg/L)
Lake Killdeer	LK-1	5	8/28/2023	1230	110	89
	LK-2	16	8/28/2023	1250	100	94
	LK-2 B	8	8/28/2023	1300	110	93
	LK-3 A	16	8/28/2023	1310	84	96
	LK-3 B	8	8/28/2023	1312	110	95
	LK-4 A	15	8/28/2023	1325	97	95
	LK-4 B	7	8/28/2023	1330	110	94
	LK-5A	15	8/28/2023	1350	110	94
	LK-5 B	7	8/28/2023	1355	110	130
	LK-6 A	7	8/28/2023	1405	120	93
	LK-6 B	15	8/28/2023	1400	140	93
	LK-7 A	7	8/28/2023	1415	120	99
	LK-7 B	15	8/28/2023	1410	100	110
	LK-8 A	17	8/28/2023	1430	110	110
	LK-8 B	9	8/28/2023	1435	120	94
Lake 004		4	8/28/2023	1510	5,900	3,200
Lake Lee		4	8/28/2023	1515	86	94



DESIGNED BY	ENJ
CHECKED BY	ENJ
APPR. BY	ENJ
DRAWN BY	ALB



SHEET TITLE  
**AERIAL SITE MAP**

JOB NAME  
 EDCC  
 POND STRATIFICATION STUDY  
 EL DORADO CHEMICAL COMPANY  
 UNION COUNTY, ARKANSAS

PROJECT NO.	2042-23-050	REV. NO.	
DATE	10/02/2023	DWG. NO.	
SCALE	SHOWN		





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 <sub>3-N</sub> , ppm	NO <sub>3-N</sub> , ppm	P, ppm	SO <sub>4</sub> ppm	Time of Grab	Temp °C	pH	DO, ppm	NH <sub>3-N</sub> , ppm	NO <sub>3-N</sub> , ppm	Phosphorous, ppm	SO <sub>4</sub> ppm	DATE/ TIME	Temp °C	DO, ppm	pH	Conductivity	NH <sub>3-N</sub> , ppm	NO <sub>3-N</sub> , ppm	SO <sub>4</sub> 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	