2022 Annual Biosolids Report

CITY OF
SIOUX FALLS
PUBLIC WORKS

Water Reclamation Division

PW23_017

General Facility Information

Facility:	**Sioux Falls Water Reclamation**	Permit NO.:	**SDL022128**
Authority Name:	**City of Sioux Falls**	Plant Type:	**Tertiary**
EPA Region:	**VIII**	Latitude:	**43.596**
Hydrologic Unit:	**10170203**	Longitude:	**96.664**

Facility Physical Address:

Street:	**4500 North Sycamore Avenue**		
City/St:	**Sioux Falls, SD**	Zip Code:	**57104**
County:	**Minnehaha**	Phone:	**605-367-8188**

Facility Mailing Address:

Street:	**4500 North Sycamore Avenue**		
City/St:	**Sioux Falls, SD**	Zip Code:	**57104**
County:	**Minnehaha**	Phone:	**605-367-8188**

Responsible Official:

Name:	**Mark Cotter**	Title:	**Public Works Director**

Operator-in-charge:

Name:	**Mark Hierholzer**	Title:	**Operations Manager**
License #	**5304**	Phone:	**605-367-8193**
E-mail:	**MHierholzer@siouxfalls.org**		

Biosolids Contact Person:

Name:	**Philip Greenwood**	Title:	**Biosolids Supervisor**
License #	**2756**	Phone:	**605-367-8192**
E-mail:	**PGreenwood@siouxfalls.org**		

Permit Information:

Permit Issued:	**10/1/2021**	Permit Expires:	**09/30/2025**
Last Inspection Date:	**9/22/2021**		

Influent Flow Characteristics:

Average Daily Flow:	**16.6 MGD**
Average Influent BOD:	**310.0 mg/L**
Average Influent TSS	**284.6 mg/L**

Addressing Items in DANR
Biosolids Annual Report Letter Dated December 28, 2022

1.	**Biosolids Production for 2022:**	**2,922.02**	**Dry Metric Tons**
2.	**Total Land Application for 2022:**	**4,039.00**	**Dry Metric Tons**
	Dewatered Biosolids Land Application	2,227.59	Dry Metric Tons
	Liquid Land Application	0	Dry Metric Tons
	Landfill Special Project (*See Section 5. b*)	1,811.41	Dry Metric Tons
	Total Landfill Disposal for 2022	**6.42**	**Dry Metric Tons**
3.	**Biosolids Storage 2022:**	**846.20**	**Dry Metric Tons**
	2022 Biosolids Storage (Lagoons)	846.20	Dry Metric Tons
	Carryover Inventory from 2021	1,408.30	Dry Metric Tons
	Added from Digesters	524.07	Dry Metric Tons
	Removed from Lagoon Cleanout	1,083.74	Dry Metric Tons
	Decant Solids (Returned to POTW)	2.42	Dry Metric Tons
	2022 Biosolids Storage (Dewatered)	0	Dry Metric Tons
	Carryover Inventory from 2021	304.05	Dry Metric Tons
	Dewatered Cake Produced	2,397.95	Dry Metric Tons
	Pressate Solids (Returned to POTW)	55.77	Dry Metric Tons

4. In 2022, the Sioux Falls Regional Landfill received 6.42 Dry Metric Tons of biosolids from the Sioux Falls Water Reclamation Facility.

5. Disposal Practices:

   a) The City of Sioux Falls utilized a rental dewatering screw press from January 1, 2022, through November 6, 2022. Anaerobically digested sludge was dewatered and stored in our onsite bunker or offsite storage area before land application. All dewatered biosolids were beneficially reused in accordance with *Surface Water Discharge Permit #: SDL022128* and *The City of Sioux Falls Sludge Management Plan: Version 5, 2022.*

b) The Sioux Falls Regional Landfill utilized dewatered biosolids as part of the construction of an additional cell. Dewatered biosolids were used as a soil amendment to help establish grasses for erosion control. A total of 1,811.41 Dry Metric Tons were hauled to the landfill for this project. Of the 1,811.41 Dry Metric tons, 1,399.19 Dry Metric Tons were from the cleanout of the south lagoon, and 412.22 Dry Metric Tons were dewatered biosolids from our anaerobic digesters. Material from the south lagoon comprised 1,083.74 Dry Metric Tons of biosolids and 315.45 Dry Metric Tons of inorganic materials.

Upon completion of the South Lagoon cleanout, the remaining clay depth was checked using a manual soil probe and tape measure. Twenty probes were taken in a four-by-five grid. All probes showed a clay depth of over 14 inches, exceeding the 12-inch requirement.

6. All Land Application Sites and Land Application Data are listed in Enclosure I. All field maps have been submitted to South Dakota DANR electronically via Shape File.

7. Dates of Land Application, and additional Land Application Data, are contained in Enclosure I.

8. Biosolids sent to the Sioux Falls Regional Landfill special project were spread by:

Sioux Falls Regional Landfill Ryan Bechtold 26750 464th Avenue Hartford, SD 57033 Phone: 605-367-8166	Dan Hart Patrol Service, LLC Garrett Bietz PO Box 619 Upton, WY 82730 Phone: 307-622-0421

9. Analytical Results for Required Pollutants are contained in Enclosure II.

10. The Analytical Results of Additional Monitoring of Biosolids are contained in Enclosure III. No additional monitoring of land application sites was performed in 2022.

11. Biosolids applied in 2022 did not exceed the Table 3 pollutant concentrations.

12. Pathogen reduction requirements were met with anaerobic digestion. Certification is contained in Enclosure IV.

13. Vector attraction reduction requirements were met with anaerobic digestion. Certification is contained in Enclosure IV.

14. Management Practices and Site Restriction Controls were followed in accordance with the current Sludge Management Plan Version 5: 2022.

15. Pathogen Reduction, Vector Attraction Reduction Requirements, Best Management Practices, and Site Restriction Certification Statement are contained in Enclosure V.

16. The City of Sioux Falls had zero noncompliance events in 2022.

17. Other Information on the Biosolids Program:

    a. In 2022, the City of Sioux Falls continued the dewatering of biosolids. As part of this operation, the City utilized a Schwing FSP 1103 screw press to dewater biosolids from our anaerobic digesters. Once dewatered, biosolids were stored on site prior to land application.

       Land application of dewatered biosolids was conducted with a side discharge spreader. The spreader evenly distributed the dewatered biosolids over the application sites. In addition, City staff observed all buffer zones and setbacks, per our Biosolids Permit and Sludge Management Plan.

       The Sludge Management Plan was amended in 2022, detailing the land application of dewatered biosolids. The modified version is titled *The City of Sioux Falls Sludge Management Plan: Version 5, 2022.*

    b. The City of Sioux Falls land applied dewatered cake on sites 184A and 222Z, which had soil pH's under 5.5 at the time of testing. Lime was applied to correct the soil pH before spreading of dewatered biosolids. Raul Vasquez from SD DANR was notified of the low pH conditions, and he requested a copy of the lime receipts. Copies of the lime receipts are provided in Enclosure IX.

    c. On June 10, 2022, the City of Sioux Falls notified SD DANR that the City would no longer be conducting fecal testing on biosolids, prior to land application. The City of Sioux Falls produces Class B biosolids through an anaerobic digestion process.

       The City of Sioux Falls' anaerobic digesters meet or exceed Process to Significantly Reduce Pathogens (PSRP) Option 3 requirements. Option 3 requirements are listed below.

Processes to Significantly Reduce Pathogens (PSRPs) Listed in Appendix B of 40 CFR Part 503.

Option 3. Anaerobic Digestion

Biosolids are treated in the absence of air for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature shall be between 15 days at 35°C to 55°C and 60 days at 20°C.

Additionally, the City of Sioux Falls stores dewatered biosolids, and land applies biosolids, in a manner that meets or exceeds Class B site restrictions, minimizing human, animal, or environmental exposure to disease-causing organisms.

Should the City of Sioux Falls' anaerobic digesters fail to meet Process to Significantly Reduce Pathogens (PSRP) Option 3 requirements, the City will immediately begin fecal testing the anaerobic digesters. Once the anaerobic digesters meet Process to Significantly Reduce Pathogens (PSRP) Option 3 requirements, fecal testing will conclude.

Supporting documentation is in the following appendices.

Appendix A – Sludge Management Plan Amendments

Appendix B – Lime Receipts

Appendix C – Current Active, Potential, and Inactive Sites

Appendix D – Deep Soil Monitoring Schedule

Appendix E – Approval Letter for Landfill Special Project

Appendix F – Soil Sample Results and Agronomic Rate Calculations

ENCLOSURE I

Land Application Sites and Application Data

2022 Dewatered Cake Land Application Sites and Agronomic Rates

Site Owner	Site Number	Site Location Sec-Twp.-Rng	Cover Crop	Application Dates	Acres Available	Acres Applied	Wet Tons Applied	lbs. N/ Acre	Total Lbs. N Applied
Brent Dybedahl	223Z S	22-104-50	Alfalfa	1/3/22–1/10/22	130	57.00	1,241.44	199.42	11,366.99
Brent Dybedahl	223Z N	22-104-50	Alfalfa	1/10/22–1/11/22	130.0	8.00	216	186.31	1,490.45
Kathleen Jacobson	176Z W	7-102-48	Corn	4/4/2022	49.8	25.00	309	108.74	2,718.57
Kathleen Jacobson	176Z E	7-102-48	Corn	4/4/22–4/5/22	49.8	24.50	323	116.91	2,864.38
Todd Jacobson	175Z W	7-102-48	Corn	4/5/22–4/9/22	52.0	26.00	332	112.34	2,920.93
Todd Jacobson	175Z E	7-102-48	Corn	4/9/22–4/11/22	52.00	26.00	331	119.93	3,118.18
Barbra Halbersma	107C	13-102-49	Corn	4/18/22–4/19/22	37.30	35.34	642	152.69	5,396.38
Barbra Halbersma	107A W	13-102-49	Corn	4/19/22–4/20/22	43.50	20.68	292	118.74	2,455.80
Barbra Halbersma	107A E	13-102-49	Corn	4/21/2022	43.50	20.26	286	118.74	2,405.21
Brad Jurgenson	184A N	36-103-49	Soybeans	4/21/22–4/25/22	50.00	24.00	402	140.59	3,372.76
Brad Jurgenson	184A S	36-103-49	Soybeans	4/28/22–4/29/22	50.00	23.96	201	70.40	1,684.71
Ronald Johnson Trust	120C	1-102-51	Grass Hay	6/28/22–6/29/22	44.00	44.00	391	85.01	3,740.28
Brent Dybedahl	Fall 223ZN	22-104-50	Alfalfa	8/22/22–8/30/22	130.0	65.00	1,110	176.96	11,502.13
Brent Dybedahl	222Z	14-104-50	Alfalfa	9/13/2022–9/19/22	60.0	60.00	878	163.80	9,828.14
Eugene Engebretson	78B W	22-104-50	Soybeans	9/20/22–9/29/22	134.5	40.00	529	91.24	3,649.56
Lloyd Zweep	103A	31-103-48	Corn	9/29/22–10/3/22	22.0	22.00	314	129.59	2,851.09
Eugene Engebretson	78A	22-104-50	Corn	10/4/22–10/11/22	55.0	55.00	794	133.36	7,635.76
Charles Brown	192Z	17-102-48	Corn	10/11/22–10/28/22	76.0	73.00	990	155.17	10,300.53
				Totals	**1,133**	**649.74**	**9,581.33**		**89,301.85**
				Average				**132.22**	

2022 Dewatered Cake Land Biosolids Site Summary

Site Owner	Site Number	Site Location Sec-Twp.-Rng	Cover Crop	Application Dates	Appl Area Hectare	Application Rate (Metric Tonnes/ Hectare)	Total Metric Tons	Surf App.	Subsurface Injection	Site Restr. Signage
Brent Dybedahl	223Z S	22-104-50	Alfalfa	1/3/22–1/10/22	23.07	12.64	291.64	X		Yes
Brent Dybedahl	223Z N	22-104-50	Alfalfa	1/10/22–1/11/22	3.24	23.83	77.16	X		Yes
Kathleen Jacobson	176Z W	7-102-48	Corn	4/4/2022	10.12	8.12	82.14	X		Yes
Kathleen Jacobson	176Z E	7-102-48	Corn	4/4/22–4/5/22	9.91	8.66	85.86	X		Yes
Todd Jacobson	175Z W	7-102-48	Corn	4/5/22–4/9/22	10.52	8.39	88.25	X		Yes
Todd Jacobson	175Z E	7-102-48	Corn	4/9/22–4/11/22	10.52	8.29	87.21	X		Yes
Barbra Halbersma	107C	13-102-49	Corn	4/18/22–4/19/22	14.30	9.48	135.57	X		Yes
Barbra Halbersma	107A W	13-102-49	Corn	4/19/22–4/20/22	8.37	7.37	61.69	X		Yes
Barbra Halbersma	107A E	13-102-49	Corn	4/21/2022	8.20	7.37	60.42	X		Yes
Brad Jurgenson	184A N	36-103-49	Soybeans	4/21/22–4/25/22	9.71	8.72	84.73	X		Yes
Brad Jurgenson	184A S	36-103-49	Soybeans	4/28/22–4/29/22	9.70	4.36	42.32	X		Yes
Ronald Johnson Trust	120C	1-102-51	Grass Hay	6/28/22–6/29/22	17.81	5.26	93.58	X		Yes
Brent Dybedahl	Fall 223ZN	22-104-50	Alfalfa	8/22/22–8/30/22	26.30	9.40	247.38	X		Yes
Brent Dybedahl	222Z	14-104-50	Alfalfa	9/13/2022–9/19/22	24.28	7.17	174.13	X		Yes
Eugene Engebretson	78B W	22-104-50	Soybeans	9/20/22–9/29/22	16.19	13.62	220.44	X		Yes
Lloyd Zweep	103A	31-103-48	Corn	9/29/22–10/3/22	8.90	6.70	59.67	X		Yes
Eugene Engebretson	78A	22-104-50	Corn	10/4/22–10/11/22	22.26	6.93	154.16	X		Yes
Charles Brown	192Z	17-102-48	Corn	10/11/22–10/28/22	29.54	6.14	181.24	X		Yes
				Average		**9.03**				
				Totals	**262.94**		**2,227.59**			

ENCLOSURE II

Required Pollutant Analytical Results

2022
Biosolids Analysis Summary
Primary Digester Composite

Macronutrients	Units of Measure	Annual Average	Annual Minimum	Annual Maximum	Analyses per Year
TKN	mg/kg	93,231	58,500	144,939	52
Ammonia	mg/kg	42,189	25,300	51,873	52
Nitrate	mg/kg	34.1	1.1	102	52
%TVS	%	65.6	60.0	73.7	52
pH	SU		7.4	7.78	9
Potassium	mg/kg	4,045	2,630	7,381	52
Pot Ash (K2O)	mg/kg	4,854	3,190	8,858	52
Phosphorus	mg/kg	18,883	11,190	33,020	52
Plant Avail P	mg/kg	17,346	1,950	36,100	52
% TS	%	2.28	1.86	3.02	52

Metals	Units of Measure	Annual Average	Annual Minimum	Annual Maximum	Analyses per Year
Arsenic	mg/kg	7.7	0.0	12.7	14
Cadmium	mg/kg	1.3	0.20	2.4	14
Chromium	mg/kg	32.4	20.0	38.9	14
Copper	mg/kg	432.7	330.0	552.5	14
Lead	mg/kg	13.5	1.6	24.5	14
Mercury	mg/kg	0.9	0.2	4.3	14
Molybdenum	mg/kg	25.5	11.0	39.7	52
Nickel	mg/kg	18.8	11.2	25.2	14
Selenium	mg/kg	6.8	0.1	11.7	14
Zinc	mg/kg	1,151.9	826.1	1,503.0	14

2022
Biosolids Analysis Summary
Dewatered Cake Land Application

Macronutrients	Units of Measure	Annual Average	Annual Minimum	Annual Maximum	Analyses per Year
TKN	mg/kg	50,179	25,317	65,147	16
Ammonia	mg/kg	9,925	4,598	18,862	16
Nitrate	mg/kg	23.4	7.1	56	15
%TVS	%	67.0	27.4	73.92	16
pH	SU	7.90	7.67	8.23	9
Potassium	mg/kg	1,124	862	2,041	15
Pot Ash (K2O)	mg/kg	1,349	1,035	2,449	15
Phosphorus	mg/kg	15,833	10,830	18,590	15
Plant Avail P	mg/kg	13,767	7,079	16,960	15
% TS	%	24.68	19.48	45.92	16

Metals	Units of Measure	Annual Average	Annual Minimum	Annual Maximum	Analyses per Year
Arsenic	mg/kg	9.8	8.3	10.8	9
Cadmium	mg/kg	1.6	1.0	2.3	9
Chromium	mg/kg	36.9	31.6	44.3	9
Copper	mg/kg	446.6	414.6	509.9	9
Lead	mg/kg	15.7	12.4	17.9	9
Mercury	mg/kg	0.8	0.6	1.0	9
Molybdenum	mg/kg	24.7	8.7	31.2	15
Nickel	mg/kg	21.4	18.1	23.6	9
Selenium	mg/kg	8.6	7.7	10.3	9
Zinc	mg/kg	1,189.7	975.4	1,268.0	9

ENCLOSURE III

Additional Monitoring of Biosolids

Sioux Falls POTW
Quarterly Pollutants of Concern Monitoring
Biosolids Additional Monitoring 2022

		RESULTS				
CODE	FORMAL CHEMICAL NAME	Q1 22	Q2 22	Q3 22	Q4 22	UNITS
V01	acrolein	ND	ND	ND	ND	ug/L
V02	acrylonitrile	ND	ND	ND	ND	ug/L
V03	benzene	ND	ND	ND	ND	ug/L
V04	Bis (chloromethyl) ether					
V05	bromoform	ND	ND	ND	ND	ug/L
V06	carbon tetrachloride	ND	ND	ND	ND	ug/L
V07	chlorobenzene	ND	ND	ND	ND	ug/L
V08	chlorodibromomethane	ND	ND	ND	ND	ug/L
V09	chloroethane	ND	ND	ND	ND	ug/L
V10	2-chloroethylvinyl ether	ND	ND	ND	ND	ug/L
V11	chloroform	ND	ND	ND	ND	ug/L
V12	dichlorobromomethane	ND	ND	ND	ND	ug/L
V13	Dichlorofluoromethane	ND	ND	ND	ND	
V14	1,1-dichloroethane	ND	ND	ND	ND	ug/L
V15	1,2-dichloroethane	ND	ND	ND	ND	ug/L
V16	1,1-dichloroethylene	ND	ND	ND	ND	ug/L
V17	1,2-dichloropropane	ND	ND	ND	ND	ug/L
V18	1,3-dichloropropylene	ND	ND	ND	ND	ug/L
V19	ethylbenzene	ND	ND	ND	ND	ug/L
V20	methyl bromide	ND	ND	ND	ND	ug/L
V21	methyl chloride	ND	ND	ND	ND	ug/L
V22	methylene chloride	ND	ND	ND	ND	ug/L
V23	1,1,2,2-tetrachloroethane	ND	ND	ND	ND	ug/L
V24	tetrachloroethylene	ND	ND	ND	ND	ug/L
V25	toluene	ND	ND	ND	ND	ug/L
V26	1,2-trans-dichloroethylene	ND	ND	ND	ND	ug/L
V27	1,1,1-trichloroethane	ND	ND	ND	ND	ug/L
V28	1,1,2-trichloroethane	ND	ND	ND	ND	ug/L
V29	trichloroethylene	ND	ND	ND	ND	ug/L
V30	Trichlorofluoromethane	ND	ND	ND	ND	ug/L
V31	vinyl chloride	ND	ND	ND	ND	ug/L
A01	2-chlorophenol	ND	ND	ND	ND	ug/L
A02	2,4-dichlorophenol	ND	ND	ND	ND	ug/L
A03	2,4-dimethylphenol	ND	ND	ND	ND	ug/L
A04	4,6-dinitro-o-cresol	ND	ND	ND	ND	ug/L
A05	2,4-dinitrophenol	ND	ND	ND	ND	ug/L

CODE	FORMAL CHEMICAL NAME	RESULTS Q1 22	Q2 22	Q3 22	Q4 22	UNITS
A06	2-nitrophenol	ND	ND	ND	ND	ug/L
A07	4-nitrophenol	ND	ND	ND	ND	ug/L
A08	p-chloro-m-cresol	ND	ND	ND	ND	ug/L
A09	pentachlorophenol	ND	ND	ND	ND	ug/L
A10	phenol	ND	ND	ND	ND	ug/L
A11	2,4,6-trichlorophenol	ND	ND	ND	ND	ug/L
B01	acenaphthene	ND	ND	ND	ND	ug/L
B02	acenaphthylene	ND	ND	ND	ND	ug/L
B03	anthracene	ND	ND	ND	ND	ug/L
B04	benzidine	ND	ND	ND	ND	ug/L
B05	benzo(a)anthracene	ND	ND	ND	ND	ug/L
B06	benzo(a)pyrene	ND	ND	ND	ND	ug/L
B07	3,4-benzofluoranthene	ND	ND	ND	ND	ug/L
B08	benzo(ghi)perylene	ND	ND	ND	ND	ug/L
B09	benzo(k)fluoranthene	ND	ND	ND	ND	ug/L
B10	bis(2-chloroethoxy) methane	ND	ND	ND	ND	ug/L
B11	bis(2-chloroethyl) ether	ND	ND	ND	ND	ug/L
B12	bis(2-chloroisopropyl) ether	ND	ND	ND	ND	ug/L
B13	bis(2-ethylhexyl) phthalate	ND	ND	674	ND	ug/L
B14	4-bromophenyl phenyl ether	ND	ND	ND	ND	ug/L
B15	butylbenzyl phthalate	ND	ND	ND	ND	ug/L
B16	2-chloronaphthalene	ND	ND	ND	ND	ug/L
B17	4-chlorophenyl phenyl ether	ND	ND	ND	ND	ug/L
B18	chrysene	ND	ND	ND	ND	ug/L
B19	dibenzo (a, h) anthracene	ND	ND	ND	ND	ug/L
B20	1,2-dichlorobenzene	ND	ND	ND	ND	ug/L
B21	1,3-dichlorobenzene	ND	ND	ND	ND	ug/L
B22	1,4-dichlorobenzene	ND	ND	ND	ND	ug/L
B23	3,3'-dichlorobenzidine	ND	ND	ND	ND	ug/L
B24	diethyl phthalate	ND	ND	ND	ND	ug/L
B25	dimethyl phthalate	ND	ND	ND	ND	ug/L
B26	di-n-butyl phthalate	ND	ND	ND	ND	ug/L
B27	2,4-dinitrotolulene	ND	ND	ND	ND	ug/L
B28	2,6-dinitrotolulene	ND	ND	ND	ND	ug/L
B29	di-n-octyl phthalate	ND	ND	ND	ND	ug/L
B30	1,2-diphenylhydrazine (as azobenzene)	ND	ND	ND	ND	ug/L
B31	fluoranthene	ND	ND	ND	ND	ug/L
B32	fluorene	ND	ND	ND	ND	ug/L
B33	hexachlorobenzene	ND	ND	ND	ND	ug/L
B34	hexachlorobutadiene	ND	ND	ND	ND	ug/L
B35	hexachlorocyclopentadiene	ND	ND	ND	ND	ug/L

CODE	FORMAL CHEMICAL NAME	RESULTS Q1 22	Q2 22	Q3 22	Q4 22	UNITS
B36	hexachloroethane	ND	ND	ND	ND	ug/L
B37	iNDeno(1,2,3-cd) pyrene	ND	ND	ND	ND	ug/L
B38	isophorone	ND	ND	ND	ND	ug/L
B39	naphthalene	ND	ND	ND	ND	ug/L
B40	nitrobenzene	ND	ND	ND	ND	ug/L
B41	N-nitrosodimethylamine	ND	ND	ND	ND	ug/L
B42	N-nitrosodi-n-propylamine	ND	ND	ND	ND	ug/L
B43	N-nitrosodiphenylamine	ND	ND	ND	ND	ug/L
B44	phenanthrene	ND	ND	ND	ND	ug/L
B45	pyrene	ND	ND	ND	ND	ug/L
B46	1,2,4-trichlorobenzene	ND	ND	ND	ND	ug/L
P01	aldrin		ND			ug/L
P02	alpha-BHC		ND			ug/L
P03	beta-BHC		ND			ug/L
P04	gamma-BHC		ND			ug/L
P05	delta-BHC		ND			ug/L
P06	chlordane		ND			ug/L
P07	4,4'-DDT		ND			ug/L
P08	4,4'-DDE		ND			ug/L
P09	4,4'-DDD		ND			ug/L
P10	dieldrin		ND			ug/L
P11	alpha-endosulfan		ND			ug/L
P12	beta-endosulfan		ND			ug/L
P13	endosulfan sulfate		ND			ug/L
P14	endrin		ND			ug/L
P15	endrin aldehyde		ND			ug/L
P16	heptachlor		ND			ug/L
P17	heptachlor epoxide		ND			ug/L
P18	PCB-1242		ND			ug/L
P19	PCB-1254		ND			ug/L
P20	PCB-1221		ND			ug/L
P21	PCB-1232		ND			ug/L
P22	PCB-1248		ND			ug/L
P23	PCB-1260		ND			ug/L
P24	PCB-1016		ND			ug/L
P25	toxaphene		ND			ug/L
O01	Antimony, Total	1.70	1.96	1.00	1.30	mg/kg
O02	Arsenic, Total	ND	ND	ND	ND	mg/kg
O03	Beryllium, Total	0.15	0.09	0.21	0.12	mg/kg
O04	Cadmium, Total	0.24	0.20	0.68	0.940	mg/kg

CODE	FORMAL CHEMICAL NAME	RESULTS Q1 22	Q2 22	Q3 22	Q4 22	UNITS
O05	Chromium, Total	30	30	29	20	mg/kg
O06	Copper, Total	360	340	390	330	mg/kg
O07	Lead, Total	11	1.60	14	11	mg/kg
O08	Mercury, Total	0.48	0.27	0.19	0.280	mg/kg
O09	Nickel, Total	13	13	18	14	mg/kg
O10	Selenium, Total	0.65	ND	0.21	ND	mg/kg
O11	Silver, Total	1.20	0.02	2.40	2.30	mg/kg
O12	Thallium, Total	0.10	ND	0.12	0.07	mg/kg
O13	Zinc, Total	1,060	830	1,270	1,260	mg/kg
O14	Cyanide, Total	ND	ND	ND	ND	mg/kg
O15	Phenols, Total	ND	ND	ND	ND	mg/kg
O16	Cyanide, weak acid dissociable	ND	ND	ND	ND	mg/kg
C01	Bromide					mg/kg
C02	Chlorine, Total Residual					mg/kg
C03	Color					
C04	Fecal Coliform					c/100mL
C05	Fluoride					mg/kg
C06	Nitrate-Nitrite					mg/kg
C07	Nitrogen, Total Organic					mg/kg
C08	HEM; Oil and Grease	18,700	27,230	19,200	20,600	mg/kg
C09	Phosphorus, Total	18,008	18,130	12,460	19,170	mg/kg
C10	Radioactivity					
C11	Sulfate	ND	ND	1,740	ND	mg/kg
C12	Sulfide					mg/kg
C13	Sulfite					mg/kg
C14	Surfactants					mg/kg
C15	Aluminum, Total	3,455	3,170	5,110	3,160	mg/kg
C16	Barium, Total					mg/kg
C17	Boron, Total					mg/kg
C18	Cobalt, Total					mg/kg
C19	Iron, Total					mg/kg
C20	Magnesium, Total					mg/kg
C21	Molybdenum, Total	15	11	16	111	mg/kg
C22	Manganese, Total					mg/kg
C23	Tin, Total					mg/kg
C24	Titanium, Total					mg/kg
T01	Asbestos					
H01	Acetaldehyde					mg/kg
H02	Allyl alcohol					mg/kg
H03	Allyl chloride					mg/kg

CODE	FORMAL CHEMICAL NAME	RESULTS Q1 22	Q2 22	Q3 22	Q4 22	UNITS
H04	Amyl acetate					mg/kg
H05	Aniline					mg/kg
H06	Benzonitrile					mg/kg
H07	Benzyl chloride					mg/kg
H08	Butyl acetate					mg/kg
H09	Butylamine					mg/kg
H10	Captan					mg/kg
H11	Carbaryl					mg/kg
H12	Carbofuran					mg/kg
H13	Carbon disulfide					mg/kg
H14	Chlorpyrifos					mg/kg
H15	Coumaphos					mg/kg
H16	Cresol	ND	ND	ND	ND	ug/L
H17	Crotonaldehyde					mg/kg
H18	Cyclohexane					mg/kg
H19	2,4-D (2,4-Dichlorophenoxy acetic acid)	ND	ND	ND	ND	ug/L
H20	Diazinon					mg/kg
H21	Dicamba					ug/L
H22	Dichlobenil					mg/kg
H23	Dichlone					mg/kg
H24	2,2-Dichloropropionic acid					mg/kg
H25	Dichlorvos					mg/kg
H26	Diethyl amine					mg/kg
H27	Dimethyl amine					mg/kg
H28	Dinitrobenzene					mg/kg
H29	Diquat					mg/kg
H30	Disulfoton					mg/kg
H31	Diuron					mg/kg
H32	Epichlorohydrin					mg/kg
H33	Ethion					mg/kg
H34	Ethylene diamine					mg/kg
H35	Ethylene dibromide					mg/kg
H36	Formaldehyde					mg/kg
H37	Furfural					mg/kg
H38	Guthion					mg/kg
H39	Isoprene					mg/kg
H40	Isopropanolamine dodecylbenzenesulfonate					mg/kg
H41	Kethane					mg/kg
H42	Kepone					mg/kg
H43	Malathion					mg/kg
H44	Mercaptodimethur					mg/kg

CODE	FORMAL CHEMICAL NAME	RESULTS Q1 22	Q2 22	Q3 22	Q4 22	UNITS
H45	Methoxychlor					ug/L
H46	Methyl mercaptan					mg/kg
H47	Methyl methacrylate					mg/kg
H48	Methyl parathion					mg/kg
H49	Mevinphos					mg/kg
H50	Mexacarbate					mg/kg
H51	Monoethyl amine					mg/kg
H79	Monomethyl amine					
H52	Naled					mg/kg
H53	Napthenic acid					mg/kg
H54	Nitrotoluene					mg/kg
H55	Parathion					mg/kg
H56	Phenolsulfanate					mg/kg
H57	Phosgene					mg/kg
H58	Propargite					mg/kg
H59	Propylene oxide					mg/kg
H60	Pyrethrins					mg/kg
H61	Quinoline					mg/kg
H62	Resorcinol					mg/kg
H63	Strontium	146	146	132	132	mg/kg
H64	Strychnine					mg/kg
H65	Styrene					mg/kg
H66	2,4,5-T (2,4,5-Trichlorophenoxy acetic acid)					ug/L
H67	TDE(Tetrachlorodiphenylethane)					mg/kg
H68	2,4,5-TP [2-(2,4,5-Trichlorophenoxy) propanoic acid]					ug/L
H69	Trichlorofan					mg/kg
H70	Triethanolamine; dodecylbenzenesulfonate					mg/kg
H71	Triethylamine					mg/kg
H72	Trimethylamine					mg/kg
H73	Uranium					mg/kg
H74	Vanadium					mg/kg
H75	Vinyl acetate					mg/kg
H76	Xylene	ND	ND	ND	ND	ug/L
H77	Xylenol					mg/kg
H78	Zirconium					mg/kg
X01	1,2,3-Trichloropropane					mg/kg
X02	2,4,5-Trichlorophenol					mg/kg
X03	2-Butanone					mg/kg
X04	2-Hexanone					mg/kg

CODE	FORMAL CHEMICAL NAME	RESULTS Q1 22	Q2 22	Q3 22	Q4 22	UNITS
X05	2-Methylnaphthalene					mg/kg
X06	2-methylphenol					mg/kg
X07	2-Nitroaniline					mg/kg
X08	3-Nitroaniline					mg/kg
X09	4-Chloroaniline					mg/kg
X10	4-Methyl-2-pentanone					mg/kg
X11	4-methylphenol					mg/kg
X12	4-Nitroaniline					mg/kg
X13	Acetone					mg/kg
X14	Ammoniacal (ammonia) Nitrogen	48,980	51,030	40,290	41,750	mg/kg
X15	Biochemical Oxygen Demand (BOD5)	1,310	2,170	1,490	2,310	mg/L
X16	Calcium (total)	21,900	22,800	29,130	27,000	mg/kg
X17	Carbazole					mg/kg
X18	Chloride	11,800	10,700	7,970	7,060	mg/kg
X19	Chromium (Hexavalent)	NF	NF	NF	NF	mg/kg
X20	Chromium (Trivalent)					mg/kg
X21	Dibenzofuran					mg/kg
X22	Dibromomethane					mg/kg
X23	Endrin Ketone					ug/L
X24	Ethanol					ug/L
X25	Ethyl Methacrylate					mg/kg
X26	Iodmethane					mg/kg
X27	Kjeldahl Nitrogen (total)	74,950	113,400	797,10	93,160	mg/kg
X28	Nitrate Nitrogen	11.00	5.80	1.90	ND	mg/kg
X29	Percent Solids	2.46	2.24	2.76	2.28	%
X30	pH					SU
X31	Potassium (total)	3,420	3,190	2,630	3,080	mg/kg
X32	Sodium (total)					mg/kg
X33	Sulfur (total)					mg/kg
X34	SGT-HEM; Non-polar Material	ND	15,180.00	ND	4,390.00	mg/kg
X35	Total 1,4-Dichlorobutene					mg/kg
X36	TEH as diesel	261.00	94.50	ND	ND	ug/L
X37	Total Suspended Solids					mg/kg
X38	trans-1,3-Dichloropropene	ND	ND	ND	ND	ug/L
X39	Chemical Oxygen Demand					mg/L
X40	Carbonaceous Biochemical Demand (CBOD5)	1,010	1,040	1,290	1,240	mg/L
X41	Phosphate (Ortho)	1,683	2,900	1,200	2,020	mg/kg

ND Non-Detected
NF Non-Filterable
NS No Sample (Wrong Method Used in Analysis)

2022 Primary Digesters
Fecal Coliforms

Date	Digester	#/g TS	Ln
1/15/2022	A	398,000	13
1/16/2022	B	243,000	12
1/17/2022	C	2,420,000	15
1/18/2022	D	239,000	12
1/19/2022	A	244,000	12
1/20/2022	B	352,000	13
1/21/2022	C	107,000	12
GEOMETRIC MEAN		338,958	13

Date	Digester	#/g TS	Ln
4/15/2022	A	238,000	12
4/16/2022	B	613,000	13
4/17/2022	C	323,000	13
4/18/2022	D	140,000	12
4/19/2022	A	230,000	12
4/20/2022	B	610,000	13
4/21/2022	C	432,000	13
GEOMETRIC MEAN		327,008	13

Date	Digester	#/g TS	Ln
2/15/2022	A	382,000	13
2/16/2022	B	630,000	13
2/17/2022	C	823,000	14
2/18/2022	D	673,000	13
2/19/2022	A	458,000	13
2/20/2022	B	348,000	13
2/21/2022	C	149,000	12
GEOMETRIC MEAN		439,462	13

Date	Digester	#/g TS	Ln
5/15/2022	A	2,230,000	15
5/16/2022	B	238,000	12
5/17/2022	C	2,380,000	15
5/18/2022	D	592,000	13
5/19/2022	A	235,000	12
5/20/2022	B	236,000	12
5/21/2022	C	1,090,000	14
GEOMETRIC MEAN		642,516	13

Date	Digester	#/g TS	Ln
3/15/2022	A	842,000	14
3/16/2022	B	146,000	12
3/17/2022	C	640,000	13
3/18/2022	D	530,000	13
3/19/2022	A	404,000	13
3/20/2022	B	563,000	13
3/21/2022	C	389,000	13
GEOMETRIC MEAN		449,183	13

Date	Digester	#/g TS	Ln
6/15/2022	A	1,150,000	14
6/16/2022	B	344,000	13
6/17/2022	C	333,000	13
6/18/2022	D	976,000	14
6/19/2022	A	203,000	12
6/20/2022	B	2,150,000	15
6/21/2022	C	945,000	14
GEOMETRIC MEAN		657,337	13

2022 Primary Digesters
Fecal Coliforms

Date	Digester	#/g TS	Ln
7/15/2022	A	144,000	12
7/16/2022	A	972,000	14
7/17/2022	B	6,660,000	16
7/18/2022	C	555,000	13
7/19/2022	D	1,270,000	14
7/20/2022	A	911,000	14
7/21/2022	B	7,050,000	16
GEOMETRIC MEAN		1,228,371	14

Date	Digester	#/g TS	Ln
10/15/2022	A	502,000	13
10/16/2022	B	163,000	12
10/17/2022	C	1,390,000	14
10/18/2022	D	1,230,000	14
10/19/2022	A	1,320,000	14
10/20/2022	B	1,020,000	14
10/21/2022	C	2,530,000	15
GEOMETRIC MEAN		899,529	14

Date	Digester	#/g TS	Ln
8/15/2022	A	503,000	13
8/16/2022	B	579,000	13
8/17/2022	C	1,210,000	14
8/18/2022	D	871,000	14
8/19/2022	A	56,400	11
8/20/2022	B	706,000	13
8/21/2022	C	1,200,000	14
GEOMETRIC MEAN		547,073	13

Date	Digester	#/g TS	Ln
11/15/2022	A	101,000	12
11/16/2022	B	361,000	13
11/17/2022	C	1,700,000	14
11/18/2022	D	1,290,000	14
11/19/2022	A	128,000	12
11/20/2022	B	373,000	13
11/21/2022	C	137,000	12
GEOMETRIC MEAN		339,794	13

Date	Digester	#/g TS	Ln
9/15/2022	A	502,000	13
9/16/2022	B	4,070,000	15
9/17/2022	C	7,740,000	16
9/18/2022	D	7,060,000	16
9/19/2022	A	566,000	13
9/20/2022	B	226,000	12
9/21/2022	C	831,000	14
GEOMETRIC MEAN		1,423,906	14

Date	Digester	#/g TS	Ln
12/15/2022	A	169,000	12
12/16/2022	B	537,000	13
12/17/2022	C	395,000	13
12/18/2022	D	379,000	13
12/19/2022	A	7,990,000	16
12/20/2022	B	1,460,000	14
12/21/2022	C	4,570,000	15
GEOMETRIC MEAN		954,965	14

MINIMUM MONTHLY GEOMETRIC MEAN	327,008	#/g TS
MAXIMUM MONTHLY GEOMETRIC MEAN	1,423,906	#/g TS
ANNUAL MAXIMUM	7,990,000	#/g TS
DAILY GEOMETRIC MEAN	608,578	#/g TS

2022 Dewatered Cake Land Application
Fecal Coliforms

Date	#/g TS	Ln
1/3/2022	4,135,752	15
1/4/2022	26,734,706	17
1/5/2022	3,120,000	15
1/6/2022	7,140,000	16
1/7/2022	1,250,000	14
1/8/2022	17,900	10
1/9/2022	674,497	13
GEOMETRIC MEAN	1,676,170	14

Date	#/g TS	Ln
4/4/2022	6,754,670	16
4/5/2022	1,100,000	14
4/8/2022	7,750,896	16
4/9/2022	2,733,513	15
4/11/2022	6,442,919	16
4/18/2022	71,700,000	18
4/19/2022	1,940,000	14
GEOMETRIC MEAN	5,440,503	16

Date	#/g TS	Ln
3/21/2022	66,500	11
GEOMETRIC MEAN	66,500	11

MINIMUM MONTHLY GEOMETRIC MEAN	66,500	#/g TS
MAXIMUM MONTHLY GEOMETRIC MEAN	5,440,503	#/g TS
ANNUAL MAXIMUM	71,700,000	#/g TS
DAILY GEOMETRIC MEAN	2,341,539	#/g TS

City of Sioux Falls
Water Reclamation Division
Biosolids Additional Monitoring 2022

POC Quarterly Analysis and Monthly Analysis Summary Report
Parameter: **Silver**

Units of Measure: mg/kg, dry weight

	Annual Average	Maximum	Analysis per Year
Primary Digesters Composite	**2.9**	**5.4**	**14**
Dewatered Cake Land Application	**3.8**	**6.5**	**9**

ENCLOSURE IV

Pathogen and Vector Attraction Reduction

City of Sioux Falls
Water Reclamation Division

CLASS B
PATHOGEN REDUCTION
DESCRIPTION

The City of Sioux Falls Water Reclamation Division produces bulk sewage sludge regulated under Surface Water Discharge Permit No. SDL022128. All sewage sludge produced from this source during 2022 complied with the Class B pathogen requirements, established under Section 1.3.2 of Surface Water Discharge Permit No. SDL022128. Pathogen reduction was achieved through a properly designed and operated Anaerobic Digestion System, exceeding minimum standards for PSRP as required in section 1.3.2 of Surface Water Discharge Permit No. SDL022128.

The following is a summary of the operating performance, of the anaerobic digestion system for 2022.

Operating Parameter	Units		Minimum	Average	Maximum
Temperature	Deg. C	Daily	38.0	38.0	38.0
Mean Cell Residence Time	Days	Monthly Average	21	35.4	47.8
pH	SU	Daily	7.0	-	7.5

The City of Sioux Falls operates four primary digesters in parallel. The reported minimum and maximum pH and temperature, are an average of the four anaerobic digester system.

City of Sioux Falls
Water Reclamation Division

VECTOR ATTRACTION REDUCTION DESCRIPTION

The City of Sioux Falls Water Reclamation Division produces bulk sewage sludge regulated under Surface Water Discharge Permit No. SDL022128. All sewage sludge produced from this source during 2022 complied with the Class B vector attraction reduction requirements, established under Section 1.3.3 of Surface Water Discharge Permit No. SDL022128. Vector attraction reduction was achieved through a properly designed and operated Anaerobic Digestion System, exceeding the minimum standard of 38 percent reduction of the mass of volatile solids, exceeding minimum standards as required in section 1.3.3 of Surface Water Discharge Permit No. SDL022128.

The following is a summary of the operating performance of the anaerobic digestion system for 2022.

	Minimum	Maximum	Average
Volatile Solids Reduction	**54%**	**66.1%**	**60.6%**

ENCLOSURE V

Pathogen Reduction, Vector Attraction Reduction Requirements, Best Management Practices, and Site Restriction Certification Statement

City of Sioux Falls
Water Reclamation Division

Pathogen Reduction,
Vector Attraction Reduction Requirements,
Best Management Practices,
and Site Restriction Certification Statement

I certify under penalty of law that the pathogen requirements in Part 1.3.2 of the permit, one of the vector attraction reduction alternatives in Part 1.3.3 of the permit, the best management practices in Part 1.6 of the permit, and the site restrictions in Part 1.3.4 of the permit have been met. This determination has been made under my direction and supervision, in accordance with the system designed to assure that qualified personnel properly gather and evaluate the information used to determine that the pathogen requirements, the vector attraction reduction requirements, the management practices, and the site restrictions have been met. I am aware that there are significant penalties for false certification, including the possibility of imprisonment.

Certification Period
01/1/2022 through 12/31/2022

2-15-2023

Mark Cotter
Director of Public Works

Date

Appendix A
Sludge Management Plan Amendments

Below are the amendments to Part K of the City of Sioux Falls Sludge Management Plan.

Additions to the Sludge Management Plan = *Underlined and Italicized*
Deletions from the Sludge Management Plan = ~~red and struck through~~.

Part K
Description of Performance Standard Sludge Monitoring

A) Temperature

The performance standard for anaerobic digesters is determined by the following procedure:

Sample collection and analysis is performed by Phase II wastewater operators between 5 a.m. and 6 a.m. each day.

Temperature is monitored in the system by the following procedure:

1) Shut off gravity thickener pumps.

2) Shut off hot water pumps.

3) Turn on recirculation pumps.

4) Operate recirculation pumps for a minimum of five minutes.

5) Operator visually monitors SCADA temperature reading received from the SCADA temperature sensors at inlet side of heat exchangers.

6) Operator records primary digester sludge temperature when a stabilized reading is obtained. These recordings are transferred by the shift 1 operator to the Control Unit Daily Log and initialed by the operator (See Appendix XIII). Each shift also records the temperature of each primary digester on the Daily Operation Log for Digester & Engine Recovery, which results in three readings on each digester Monday through Friday and two readings on the weekend. (See Appendix XIV.)

B) Mean Cell residence Time (MCRT)

The average MCRT is automatically calculated by the computer on a daily basis. Following is a procedure and synopsis of how this performance standard is determined.

1) Total primary digester influent flow is determined by thickener sludge flow meter readings.

   a) The Phase II operator will record the totalizer reading on the flow meter around midnight each day on the Daily Operation Log for Digester & Engine Recovery. (Appendix XIV.)

2) The Phase II operator will also record the cover levels on each primary digester at midnight.

a) Total digester feed and cover levels are entered into a computer spreadsheet to calculate individual and total digester detention times.

3) Primary digester volume is determined by using the individual digester cover levels and a multiplier of 24,821 gallons per foot for each digester. A one-foot correction factor is subtracted from the cover level to account for grit accumulation in the primary digesters. The total volume of all three digesters is then calculated and divided by the total digester feed to calculate the overall digester detention time.

C) pH, Total Solids (TS), Total Volatile Solids (TVS), and Alkalinity

Representative grab sample of primary digester sludge is monitored daily for the above parameters. Sample monitoring is performed in accordance with the following procedure.

Sample collection is performed by Phase II wastewater operators between 5 a.m. to 6 a.m. daily.

1) Sample is collected at the outlet sample point of recirculation pumps.

	Sample Point
Primary Digester #1	18A
Primary Digester #2	18B
Primary Digester #3	18C
Primary Digester #4	18D

a) Recirculation pumps are operated in the manual position and ran for a minimum of five minutes prior to collecting sample.

b) An initial aliquot of approximately one gallon of sludge is discarded to ensure flushing of sample point.

c) A representative grab sample of at least 100 mL is then dispensed into a clean plastic sample container.

2) Sample is immediately taken to the operations lab in the control unit and analyzed for pH; pH is analyzed in accordance with SW-904.5 Methodology.

a) pH readings for each primary digester are then recorded on the Control Unit Daily Log and initialed by the operator (Appendix XIII).

3) Remaining aliquot of sample is transferred to facility lab for analysis of TS and TVS in accordance with SM-2540 G Methodology. Alkalinity is monitored by the laboratory once each week. Additional sample is collected on the first four Tuesdays of the month for volatile acid analysis which is performed on each digester once per month.

Primary Digester No. 1	18A	First Tuesday
Primary Digester No. 2	18B	Second Tuesday
Primary Digester No. 3	18C	Third Tuesday
Primary Digester No. 4	18D	Fourth Tuesday

D) Vector Attraction Reduction

The average Vector Attraction Reduction is calculated automatically by the computer on a monthly basis. Following is the procedure and synopsis of how this performance standard is determined.

1) Primary digester influent sample is collected at the discharge sample point of gravity thickener transfer pumps.

Gravity Thickener	Sample Point
No. 1	23A
No. 2	23B

2) Representative grab samples are collected at the above sampling points each day at approximately 12:01 a.m., 8 a.m., and 4 p.m. Samples are collected by the Phase II Operator.

   a) An initial aliquot of approximately one gallon is discarded to ensure complete flushing of sample point.

   b) Representative grab sample of primary digester influent sludge is dispensed into a sample container.

   c) Individual grabs are composited together when collected into a composite grab sample container in sample refrigerator in digester unit office.

   d) Composite grab sample is transferred to facility lab by the Phase II Operator after 4 p.m. sample is collected.

   e) Sample is then analyzed for Total Solids and Total Volatile Solids in accordance with SM-2540 Methodology.

3) Primary Digester Sludge Effluent sample is collected at outlet sampling point of Primary digester transfer pumps.

Location	Sample Point
Primary Digester 1	18A
Primary Digester 2	18B
Primary Digester 3	18C
Primary Digester 4	18D

   a) Representative grab sample of primary digester sludge is monitored daily for the above parameters. Sample monitoring is performed in accordance with the following procedure.

   b) Sample collection is performed by Phase II wastewater operators between 5 a.m. to 6 a.m. daily.

c) The samples are run individually, and the results are averaged by the chemist and reported as 19CD for our daily composite.

d) An initial aliquot of approximately one gallon is discarded to ensure complete flushing of sample point.

e) The grab samples are transferred to the facility lab by the Phase II Operator after the phase II operator runs the pH test on each.

f) Samples are then analyzed by in-house lab staff for total solids and total volatile Solids in accordance with SM-2540 G Methodology.

g) Volatile solids reduction is then calculated using the Van Kleek Method by computer summarized in Monthly VSR Report (Appendix XV).

E) Fecal Coliform

1) Samples of Primary digester sludge are collected and analyzed for fecal coliforms for seven consecutive days each month. This process is performed to provide a contingent alternative for pathogen reduction requirements for Class B sludge. The following procedure will be used to comply with Part 1.3.2 of Surface Water Discharge Permit #SDL022128 and be used as a performance standard.

a) The sample for fecal coliform analysis is taken from one of the Primary digesters.

(i) Sample Point 18A, B, C, & D are located on the outlet side of recirculation pump.

b) The sample is collected by the phase two operator. The seven consecutive day period is scheduled by the Chemist on a monthly basis. One representative grab sample is collected on each of the seven-day period.

(i) Recirculation pumps must be run for a minimum of ten minutes prior to collecting a sample.

(ii) An initial aliquot of approximately one gallon of sludge is discarded to ensure flushing of sample point.

(iii) A representative grab sample is then collected in a sterilized sample container.

c) The sample is immediately taken to the WREC laboratory and analyzed for fecal coliforms in accordance with SM-9221 E Methodology.

~~2) Samples of the sludge lagoon in use are collected and analyzed for fecal coliforms for seven consecutive application days. This monitoring is performed at the initiation of the cleaning cycle of each basin. This monitoring is intended to be used as a confirmation test to verify that biosolids have maintained the pathogen reduction achieved in our Process to Significantly Reduce Pathogens (PSRP) during the storage in these active cells.~~

~~a) A sample for fecal coliform analysis is taken at the truck loading bay from the semi tanker after being filled.~~

b) Sample Point 27A is the north basin biosolids effluent.

c) Sample Point 27B is the south basin biosolids effluent.

d) The sample is collected by the solids handling operator.

e) Semi tanker sampled should be a representative of the biosolids being land applied that day.

f) The representative grab sample should be collected in a sterilized sample container.

g) The sample is immediately taken to the WREC laboratory and analyzed for fecal coliforms in accordance with SM-9221 E Methodology.

3) Samples of the Biosolids Cake are collected and analyzed for fecal coliforms for seven consecutive application days (when cake is hauled to field site). This monitoring is intended to be used as a confirmation test to verify that biosolids have maintained the pathogen reduction achieved in our Process to Significantly Reduce Pathogens (PSRP) during the storage in these active cells.

a) A sample for fecal coliform analysis is taken at the truck loading bay while the truck is being filled.

b) Dewatered Biosolids Cake will be reported as Sample Point 21.

c) The sample is collected by the solids handling operator.

d) The truck sampled should be representative of the biosolids being land applied that day.

e. The representative grab sample should be collected in a sterilized sample container.

f. The sample is immediately taken to the WREC laboratory and analyzed for fecal coliforms in accordance with SM-9221 E Methodology.

F) Description of Biosolids Chemical Constituent Monitoring

1) Compliance Monitoring

Nutrients and metals for compliance are determined at the source for land application, either the primary digesters or lagoon biosolids.

a) Digester Effluent Biosolids

(i) A minimum of one daily composite grab sample shall be collected from the primary digester sludge effluent at the outlet sampling point of primary digester recirculation pumps each week.

Location	Sample Point
Primary Digester 1	**18A**
Primary Digester 2	**18B**
Primary Digester 3	**18C**
Primary Digester 4	**18D**

(ii) Representative grab samples are collected at the above sampling points each day between 5 a.m. and 6 a.m. Samples are collected by the scheduled Phase II Operator.

(iii) The composite sample is reported as 19CW for our weekly composite.

(iv) Monitoring: Transferring of biosolids to the Biosolids Basin.

(a) Sample shall normally be collected on the Tuesday of each week.

(b) Monitoring shall be performed by the Phase II Plant Operator.

(c) An initial aliquot of at least one gallon of biosolids shall be discarded to ensure flushing of sample point.

(d) Individual aliquots of 500 ml shall be collected and composited in a preserved container in the digester control room.

(e) Grab composite sample and a Chain of Custody form shall be delivered and relinquished to the WREC laboratory each morning.

(f) Sample is properly split, preserved, and entered into WIMS.

(g) Weekly grab composite sample shall be analyzed for the chemical constituents as listed in Appendix XVI of this part by the WREC Lab and contract laboratory.

(v) Monitoring; Transferring of biosolids to Land Application Tankers.

(a) Sample collected at Sample Point 19B, discharge spout to the semi tankers in the loading bay of the solids dewatering unit or from the air bleed offline of the semi tanker while being unloaded to the land application tractor.

(b) Sample shall be collected on the first day of application of each week.

(c) Monitoring shall be performed by the solids handling operator.

(d) Operator should ensure that the sludge line is thoroughly flushed before grabbing a sample to ensure that the sample is a representative of the biosolids discharge.

(e) Individual aliquots of 1,000 mL shall be collected during the loading of semi tankers at approximately the following times and composited in a preserved container in the Digester Control Room.

8 a.m.
10 a.m.
12 p.m.
2 p.m.

(f) Grab composite sample and Chain of Custody form shall be delivered and relinquished to the WREC Laboratory at the end of the workday.

(g) Sample is properly split, preserved, and entered into WIMS.

(h) Weekly grab composite sample shall be analyzed for the chemical constituents as listed in Table 8 of this part.

b) Sludge Storage Lagoons

(i) Treated biosolids are normally transferred to the sludge storage lagoons. These basins are used for the temporary storage of biosolids. During the spring, summer, and fall, our solids handling staff remove the biosolids from these basins and directly apply this byproduct to agricultural land as soil amendment. During this land application, a minimum of one daily composite grab sample is collected at Sample Point 27A or 27B each week.

(ii) Monitoring: Transferring biosolids to the land application tankers.

(a) Sample shall be collected at the biosolids basin truck-loading station from the semi tanker after being filled or from the air bleed offline of the semi tanker while being unloaded to the land application tractor.

(b) Sample Point 27A is the north basin biosolids effluent.

(c) Sample Point 27B is the south basin biosolids effluent.

(d) Sample shall normally be collected on the first land application production day of each week.

(e) The sample is collected by the solids handling operator.

(f) A minimum of four tanker loads during a normal production day shall be sampled.

(g) Normally a 500 mL grab sample will be collected from every third semi tanker load and composited in a preserved sample container.

(h) At the end of each day the grab composite and Chain of Custody form shall be delivered and relinquished to the WREC laboratory.

(i) Lab staff shall properly split, preserve, and log.

(j) Weekly grab composite sample shall be analyzed for the chemical constituents as listed in Appendix XVI by the WREC Lab and contract lab.

c) Biosolids Cake Storage

(i) Treated biosolids are dewatered and transferred to the Biosolids Cake Storage Area. This is used for the temporary storage of biosolids. ~~During the spring, summer, and fall,~~ *The Sioux Falls Water Reclamation Facility* biosolids handling staff remove the biosolids from *storage* ~~this~~ and directly apply this byproduct to agricultural land as soil amendment. During this land application, a minimum of one daily composite grab sample is collected at Sample Point 21

(ii) Monitoring: Transferring biosolids to the land application truck.

(a) Sample shall be collected at the biosolids truck-loading station from the truck after being filled or from the storage pile directly.

(b) Sample Point 21 is the Dewatered Cake.

(c) Sample shall normally be collected on the first land application production day of each week.

(d) The sample is collected by the solids handling operator.

(e) A composite of 5 samples shall be taken from the segment of the pile being hauled to the land application site (s)

(f) The composited sample will be placed in a 2,000 mL Whirlpak container and preserved.

(g) At the end of each day the grab composite and Chain of Custody form shall be delivered and relinquished to the WREC laboratory.

(h) Lab staff shall properly split, preserve, and log.

(i) Weekly grab composite sample shall be analyzed for the chemical constituents as listed in Appendix XVI by the WREC Lab and contract lab.

G) Description of Pathogen Treatment

The City of Sioux Falls uses a properly designed and operated anaerobic digestion system for pathogen reduction for Class B biosolids. The digestion system consists of four heated primary *digesters that maintain a minimum temperature of 35 degrees Celsius and have a minimum mean cell residence time of 15 days, meeting the Process to Significantly Reduce Pathogen (PSRP) requirements under Table 5-5, Alternative 2, Option 3.*

In the event the anaerobic digestion system does not meet minimum PSRP standards, the City will use the Microbiological Limit described in Part 1.3.2 of our Surface Water Discharge Permit. The City of Sioux Falls' sewage sludge easily complies with the fecal coliform geometric mean of 2,000,000 MPN/gram of TS.

Procedures for complying with this performance standard can be found in monitoring Section Part K, Section E of this SMP. Fecal coliform samples are collected from the digesters for seven consecutive days each month to verify the pathogen reduction.
~~Every month during the application season, fecal coliform samples will be collected from the lagoon source of biosolids each day for seven consecutive application days.~~

H) Description of Vector Attraction Control

Primary Standard

The City of Sioux Falls shall be using the Vector Attraction Reduction (VAR) allowed Part 1.3.3 as the primary performance standard. Volatile solids reduction is determined as follows:

Daily composite samples are collected of the raw sludge and digested sludge (from the primary digesters). The samples are analyzed for percent total solids and percent volatile solids.

The volatile solids reduction is determined from the following equation:

$$\%VSR = \frac{(\text{Raw } \%VS - \text{Digested } \%VS)}{(\text{Raw } \%VS - (\text{Raw } \% \text{ VS} \times \text{Digested } \%VS))}$$

Where %VSR = percent volatile solids reduction
Raw %VS = volatile solids in raw sludge
Digested %VS = volatile solids in digested sludge

Volatile solids reduction is tabulated on a monthly basis. The monthly average of volatile solids reduction determines compliance with the 38 percent minimum reduction requirement.

Alternative Standard for Biosolids from POTW Digester

In the event that our anaerobic digestion system does not meet the primary or first alternative standard, the City may use Vector Attraction Reduction allowed in Part 1.3.3 covered under 40 C.F.R. Part 503.33 (a.b.r. in ARSD Chapter 74:52:09) as an alternative to maintain compliance. As soon as primary and first alternative performance standards are not met, the Biosolids Supervisor shall ensure that all biosolids be injected or incorporated until the anaerobic digestion system complies with primary standard for VAR. Following is our current practice to comply with injection requirements of this standard.

Sludge Incorporation Practice

(i) Liquid injection of sludge below the land surface. This injection process is accomplished by a tractor pulling a slurry tank equipped with subsurface injection knives mounted on a tool bar. This device is capable of injecting the sludge to a depth of 10 inches. Normal

operation calls for an injection depth necessary to cover the sludge within moments of injection and not allow run off of sludge.

(ii) Cake incorporation will consist of the use of an agricultural disk to work the cake into the soil.

I) Description of Notification

The Biosolids Analysis Report filed by the Water Reclamation Chemist is used as a mode to transmit information to the Biosolids Supervisor. This report is issued monthly and will be filed with the Biosolids Supervisor.

Notice to Landowner/Site Manager (see Appendix VII) is used by the Biosolids Supervisor to inform and notify the owner/site manager of necessary information to comply with the Part 1.3.4 requirements. A copy of this form will be delivered to the owner or his designated representative after the conclusion of the sludge application.

J) Description of Certifications

The City of Sioux Falls is required to supply the following certification statement as stated in SDL022128 Part 1.7.6 and is located in the SMP Appendix XVII.

SIOUXPERGROW Pathogen Reduction, Vector Attraction Reduction Requirements, Best Management Practices, and Site Restriction Certification Statement.

K) Description of *Recordkeeping*

1) Pathogen Reduction Records

a) Temperature: Primary digester temperatures are recorded on Unit 11 and 12 Miscellaneous Log and transferred to Control Unit Daily Log and filed in Administrative Unit.

b) MCRT: Primary digester influent flow data is recorded on Unit 11 and 12 Daily Log. Calculated MCRT are recorded and maintained on computer files.

c) pH: Primary digester pH analysis are recorded on the Control Unit Daily Log and filed in the administrative unit.

2) Vector Attraction Reduction Records

a) TVS: Original results on analytical bench sheets data transferred to the lab spreadsheet.

b) VSR: Calculated Value is recorded on the Monthly Volatile Solids Reduction Report.

3) Sludge Pollutant Records

a) All original sampling logs, chain-of-custody forms and laboratory reports are maintained in the Administrative Unit.

b) All pollutant analysis data is entered into a laboratory computer spreadsheet.

4) Laboratory Equipment and Quality Assurance Records

a) All calibration records, equipment service records, and operational procedures are maintained in the facility laboratory by the department Chemist. Also, QA records like

duplicates, sample blanks, equipment blanks, split samples, and spike sample records are maintained by the department Chemist.

5) Management Practice Records

a) Site management files are kept in the Administrative Unit. These files contain information on site management, location of sites, date and time of sludge application, agronomic rate computations, site size in acres, and annual agronomic rate computations.

6) Site Information Records

a) Land application site information is ***located*** in the ***Administrative*** Unit. This information is kept in the site management files, such as site selection criteria, cropping plan, soil and water monitoring results, and preliminary field site survey. Land application site maps are also on file in the ***Administrative*** Unit.

7) Site Restriction Records

a) Site restriction information is found on site maps and site management files in the Administrative Unit along with land application agreements explaining site restrictions responsibilities to the owner/site manager. Copies of site application notices to the Landowner/Site Manager are found in the site management file.

8) Retention of Records

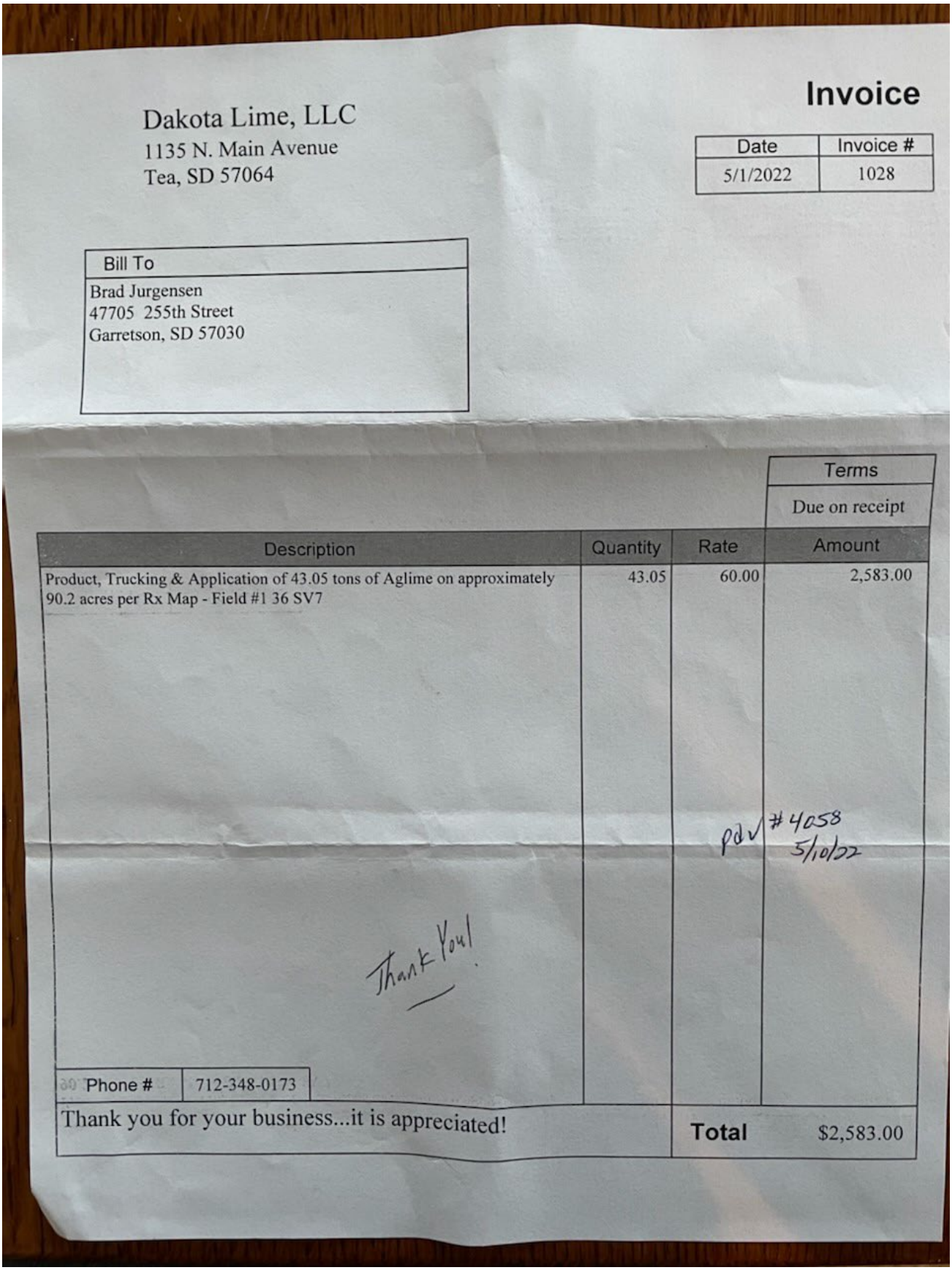
a) The City shall maintain all records required by this plan and permit No. SDL022128 for a minimum of five years.

b) If any of the ten pollutant metals exceed Part 1.3.1 Table 3 of the Surface Water Discharge Permit, the most recent pollutant metals monitoring result will be the baseline. This most recent pollutant metals monitoring result will then be retained for the life of the site.

Appendix B

Lime Receipts

184Z Lime Receipt



Invoice

Dakota Lime, LLC
1135 N. Main Avenue
Tea, SD 57064

Date	Invoice #
5/1/2022	1028

Bill To

Brad Jurgensen
47705 255th Street
Garretson, SD 57030

Terms
Due on receipt

Description	Quantity	Rate	Amount
Product, Trucking & Application of 43.05 tons of Aglime on approximately 90.2 acres per Rx Map - Field #1 36 SV7	43.05	60.00	2,583.00

pd ✓ #4058 5/10/22

Thank You!

Phone # 712-348-0173

Thank you for your business...it is appreciated!

Total $2,583.00

Thurs or Monday

CHS

Blend Ticket

Page 1 of 1

Client: 118501
DYBEDAHL, BRENT J (JAKE)
47036 247TH ST
DELL RAPIDS, SD 57022
605-261-2235

CHS Colton Agronomy DL1428
46389 245th St
Colton SD 57018
605-446-3400

048013-SD-39

Blend No: 65518
Batches: 1
Date: 9/6/2022
Time:

~~Driver~~ **Driver/Salespers** SCOTT LINK **Driver**
Field: Home 60 **Ordered:** 0-0-0
NA: **Delivered:** 0-0-0
Crop: **Analysis:** 0-0-0
Legal: State: **County:** **Township:** **Range / Section:** /

Batch No: 0000000001 **Batch Weight:** 26,640.000 lb
Batch Comment:

Item	Quantity	Location	Weight	Scale Stops	Actual Quantity
Items Included in Blend					
LIME PELLETIZED SUPER 98G BULK	13.3200 ton	A32	**26640** lb	**26640**	
Items Not Included in Blend			**Total Quantity**		
YIELDPOINT VR APPLICATION DRY SINGLE ACRE	57.4000 ac	A32	57.4000 ac		

Batch Area: 57.40 ac
Blender: Kahler Colton **Load Out:**
Applicator: **License No:** **Lic. Expiration Date:**

Total Weight:	26,640.000	lb	**No. Batches:**	1		**Saltout Temp:**	0
Estimated Density:	75.0000	lb / ft3	**Weight/Area:**	464.1115	lb / ac	**Precipitate:**	
Total Area:	57.4	ac	**Volume/Area:**	6.1880	ft3 / ac		
Total Volume:	355.2000	ft3					

Land Note:
Batches: 1 CT

Appendix C

Current Active, Potential, and Inactive Sites

2022 Biosolids Application Sites (Active and Potential)

County	Site No.	Location Sec/Twshp/Range	Owner	Acres	Soil Type	Status
Min.	025Z	16-102-48	Eleanor Burkman	73.5	MNB, MNC2	Active
Min.	038Z	4-102-48	Dean Peterson	37.8	MNC2, MNB	Active
Min.	055Z	4-102-48	Dale Peterson	64	BVC2, MNB, MNC2	Active
Min.	056Z	4-102-48	Larry Peterson	28	MNB, MNC2	Active
Min.	076Z	29-103-48	Eugene Engebretson	65.6	MoB, MNC2, An	Active
Min.	078A	30-103-48	Eugene Engebretson	55	MoB, MNC2	Active
Min.	078B	30-103-48	Eugene Engebretson	134.5	MoB, MNC2, An, FaC2	Active
Min.	095A	29-103-48	Schreurs and Anderson	40.8	MNC2, MoB, AcA, An	Active
Min.	095B	29-103-48	Schreurs and Anderson	16.5	MNC2, MOB, An	Active
Min.	100A	33-103-48	Eugene Engebretson	39	MoB, NCC2, MNC2, An	Active
Min.	100B	33-103-48	Eugene Engebretson	28	MoB, NCC2, An	Active
Min.	103A	31-103-48	Lloyd Zweep	22	MoA, MNC2	Active
Min.	103B	31-103-48	Lloyd Zweep	76.3	MNC2, MoA, MoB, An	Active
Min.	103D	31-103-48	Lloyd Zweep	73.5	MoB, NCC2, An	Active
Min.	104A	14-102-49	Mike Williams	69.4	EgC2, MNB2, NCC2, NCD2, BnE, VnC2	Active
Min.	104B	14-102-49	Mike Williams	78.7	EgC2, MNB2, NCC2, NCD2, BnE, VnC2	Active
Min.	106Z	23-102-49	Mike Williams	13.6	NCC2, NCD2	Active
Min.	107A	13-102-49	Barbra Halbersma	43.5	CrD, MnB	Active
Min.	107C	13-102-49	Barbra Halbersma	37.3	CrD, MnB, SdE	Active
Min.	108Z	18-102-48	Barbra Halbersma	78	MnB, NcC, Wk	Active
Min.	109A	9-103-48	Marian Anderson	34	MNC2, MoB, MoA, An	Active
Min.	109B	9-103-48	Marian Anderson	5.2	MNC2	Active
Min.	110Z	19-102-48	Lawrence Sittig	135.3	MNB, MNC2, NCD2	Active
Min.	111A	33-103-48	Lloyd Zweep	68.3	MOB, MNC2, MoA, AcA, NCC2	Active
Min.	111B	33-103-48	Lloyd Zweep	23.4	MNC2, MNB, An	Active
Min.	112A	33-103-48	Dale Zweep	48	MoB, NCC2, MNC2, An	Active
Min.	112B	33-103-48	Dale Zweep	77.5	MoB, NCC2, MNC2, An	Active
Min.	113A	28-103-48	Dale Zweep	94	MNC2, MOB, ESA, An	Active
Min.	113B	28-103-48	Dale Zweep	12	MNC2, MOB, An	Potential
Min.	113C	28-103-48	Dale Zweep	20	MOB, An	Potential
Min.	120A	1-102-51	Ronald Johnson Trust	28.2	MNC2, AcA, MNB2	Active
Min.	120B	1-102-51	Ronald Johnson Trust	32	MNC2, AcA, MNB2	Active
Min.	120C	1-102-51	Ronald Johnson Trust	44	FaC2, EgB, An, MNC2	Active
Min.	120D	1-102-51	Ronald Johnson Trust	65.4	MNC2, MNB2, An	Active
Min.	122A	6-102-50	Ronald Johnson Trust	36.2	MNB2, MNC2	Active
Min.	122B	6-102-50	Ronald Johnson Trust	40	MNC2, MNB2	Active
Min.	127A	6-102-50	Ronald Johnson	34	MNB2, MNC2	Active
Min.	127B	6-102-50	Ronald Johnson	45	MNB2, MNC3	Active
Min.	151A	1-102-51	Donna Pomerenke	35	NcD2, MNC2, MNB2	Active
Min.	151B	1-102-51	Donna Pomerenke	34.6	MNB2, MNC2	Active
Min.	155A	6-102-50	Richard Lundin	43	MNC2, MNB2, FaB	Active
Min.	155B	6-102-51	Richard Lundin	28.9	MNC2, MNB2, An	Active
Min.	170Z	19-101-47	Gregg Ode	118	MdB, MnB, NcC, Wk, TfC, Ftb	Active
Min.	175Z	7-102-48	Todd Jacobson	52.01	MnC, MnB, Wk	Potential
Min.	176Z	7-102-48	Kathleen Jacobson	49.79	MnC, MnB, Wk, Ob	Potential
Min.	177Z	26-102-49	Ruth Smith	51	DxB, HsC, SpA, HoB, Ob	Active
Min.	178Z	25-103-49	Brad Jurgenson	73.1	MnB, GsB, TfC, FtB, Ob	Active
Min.	179Z	24-103-49	Brad Jurgenson	35	MnB, WK, GvA, FaB	Potential
Min.	180Z	3-102-49	John Marich	137	TfC, Bo, GvA, GsB, FtB,	Active
Min.	181A	10-102-49	Leon Swenson	40	TfC, Bo, GvA, GsB, FtB, Ch, FaA, Wk	Active
Min.	181B	10-102-49	Leon Swenson	65	TfC, Bo, GvA, GsB, FtB, Ch, FaA, Wk	Active

County	Site No.	Location Sec/Twshp/Range	Owner	Acres	Soil Type	Status
Min.	181C	10-102-49	Leon Swenson	18	TfC, Bo, GvA, GsB, FtB, Ch, FaA, Wk	Active
Min.	182Z	25-103-49	Brad Jurgenson	29.6	TfC, Ob, GsB, Ftb	Active
Min.	183A	35-103-49	Lester/Brad Jurgenson	17.5	TfC, FtB	Active
Min.	183B	35-103-49	Lester/Brad Jurgenson	28	GsB, TfC, Ob	Potential
Min.	184A	36-103-49	Brad Jurgenson	50	TfC, Ob, FaB, GsB, FtB	Active
Min.	184B	36-103-49	Brad Jurgenson	19	TfC, Ob, FaB, GsB, FtB	Active
Min.	184C	36-103-49	Brad Jurgenson	16.4	TfC, Ob, FaB, GsB, FtB	Active
Min.	184D	36-103-49	Brad Jurgenson	93.5	TfC, Ob, FaB, GsB, FtB	Active
Min.	185Z	35-103-49	Juanita Roland	53.75	FtB, GsB, TfC, Ob	Active
Min.	186Z	35-103-49	Brad Jurgenson	80	GsB, Ob, HsC, GvA, FtB, TfC, FaB	Potential
Min.	187Z	35-103-49	Brad Jurgenson	128	FaB, GsB, Wk, MnB, TfC, FtB	Potential
Min.	188Z	35-103-49	Terry Jurgenson	146	BsB, GvA, Ob, GsB, FtB	Active
Min.	189Z	35-103-49	Brad Jurgenson	69.33	BsB, HsC, Ob, Tr, TfC, DxB, FaA, FtB	Active
Min.	190Z	7-102-48	Jeff Svennes	138.5	MnB, FtB, NcC, GsB, Ob	Active
Min.	191Z	16-102-48	Dale Trigg	34.1	CsD, Wk, NcC, MnB	Potential
Min.	192Z	17-102-48	Charles Brown	76	MnC, Wk, MnB,	Active
Min.	193Z	16-102-48	John Brown	35	NcC, Wk, MnB	Active
Min.	194Z	16-102-48	Thomas and John Brown	63	NcC, MnB	Active
Min.	195Z	16-102-48	Josephine Brown	115	CsD, NcC, MnB, HtD	Potential
Min.	196Z	17-101-47	Boucher Holdings	87	MdB, GsB, FtB, TfC, DxB, DgC	Potential
Min.	197Z	17-101-47	Boucher Holdings	110	Cd, HtD, HsC, Tr, GsB, MdB, MnC, MnB, Wk	Potential
Lin.	202Z	22-99-49	Rodger Fodness	150	WeA, Cd, te, WhA	Potential
Lin.	203Z	32-99-49	Rodger Fodness	160	WhA, Te, SkD2, EaB, WeA, Cd	Potential
Lin.	204Z	14-99-49	Rodger Fodness	80	WeA, Cd, WhA, Ca	Potential
Min.	210Z	10-101-50	John H Family Trust	440	Tr, MnB, NcC	Potential
Min.	211Z	15-104-50	Kevin and Pam Dybedahl	110	MnB, Mk, NcC, FtB, W, TfC, Ob	Active
Min.	212Z	35-103-48	Baddyn Farms	39	BcA, CoB, NCC, MnB	Potential
Min.	213Z	22-102-49	Barney Cain	75	DxB, TfC, Ob,	Potential
Min.	214Z	2-102-49	Douglas Sittig	175	GvA, GsB, Wk, Fab, TfC, TgD, Cd	Active
Min.	217Z	6-101-48	William Ode	156	MnB, CrD, Wk, NcC	Potential
Min.	219Z	32-102-48	Raymond Ode Living Trust	65	SpB, TfC, HsD, MnB	Potential
Min.	220Z	12-102-49	City of Sioux Falls	155	FtB, TgD, Ch, DcA, CsD, TfC, NcC, TgD	Potential
Min.	222Z	14-104-50	Brent Dybedahl	60	NcC, Wk, MnB	Active
Min.	223Z	22-104-50	Brent Dybedahl	130	TfC, Ftb, FaA, Tr, MtA, Hob, DxB, MnB, Wk, FaB, NcC	Active
Moody	301Z	19-106-49	Witte Group	131	Wo, WeB, Ca, Lb, EtC	Potential
Moody	302Z	19-106-49	Van Woundenberg Linda Trust	147	Wo, WeB, EeB, Ca	Potential
Moody	303Z	18-106-49	Suzanne Hemmer	160	WeB, Ca, Ba	Potential
Moody	304Z	6-105-49	Steven Hemmer	97	Grb, MtC, Or HsD, MfC, DaA, DaB	Potential
Moody	305Z	6-105-49	Bradley Hemmer	104	MoB, Wa, WeB, MtA, La, Lb, EtC	Potential

2022 Inactive Application Sites

County	Site No.	Location Sec/Twshp/Range	Owner	Acres	Soil Type	Status
Min.	001A	5-102-48	Ralph DeRaad	57.5	MNB, MNC2	Inactive
Min.	001B	5-102-48	Ralph DeRaad	44	MNB, MNC2, An	Inactive
Min.	002A	5-102-48	Marilyn Swenson	108.5	MNB, MNC2, An	Inactive
Min.	002C	5-102-48	Marilyn Swenson	10.5	MNB, MNC2	Inactive
Min.	003Z	35-103-49	Lyle Bachman	59	FaA, FaB, MNB2	Inactive
Min.	004Z	35-103-49	Lyle Bachman	59	FaB, MNB2, An, EgC2	Inactive
Min.	005Z	14-103-49	Lyle Bachman	24.8	An, MdB2, MnB2, MnC2, MoB	Inactive
Min.	006Z	14-103-49	Lyle Bachman	49.6	An, MnB2, MnC2, MoB	Inactive
Min.	007Z	34-102-49	Benson Trust	77.2	EgC2, EgB, VNB, VNC2	Inactive
Min.	008Z	14-102-49	Mark Renner	45.6	MNB2, FaB, Tr, NCC2	Inactive
Min.	009Z	23-102-49	Slip-up Creek	18.7	MdC2, MdD2	Inactive
Min.	010Z	23-102-49	Slip-up Creek	12.4	MdB2, MdD2	Inactive
Min.	011Z	7-102-48	Betty Egge	89.1	MNB, MNC2, VNB, VNC	Inactive
Min.	012Z	7-102-48	Betty Egge	14.8	MNB, MNC2, VNC	Inactive
Min.	013Z	7-102-48	Betty Egge	14.8	MNB, MNC2	Inactive
Min.	014Z	25-102-48	Lyle Elofson	17	MNC2, MoB	Inactive
Min.	015Z	25-102-48	Lyle Elofson	65.4	MNC2, MoB	Inactive
Min.	016Z	19-103-48	Dorthy Erickson	53.6	An, MNB2, MNC2, MoB	Inactive
Min.	017Z	19-103-48	Dorthy Erickson	72.1	MNB2, MoB	Inactive
Min.	018Z	35-102-49	Knaubach Farm	29	BS, VnB, VnC2	Inactive
Min.	019A	35-102-49	Knaubach Farm	20	An, Te, WeA	Inactive
Min.	019B	35-102-49	Knaubach Farm	10.5	VnC2	Inactive
Min.	020Z	1-102-50	William Flood	39.6	MNB2, MNC2	Inactive
Min.	021Z	31-103-50	Merlin Anderson	71	MNB, NCC2, NCD2, FaB, AcA	Inactive
Min.	022Z	25-102-50	McCrossan Foundation	56.2	AcA, MNB2, MNC2	Inactive
Min.	023Z	23-102-49	Mike Williams	47.8	FaB2, MdC2, NCC2	Inactive
Min.	024Z	23-103-49	Duane Harvey	49.7	KrC2, MNC2, MoB	Inactive
Min.	027Z	22-103-49	Ken Koopman	17.5	EgB, FaB, MdC2	Inactive
Min.	028Z	22-103-49	Ken Koopman	21.6	EgC2, FaB	Inactive
Min.	029Z	22-103-49	Ken Koopman	22	FaB, FaC2	Inactive
Min.	030Z	22-103-49	Ken Koopman	22.4	EgC2, FaB, FaC2	Inactive
Min.	032Z	34-102-49	Angela McConnville	38.7	EgB, FaC2, VnB	Inactive
Min.	033Z	35-102-49	Pat Lacey, Pwr of Atty	18.5	BmD, VnB	Inactive
Min.	034Z	35-102-49	Pat Lacey, Pwr of Atty	48.1	VnB, VnC2	Inactive
Min.	035Z	35-102-49	Pat Lacey, Pwr of Atty	30.2	BmD, MdC2, VnC2	Inactive
Min.	036A	35-102-49	Pat Lacey, Pwr of Atty	26.7	VnC2, BmD, BS	Inactive
Min.	036B	35-102-49	Pat Lacey, Pwr of Atty	20.5	MdC2, VnB	Inactive
Min.	037A	35-102-49	Pat Lacey, Pwr of Atty	36.8	BmD, KrA, VnC2	Inactive
Min.	037B	35-102-49	Pat Lacey, Pwr of Atty	31.2	VnC2, BmD	Inactive
Min.	039Z	25-103-49	Martin Luebke	37.4	EgA, EgC2, MdB2, MdD2	Inactive
Min.	040Z	2-101-49	Sweetman Partners LLD	31.8	WeA	Inactive
Min.	041Z	2-101-49	Sweetman Partners LLD	23	WeA	Inactive
Min.	042Z	2-101-49	Sweetman Partners LLD	13.7	KrB, MdC2	Inactive
Lin.	043Z	4-99-50	Jeannie McNeil	91.6	WhA, Ca, EsB, Te, EcB	Inactive
Min.	044Z	23-102-49	Chris McConville	56.3	An, FaB, FaC2, MdB2, MdC2, VnC2	Inactive
Min.	045Z	26-102-49	Chris McConville	34.4	VnA	Inactive

County	Site No.	Location Sec/Twshp/Range	Owner	Acres	Soil Type	Status
Min.	046A	27-102-49	Chris McConville	39	VnB, VnC2, EgB	Inactive
Min.	046B	27-102-49	Chris McConville	20.8	VnB, VnC2, EgB	Inactive
Min.	046C	27-102-49	Chris McConville	26.4	VnB, VnC2, EgB	Inactive
Min.	047Z	27-102-49	Angela McConville II	29.9	EgB, FaC2, VnB	Inactive
Min.	048Z	10-102-49	Roy McElroy	78	An, FaC2, MNB, MNC2, MdB2	Inactive
Min.	049Z	10-102-49	Roy McElroy	79	An, FaC2, MNB, MNC2, MdB2	Inactive
Lin.	050A	5-99-50	Jeannie McNeil	23.5	Cd, EsB, La	Inactive
Lin.	050B	5-99-50	Jeannie McNeil	94.1	EsB, DcB, Ca, EaB, WhA, Te	Inactive
Lin.	050C	5-99-50	Jeannie McNeil	84	Te, WhA, Ca, EaB	Inactive
Min.	051Z	26-102-48	Orlin Nelson	16.1	MoB	Inactive
Lin.	052A	18-99-49	Gerald Menholt	76.4	WhA, Ca, Cd, EaB, WeA	Inactive
Lin.	052B	18-99-49	Gerald Menholt	44.3	WeA, Cd	Inactive
Min.	053Z	26-102-48	Orlin Nelson	20.2	MoA, MNC2	Inactive
Min.	054Z	6-101-48	Gordon Ode	35.2	MNB2, NCD2	Inactive
Lin.	058A	18-99-49	Caroline Deinema	123.7	WeA, Te, WhA, EaB, Cd	Inactive
Lin.	058B	18-99-49	Caroline Deinema	51.9	WhA, Cd	Inactive
Min.	060Z	36-102-49	Water Reclamation	25.8	Bs, EsA, FaC2, VNC2	Inactive
Min.	061Z	36-102-49	Water Reclamation	9	Bs, WeA	Inactive
Min.	062Z	1-101-49	Water Reclamation	7	WeA	Inactive
Min.	063A	15-102-49	Mark Renner	65.5	An, EgC2, MNC2, MNB2, MoA, Tr, VnC2	Inactive
Min.	063B	15-102-49	Mark Renner	50.6	MNB2, VnB, An	Inactive
Min.	063C	15-102-49	Mark Renner	53	VnC2, KrA, VnB, An	Inactive
Lin.	064Z	15-99-49	Bothmer Olson	69.6	Cd, Ca, WhA, WeA	Inactive
Min.	065B	22-102-49	Mark Renner	51.6	VnB, MNC2, An	Inactive
Min.	065C	22-102-49	Mark Renner	52.9	An, FaC2, MNB2, MNC2, MoB, VNB, VNC2	Inactive
Lin.	066A	15-100-49	Jim Hall	129.3	WhA, Cd, Ca	Inactive
Lin.	066B	15-100-49	Jim Hall	147.7	WhA, EaB, Mh, EcB, Ws, Ca	Inactive
Lin.	066C	15-100-49	Jim Hall	77.4	EcB, WhA, Ca, Cd	Inactive
Lin.	068Z	21-100-49	Jim Hall	34.9	EaB, EcB, Ca	Inactive
Lin.	069Z	28-100-49	Jim Hall	63.4	Ca, WhA, EcB, EaB	Inactive
Lin.	070B	21-99-49	Elaine Beumer	121.1	Ws, Ca, Wha	Inactive
Lin.	070C	21-99-49	Elaine Beumer	19.4	WhA, Cd, Ca	Inactive
Lin.	071Z	24-99-50	Steve & Harvey Menholt	70	WhA, Ca, Te, Ch	Inactive
Min.	072Z	30-103-48	Al Sabers	118	An, MNC2, MoB	Inactive
Min.	073A	6-103-48	Vernon Sagness	34.7	MNC2, MoA, MoB	Inactive
Min.	073B	6-103-48	Vernon Sagness	28.3	MNC2, MoA	Inactive
Min.	073C	6-103-48	Vernon Sagness	14.5	MoB, An, MoA, MNC2	Inactive
Min.	074Z	6-103-48	Virgil Sagness	32.5	MNC2, MNB	Inactive
Min.	075Z	29-103-48	Al Sabers	64.7	MNC2, MoB	Inactive
Min.	077Z	26-103-48	Al Sabers	72	An, EsA, FaA, MoB, VnB	Inactive
Lin.	079A	14-99-50	Ludwig Camp	56.7	Ca, WaA, Ws	Inactive
Lin.	079B	14-99-50	Ludwig Camp	78.5	Ca, Te, WhA	Inactive
Min.	080Z	22-103-49	Glenn Sebesta	5.3	An, MNC2, VoB	Inactive
Min.	081Z	13-102-49	Clarence Sittig	20.2	EsA, FaA, MdD2	Inactive
Lin.	082Z	33-99-49	Richard Peterson	128.3	EcB, Te, Ca, EsB, WhA, EaB	Inactive
Lin.	083A	2-99-50	Frank Huizenga	9.5	La, WhA	Inactive
Lin.	083B	2-99-50	Frank Huizenga	26.6	La, Cd, Te, WhA, EaB	Inactive
Lin.	083C	2-99-50	Frank Huizenga	63.8	La, EaB, WhA, Ca, Cd, EsB	Inactive
Lin.	084Z	4-99-50	Brett Merkle	91.6	EsB, EcB, Ca, WhA, Te	Inactive
Lin.	085A	4-99-50	William Truman	24.3	WhA, Ca, EsB, EcB	Inactive

County	Site No.	Location Sec/Twshp/Range	Owner	Acres	Soil Type	Status
Lin.	085B	4-99-50	William Truman	37.9	Ca, WhA, Te, EcB, EsB	Inactive
Min.	086A	6-102-50	Nancy Nickel	21.8	FaB, FaC2, EgC2, MNC2, An	Inactive
Min.	086B	6-102-50	Nancy Nickel	8.5	MNC2, MNB2	Inactive
Min.	088Z	31-103-48	Lester Sittig	25.6	NCC2, MoB	Inactive
Lin.	089A	9-100-49	Gerald Johnson	98	EaB, Ca, WeA, Te, EcB, Ws	Inactive
Min.	090Z	6-102-48	Angeline Sittig estate	38.5	MNB, MNC2	Inactive
Lin.	091Z	10-100-49	Gerald Johnson	54.5	Cd, EaB, Ws, Ca	Inactive
Lin.	092Z	16-100-49	Gerald Johnson	193.1	Ws, EaB, WhA, Ca, EcB	Inactive
Lin.	093Z	15-100-49	Gerald Johnson	22.2	Mh, EaB, EcB, Ca, WhA	Inactive
Lin.	094Z	15-100-49	Mark Johnson	38.3	EaB, WhA, EcB	Inactive
Lin.	097Z	16-99-49	Gerald Johnson	62.1	Cd, Te, WhA, Ca	Inactive
Lin.	098A	28-100-50	Gerald Johnson	38.6	Ca, WeA, EcB, Cd	Inactive
Lin.	098B	28-100-50	Gerald Johnson	34.8	Cd, EcB, Ca, WeA	Inactive
Lin.	099Z	20-100-50	Gerald Johnson	34.8	EcB, Ca	Inactive
Min.	101Z	1-102-49	Jim Wehde	116.9	FaB, MdD2, MoB, MdC2	Inactive
Min.	102Z	2-102-49	Jim Wehde	304.7	An, FaA, FaB, FaC2, MdB2, MdC2	Inactive
Min.	116A	18-103-49	Chris McConville	32	MNB2, CrD2, MNC2	Inactive
Min.	119Z	24-101-52	John Cole	137.3	KrB, BKC2, An, AcA, LPHW, KrA	Inactive
Min.	121A	2-102-51	Ronald & A. Joyce Johnson	7.1	NCD2, MNB2	Inactive
Min.	121B	2-102-51	Ronald & A. Joyce Johnson	26.5	MNB2, NCC2, MNC2, NCD2	Inactive
Min.	121C	2-102-51	Ronald & A. Joyce Johnson	7.5	MNB2, MNC2	Inactive
Min.	121D	2-102-51	Ronald & A. Joyce Johnson	21.3	EgC2, MNC2, An, MNB2, NCC2	Inactive
Min.	121F	2-102-51	Ronald & A. Joyce Johnson	33.2	EsB, MoB, EgC2, An	Inactive
Min.	123A	7-102-50	A. Joyce Johnson	17	MNC2, An	Inactive
Min.	123B	7-102-50	A. Joyce Johnson	13	NCD2	Inactive
Min.	123C	7-102-50	A. Joyce Johnson	110	NCD2, An, MNC2, MNB	Inactive
Min.	124A	18-102-50	Walter Klein	34.3	NCC2, BnE, An	Inactive
Min.	124B	18-102-50	Walter Klein	29.1	NCC2, MNB	Inactive
Min.	124C	18-102-50	Walter Klein	23.4	NCC2, MNB, MoB, MNC2	Inactive
Min.	124D	18-102-50	Walter Klein	40.1	MoB, MNC2, MNB	Inactive
Min.	124E	18-102-50	Walter Klein	60	MoB, NCD2, NCC2	Inactive
Min.	125Z	7-102-50	Terry Klein	71	MNC2, An	Inactive
Min.	126A	12-102-51	Marian Klein	60	NCD2, MNB2, An	Inactive
Min.	128E	24-102-48	Arnold & Alvin Erickson	15	MoB, MNC2	Inactive
Min.	133A	29-102-47	Arnold & Kermit Erickson	20	MNC2, MoB, MNB	Inactive
Min.	133B	29-102-47	Arnold & Kermit Erickson	30.1	MNC2, MoB, An, MoA	Inactive
Min.	133E	29-102-47	Arnold & Kermit Erickson	20	MNC2, MoB, An	Inactive
Min.	137A	20-102-47	Everett Andersen	30	MoB, An	Inactive
Min.	137D	20-102-47	Everett Andersen	18	MoB, MoA	Inactive
Min.	138A	20-102-47	James Andersen	30	MoB, MNC2	Inactive
Min.	138B	20-102-47	James Andersen	28.5	MoB, An, MNC2	Inactive
Min.	140A	8-102-50	Erwin Peterson Estate	25.9	An, MNC2, MNB2	Inactive
Min.	140B	8-102-50	Erwin Peterson Estate	27	An, MNC2, MNB2	Inactive
Min.	140C	8-102-50	Erwin Peterson Estate	27.8	MNC2, An	Inactive
Min.	140D	8-102-50	Erwin Peterson Estate	26.3	NCC2, An	Inactive
Min.	141A	5-102-50	Robert Oyen	36.2	MNB2, MNC2	Inactive

County	Site No.	Location Sec/Twshp/Range	Owner	Acres	Soil Type	Status
Min.	141B	5-102-50	Robert Oyen	23.3	MNB2, MNC2	Inactive
Min.	142A	4-102-50	Maurine Oyen	39.4	AcA, MNB2, MNC2	Inactive
Min.	142B	4-102-50	Maurine Oyen	16.2	MNB2, MNC2	Inactive
Min.	143A	34-103-50	Robert Oyen	67.6	Dm, An, MNC2, MNB	Inactive
Min.	143B	34-103-50	Robert Oyen	41	MNC2, MNB	Inactive
Min.	143C	34-103-50	Robert Oyen	70	Dm, An, MNC2, MNB	Inactive
Min.	144Z	22-103-50	Robert Oyen	103	MNB, MNC2, An	Inactive
Min.	154A	36-103-51	Ronald Johnson	7.5	EgC2, An, MNC2	Inactive
Min.	154B	36-103-51	Ronald Johnson	18.9	EgC2, FaB, FaC2	Inactive
Min.	156Z	22-103-49	Ken Koopman	9.1	EgB, FaC2, EgC2	Inactive
Min.	157Z	2-101-49	Concrete Materials	14.4	Bs	Inactive
Min.	158A	18-103-48	Robert Ollerich	50.5	MoB, MNC2	Inactive
Min.	158B	18-103-48	Robert Ollerich	56.9	MNC2, MoB	Inactive
Min.	158C	18-103-48	Robert Ollerich	7.4	An, MoA	Inactive
Min.	158D	18-103-48	Robert Ollerich	13.2	MoA, MoB, An	Inactive
Min.	159A	34-104-49	Steve Ollerich	6.9	MNC2, MNB, An	Inactive
Min.	159B	34-104-49	Steve Ollerich	35.3	MNB, MNC2, An	Inactive
Min.	159C	34-104-49	Steve Ollerich	31.1	MoB, MNC2, FaB	Inactive
Min.	160A	5-102-50	Tim Oyen	63	KrA, KrB	Inactive
Min.	161A	6-102-48	Owen Flatberg	35.8	MNB, MNC2, An	Inactive
Min.	161B	6-102-48	Owen Flatberg	43.7	MNB, MNC2	Inactive
Min.	161C	6-102-48	Owen Flatberg	43.7	MNB, MoB, MoA, An	Inactive
Min.	162Z	6-102-48	Ron and Lowell Wirtjes	74.4	MNB, MNC2, An	Inactive

Appendix D

Deep Soil Monitoring Schedule

2023 5-Year Deep Soil Monitoring Schedule

Site No.	Location Sec/Twshp/Range	2023	2024	2025	2026	2027
025Z	16-102-48					X
038Z	4-102-48				X	
055Z	4-102-48				X	
056Z	4-102-48				X	
076Z	29-103-48					X
078A	30-103-48	X				
078B	30-103-48	X				
078C	30-103-48	X				
078D	30-103-48	X				
095A	29-103-48		X		X	
095B	29-103-48		X		X	
100A	33-103-48				X	
100B	33-103-48				X	
103A	31-103-48		X		X	
103B	31-103-48		X		X	
103D	31-103-48		X		X	
104A	14-102-49					X
104B	14-102-49					X
106Z	23-102-49					X
107A	13-102-49			X		
107B	13-102-49			X		
107C	13-102-49			X		
108Z	18-102-48			X		
109A	9-103-48				X	
109B	9-103-48				X	
110A	19-102-48				X	
110B	19-102-48				X	
110C	19-102-48				X	
110D	19-102-48				X	
110E	19-102-48				X	
111A	33-103-48	X				
111B	33-103-48	X				
112A	33-103-48				X	
112B	33-103-48				X	
113A	28-103-48		X		X	
113B	28-103-48		X			
113C	28-103-48		X			
120A	1-102-51		X			
120B	1-102-51		X		X	
120C	1-102-51		X			

Site No.	Location Sec/Twshp/Range	2023	2024	2025	2026	2027
120D	1-102-51		X			
122A	6-102-50	X				
122B	6-102-50	X				
127A	6-102-50					X
127B	6-102-50					X
151A	1-102-51					X
151B	1-102-51					X
155A	6-102-50				X	
155B	6-102-51				X	
170Z	19-101-47			X		
175Z	7-102-48			X		
176Z	7-102-48			X		
177Z	26-102-49			X		
178Z	25-103-49			X		
179Z	24-103-49			X		
180Z	3-102-49			X		
181A	10-102-49			X		
181B	10-102-49			X		
181C	10-102-49			X		
182Z	25-103-49			X		
183A	35-103-49			X		
183B	35-103-49		X			
184Z	36-103-49			X		
185Z	35-103-49			X		
186Z	35-103-49		X			
187Z	35-103-49		X			
188Z	35-103-49		X			
189Z	35-103-49		X			
190Z	7-102-48		X			
191Z	16-102-48					
192Z	17-102-48		X			
193Z	16-102-48		X		X	
194Z	16-102-48		X			
195Z	16-102-48				X	
196Z	17-101-47					
197Z	17-101-47					
202Z	22-99-49					
203Z	32-99-49					
204Z	14-99-49				X	
210Z	10-101-50				X	

Site No.	Location Sec/Twshp/Range	2023	2024	2025	2026	2027
211Z	15-104-50					
212Z	35-103-48					
213Z	22-102-49					
214Z	2-102-49				X	
217Z	6-101-48					
219Z	32-102-48					
220Z	12-102-49					
222Z	14-104-50				X	
223Z	22-104-50				X	

Appendix E

Approval Letter for Landfill Special Project

DEPARTMENT of AGRICULTURE and NATURAL RESOURCES
JOE FOSS BUILDING
523 E CAPITOL AVE
PIERRE SD 57501-3182
danr.sd.gov

September 19, 2022

Phillip Greenwood
Biosolids Supervisor, City of Sioux Falls
224 West 9th Street
Sioux Falls, SD 57709

Mr. Phillip Greenwood,

I am writing in regard to the approval to land apply dewatered biosolids on Sioux Falls landfill grounds. The SD Department of Agriculture and Natural Resources understands that this application will be disced into stockpile soil material to prevent any vector attractions and pollution runoff. The department also understands that this application site is surrounded by a gated fence and is not regularly visited by the public. The area of application is not above aquifer material and potential for groundwater contamination is minimal. The department approves of this reuse method for your generated class B biosolids.

Thank you for your continued efforts to protect the environment and natural resources of South Dakota. If you have any questions, please contact me at (605) 394-2229.

Sincerely,

Raul Vasquez
Engineer II, Biosolids Coordinator
Surface Water Quality Program

cc: Jesse Neyens, Environmental Analyst, 1017 East Chambers Street, Sioux Falls
DENR – Biosolids File

Appendix F

Soil Sample Results and Agronomic Rate Calculations

REPORT NUMBER
21-245-0101 v2
COMPLETED DATE
Sep 7, 2021
ACCOUNT
1065
RECEIVED DATE
Sep 2, 2021

Midwest Laboratories®
13611 B Street • Omaha, Nebraska 68144-3693 • (402) 334-7770
www.midwestlabs.com

TODAY'S DATE
Sep 08, 2021

CITY OF SIOUX FALLS
SOILS
4500 N SYCAMORE AVE
SIOUX FALLS SD 57104-6407

IDENTIFICATION
223Z WEST A1

SOIL ANALYSIS REPORT

NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)

LAB NUMBER *381*	SAMPLE IDENTIFICATION	ORGANIC MATTER L.O.I. percent	RATE	PHOSPHORUS P_1 (WEAK BRAY) 1:7 ppm	RATE	PHOSPHORUS P_2 (STRONG BRAY) 1:7 ppm	RATE	OLSEN BICARBONATE P ppm	RATE	POTASSIUM K ppm	RATE	MAGNESIUM Mg ppm	RATE	CALCIUM Ca ppm	RATE	SODIUM Na ppm	RATE	pH SOIL pH 1:1	pH BUFFER INDEX	CATION EXCHANGE CAPACITY C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED) % K	% Mg	% Ca	% H	% Na
48101	223Z WEST A1	4.4	H	14	L	30	M			156	M	596	VH	2437	M			5.6	6.5	23.0	1.7	21.6	53.0	23.7	
48102	223Z WEST A2																								
48103	223Z EAST B1	4.4	H	9	L	23	M			143	L	612	VH	2455	M			5.6	6.5	23.2	1.6	22.0	52.9	23.5	
48104	223Z EAST B2																								

LAB NUMBER *381*	NITRATE-N (FIA) SURFACE ppm	SURFACE lbs/A	SURFACE depth (in)	SUBSOIL 1 ppm	SUBSOIL 1 lbs/A	SUBSOIL 1 depth (in)	SUBSOIL 2 ppm	SUBSOIL 2 lbs/A	SUBSOIL 2 depth (in)	Total lbs/A	SULFUR S ICAP ppm	RATE	ZINC Zn DTPA ppm	RATE	MANGANESE Mn DTPA ppm	RATE	IRON Fe DTPA ppm	RATE	COPPER Cu DTPA ppm	RATE	BORON B SORB. DTPA ppm	RATE	EXCESS LIME RATE	SOLUBLE SALTS 1:1 mmhos/cm	RATE
48101	7																								
48102	3																								
48103	8																								
48104	2																								

REV.10/17

The above analytical results apply only to the sample(s) submitted. Samples are retained a maximum of 30 days.

REPORT NUMBER
21-320-1127
COMPLETED DATE
Nov 18, 2021
ACCOUNT
1065
RECEIVED DATE
Nov 16, 2021

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TODAY'S DATE
Nov 18, 2021

CITY OF SIOUX FALLS
SOILS
4500 N SYCAMORE AVE
SIOUX FALLS SD 57104-6407

IDENTIFICATION
176Z A1

SOIL ANALYSIS REPORT

NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)

LAB NUMBER *388*	SAMPLE IDENTIFICATION	ORGANIC MATTER L.O.I. percent	RATE	PHOSPHORUS P_1 (WEAK BRAY) 1:7 ppm	RATE	PHOSPHORUS P_2 (STRONG BRAY) 1:7 ppm	RATE	OLSEN BICARBONATE P ppm	RATE	POTASSIUM K ppm	RATE	MAGNESIUM Mg ppm	RATE	CALCIUM Ca ppm	RATE	SODIUM Na ppm	RATE	pH SOIL pH 1:1	BUFFER INDEX	CATION EXCHANGE CAPACITY C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED) % K	% Mg	% Ca	% H	% Na
97433	176Z A1	3.0	M	17	M	35	M			129	L	608	VH	2345	M			5.9	6.6	20.6	1.6	24.6	56.9	16.9	
97434	176Z A2																								
97435	176Z B1	3.7	H	16	M	29	M			161	M	545	VH	2053	M			5.8	6.6	18.8	2.2	24.2	54.6	19.0	
97436	176Z B2																								

LAB NUMBER *388*	NITRATE-N (FIA) SURFACE ppm	SURFACE lbs/A	SURFACE depth (in)	SUBSOIL 1 ppm	SUBSOIL 1 lbs/A	SUBSOIL 1 depth (in)	SUBSOIL 2 ppm	SUBSOIL 2 lbs/A	SUBSOIL 2 depth (in)	Total lbs/A	SULFUR S ICAP ppm	RATE	ZINC Zn DTPA ppm	RATE	MANGANESE Mn DTPA ppm	RATE	IRON Fe DTPA ppm	RATE	COPPER Cu DTPA ppm	RATE	BORON B SORB. DTPA ppm	RATE	EXCESS LIME RATE	SOLUBLE SALTS 1:1 mmhos/cm	RATE
97433	8																								
97434	4																								
97435	5																								
97436	3																								

REV.10/17

The above analytical results apply only to the sample(s) submitted. Samples are retained a maximum of 30 days.

REPORT NUMBER
21-320-1126
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IDENTIFICATION
175Z A1

SOIL ANALYSIS REPORT

LAB NUMBER *388*	SAMPLE IDENTIFICATION	ORGANIC MATTER L.O.I.	PHOSPHORUS			POTASSIUM	MAGNESIUM	CALCIUM	SODIUM	pH		CATION EXCHANGE CAPACITY	PERCENT BASE SATURATION (COMPUTED)				
			P_1 (WEAK BRAY) 1:7	P_2 (STRONG BRAY) 1:7	OLSEN BICARBONATE P	K	Mg	Ca	Na	SOIL pH 1:1	BUFFER INDEX	C.E.C.	% K	% Mg	% Ca	% H	% Na
		percent RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE			meq/100g					
97429	175Z A1	2.9 M	13 L	29 M		126 L	557 VH	2226 M		5.9	6.6	19.4	1.7	23.9	57.4	17.0	
97430	175Z A2																
97431	175Z B1	3.5 M	18 M	30 M		161 M	482 VH	2003 M		5.5	6.5	19.5	2.1	20.6	51.4	25.9	
97432	175Z B2																

LAB NUMBER *388*	NITRATE-N (FIA) SURFACE ppm	SURFACE lbs/A	SURFACE depth (in)	SUBSOIL 1 ppm	SUBSOIL 1 lbs/A	SUBSOIL 1 depth (in)	SUBSOIL 2 ppm	SUBSOIL 2 lbs/A	SUBSOIL 2 depth (in)	Total lbs/A	SULFUR S ICAP ppm RATE	ZINC Zn DTPA ppm RATE	MANGANESE Mn DTPA ppm RATE	IRON Fe DTPA ppm RATE	COPPER Cu DTPA ppm RATE	BORON B SORB. DTPA ppm RATE	EXCESS LIME RATE	SOLUBLE SALTS 1:1 mmhos/cm RATE	
97429	5																		
97430	4																		
97431	8																		
97432	3																		

REV.10/17

The above analytical results apply only to the sample(s) submitted. Samples are retained a maximum of 30 days.

REPORT NUMBER
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IDENTIFICATION
107C A1

SOIL ANALYSIS REPORT

NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)

LAB NUMBER *388*	SAMPLE IDENTIFICATION	ORGANIC MATTER L.O.I. percent	RATE	PHOSPHORUS P_1 (WEAK BRAY) 1:7 ppm	RATE	PHOSPHORUS P_2 (STRONG BRAY) 1:7 ppm	RATE	OLSEN BICARBONATE P ppm	RATE	POTASSIUM K ppm	RATE	MAGNESIUM Mg ppm	RATE	CALCIUM Ca ppm	RATE	SODIUM Na ppm	RATE	pH SOIL pH 1:1	BUFFER INDEX	CATION EXCHANGE CAPACITY C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED) % K	% Mg	% Ca	% H	% Na
97420	107C A1	3.1	M	29	H	66	VH	27	VH	104	L	587	VH	3257	H			7.2		21.4	1.2	22.9	75.9	0.0	
97421	107C A2																								

LAB NUMBER *388*	NITRATE-N (FIA) SURFACE ppm	SURFACE lbs/A	SURFACE depth (in)	SUBSOIL 1 ppm	SUBSOIL 1 lbs/A	SUBSOIL 1 depth (in)	SUBSOIL 2 ppm	SUBSOIL 2 lbs/A	SUBSOIL 2 depth (in)	Total lbs/A	SULFUR S ICAP ppm	RATE	ZINC Zn DTPA ppm	RATE	MANGANESE Mn DTPA ppm	RATE	IRON Fe DTPA ppm	RATE	COPPER Cu DTPA ppm	RATE	BORON B SORB. DTPA ppm	RATE	EXCESS LIME RATE	SOLUBLE SALTS 1:1 mmhos/cm	RATE	
97420	12																									
97421	7																									

REV.10/17

The above analytical results apply only to the sample(s) submitted. Samples are retained a maximum of 30 days.

REPORT NUMBER
21-320-1123
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IDENTIFICATION
107A A1

SOIL ANALYSIS REPORT

NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)

LAB NUMBER *388*	SAMPLE IDENTIFICATION	ORGANIC MATTER L.O.I.	PHOSPHORUS P_1 (WEAK BRAY) 1:7	PHOSPHORUS P_2 (STRONG BRAY) 1:7	PHOSPHORUS OLSEN BICARBONATE P	POTASSIUM K	MAGNESIUM Mg	CALCIUM Ca	SODIUM Na	pH SOIL pH 1:1	pH BUFFER INDEX	CATION EXCHANGE CAPACITY C.E.C.	PERCENT BASE SATURATION (COMPUTED) % K	% Mg	% Ca	% H	% Na
		percent RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE			meq/100g					
97416	107A A1	3.9 H	31 VH	80 VH	29 VH	80 L	435 VH	2750 H		7.1		17.6	1.2	20.6	78.2	0.0	
97417	107A A2																
97418	107A B1	3.8 H	27 H	48 H		115 L	591 VH	2623 M		6.4	6.7	20.1	1.5	24.5	65.2	8.8	
97419	107A B2																

LAB NUMBER *388*	NITRATE-N (FIA) SURFACE ppm	SURFACE lbs/A	SURFACE depth (in)	SUBSOIL 1 ppm	SUBSOIL 1 lbs/A	SUBSOIL 1 depth (in)	SUBSOIL 2 ppm	SUBSOIL 2 lbs/A	SUBSOIL 2 depth (in)	Total lbs/A	SULFUR S ICAP ppm RATE	ZINC Zn DTPA ppm RATE	MANGANESE Mn DTPA ppm RATE	IRON Fe DTPA ppm RATE	COPPER Cu DTPA ppm RATE	BORON B SORB. DTPA ppm RATE	EXCESS LIME RATE	SOLUBLE SALTS 1:1 mmhos/cm RATE	
97416	9																		
97417	10																		
97418	16																		
97419	8																		

REV.10/17

The above analytical results apply only to the sample(s) submitted. Samples are retained a maximum of 30 days.

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22-104-0053
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TODAY'S DATE
Apr 15, 2022

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IDENTIFICATION
184A A1

SOIL ANALYSIS REPORT

NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)

LAB NUMBER *395*	SAMPLE IDENTIFICATION	ORGANIC MATTER L.O.I. percent	RATE	PHOSPHORUS P_1 (WEAK BRAY) 1:7 ppm	RATE	PHOSPHORUS P_2 (STRONG BRAY) 1:7 ppm	RATE	OLSEN BICARBONATE P ppm	RATE	POTASSIUM K ppm	RATE	MAGNESIUM Mg ppm	RATE	CALCIUM Ca ppm	RATE	SODIUM Na ppm	RATE	pH SOIL pH 1:1	BUFFER INDEX	CATION EXCHANGE CAPACITY C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED) % K	% Mg	% Ca	% H	% Na
64783	184A A1	2.2	L	39	VH	74	VH	17	H	79	L	229	H	2349	H			6.6	6.9	14.8	1.4	12.9	79.4	6.3	
64784	184A A2																								
64785	184A B1	2.7	M	52	VH	86	VH			124	M	222	H	1506	M			5.2	6.6	14.8	2.1	12.5	50.9	34.5	
64786	184A B2																								

LAB NUMBER *395*	NITRATE-N (FIA) SURFACE ppm	SURFACE lbs/A	SURFACE depth (in)	SUBSOIL 1 ppm	SUBSOIL 1 lbs/A	SUBSOIL 1 depth (in)	SUBSOIL 2 ppm	SUBSOIL 2 lbs/A	SUBSOIL 2 depth (in)	Total lbs/A	SULFUR S ICAP ppm	RATE	ZINC Zn DTPA ppm	RATE	MANGANESE Mn DTPA ppm	RATE	IRON Fe DTPA ppm	RATE	COPPER Cu DTPA ppm	RATE	BORON B SORB. DTPA ppm	RATE	EXCESS LIME RATE	SOLUBLE SALTS 1:1 mmhos/cm	RATE
64783	16																								
64784	9																								
64785	22																								
64786	19																								

REV.10/17

The above analytical results apply only to the sample(s) submitted. Samples are retained a maximum of 30 days.

REPORT NUMBER
22-174-0433
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Jun 27, 2022
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Jun 27, 2022

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IDENTIFICATION
120C A1

SOIL ANALYSIS REPORT

NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)

LAB NUMBER *398*	SAMPLE IDENTIFICATION	ORGANIC MATTER L.O.I. percent	RATE	PHOSPHORUS P_1 (WEAK BRAY) 1:7 ppm	RATE	PHOSPHORUS P_2 (STRONG BRAY) 1:7 ppm	RATE	OLSEN BICARBONATE P ppm	RATE	POTASSIUM K ppm	RATE	MAGNESIUM Mg ppm	RATE	CALCIUM Ca ppm	RATE	SODIUM Na ppm	RATE	pH SOIL pH 1:1	BUFFER INDEX	CATION EXCHANGE CAPACITY C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED) % K	% Mg	% Ca	% H	% Na
84876	120C A1	3.7	H	161	VH	162	VH	84	VH	79	L	389	VH	2270	H			6.8		14.8	1.4	21.9	76.7	0.0	
84877	120C A2																								
84878	120C B1	4.9	VH	139	VH	153	VH	83	VH	96	L	514	VH	3044	H			6.9		19.7	1.2	21.7	77.1	0.0	
84879	120C B2																								
84880	120D A1	4.6	VH	58	VH	101	VH	45	VH	173	M	467	VH	3134	H			7.1		20.0	2.2	19.5	78.3	0.0	
84881	120D A2																								
84882	120D B1	4.3	H	82	VH	151	VH	56	VH	262	VH	466	VH	3170	H			6.5	6.7	22.1	3.0	17.6	71.7	7.7	
84883	120D B2																								

LAB NUMBER *398*	NITRATE-N (FIA) SURFACE ppm	SURFACE lbs/A	SURFACE depth (in)	SUBSOIL 1 ppm	SUBSOIL 1 lbs/A	SUBSOIL 1 depth (in)	SUBSOIL 2 ppm	SUBSOIL 2 lbs/A	SUBSOIL 2 depth (in)	Total lbs/A	SULFUR S ICAP ppm	RATE	ZINC Zn DTPA ppm	RATE	MANGANESE Mn DTPA ppm	RATE	IRON Fe DTPA ppm	RATE	COPPER Cu DTPA ppm	RATE	BORON B SORB. DTPA ppm	RATE	EXCESS LIME RATE	SOLUBLE SALTS 1:1 mmhos/cm	RATE	
84876	6																									
84877	1																									
84878	8																									
84879	2																									
84880	5																									
84881	1																									
84882	10																									
84883	3																									

REV.10/17

The above analytical results apply only to the sample(s) submitted. Samples are retained a maximum of 30 days.

REPORT NUMBER
22-230-0040
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Aug 21, 2022
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Aug 18, 2022

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Aug 21, 2022

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IDENTIFICATION
223Z A1

SOIL ANALYSIS REPORT

LAB NUMBER *399*	SAMPLE IDENTIFICATION	ORGANIC MATTER L.O.I.		PHOSPHORUS P_1 (WEAK BRAY) 1:7		PHOSPHORUS P_2 (STRONG BRAY) 1:7		OLSEN BICARBONATE P		NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE) POTASSIUM K		MAGNESIUM Mg		CALCIUM Ca		SODIUM Na		pH SOIL pH 1:1	pH BUFFER INDEX	CATION EXCHANGE CAPACITY C.E.C.	PERCENT BASE SATURATION (COMPUTED) % K	% Mg	% Ca	% H	% Na
		percent	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE			meq/100g					
75598	N 223Z A1	2.6	M	23	H	39	M			103	L	449	VH	2340	M			6.3	6.7	17.5	1.5	21.4	66.9	10.2	
75599	N 223Z A2																								
75600	N 223Z B1	3.3	M	41	VH	59	VH			108	L	451	VH	1987	M			5.6	6.5	18.3	1.5	20.5	54.3	23.7	
75601	N223Z B2																								

LAB NUMBER *399*	NITRATE-N (FIA) SURFACE ppm	SURFACE lbs/A	SURFACE depth (in)	SUBSOIL 1 ppm	SUBSOIL 1 lbs/A	SUBSOIL 1 depth (in)	SUBSOIL 2 ppm	SUBSOIL 2 lbs/A	SUBSOIL 2 depth (in)	Total lbs/A	SULFUR S ICAP ppm	SULFUR RATE	ZINC Zn DTPA ppm	ZINC RATE	MANGANESE Mn DTPA ppm	MANGANESE RATE	IRON Fe DTPA ppm	IRON RATE	COPPER Cu DTPA ppm	COPPER RATE	BORON B SORB. DTPA ppm	BORON RATE	EXCESS LIME RATE	SOLUBLE SALTS 1:1 mmhos/cm	SOLUBLE SALTS RATE	
75598	10																									
75599	3																									
75600	8																									
75601	2																									

REV.10/17

REPORT NUMBER
22-236-0070
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TODAY'S DATE
Aug 26, 2022

IDENTIFICATION
222Z A1

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SOIL ANALYSIS REPORT

NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)

LAB NUMBER *399*	SAMPLE IDENTIFICATION	ORGANIC MATTER L.O.I.	PHOSPHORUS			POTASSIUM	MAGNESIUM	CALCIUM	SODIUM	pH		CATION EXCHANGE CAPACITY C.E.C.	PERCENT BASE SATURATION (COMPUTED)				
			P_1 (WEAK BRAY) 1:7	P_2 (STRONG BRAY) 1:7	OLSEN BICARBONATE P	K	Mg	Ca	Na	SOIL pH 1:1	BUFFER INDEX		% K	% Mg	% Ca	% H	% Na
		percent RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE			meq/100g					
81355	222Z A1	4.1 H	24 H	62 VH		136 L	606 VH	2495 M		5.7	6.5	22.7	1.5	22.2	55.0	21.3	
81356	222Z A2																
81357	222Z B1	4.0 H	21 M	55 H		133 L	610 VH	2302 L		5.4	6.4	23.7	1.4	21.4	48.6	28.6	
81358	222Z B2																

LAB NUMBER *399*	NITRATE-N (FIA) SURFACE ppm	SURFACE lbs/A	SURFACE depth (in)	SUBSOIL 1 ppm	SUBSOIL 1 lbs/A	SUBSOIL 1 depth (in)	SUBSOIL 2 ppm	SUBSOIL 2 lbs/A	SUBSOIL 2 depth (in)	Total lbs/A	SULFUR S ICAP ppm RATE	ZINC Zn DTPA ppm RATE	MANGANESE Mn DTPA ppm RATE	IRON Fe DTPA ppm RATE	COPPER Cu DTPA ppm RATE	BORON B SORB. DTPA ppm RATE	EXCESS LIME RATE	SOLUBLE SALTS 1:1 mmhos/cm RATE	
81355	14																		
81356	4																		
81357	13																		
81358	3																		

REV.10/17

The above analytical results apply only to the sample(s) submitted. Samples are retained a maximum of 30 days.

REPORT NUMBER
22-257-0136
COMPLETED DATE
Sep 16, 2022
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Sep 14, 2022

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Sep 16, 2022

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78B A1

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SOIL ANALYSIS REPORT

NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)

LAB NUMBER *400*	SAMPLE IDENTIFICATION	ORGANIC MATTER L.O.I. percent	RATE	PHOSPHORUS P_1 (WEAK BRAY) 1:7 ppm	RATE	PHOSPHORUS P_2 (STRONG BRAY) 1:7 ppm	RATE	OLSEN BICARBONATE P ppm	RATE	POTASSIUM K ppm	RATE	MAGNESIUM Mg ppm	RATE	CALCIUM Ca ppm	RATE	SODIUM Na ppm	RATE	pH SOIL pH 1:1	pH BUFFER INDEX	CATION EXCHANGE CAPACITY C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED) % K	% Mg	% Ca	% H	% Na
03548	78B A1	3.1	M	89	VH	114	VH	58	VH	134	M	491	VH	2999	H			6.5	6.8	21.0	1.6	19.5	71.4	7.5	
03550	78B A2																								

LAB NUMBER *400*	NITRATE-N (FIA) SURFACE ppm	SURFACE lbs/A	SURFACE depth (in)	SUBSOIL 1 ppm	SUBSOIL 1 lbs/A	SUBSOIL 1 depth (in)	SUBSOIL 2 ppm	SUBSOIL 2 lbs/A	SUBSOIL 2 depth (in)	Total lbs/A	SULFUR S ICAP ppm	RATE	ZINC Zn DTPA ppm	RATE	MANGANESE Mn DTPA ppm	RATE	IRON Fe DTPA ppm	RATE	COPPER Cu DTPA ppm	RATE	BORON B SORB. DTPA ppm	RATE	EXCESS LIME RATE	SOLUBLE SALTS 1:1 mmhos/cm	RATE
03548	28																								
03550	11																								

REV.10/17

The above analytical results apply only to the sample(s) submitted. Samples are retained a maximum of 30 days.

REPORT NUMBER
22-266-0104
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Sep 23, 2022

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TODAY'S DATE
Sep 27, 2022

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SOIL ANALYSIS REPORT

NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)

LAB NUMBER *400*	SAMPLE IDENTIFICATION	ORGANIC MATTER L.O.I. percent	RATE	PHOSPHORUS P_1 (WEAK BRAY) 1:7 ppm	RATE	PHOSPHORUS P_2 (STRONG BRAY) 1:7 ppm	RATE	OLSEN BICARBONATE P ppm	RATE	POTASSIUM K ppm	RATE	MAGNESIUM Mg ppm	RATE	CALCIUM Ca ppm	RATE	SODIUM Na ppm	RATE	pH SOIL pH 1:1	BUFFER INDEX	CATION EXCHANGE CAPACITY C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED) % K	% Mg	% Ca	% H	% Na
19160	103A A1	3.9	H	50	VH	75	VH			183	M	540	VH	3147	M			6.2	6.6	23.5	2.0	19.1	67.0	11.9	
19161	103A A2																								
19162	78A A1	3.5	M	46	VH	78	VH	36	VH	165	M	515	VH	2851	H			6.5	6.8	20.5	2.1	20.9	69.5	7.5	
19163	78A A2																								
19164	78A B1	3.4	M	40	VH	66	VH	32	VH	187	M	663	VH	3543	H			6.7		23.7	2.0	23.3	74.7	0.0	
19165	78A B2																								

LAB NUMBER *400*	NITRATE-N (FIA) SURFACE ppm	SURFACE lbs/A	SURFACE depth (in)	SUBSOIL 1 ppm	SUBSOIL 1 lbs/A	SUBSOIL 1 depth (in)	SUBSOIL 2 ppm	SUBSOIL 2 lbs/A	SUBSOIL 2 depth (in)	Total lbs/A	SULFUR S ICAP ppm	RATE	ZINC Zn DTPA ppm	RATE	MANGANESE Mn DTPA ppm	RATE	IRON Fe DTPA ppm	RATE	COPPER Cu DTPA ppm	RATE	BORON B SORB. DTPA ppm	RATE	EXCESS LIME RATE	SOLUBLE SALTS 1:1 mmhos/cm	RATE
19160	12																								
19161	4																								
19162	11																								
19163	4																								
19164	9																								
19165	4																								

REV.10/17

The above analytical results apply only to the sample(s) submitted. Samples are retained a maximum of 30 days.

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22-279-0380
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Oct 10, 2022

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103D A1

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SIOUX FALLS SD 57104-6407

SOIL ANALYSIS REPORT

NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)

LAB NUMBER *400*	SAMPLE IDENTIFICATION	ORGANIC MATTER L.O.I.	PHOSPHORUS			POTASSIUM	MAGNESIUM	CALCIUM	SODIUM	pH		CATION EXCHANGE CAPACITY C.E.C.	PERCENT BASE SATURATION (COMPUTED)				
			P_1 (WEAK BRAY) 1:7	P_2 (STRONG BRAY) 1:7	OLSEN BICARBONATE P	K	Mg	Ca	Na	SOIL pH 1:1	BUFFER INDEX	meq/100g	% K	% Mg	% Ca	% H	% Na
		percent RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE								
88242	103D A1	3.3 M	29 H	51 H	22 H	181 H	466 VH	2650 H		6.5	6.8	19.0	2.4	20.4	69.7	7.5	
88243	103D A2																
88244	103D B1	3.2 M	25 H	52 H	22 H	147 M	503 VH	2539 H		6.5	6.8	18.7	2.0	22.4	67.9	7.7	
88245	103D B2																
88246	192Z A1	3.9 H	48 VH	83 VH		154 M	588 VH	2396 M		5.8	6.6	21.4	1.8	22.9	56.0	19.3	
88247	192Z A2																
88248	192Z B1	4.0 H	54 VH	94 VH		142 M	559 VH	2303 M		5.9	6.6	19.9	1.8	23.4	57.9	16.9	
88249	192Z B2																

LAB NUMBER *400*	NITRATE-N (FIA) SURFACE ppm	SURFACE lbs/A	SURFACE depth (in)	SUBSOIL 1 ppm	SUBSOIL 1 lbs/A	SUBSOIL 1 depth (in)	SUBSOIL 2 ppm	SUBSOIL 2 lbs/A	SUBSOIL 2 depth (in)	Total lbs/A	SULFUR S ICAP ppm RATE	ZINC Zn DTPA ppm RATE	MANGANESE Mn DTPA ppm RATE	IRON Fe DTPA ppm RATE	COPPER Cu DTPA ppm RATE	BORON B SORB. DTPA ppm RATE	EXCESS LIME RATE	SOLUBLE SALTS 1:1 mmhos/cm RATE	
88242	10																		
88243	4																		
88244	9																		
88245	3																		
88246	14																		
88247	5																		
88248	13																		
88249	5																		

REV.10/17

The above analytical results apply only to the sample(s) submitted. Samples are retained a maximum of 30 days.

Site ID:	223Z South (Remaining from 2021)		
Availible Acres:	65	Soil Report Number:	Midwest Labs: 21-245-0101

Soil Sample Results

NITRATE IN SOIL (0 -6") (PPM)	8
NITRATE IN SOIL (6-24") (PPM)	2
TOTAL SOIL NITRATE (LBS./ACRE)	28

Crop Information

CROP	Alfalfa
YIELD	5 Tons/A
Nitrogen required by crop (LBS/ACRE)	230

Sludge Analysis

Ammonium, NH_4 (LBS/DT)	9,715.00	mg/kg
Volatization Factor	1.00	
Available Ammounium NH_4 (LBS/DT)	9,715.00	mg/kg
TKN (LBS/DT)	50,470.00	mg/kg
MINERALIZATION	0.20	
ORGANIC NITROGEN (LBS/DT)	8,151.00	mg/kg
Nitrate Nitrogen (LBS/DT)	20.00	mg/kg
Total Suspended Solids	25.69%	
Calculated Plant Available Nitrogen (Lbs./Ton)	**35.77**	

Application Rate Updates

Gallons per Acre/ Wet tons to Site	Date

Application Rate

Nitrogen need from Biosolids	202
Loading Rate from Biosolids (DT/ACRE)	5.65
Wet Tons per Acre	21.98
Calculated Gallons per Acre	5,271
Wet tons Per Field	**1,357**

5% safety factor figured into Wet Tons Per Field calculation

*** Constants for Nirate**

Nitrate in soil (0 -6") PPM x 2 = lbs/acre

Nitrate in soil (6-24") PPM x 6 = lbs/acre

** 1 PPM x 2 = 1 lbs/acre

****** Volatization Factor**

Injected = 1

Surface Applied = .5

Cake over 20% = 1

*****Minerialzation rates**

1st year = 20%

2nd year and up (with yealry applications) = 30%

Data Entered by user
Calculation

Site ID:	223Z North (Remaining from 2021)		
Availible Acres:	65	Soil Report Number:	Midwest Labs: 21-245-0101

Soil Sample Results

NITRATE IN SOIL (0 -6") (PPM)	7
NITRATE IN SOIL (6-24") (PPM)	3
TOTAL SOIL NITRATE (LBS./ACRE)	32

Crop Information

CROP	Alfalfa
YIELD	5 Tons/A
Nitrogen required by crop (LBS/ACRE)	230

Sludge Analysis

Ammonium, NH_4 (LBS/DT)	9,715.00	mg/kg
Volatization Factor	1.00	
Available Ammounium NH_4 (LBS/DT)	9,715.00	mg/kg
TKN (LBS/DT)	50,470.00	mg/kg
MINERALIZATION	0.20	
ORGANIC NITROGEN (LBS/DT)	8,151.00	mg/kg
Nitrate Nitrogen (LBS/DT)	20.00	mg/kg
Total Suspended Solids	25.69%	
Calculated Plant Available Nitrogen (Lbs./Ton)	**35.77**	

Application Rate Updates

Gallons per Acre/ Wet tons to Site	Date

Application Rate

Nitrogen need from Biosolids	198
Loading Rate from Biosolids (DT/ACRE)	5.54
Wet Tons per Acre	21.55
Calculated Gallons per Acre	5,167
Wet tons Per Field	**1,330**

5% safety factor figured into Wet Tons Per Field calculation

*** Constants for Nirate**

Nitrate in soil (0 -6") PPM x 2 = lbs/acre

Nitrate in soil (6-24") PPM x 6 = lbs/acre

** 1 PPM x 2 = 1 lbs/acre

****** Volatization Factor**

Injected = 1

Surface Applied = .5

Cake over 20% = 1

*****Minerialzation rates**

1st year = 20%

2nd year and up (with yealry applications) = 30%

Data Entered by user
Calculation

Site ID:	176Z East		
Availible Acres:	24.5	Soil Report Number:	Midwest Labs: 21-320-1127

Soil Sample Results

NITRATE IN SOIL (0 -6") (PPM)	5
NITRATE IN SOIL (6-24") (PPM)	3
TOTAL SOIL NITRATE (LBS./ACRE)	28

Crop Information

CROP	Corn
YIELD	180 bu/A.
Nitrogen required by crop (LBS/ACRE)	216

Sludge Analysis

Ammonium, NH_4 (LBS/DT)	14,661.00	mg/kg
Volatization Factor	1.00	
Available Ammounium NH_4 (LBS/DT)	14,661.00	mg/kg
TKN (LBS/DT)	56,782.00	mg/kg
MINERALIZATION	0.20	
ORGANIC NITROGEN (LBS/DT)	8,424.20	mg/kg
Nitrate Nitrogen (LBS/DT)	26.00	mg/kg
Total Suspended Solids	29.30%	
Calculated Plant Available Nitrogen (Lbs./Ton)	**46.22**	

Application Rate Updates

Gallons per Acre/ Wet tons to Site	Date
394 wT/A	4-Apr
323	6-Apr

Application Rate

Nitrogen need from Biosolids	188
Loading Rate from Biosolids (DT/ACRE)	4.07
Wet Tons per Acre	13.88
Calculated Gallons per Acre	3,329
Wet tons Per Field	**323**

5% safety factor figured into Wet Tons Per Field calculation

Constants for Nirate

Nitrate in soil (0 -6") PPM x 2 = lbs/acre

Nitrate in soil (6-24") PPM x 6 = lbs/acre

1 PPM x 2 = 1 lbs/acre

Volatization Factor

Injected = 1

Surface Applied = .5

Cake over 20% = 1

Minerialzation rates

1st year = 20%

2nd year and up (with yealry applications) = 30%

Data Entered by user
Calculation

Site ID:	176Z West		
Availible Acres:	25	Soil Report Number:	Midwest Labs: 21-320-1127

Soil Sample Results

NITRATE IN SOIL (0 -6") (PPM)	8
NITRATE IN SOIL (6-24") (PPM)	4
TOTAL SOIL NITRATE (LBS./ACRE)	40

Crop Information

CROP	Corn
YIELD	180 bu/A.
Nitrogen required by crop (LBS/ACRE)	216

Sludge Analysis

Ammonium, NH_4 (LBS/DT)	14,661.00	mg/kg
Volatization Factor	1.00	
Available Ammounium NH_4 (LBS/DT)	14,661.00	mg/kg
TKN (LBS/DT)	56,782.00	mg/kg
MINERALIZATION	0.20	
ORGANIC NITROGEN (LBS/DT)	8,424.20	mg/kg
Nitrate Nitrogen (LBS/DT)	26.00	mg/kg
Total Suspended Solids	29.30%	
Calculated Plant Available Nitrogen (Lbs./Ton)	**46.22**	

Application Rate Updates

Gallons per Acre/ Wet tons to Site	Date
377 Wt/A	4-Apr
309 wt/A	6-Apr

Application Rate

Nitrogen need from Biosolids	176
Loading Rate from Biosolids (DT/ACRE)	3.81
Wet Tons per Acre	13.00
Calculated Gallons per Acre	3,116
Wet tons Per Field	**309**

5% safety factor figured into Wet Tons Per Field calculation

Constants for Nirate

Nitrate in soil (0 -6") PPM x 2 = lbs/acre

Nitrate in soil (6-24") PPM x 6 = lbs/acre

1 PPM x 2 = 1 lbs/acre

Volatization Factor

Injected = 1

Surface Applied = .5

Cake over 20% = 1

Minerialzation rates

1st year = 20%

2nd year and up (with yealry applications) = 30%

Data Entered by user
Calculation

Site ID:	175Z East		
Availible Acres:	26	Soil Report Number:	Midwest Labs: 21-320-1126

Soil Sample Results

NITRATE IN SOIL (0 -6") (PPM)	5
NITRATE IN SOIL (6-24") (PPM)	4
TOTAL SOIL NITRATE (LBS./ACRE)	34

Crop Information

CROP	Corn
YIELD	180 bu/A.
Nitrogen required by crop (LBS/ACRE)	216

Sludge Analysis

Ammonium, NH_4 (LBS/DT)	14,661.00	mg/kg
Volatization Factor	1.00	
Available Ammounium NH_4 (LBS/DT)	14,661.00	mg/kg
TKN (LBS/DT)	56,782.00	mg/kg
MINERALIZATION	0.20	
ORGANIC NITROGEN (LBS/DT)	8,424.20	mg/kg
Nitrate Nitrogen (LBS/DT)	26.00	mg/kg
Total Suspended Solids	29.30%	
Calculated Plant Available Nitrogen (Lbs./Ton)	**46.22**	

Application Rate Updates

Gallons per Acre/ Wet tons to Site	Date

Application Rate

Nitrogen need from Biosolids	182
Loading Rate from Biosolids (DT/ACRE)	3.94
Wet Tons per Acre	13.44
Calculated Gallons per Acre	3,223
Wet tons Per Field	**332**

5% safety factor figured into Wet Tons Per Field calculation

*** Constants for Nirate**

Nitrate in soil (0 -6") PPM x 2 = lbs/acre

Nitrate in soil (6-24") PPM x 6 = lbs/acre

** 1 PPM x 2 = 1 lbs/acre

****** Volatization Factor**

Injected = 1

Surface Applied = .5

Cake over 20% = 1

*****Minerialzation rates**

1st year = 20%

2nd year and up (with yealry applications) = 30%

Data Entered by user
Calculation

Site ID:	175Z West

Availible Acres:	26	Soil Report Number:	Midwest Labs: 21-320-1126

Soil Sample Results

NITRATE IN SOIL (0 -6") (PPM)	8
NITRATE IN SOIL (6-24") (PPM)	3
TOTAL SOIL NITRATE (LBS./ACRE)	34

Crop Information

CROP	Corn
YIELD	180 bu/A.
Nitrogen required by crop (LBS/ACRE)	216

Sludge Analysis

Ammonium, NH_4 (LBS/DT)	14,661.00	mg/kg
Volatization Factor	1.00	
Available Ammounium NH_4 (LBS/DT)	14,661.00	mg/kg
TKN (LBS/DT)	56,782.00	mg/kg
MINERALIZATION	0.20	
ORGANIC NITROGEN (LBS/DT)	8,424.20	mg/kg
Nitrate Nitrogen (LBS/DT)	26.00	mg/kg
Total Suspended Solids	29.30%	
Calculated Plant Available Nitrogen (Lbs./Ton)	**46.22**	

Application Rate Updates

Gallons per Acre/ Wet tons to Site	Date

Application Rate

Nitrogen need from Biosolids	182
Loading Rate from Biosolids (DT/ACRE)	3.94
Wet Tons per Acre	13.44
Calculated Gallons per Acre	3,223
Wet tons Per Field	**332**

5% safety factor figured into Wet Tons Per Field calculation

*** Constants for Nirate**

Nitrate in soil (0 -6") PPM x 2 = lbs/acre

Nitrate in soil (6-24") PPM x 6 = lbs/acre

** 1 PPM x 2 = 1 lbs/acre

****** Volatization Factor**

Injected = 1

Surface Applied = .5

Cake over 20% = 1

*****Minerialzation rates**

1st year = 20%

2nd year and up (with yealry applications) = 30%

Data Entered by user
Calculation

Site ID:	107C		
Availible Acres:	37.3	Soil Report Number:	Midwest Labs: 21-320-1124

Soil Sample Results

NITRATE IN SOIL (0 -6") (PPM)	12
NITRATE IN SOIL (6-24") (PPM)	7
TOTAL SOIL NITRATE (LBS./ACRE)	66

Crop Information

CROP	Soybean
YIELD	50 bu/A.
Nitrogen required by crop (LBS/ACRE)	230

Sludge Analysis

Ammonium, NH_4 (LBS/DT)	7,330.00	mg/kg
Volatization Factor	1.00	
Available Ammounium NH_4 (LBS/DT)	7,330.00	mg/kg
TKN (LBS/DT)	48,359.00	mg/kg
MINERALIZATION	0.20	
ORGANIC NITROGEN (LBS/DT)	8,205.80	mg/kg
Nitrate Nitrogen (LBS/DT)	26.00	mg/kg
Total Suspended Solids	29.00%	
Calculated Plant Available Nitrogen (Lbs./Ton)	**31.12**	

Application Rate Updates

Gallons per Acre/ Wet tons to Site	Date

Application Rate

Nitrogen need from Biosolids	164
Loading Rate from Biosolids (DT/ACRE)	5.27
Wet Tons per Acre	18.17
Calculated Gallons per Acre	4,357
Wet tons Per Field	**644**

5% safety factor figured into Wet Tons Per Field calculation

*** Constants for Nirate**

Nitrate in soil (0 -6") PPM x 2 = lbs/acre

Nitrate in soil (6-24") PPM x 6 = lbs/acre

** 1 PPM x 2 = 1 lbs/acre

****** Volatization Factor**

Injected = 1

Surface Applied = .5

Cake over 20% = 1

*****Minerialzation rates**

1st year = 20%

2nd year and up (with yealry applications) = 30%

Data Entered by user
Calculation

Site ID:	107A E		
Availible Acres:	21.75	Soil Report Number:	Midwest Labs: 21-320-1123

Soil Sample Results

NITRATE IN SOIL (0 -6") (PPM)	16
NITRATE IN SOIL (6-24") (PPM)	8
TOTAL SOIL NITRATE (LBS./ACRE)	80

Crop Information

CROP	Soybean
YIELD	50 bu/A.
Nitrogen required by crop (LBS/ACRE)	230

Sludge Analysis

Ammonium, NH_4 (LBS/DT)	14,661.00	mg/kg
Volatization Factor	1.00	
Available Ammounium NH_4 (LBS/DT)	14,661.00	mg/kg
TKN (LBS/DT)	56,782.00	mg/kg
MINERALIZATION	0.20	
ORGANIC NITROGEN (LBS/DT)	8,424.20	mg/kg
Nitrate Nitrogen (LBS/DT)	26.00	mg/kg
Total Suspended Solids	23.27%	
Calculated Plant Available Nitrogen (Lbs./Ton)	**46.22**	

Application Rate Updates

Gallons per Acre/ Wet tons to Site	Date

Application Rate

Nitrogen need from Biosolids	150
Loading Rate from Biosolids (DT/ACRE)	3.25
Wet Tons per Acre	13.95
Calculated Gallons per Acre	3,344
Wet tons Per Field	**288**

5% safety factor figured into Wet Tons Per Field calculation

*** Constants for Nirate**

Nitrate in soil (0 -6") PPM x 2 = lbs/acre

Nitrate in soil (6-24") PPM x 6 = lbs/acre

** 1 PPM x 2 = 1 lbs/acre

****** Volatization Factor**

Injected = 1

Surface Applied = .5

Cake over 20% = 1

*****Minerialzation rates**

1st year = 20%

2nd year and up (with yealry applications) = 30%

Data Entered by user
Calculation

Site ID:	107A W		
Availible Acres:	21.75	Soil Report Number:	Midwest Labs: 21-320-1126

Soil Sample Results

NITRATE IN SOIL (0 -6") (PPM)	9
NITRATE IN SOIL (6-24") (PPM)	10
TOTAL SOIL NITRATE (LBS./ACRE)	78

Crop Information

CROP	Soybean
YIELD	50 bu/A.
Nitrogen required by crop (LBS/ACRE)	230

Sludge Analysis

Ammonium, NH_4 (LBS/DT)	14,661.00	mg/kg
Volatization Factor	1.00	
Available Ammounium NH_4 (LBS/DT)	14,661.00	mg/kg
TKN (LBS/DT)	56,782.00	mg/kg
MINERALIZATION	0.20	
ORGANIC NITROGEN (LBS/DT)	8,424.20	mg/kg
Nitrate Nitrogen (LBS/DT)	26.00	mg/kg
Total Suspended Solids	23.27%	
Calculated Plant Available Nitrogen (Lbs./Ton)	**46.22**	

Application Rate Updates

Gallons per Acre/ Wet tons to Site	Date

Application Rate

Nitrogen need from Biosolids	152
Loading Rate from Biosolids (DT/ACRE)	3.29
Wet Tons per Acre	14.13
Calculated Gallons per Acre	3,389
Wet tons Per Field	**292**

5% safety factor figured into Wet Tons Per Field calculation

*** Constants for Nirate**

Nitrate in soil (0 -6") PPM x 2 = lbs/acre

Nitrate in soil (6-24") PPM x 6 = lbs/acre

** 1 PPM x 2 = 1 lbs/acre

****** Volatization Factor**

Injected = 1

Surface Applied = .5

Cake over 20% = 1

*****Minerialzation rates**

1st year = 20%

2nd year and up (with yealry applications) = 30%

Data Entered by user
Calculation

Site ID:	184A N		
Availible Acres:	26.7	Soil Report Number:	Midwest Labs: 21-104-0053

Soil Sample Results

NITRATE IN SOIL (0 -6") (PPM)	16
NITRATE IN SOIL (6-24") (PPM)	9
TOTAL SOIL NITRATE (LBS./ACRE)	86

Crop Information

CROP	Soybean
YIELD	50 bu/A.
Nitrogen required by crop (LBS/ACRE)	230

Sludge Analysis

Ammonium, NH_4 (LBS/DT)	8,331.00	mg/kg
Volatization Factor	1.00	
Available Ammounium NH_4 (LBS/DT)	8,331.00	mg/kg
TKN (LBS/DT)	56,857.00	mg/kg
MINERALIZATION	0.20	
ORGANIC NITROGEN (LBS/DT)	9,705.20	mg/kg
Nitrate Nitrogen (LBS/DT)	26.00	mg/kg
Total Suspended Solids	23.75%	
Calculated Plant Available Nitrogen (Lbs./Ton)	**36.12**	

Application Rate Updates

Gallons per Acre/ Wet tons to Site	Date

Application Rate

Nitrogen need from Biosolids	144
Loading Rate from Biosolids (DT/ACRE)	3.99
Wet Tons per Acre	16.78
Calculated Gallons per Acre	4,025
Wet tons Per Field	**426**

5% safety factor figured into Wet Tons Per Field calculation

*** Constants for Nirate**

Nitrate in soil (0 -6") PPM x 2 = lbs/acre

Nitrate in soil (6-24") PPM x 6 = lbs/acre

** 1 PPM x 2 = 1 lbs/acre

****** Volatization Factor**

Injected = 1

Surface Applied = .5

Cake over 20% = 1

*****Minerialzation rates**

1st year = 20%

2nd year and up (with yealry applications) = 30%

Data Entered by user
Calculation

Site ID:	184A S		
Availible Acres:	26.7	Soil Report Number:	Midwest Labs: 21-104-0053

Soil Sample Results

NITRATE IN SOIL (0 -6") (PPM)	22
NITRATE IN SOIL (6-24") (PPM)	19
TOTAL SOIL NITRATE (LBS./ACRE)	158

Crop Information

CROP	Soybean
YIELD	50 bu/A.
Nitrogen required by crop (LBS/ACRE)	230

Application Rate Updates

Gallons per Acre/ Wet tons to Site	Date

Sludge Analysis

Ammonium, NH_4 (LBS/DT)	8,331.00	mg/kg
Volatization Factor	1.00	
Available Ammounium NH_4 (LBS/DT)	8,331.00	mg/kg
TKN (LBS/DT)	56,857.00	mg/kg
MINERALIZATION	0.20	
ORGANIC NITROGEN (LBS/DT)	9,705.20	mg/kg
Nitrate Nitrogen (LBS/DT)	26.00	mg/kg
Total Suspended Solids	23.75%	
Calculated Plant Available Nitrogen (Lbs./Ton)	**36.12**	

Application Rate

Nitrogen need from Biosolids	72
Loading Rate from Biosolids (DT/ACRE)	1.99
Wet Tons per Acre	8.39
Calculated Gallons per Acre	2,012
Wet tons Per Field	**213**

5% safety factor figured into Wet Tons Per Field calculation

*** Constants for Nirate**

Nitrate in soil (0 -6") PPM x 2 = lbs/acre

Nitrate in soil (6-24") PPM x 6 = lbs/acre

** 1 PPM x 2 = 1 lbs/acre

****** Volatization Factor**

Injected = 1

Surface Applied = .5

Cake over 20% = 1

*****Minerialzation rates**

1st year = 20%

2nd year and up (with yealry applications) = 30%

Data Entered by user

Calculation

Site ID:	120C		
Availible Acres:	44	Soil Report Number:	Midwest Labs: 22-174-0433

Soil Sample Results

NITRATE IN SOIL (0 -6") (PPM)	8
NITRATE IN SOIL (6-24") (PPM)	2
TOTAL SOIL NITRATE (LBS./ACRE)	28

Crop Information

CROP	Grass Hay
YIELD	5 Tons/A
Nitrogen required by crop (LBS/ACRE)	125

Sludge Analysis

Ammonium, NH_4 (LBS/DT)	11,620.00	mg/kg
Volatization Factor	1.00	
Available Ammounium NH_4 (LBS/DT)	11,620.00	mg/kg
TKN (LBS/DT)	44,657.00	mg/kg
MINERALIZATION	0.20	
ORGANIC NITROGEN (LBS/DT)	6,607.40	mg/kg
Nitrate Nitrogen (LBS/DT)	26.00	mg/kg
Total Suspended Solids	26.35%	
Calculated Plant Available Nitrogen (Lbs./Ton)	**36.51**	

Application Rate Updates

Gallons per Acre/ Wet tons to Site	Date

Application Rate

Nitrogen need from Biosolids	97
Loading Rate from Biosolids (DT/ACRE)	2.66
Wet Tons per Acre	10.08
Calculated Gallons per Acre	2,418
Wet tons Per Field	**421**

5% safety factor figured into Wet Tons Per Field calculation

*** Constants for Nirate**

Nitrate in soil (0 -6") PPM x 2 = lbs/acre

Nitrate in soil (6-24") PPM x 6 = lbs/acre

** 1 PPM x 2 = 1 lbs/acre

****** Volatization Factor**

Injected = 1

Surface Applied = .5

Cake over 20% = 1

*****Minerialzation rates**

1st year = 20%

2nd year and up (with yealry applications) = 30%

Data Entered by user
Calculation

Site ID:	223Z North

Availible Acres:	65	Soil Report Number:	Midwest Labs: 22-230-0040

Soil Sample Results

NITRATE IN SOIL (0 -6") (PPM)	10
NITRATE IN SOIL (6-24") (PPM)	3
TOTAL SOIL NITRATE (LBS./ACRE)	38

Crop Information

CROP	Alfalfa
YIELD	5 Tons/A
Nitrogen required by crop (LBS/ACRE)	230

Sludge Analysis

Ammonium, NH_4 (LBS/DT)	9,957.00	mg/kg
Volatization Factor	1.00	
Available Ammounium NH_4 (LBS/DT)	9,957.00	mg/kg
TKN (LBS/DT)	49,044.00	mg/kg
MINERALIZATION	0.30	
ORGANIC NITROGEN (LBS/DT)	11,726.10	mg/kg
Nitrate Nitrogen (LBS/DT)	26.00	mg/kg
Total Suspended Solids	24.57%	
Calculated Plant Available Nitrogen (Lbs./Ton)	**43.42**	

Application Rate Updates

Gallons per Acre/ Wet tons to Site	Date

Application Rate

Nitrogen need from Biosolids	192
Loading Rate from Biosolids (DT/ACRE)	4.42
Wet Tons per Acre	18.00
Calculated Gallons per Acre	4,316
Wet tons Per Field	**1,111**

5% safety factor figured into Wet Tons Per Field calculation

*** Constants for Nirate**

Nitrate in soil (0 -6") PPM x 2 = lbs/acre

Nitrate in soil (6-24") PPM x 6 = lbs/acre

** 1 PPM x 2 = 1 lbs/acre

****** Volatization Factor**

Injected = 1

Surface Applied = .5

Cake over 20% = 1

*****Minerialzation rates**

1st year = 20%

2nd year and up (with yealry applications) = 30%

Data Entered by user
Calculation

Site ID:	222Z		
Availible Acres:	60	Soil Report Number:	Midwest Labs: 22-236-0070

Soil Sample Results

NITRATE IN SOIL (0 -6") (PPM)	14
NITRATE IN SOIL (6-24") (PPM)	4
TOTAL SOIL NITRATE (LBS./ACRE)	52

Crop Information

CROP	Alfalfa
YIELD	5 Tons/A
Nitrogen required by crop (LBS/ACRE)	230

Sludge Analysis

Ammonium, NH_4 (LBS/DT)	12,687.00	mg/kg
Volatization Factor	1.00	
Available Ammounium NH_4 (LBS/DT)	12,687.00	mg/kg
TKN (LBS/DT)	55,668.00	mg/kg
MINERALIZATION	0.30	
ORGANIC NITROGEN (LBS/DT)	12,894.30	mg/kg
Nitrate Nitrogen (LBS/DT)	26.00	mg/kg
Total Suspended Solids	21.86%	
Calculated Plant Available Nitrogen (Lbs./Ton)	**51.21**	

Application Rate Updates

Gallons per Acre/ Wet tons to Site	Date

Application Rate

Nitrogen need from Biosolids	178
Loading Rate from Biosolids (DT/ACRE)	3.48
Wet Tons per Acre	15.90
Calculated Gallons per Acre	3,813
Wet tons Per Field	**906**

5% safety factor figured into Wet Tons Per Field calculation

*** Constants for Nirate**

Nitrate in soil (0 -6") PPM x 2 = lbs/acre

Nitrate in soil (6-24") PPM x 6 = lbs/acre

** 1 PPM x 2 = 1 lbs/acre

****** Volatization Factor**

Injected = 1

Surface Applied = .5

Cake over 20% = 1

*****Minerialzation rates**

1st year = 20%

2nd year and up (with yealry applications) = 30%

Data Entered by user
Calculation

Site ID: 78B West (40 Acres)

Availible Acres:	25	Soil Report Number:	Midwest Labs: 22-257-0136

Soil Sample Results

NITRATE IN SOIL (0 -6") (PPM)	28
NITRATE IN SOIL (6-24") (PPM)	11
TOTAL SOIL NITRATE (LBS./ACRE)	122

Crop Information

CROP	Soybeans
YIELD	50 Bu./A
Nitrogen required by crop (LBS/ACRE)	230

Sludge Analysis

Ammonium, NH_4 (LBS/DT)	12,687.00	mg/kg
Volatization Factor	1.00	
Available Ammounium NH_4 (LBS/DT)	12,687.00	mg/kg
TKN (LBS/DT)	55,668.00	mg/kg
MINERALIZATION	0.30	
ORGANIC NITROGEN (LBS/DT)	12,894.30	mg/kg
Nitrate Nitrogen (LBS/DT)	20.00	mg/kg
Total Suspended Solids	21.86%	
Calculated Plant Available Nitrogen (Lbs./Ton)	**51.2026**	

Application Rate Updates

Gallons per Acre/ Wet tons to Site	Date

Application Rate

Nitrogen need from Biosolids	108
Loading Rate from Biosolids (DT/ACRE)	2.11
Wet Tons per Acre	9.65
Calculated Gallons per Acre	2,314
Wet tons Per Field	**229**

5% safety factor figured into Wet Tons Per Field calculation

*** Constants for Nirate**

Nitrate in soil (0 -6") PPM x 2 = lbs/acre

Nitrate in soil (6-24") PPM x 6 = lbs/acre

** 1 PPM x 2 = 1 lbs/acre

****** Volatization Factor**

Injected = 1

Surface Applied = .5

Cake over 20% = 1

*****Minerialzation rates**

1st year = 20%

2nd year and up (with yealry applications) = 30%

Data Entered by user

Calculation

Site ID:	78B West (40 Acres)

Availible Acres:	11	Soil Report Number:	Midwest Labs: 22-257-0136

Soil Sample Results

NITRATE IN SOIL (0 -6") (PPM)	28
NITRATE IN SOIL (6-24") (PPM)	11
TOTAL SOIL NITRATE (LBS./ACRE)	122

Crop Information

CROP	Soybeans
YIELD	50 Bu./A
Nitrogen required by crop (LBS/ACRE)	230

Sludge Analysis

Ammonium, NH_4 (LBS/DT)	1,302.00	mg/kg
Volatization Factor	1.00	
Available Ammounium NH_4 (LBS/DT)	1,302.00	mg/kg
TKN (LBS/DT)	6,294.00	mg/kg
MINERALIZATION	0.30	
ORGANIC NITROGEN (LBS/DT)	1,497.60	mg/kg
Nitrate Nitrogen (LBS/DT)	20.00	mg/kg
Total Suspended Solids	64.32%	
Calculated Plant Available Nitrogen (Lbs./Ton)	**5.6392**	

Application Rate Updates

Gallons per Acre/ Wet tons to Site	Date

Application Rate

Nitrogen need from Biosolids	108
Loading Rate from Biosolids (DT/ACRE)	19.15
Wet Tons per Acre	29.78
Calculated Gallons per Acre	7,140
Wet tons Per Field	**311**

5% safety factor figured into Wet Tons Per Field calculation

*** Constants for Nirate**

Nitrate in soil (0 -6") PPM x 2 = lbs/acre

Nitrate in soil (6-24") PPM x 6 = lbs/acre

** 1 PPM x 2 = 1 lbs/acre

****** Volatization Factor**

Injected = 1

Surface Applied = .5

Cake over 20% = 1

*****Minerialzation rates**

1st year = 20%

2nd year and up (with yealry applications) = 30%

Data Entered by user

Site ID:	103A		
Availible Acres:	22	Soil Report Number:	Midwest Labs: 22-266-104

Soil Sample Results

NITRATE IN SOIL (0 -6") (PPM)	12
NITRATE IN SOIL (6-24") (PPM)	4
TOTAL SOIL NITRATE (LBS./ACRE)	48

Crop Information

CROP	Corn
YIELD	180 bu/A
Nitrogen required by crop (LBS/ACRE)	216

Sludge Analysis

Ammonium, NH_4 (LBS/DT)	12,687.00	mg/kg
Volatization Factor	1.00	
Available Ammounium NH_4 (LBS/DT)	12,687.00	mg/kg
TKN (LBS/DT)	55,668.00	mg/kg
MINERALIZATION	0.30	
ORGANIC NITROGEN (LBS/DT)	12,894.30	mg/kg
Nitrate Nitrogen (LBS/DT)	20.00	mg/kg
Total Suspended Solids	21.86%	
Calculated Plant Available Nitrogen (Lbs./Ton)	**51.2026**	

Application Rate Updates

Gallons per Acre/ Wet tons to Site	Date

Application Rate

Nitrogen need from Biosolids	168
Loading Rate from Biosolids (DT/ACRE)	3.28
Wet Tons per Acre	15.01
Calculated Gallons per Acre	3,599
Wet tons Per Field	**314**

5% safety factor figured into Wet Tons Per Field calculation

*** Constants for Nirate**

Nitrate in soil (0 -6") PPM x 2 = lbs/acre

Nitrate in soil (6-24") PPM x 6 = lbs/acre

** 1 PPM x 2 = 1 lbs/acre

****** Volatization Factor**

Injected = 1

Surface Applied = .5

Cake over 20% = 1

*****Minerialzation rates**

1st year = 20%

2nd year and up (with yealry applications) = 30%

Data Entered by user

Calculation

Site ID:	78A		
Availible Acres:	55	Soil Report Number:	Midwest Labs: 22-266-104

Soil Sample Results

NITRATE IN SOIL (0 -6") (PPM)	11
NITRATE IN SOIL (6-24") (PPM)	4
TOTAL SOIL NITRATE (LBS./ACRE)	46

Crop Information

CROP	Corn
YIELD	180 Bu/A
Nitrogen required by crop (LBS/ACRE)	216

Sludge Analysis

Ammonium, NH_4 (LBS/DT)	13,507.00	mg/kg
Volatization Factor	1.00	
Available Ammounium NH_4 (LBS/DT)	13,507.00	mg/kg
TKN (LBS/DT)	54,881.00	mg/kg
MINERALIZATION	0.20	
ORGANIC NITROGEN (LBS/DT)	8,274.80	mg/kg
Nitrate Nitrogen (LBS/DT)	20.00	mg/kg
Total Suspended Solids	19.40%	
Calculated Plant Available Nitrogen (Lbs./Ton)	**43.6036**	

Application Rate Updates

Gallons per Acre/ Wet tons to Site	Date

Application Rate

Nitrogen need from Biosolids	170
Loading Rate from Biosolids (DT/ACRE)	3.90
Wet Tons per Acre	20.10
Calculated Gallons per Acre	4,819
Wet tons Per Field	**1,050**

5% safety factor figured into Wet Tons Per Field calculation

*** Constants for Nirate**

Nitrate in soil (0 -6") PPM x 2 = lbs/acre

Nitrate in soil (6-24") PPM x 6 = lbs/acre

** 1 PPM x 2 = 1 lbs/acre

****** Volatization Factor**

Injected = 1

Surface Applied = .5

Cake over 20% = 1

*****Minerialzation rates**

1st year = 20%

2nd year and up (with yealry applications) = 30%

Data Entered by user

Calculation

Site ID:	192Z		
Availible Acres:	73	Soil Report Number:	Midwest Labs: 22-279-0380

Soil Sample Results

NITRATE IN SOIL (0 -6") (PPM)	14
NITRATE IN SOIL (6-24") (PPM)	5
TOTAL SOIL NITRATE (LBS./ACRE)	58

Crop Information

CROP	Corn
YIELD	180
Nitrogen required by crop (LBS/ACRE)	216

Sludge Analysis

Ammonium, NH_4 (LBS/DT)	13,507.00	mg/kg
Volatization Factor	1.00	
Available Ammounium NH_4 (LBS/DT)	13,507.00	mg/kg
TKN (LBS/DT)	54,881.00	mg/kg
MINERALIZATION	0.20	
ORGANIC NITROGEN (LBS/DT)	8,274.80	mg/kg
Nitrate Nitrogen (LBS/DT)	20.00	mg/kg
Total Suspended Solids	19.40%	
Calculated Plant Available Nitrogen (Lbs./Ton)	**43.6036**	

Application Rate Updates

Gallons per Acre/ Wet tons to Site	Date

Application Rate

Nitrogen need from Biosolids	158
Loading Rate from Biosolids (DT/ACRE)	3.62
Wet Tons per Acre	18.68
Calculated Gallons per Acre	4,479
Wet tons Per Field	**1,295**

5% safety factor figured into Wet Tons Per Field calculation

*** Constants for Nirate**

Nitrate in soil (0 -6") PPM x 2 = lbs/acre

Nitrate in soil (6-24") PPM x 6 = lbs/acre

** 1 PPM x 2 = 1 lbs/acre

****** Volatization Factor**

Injected = 1

Surface Applied = .5

Cake over 20% = 1

*****Minerialzation rates**

1st year = 20%

2nd year and up (with yealry applications) = 30%

Data Entered by user
Calculation