

Protecting Our Water Environment



Metropolitan Water Reclamation District of Greater Chicago

***MONITORING AND RESEARCH
DEPARTMENT***

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ANNUAL BIOSOLIDS MANAGEMENT REPORT FOR 2021

September 2022

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ANNUAL BIOSOLIDS MANAGEMENT REPORT FOR 2021

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LIST OF ABBREVIATIONS

Acronym/Abbreviation	Meaning
°C	degrees Celsius
°F	degrees Fahrenheit
As	arsenic
Cd	cadmium
<i>CFR</i>	<i>Code of Federal Regulations</i>
CSD	Controlled Solids Distribution
Cu	copper
District	Metropolitan Water Reclamation District of Greater Chicago
DT	dry tons
Egan	John E. Egan
EQ	“Exceptional Quality”
Hg	mercury
IDOA	Illinois Department of Agriculture
IEPA	Illinois Environmental Protection Agency
kg	kilogram
Kirie	James C. Kirie
MBM	Metropolitan Biosolids Management, LLC
mg	milligram
MGD	million gallons per day
Mo	molybdenum
MPN	most probable number
N	nitrogen
NH ₃ -N	ammonia nitrogen
NH ₄ -N	ammonium nitrogen
Ni	nickel
NO ₃ ⁻ +NO ₂ ⁻ -N	nitrate plus nitrite nitrogen
NO ₃ ⁻ -N	nitrate nitrogen
O’Brien	Terrence J. O’Brien
Part 503	Title 40 Part 503
Pb	lead
PFRP	Process to Further Reduce Pathogens
PFU	plaque-forming unit
Se	selenium
SMA	Solids Management Area
TKN	total Kjeldahl nitrogen
TVS	total volatile solids
USEPA	United States Environmental Protection Agency
VAR	vector attraction reduction
WRP	water reclamation plant
Zn	zinc

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DISCLAIMER

Mention of proprietary equipment and chemicals in this report does not constitute endorsement by the Metropolitan Water Reclamation District of Greater Chicago.

FOREWORD

This report serves as a record of the data and information that fulfills the frequency of monitoring and the reporting requirements for 2021 for biosolids management by the District, as specified in the United States Environmental Protection Agency's (USEPA's) *Code of Federal Regulations (CFR)* Title 40 Part 503 (Part 503). The Part 503 reporting was done as required through the USEPA's online reporting system in February 2022.

OVERVIEW OF METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO BIOSOLIDS PRODUCTS AND UTILIZATION PROGRAM

The District operates seven water reclamation plants (WRPs), namely the Stickney, Calumet, Terrence J. O'Brien (O'Brien), John E. Egan (Egan), Hanover Park, James C. Kirie (Kirie), and Lemont WRPs. Four WRPs, Stickney, Calumet, Egan, and Hanover Park, produce final biosolids products. Under normal operations, the untreated sludge generated at the Kirie WRP is sent to the Egan WRP, and sludge from the O'Brien and Lemont WRPs is sent to the Stickney WRP for processing into final products. The processing of biosolids at the four WRPs that generate final biosolids products includes anaerobic digestion at 35°C for at least 15 days of detention time to meet the 40 *CFR* Part 503 Class B pathogen reduction requirements. The metal concentrations in all biosolids produced at the District are well below the pollutant concentration limits established in Table 3 of Part 503.13(b)(3). The additional processing to achieve the final products varies between the four WRPs as indicated in the description of the biosolids products outlined below.

Biosolids Products at the Metropolitan Water Reclamation District of Greater Chicago

- **Dewatered Class B Biosolids:** These biosolids are produced primarily by centrifugation of anaerobically digested liquid biosolids (~5 percent solids content) to approximately 25 percent solids content (centrifuge cake). Alternatively, the anaerobically digested liquid biosolids are stored temporarily in lagoons, then placed on drying beds for partial (semi) drying (>20 percent solids content) through mechanical agitation before use. These dewatered biosolids meet the Class B pathogen standards of the USEPA Part 503 biosolids rule and meet Vector Attraction Reduction (VAR) requirements through timely incorporation into land. This product is produced at the Stickney and Calumet WRPs, and sometimes at the Egan WRP (centrifuged biosolids), and commonly applied to farmland as a fertilizer.
- **Air-dried Exceptional Quality Biosolids:** These biosolids are produced through the aging (typically for over one year) of centrifuge cake biosolids or digested sludge in lagoons followed by air-drying to at least 65 percent solids content. This air-dried material meets the "Exceptional Quality" (EQ) standards of the USEPA Part 503 biosolids rule, which designates biosolids that meet the strictest trace metals, pathogen, and VAR requirements. This product is produced at the Stickney and Calumet WRPs, and since the early 1990s, it has been used under a Controlled Solids Distribution (CSD) program as a fertilizer or soil amendment on areas such as recreational fields and golf courses and for reclamation of urban soils. The material is currently voluntarily registered as a soil amendment with the Illinois Department of Agriculture (IDOA).
- **Composted Exceptional Quality Biosolids:** The composted biosolids are produced at the Stickney WRP Harlem Avenue and at the Calumet East Solids Management Areas (SMAs) under permits issued by the Illinois Environmental

Protection Agency (IEPA) Bureau of Land and according to operational standards of the Federal 40 *CFR* Part 503 Process to Further Reduce Pathogens (PFRP) protocol (USEPA, 1993). The composting recipe consists of one part centrifuge cake biosolids and three parts woodchips. The composting process used is open windrow composting for a minimum of 23 days, a minimum of five turnings, temperature maintained at a minimum of 55°C, and then followed by 16 weeks of curing. The product produced is currently voluntarily registered as a soil amendment with the IDOA.

- **Liquid Class B Biosolids:** The digested biosolids produced at the Hanover Park WRP are stored and thickened (~5 percent solids content) in lagoons on the grounds of the Hanover Park WRP. This material meets the 40 *CFR* Part 503 Class B pathogen and vector attraction reduction requirements and is applied through subsurface injection at the on-site Fischer Farm as a fertilizer for crops, mainly corn. The Fisher Farm has an underdrain system that returns drainage from the fields back to the WRP.
- **Biosolids Pellets:** The product is produced by heat-drying at a pelletizer facility located at the Stickney WRP that is owned and operated by Metropolitan Biosolids Management, LLC (MBM), a subsidiary of Veolia Water North America. The operation generates fertilizer pellets that meet EQ biosolids standards with a solids content greater than 90 percent.

Metropolitan Water Reclamation District of Greater Chicago Site-Specific Designations and Adjusted Standards for Biosolids Quality and Utilization

- **Illinois Pollution Control Board Adjusted Standards (AS 95-4 and 02-03):** This adjusted standard, originally granted to the District in 1995 by the Illinois Pollution Control Board, allows the use of lagoon-aged (at least 1.5 years) air-dried (at least 65 percent solids content) biosolids for establishing the final vegetative layer on landfills as a landfill final cover. Class A status is not necessary for lagoon-aged air-dried biosolids used for final cover.
- **United States Environmental Protection Agency Site-Specific Process to Further Reduce Pathogens Certification:** This site-specific certification of the Calumet and Stickney WRPs' biosolids processing trains was granted in 2002. The certification specifies that biosolids produced by these processing trains in accordance with all parameters specified in the certification are designated Class A. The codified operational parameters are related to digestion time and temperature, lagoon storage time, loading rates, and frequency of agitation on drying cells. Any biosolids which do not comply with any of the codified parameters for the biosolids processing trains are to be isolated from PFRP-compliant biosolids and must be tested to meet the Part 503 pathogen (virus and helminth) requirements to be designated Class A. Currently, this certification is renewable every five years. Over the past nine years, due to operational efficiencies related to lagoon storage time and air-drying operations,

biosolids processing at both the Calumet and Stickney WRPs have not been operated to follow the codified parameters; therefore, all air-dried EQ biosolids are tested for helminth ova and viruses.

Requirements for Co-Disposal of Unsuitable Biosolids Materials at Landfills

Some biosolids are considered as unsuitable for land application because they contain gravel, wood debris, and dust from the sweeping of roads at biosolids processing sites. These materials are co-disposed with municipal solid wastes at a nonhazardous waste landfill according to the federal requirements in 40 *CFR* Parts 258 and 261 and the Illinois nonhazardous waste landfill regulations (Illinois Administrative Code Title 35, Subtitle G, Chapter I, Subchapter H, Part 810). The biosolids are certified for co-disposal at landfills through analysis as specified in 40 *CFR* Part 261 to establish their nonhazardous nature. District biosolids have always met these requirements. Analytical results required for the landfill company's IEPA permits, including toxic characteristic leaching procedure constituents, polychlorinated biphenyls, cyanide, sulfide, and paint filter tests, were updated in October 2021. Some unsuitable biosolids can be also used as daily cover on landfills.

Total Biosolids Produced at the Metropolitan Water Reclamation District of Greater Chicago

A total of 148,279 dry tons (DT) of biosolids was produced at District WRPs in 2021 based on the total of amounts at the Stickney and Calumet WRPs (which received all solids produced at the Egan, O'Brien, Kirie, and Lemont WRPs) and Hanover Park WRP, which did not transport any solids to another WRP ([Table 1](#)). The Stickney WRP produced 122,661 DT of biosolids from processing of solids generated at the plant and solids transported from the Egan, O'Brien, Kirie, and Lemont WRPs. The Calumet WRP produced 24,863 DT. The Hanover Park WRP produced 755 DT, all of which was retained or applied on-site. This brings the District's five- and ten-year biosolids production running averages to 139,925 and 138,090 DT/year, respectively.

Biosolids Utilization Outlets

The District's Biosolids Management Program is designed to manage all the biosolids for beneficial reuse. There are five main outlets for the beneficial utilization of District biosolids: (1) the Farmland Application Program, (2) the Urban Utilization Program, (3) the Fischer Farm Utilization Program, (4) pelletizing at the Metropolitan Biosolids Management, LLC (MBM) facility, and (5) landfill final cover. In 2021, a total of 125,876 DT of biosolids were utilized through these outlets ([Table 1](#)). During 2021, no biosolids were co-disposed with municipal solid wastes at landfill sites ([Figure 1](#)).

Farmland Application Program. In this program, dewatered Class B biosolids are utilized as a fertilizer for production of row crops in nearby counties in northeastern Illinois. Under this program, land application companies are contracted by the District through the competitive bidding process. The contractor is responsible for enrolling farmers in the program and for hauling and applying the biosolids to the farm fields. The farmland application program is conducted under separate permits issued by the IEPA to the District and the contractor. The District provides

TABLE 1: PRODUCTION AND UTILIZATION OF SLUDGE AND BIOSOLIDS DURING 2021¹

Production and Utilization	Water Reclamation Plants						
	Stickney	Calumet	Hanover Park	Egan	O'Brien	Kirie	Lemont
	-----Dry Tons (Metric Tons)-----						
Production ² Outlets	122,661 (111,276)	24,863 (22,555)	755 (685)	5,734 (5,202)	38,990 (35,371)	5,735 (5,203)	434 (394)
Utilization							
Agricultural land	56,416 (51,180)	7,974 (7,234)	1,244 (1,128)	0	0	0	0
Urban land (total)	11,037 (10,013)	6,408 (5,813)	0	0	0	0	0
air-dried	5,633 (5,110)	5,824 (5,283)	0	0	0	0	0
composted	5,403 (4,902)	584 (530)	0	0	0	0	0
Pelletizing facility ³	42,797 (38,825)	0	0	0	0	0	0
Landfill (total) ⁴	0	0	0	0	0	0	0
To Other WRPs ⁵	0	0	0	5,734 (5,202)	38,990 (35,371)	5,735 (5,203)	434 (394)

¹Differences between biosolids production and total use or disposal in 2021 were due to a net withdrawal or storage in lagoons or drying areas and processing of biosolids imported from other WRPs.

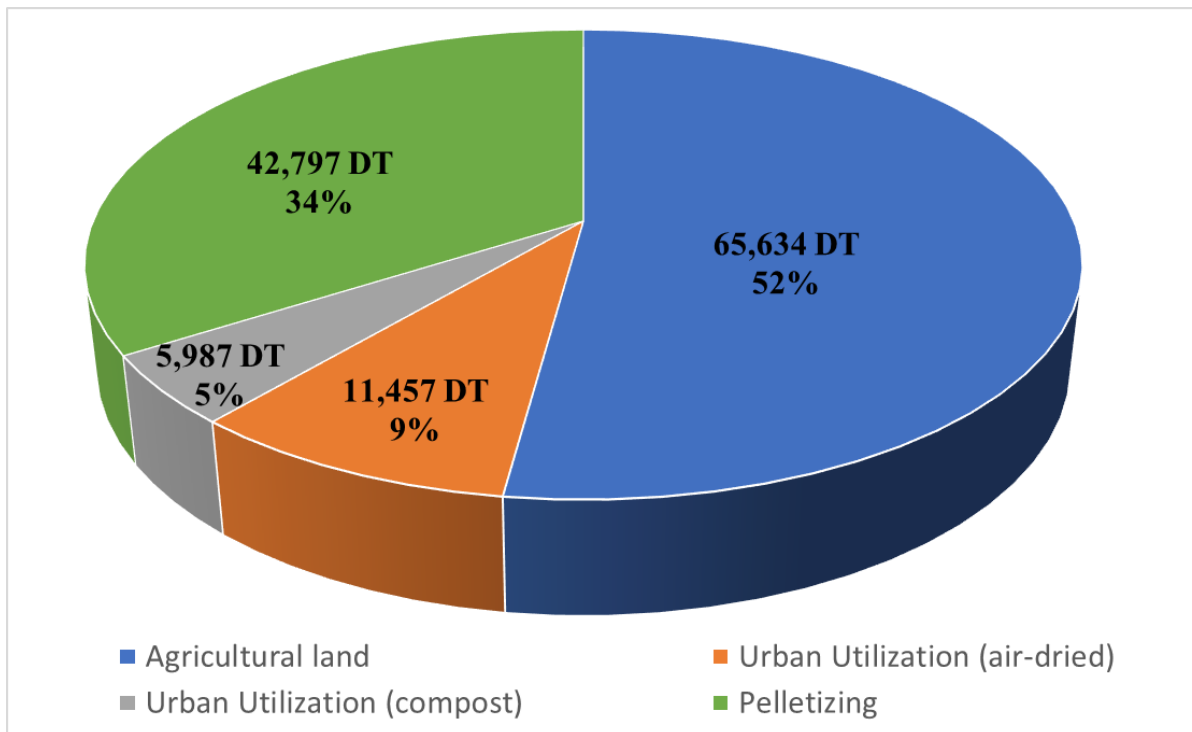
²Stickney, Calumet, and Hanover Park WRPs produced biosolids. The O'Brien, Kirie, and Lemont WRPs produced undigested sludge and the Egan WRP produced digested biosolids that were sent to the Stickney WRP via the O'Brien WRP for further processing and utilization. Figures represent total solids generated at the end of each plant's processing train plus those imported from other plants for further processing and utilization.

³Sent to Stickney WRP pelletizing facility owned and operated by Metropolitan Biosolids Management, LLC, 6001 W. Pershing Road, Cicero, IL 60804 (Contract No. 98-RFP-10).

⁴Includes co-disposal and daily cover.

⁵For further processing.

FIGURE 1: OUTLETS OF BIOSOLIDS UTILIZATION AND DISPOSAL AT THE METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO IN 2021



oversight of the program to ensure that the land application of biosolids is conducted in accordance with regulations and permits and that the contractor’s operations are consistent with the District’s goal of improving the public’s awareness of the benefits of the farmland application program to the farming community. This District oversight is done by requiring the land application contractor to comply with hauling and field operation specifications and to execute a Public Relations Program and by District staff who conduct additional activities to complement the activities of the contractors. The District continually evaluates and modifies the program as needed to improve public awareness, benefits, and long-term sustainability of the program. In 2021, a total of 64,390 DT of dewatered Class B biosolids from the Stickney and Calumet WRPs were applied to farmland as fertilizer ([Figure 1](#)).

Urban Utilization Program. Air-dried and composted EQ biosolids are applied to recreational areas (e.g., parks, golf courses, and athletic fields) and residential properties within the Chicago metropolitan area. The air-dried biosolids are typically used as topdressing on established turfgrass or blended into topsoil as a soil amendment. The composted biosolids are typically applied to land as a soil amendment or as mulch on planter beds. This program has traditionally been done under a CSD Permit issued by the IEPA Bureau of Water. In 2015, the Illinois General Assembly amended the Illinois Environmental Protection Act to adopt the USEPA EQ standard in the state and recognize biosolids as a safe, beneficial, and renewable resource. This legislative change eased state regulations that were stricter than federal restrictions on the use of EQ biosolids, and the CSD permit is no longer relevant for utilization of EQ biosolids. In 2021, 11,457 DT of air-dried biosolids and 5,987 DT of composted biosolids from the Stickney and Calumet WRPs were used in the metropolitan Chicago area ([Figure 1](#)).

Fischer Farm Utilization Program. The liquid Class B biosolids produced at the Hanover Park WRP are stored and thickened in lagoons and are utilized as fertilizer for application to farmland by a subsurface injection at the Fischer Farm located at the WRP. The supernatant from the settling of the biosolids and the settled biosolids are applied separately. In 2021, a total of 1,244 DT of biosolids as liquid biosolids and lagoon supernatant was applied to the farm (part of biosolids applied to agricultural land in [Figure 1](#)). The application of the biosolids and production of the row crops at that site are done by a contractor under separate contracts awarded through the competitive bidding process.

Pelletizing Facility. Anaerobically digested centrifuge-dewatered biosolids are delivered to the MBM facility located at the Stickney WRP, where they are dried to at least 90 percent solids, pelletized, and sold as a fertilizer product by MBM. In 2021, 42,797 DT of pelletized biosolids were generated from anaerobically digested biosolids produced at the Stickney WRP ([Figure 1](#)).

Biosolids to Landfills. In 2021, no biosolids were sent to landfills for co-disposal with municipal solid wastes or used as daily or final landfill cover.

The following sections provide a short description of the sludge processing and biosolids management operations at each of the District's seven WRPs. In addition, we discuss the utilization of the biosolids, outline the data-reporting requirements under Part 503, and present the required monitoring data in summary tables. The production and utilization of sludge and biosolids by the District in 2021 are summarized in [Table 1](#). All utilization of biosolids in 2021 complied with the management practices specified in Section 503.14. It should be noted that the total biosolids production in any given year may not equal the amount of the final biosolids product utilized, since biosolids may be utilized from production inventory for a previous year or biosolids produced in a given year may be stored or aged for utilization in subsequent years.

This report documents the production and utilization of the District's biosolids in 2021 records required under Part 503 at Section 503.18.

The District has four IEPA permitted biosolids management programs that must comply with Part 503 requirements. These programs are:

1. Fulton County Dedicated Biosolids Application to Land (IEPA Permit No. 2018-SC-63477).
2. Hanover Park Fischer Farm Biosolids Application to Land (IEPA Permit No. 2016-61315).
3. Controlled Solids Distribution Program (Biosolids Application to Land in the Chicago Area under IEPA Permit No. 2019-SC-64906).
4. Farmland Application Program (Biosolids Application to Farmland from the Calumet, Stickney, and the Egan WRPs under IEPA Permit No. 2018-SC-63703).

In addition, the District has two IEPA permits for composting biosolids at the Calumet East SMA (Permit No. 2017-017-DE/OP) and the Harlem Avenue SMA (Permit No. 2017-017-

DE/OP). The biosolids compost is distributed for use as a soil amendment under Illinois Department of Agriculture registration (License No. 100181).

STICKNEY WATER RECLAMATION PLANT

Treatment Plant and Biosolids Process Train Description

The Stickney WRP, located in Stickney, Illinois, has a design average flow of 1,200 million gallons per day (MGD). The annual average treated flow in 2021 was 604 MGD. Wastewater reclamation processes include primary (Imhoff and primary settling) and secondary (activated sludge process) treatments. All solids produced at this WRP, solids directly transported from the Lemont WRP, and solids pipelined from the O'Brien WRP, which received processed solids generated at the Egan and Kirie WRPs, are anaerobically digested at the Stickney WRP. Stickney WRP biosolids are then handled as follows:

1. Placed in lagoons for dewatering, aging, and stabilization and then transported to paved cells and air-dried prior to:
 - a. Application to urban land as EQ biosolids.
 - b. Application to farmland as dewatered Class B biosolids.
 - c. Use at local municipal solid waste landfills as final landfill cover. No biosolids were utilized through this outlet in 2021 ([Table 1](#)).
2. Dewatered by centrifuging to approximately 25 percent solids content and then applied to farmland as Class B biosolids by a private contractor.
3. Dewatered by centrifuging to approximately 25 percent solids content, transported to paved cells, and air-dried prior to use as daily landfill cover. No biosolids were utilized this way in 2021 ([Table 1](#)).
4. Dewatered by centrifuging to approximately 25 percent solids content and transported to the Harlem Avenue SMA for co-composting with woodchips and yard waste prior to application to urban land as composted EQ biosolids. Class A pathogen reduction was achieved using the open windrow composting process through which all the requirements were met. The temperature of the compost piles in 2021 was maintained at $\geq 55^{\circ}\text{C}$ for at least 15 days, and the piles were turned five times during this period ([Table 2](#)). The VAR requirement was achieved through the same open windrow composting process and met the established standards of Section 503.33(b)(5) by fulfilling the temperature and time requirements ($\geq 45^{\circ}\text{C}$ for at least 14 days) in the open windrows ([Table 2](#)).
5. Dewatered by centrifuging to approximately 25 percent solids content, placed in lagoons for aging and stabilization, and transported to paved cells and air-dried prior to:
 - a. Application to urban land as EQ biosolids.

TABLE 2: SUMMARY OF TEMPERATURE READINGS AND TURNING DATES OF OPEN WINDROWS DURING PRODUCTION OF COMPOSTED EXCEPTIONAL QUALITY BIOSOLIDS AT THE HARLEM AVENUE SOLIDS MANAGEMENT AREA IN 2021

Pile ID Number ¹	Composting Date (Range) ²	Turning Date ²					Composting Temperature °C (Range)
21-1	03/28–04/19	04/01	04/05	04/09	04/12	04/15	63–79
21-2	04/07–04/26	04/09	04/12	04/15	04/19	04/22	56–78
21-3	04/09–04/29	04/12	04/15	04/19	04/22	04/26	56–77
21-4	04/17–05/06	04/19	04/22	04/26	04/29	05/03	59–76
21-5	04/24–05/13	04/26	04/29	05/03	05/06	05/10	58–78
21-6	05/03–05/27	05/06	05/10	05/13	05/17	05/20	62–80
21-7	05/10–06/03	05/13	05/17	05/20	05/24	05/27	55–78
21-8	05/18–06/10	05/20	05/24	05/27	06/01	06/04	56–79
21-9	05/17–06/10	05/20	05/24	05/27	06/01	06/04	55–77
21-10	05/18–06/24	05/20	05/24	06/01	06/15	06/17	55–76
21-11	06/01–06/21	06/04	06/07	06/10	06/14	06/17	60–75
21-12	06/05–06/28	06/10	06/14	06/17	06/21	06/24	57–75
21-13	06/10–07/06	06/14	06/17	06/21	06/24	06/28	55–73
21-14	06/14–07/06	06/17	06/21	06/24	06/28	07/01	55–76
21-15	06/14–07/06	06/17	06/21	06/24	06/28	07/01	61–74
21-16	06/18–07/09	06/21	06/24	06/28	07/01	07/06	55–73
21-17	06/20–07/15	06/24	06/28	07/01	07/06	07/09	55–75
21-18	06/28–07/19	07/01	07/06	07/09	07/12	07/15	55–68
21-19	06/28–07/19	07/01	07/06	07/09	07/12	07/15	55–64
21-20	07/06–07/27	07/09	07/12	07/15	07/19	07/22	55–71
21-21	07/06–07/27	07/09	07/12	07/15	07/19	07/22	55–69
21-22	07/06–07/27	07/09	07/12	07/15	07/19	07/22	56–69
21-23	07/13–08/03	07/15	07/19	07/22	07/26	07/29	56–66
21-24	07/06–07/27	07/09	07/12	07/15	07/19	07/22	56–75
21-25	07/11–08/05	07/15	07/19	07/26	07/29	08/02	57–74
21-26	07/15–08/05	07/19	07/22	07/26	07/29	08/02	57–75
21-27	07/17–08/05	07/19	07/22	07/26	07/29	08/02	58–72
21-28	07/19–08/09	07/22	07/26	07/29	08/02	08/05	58–74
21-29	07/26–08/16	07/29	08/02	08/05	08/09	08/12	57–68
21-30	07/29–08/19	08/02	08/05	08/09	08/12	08/16	62–76
21-31	07/26–08/16	07/29	08/02	08/05	08/09	08/12	60–79
21-32	07/31–08/19	08/02	08/05	08/09	08/12	08/16	59–75
21-33	07/29–08/16	07/31	08/02	08/05	08/09	08/12	60–79
21-34	08/07–08/26	08/09	08/12	08/16	08/19	08/23	61–79
21-35	08/07–08/26	08/09	08/12	08/16	08/19	08/23	59–78

TABLE 2 (Continued): SUMMARY OF TEMPERATURE READINGS AND TURNING DATES OF OPEN WINDROWS DURING PRODUCTION OF COMPOSTED EXCEPTIONAL QUALITY BIOSOLIDS AT THE HARLEM AVENUE SOLIDS MANAGEMENT AREA IN 2021

Pile ID Number ¹	Composting Date (Range) ²	Turning Date ²					Composting Temperature °C (Range)
21-36	08/11–09/02	08/16	08/19	08/23	08/26	08/30	56–77
21-37	08/14–09/02	08/16	08/19	08/23	08/26	08/30	58–75
21-38	08/20–09/09	08/23	08/26	08/30	09/02	09/07	60–74
21-39	08/23–09/13	08/26	08/30	09/02	09/07	09/10	58–76
21-40	08/27–09/16	08/30	09/02	09/07	09/10	09/13	61–73
21-41	09/02–09/24	09/07	09/10	09/13	09/16	09/20	61–78
21-42	09/11–09/30	09/13	09/16	09/20	09/23	09/27	61–76
21-43	09/21–10/14	09/23	09/27	09/30	10/04	10/07	61–76
21-44	09/23–10/14	09/27	09/30	10/04	10/07	10/11	55–77
21-45	09/29–10/25	10/04	10/07	10/11	10/18	10/21	55–77
21-49	10/24–11/17	10/28	11/01	11/04	11/08	11/12	56–77
21-50	10/29–11/23	11/01	11/04	11/08	11/12	11/16	59–71
21-51	11/05–12/02	11/08	11/12	11/16	11/24	11/30	55–71

¹All piles reported are certified in accordance with the temperature and turning time requirements.

²Dates are month/day in 2021.

- b. Use at local municipal solid waste landfills as final landfill cover. No biosolids were utilized through this outlet in 2021 (Table 1).
6. Dewatered by centrifuging to approximately 25 percent solids content and conveyed to MBM to produce heat-dried biosolids pellets under Contract 98-RFP-10. The biosolids pellets were marketed to users by MBM. The analysis of these biosolids (provided by MBM) is presented in Table 3.

In 2021, the Stickney WRP produced a total of 122,661 DT of biosolids (Table 1). This total includes biosolids generated by processing sludge originating at the Stickney WRP as well as the sludge imported from the Egan, O'Brien, Kirie, and Lemont WRPs for further processing. The quantity of biosolids beneficially utilized (110,250 DT) was close to the total 2021 production (122,661 DT) for the Stickney WRP.

Biosolids to Landfills

In 2021, no biosolids produced at the Stickney WRP were sent to landfill for co-disposal with municipal solid wastes or used as daily or final landfill cover (Table 1).

Application of Class B Biosolids to Farmland

In 2021, a total of 56,416 DT of dewatered Class B biosolids (centrifuge cake and semi-dried biosolids) generated at the Stickney WRP was applied to agricultural land under IEPA Permit No. 2018-SC-63703. Application to agricultural land was done through contracts with Synagro Midwest, Inc., and Stewart Environmental, Inc. In accordance with Table 1 of Section 503.16, the frequency of monitoring for these biosolids is 12 times per year.

All Stickney WRP dewatered Class B biosolids land applied in 2021 met the pollutant concentration limits in Table 3 of Section 503.13 (Table 4), the VAR requirements of Section 503.33(b)(10) (by incorporation in soil within six hours after application), and the anaerobic digestion time and temperature requirements of the Class B pathogen standard of Section 503.32(b)(3) (Table 5). The biosolids nitrogen concentrations (Table 4) were used to compute the agronomic rates for farmland application.

Application of Exceptional Quality Biosolids to Urban Land

In 2021, a total of 11,037 DT of Stickney WRP air-dried EQ (5,633 DT) and composted EQ (5,403 DT) biosolids were applied to urban land for various uses such as the construction and maintenance of golf courses, recreation fields, and parks. The sites and methods of utilization of these biosolids under the program are listed in Table 6.

Air-Dried Exceptional Quality Biosolids. In 2021, a total of 5,633 DT of Stickney WRP air-dried EQ biosolids was applied to urban land. All Stickney air-dried biosolids applied to urban

TABLE 3: CONCENTRATIONS OF NITROGEN AND METALS IN HEAT-DRIED BIOSOLIDS PELLETS GENERATED BY METROPOLITAN BIOSOLIDS MANAGEMENT FACILITIES AT THE STICKNEY WATER RECLAMATION PLANT IN 2021¹

Date	Total N	NO ₃ ⁻ -N	NH ₄ -N	As	Cd	Cu	Hg	Mo	Ni	Pb	Se	Zn
	mg/dry kg											
01/04/21	38,504	2.7	1,900	5.6	1.9	467	0.48	14.6	47.7	74.5	4.7	699
02/02/21	44,804	<2.3	4,410	6.5	2.1	459	0.33	15.3	50.2	61.4	4.8	710
03/04/21	29,904	<2.3	4,790	6.0	3.1	477	0.35	18.0	58.1	52.9	4.9	689
04/06/21	38,704	<2.3	4,320	7.4	2.8	445	0.37	15.8	43.8	56.6	4.3	733
05/04/21	25,804	<2.2	4,800	7.0	3.0	478	0.52	15.0	42.1	61.6	5.8	722
06/01/21	32,166	<36.1	4,520	7.2	3.4	449	0.50	14.6	36.4	64.5	4.6	803
07/06/21	31,119	<11.0	3,000	8.0	4.3	460	0.51	14.7	39.9	95.5	4.1	841
08/03/21	32,408	<4.5	2,610	9.2	4.9	455	0.60	16.3	41.2	103	5.2	991
09/07/21	37,904	<2.4	3,850	8.3	3.5	468	0.54	19.7	51.9	109	4.2	1,020
10/05/21	40,520	<11.3	1,910	8.5	3.2	483	0.55	20.1	53.7	94.8	5.3	851
11/02/21	20,404	<2.3	3,230	10	3.1	458	0.094	18.4	48.7	103	<4.0	912
12/07/21	30,316	<9.2	3,170	9.0	3.0	458	0.48	19.3	51.0	84.1	<8.0	833
Minimum	20,404	<2.2	1,900	5.6	1.9	445	0.094	14.6	36.4	52.9	4.1	689
Mean ²	33,546	5.3	3,543	7.8	3.2	463	0.44	16.8	47.1	80.1	4.7	817
Maximum	44,804	<36.1	4,800	10.3	4.9	483	0.60	20.1	58.1	109	5.8	1,020
503 Limit	NL ³	NL	NL	41	39	1,500	17	75	420	300	100	2,800

¹Data provided by Metropolitan Biosolids Management, LLC.

²In calculating each mean, any value less than the reporting limit was treated as equal to the reporting limit divided by the square root of two.

³No limit.

TABLE 4: CONCENTRATIONS OF NITROGEN AND METALS IN DEWATERED BIOSOLIDS GENERATED AT THE STICKNEY WATER RECLAMATION PLANT AND APPLIED TO FARMLAND IN 2021

Date	TKN	NH ₃ -N	As	Cd	Cu	Hg	Mo	Ni	Pb	Se	Zn
	mg/dry kg										
03/23/21	51,676	12,693	12.9	2.47	427	NRR ¹	14.7	48.3	77.7	<10.0	730
04/05/21	41,410	10,848	21.3	3.36	430	0.30	13.9	41.3	95.7	<10.0	861
04/22/21	31,987	8,399	15	3.18	458	0.46	14.1	47.0	95.2	<10.0	888
04/22/21	50,734	11,836	12.4	2.50	454	0.38	15.1	50.0	81.1	<10.0	766
05/05/21	50,367	13,832	20.1	3.23	433	0.40	14.0	40.7	96.5	<10.0	842
05/05/21	28,491	9,287	15.1	3.29	455	0.55	13.9	45.5	93.6	<10.0	872
05/13/21	31,764	8,259	14.7	3.34	436	0.48	13.7	42.6	99.1	<10.0	884
05/26/21	58,926	19,085	12.8	2.85	418	0.28	14.6	40.9	56.2	<10.0	711
06/07/21	64,915	21,122	17.4	2.84	487	0.38	16.0	48.7	61.4	<10.0	830
06/22/21	27,438	8,987	18	3.38	434	0.74	14.8	44.6	103	<10.0	911
06/22/21	40,121	12,238	13.4	3.15	422	0.45	14.3	39.5	85.3	<10.0	803
07/09/21	NRR ²	16,472	10	2.91	464	0.35	16.2	52.4	66.3	<10.0	798
07/09/21	39,451	11,567	12.8	3.34	440	0.42	14.7	43.2	101	<10.0	892
07/21/21	37,727	8,357	13.5	3.30	446	0.55	14.5	42.8	102	<10.0	884
08/10/21	52,212	19,230	<10.0	3.16	445	0.33	15.0	41.6	57.6	<10.0	744
08/10/21	31,065	8,649	<10.0	3.22	456	0.41	15.2	43.7	91.2	<10.0	850
08/25/21	30,004	9,113	15.5	3.36	459	0.69	14.8	44.1	106	<10.0	917
09/10/21	42,962	13,881	10	2.91	449	0.27	13.6	40.4	77.1	<10.0	786
09/10/21	51,361	14,909	10	4.97	431	0.36	14.4	38.1	89.3	<10.0	857
09/24/21	28,903	6,364	10.1	3.07	416	0.68	13.5	39.6	93.9	<10.0	812
10/14/21	45,871	7,782	10	3.09	435	0.51	16.0	45.1	79.7	<10.0	806
10/14/21	44,563	13,941	10	4.50	425	0.54	17.8	42.8	85.1	<10.0	853
11/03/21	39,674	7,708	11.1	3.41	442	0.61	16.8	46.5	94.6	<10.0	895
11/03/21	27,747	4,831	13.6	3.90	475	0.79	15.7	48.0	113	<10.0	984

TABLE 4 (Continued): CONCENTRATIONS OF NITROGEN AND METALS IN DEWATERED BIOSOLIDS GENERATED AT THE STICKNEY WATER RECLAMATION PLANT AND APPLIED TO FARMLAND IN 2021

Date	TKN	NH ₃ -N	As	Cd	Cu	Hg	Mo	Ni	Pb	Se	Zn
	mg/dry kg										
11/09/21	47,237	13,851	<10.0	4.64	443	0.39	17.6	43.6	86.5	<10.0	894
11/09/21	50,374	13,091	<10.0	3.17	436	0.44	15.5	40.7	76.4	<10.0	779
Minimum	27,438	4,831	<10.0	2.47	416	0.27	13.5	38.1	56.2	<10.0	711
Mean ³	41,879	11,782	12.4	3.33	443	0.47	15.0	43.9	87.1	<10.0	840
Maximum	64,915	21,122	21.3	4.97	487	0.79	17.8	52.4	113	<10.0	984
503 Limit	NL ⁴	NL	41	39	1,500	17	75	420	300	100	2,800

¹No reportable result because the thermometer used for digestion was not calibrated.

²No reportable result due to possible incomplete digestion of the sample.

³In calculating each mean, any value less than the reporting limit was treated as equal to the reporting limit divided by the square root of two.

⁴No limit.

TABLE 5: DIGESTER TEMPERATURES AND DETENTION TIMES DURING PROCESSING OF BIOSOLIDS GENERATED AT THE STICKNEY WATER RECLAMATION PLANT AND APPLIED TO FARMLAND IN 2021

Month	Average Temperature °F	Average Detention Time	Minimum Detention Time Required by 503.32(b)(3) ¹	Meets Part 503 Class B Requirements
		-----days-----		
January	96.4	21.0	15.0	Yes
February	96.4	19.4	15.0	Yes
March	96.5	17.7	15.0	Yes
April	96.8	18.6	15.0	Yes
May	97.8	23.1	15.0	Yes
June	97.7	25.8	15.0	Yes
July	97.9	25.4	15.0	Yes
August	98.4	25.7	15.0	Yes
September	98.7	26.7	15.0	Yes
October	98.5	24.9	15.0	Yes
November	97.4	31.0	15.0	Yes
December	98.1	29.7	15.0	Yes

¹For anaerobic digestion at average temperature achieved.

TABLE 6: PROFILE OF USERS THAT UTILIZED STICKNEY WATER RECLAMATION PLANT AIR-DRIED AND COMPOSTED EXCEPTIONAL QUALITY BIOSOLIDS IN 2021¹

User Type	Use	Number of Users
Composted Biosolids		
Park districts and municipalities	Landscaping	17
Schools and universities	Landscaping	10
Golf courses and athletic clubs	Landscaping	5
Landscaping and construction companies	Landscaping	7
Nongovernmental organizations	Landscaping	18
Park districts and municipalities	Gardening	3
Nongovernmental organizations	Gardening	11
Park districts and municipalities	Brownfields and construction sites	1
Distribution at Metropolitan Water Reclamation District of Greater Chicago Water Reclamation Plants ²	Direct pick-up by residents	NA
Residents of Metropolitan Chicago area	Private residential use	239
Air-Dried Biosolids		
Park districts and municipalities	Landscaping	16
Schools and universities	Landscaping	4
Landscaping and construction companies	Landscaping	4
Golf courses and athletic clubs	Topdressing	9
Non-governmental organizations	Topdressing	5
Park districts and municipalities	Brownfields and construction sites	3
Landscaping and construction companies	Brownfields and construction sites	1
Residents in Metropolitan Chicago area	Private residential use	19

¹Individual users and organizations on file.

²Calumet, Hanover Park, James C. Kirie, John E. Egan, Stickney, and Terrence J. O'Brien Water Reclamation Plants.

land in 2021 met the pollutant concentration limits in Table 3 of Section 503.13 and the VAR requirements of Section 503.33(b)(1) (Table 7).

All of the air-dried EQ biosolids met the Class A pathogen limits of Section 503.32(a)(5) (Tables 8 and 9). Enteric viruses and helminth ova were analyzed before biosolids were dried (Table 8). The fecal coliform analyses were performed after the biosolids were dried and prior to utilization on urban land (Table 9). Management practices complied with Section 503.14. In accordance with Table 1 of Section 503.16, the frequency of monitoring for these biosolids is six times per year.

Composted Exceptional Quality Biosolids. In 2021, a total of 5,403 DT of composted EQ biosolids generated at the Stickney WRP during 2020 was applied to urban land. The composted EQ biosolids applied to urban land in 2021 met composting temperature and time requirements in 2020, and met the pollutant concentration limits in Table 3 of Section 503.13 prior to utilization in 2021 (Table 10). The fecal coliform analyses were performed after the composted EQ biosolids were cured and prior to utilization on urban land (Table 11). In accordance with Table 1 of Section 503.16, the frequency of monitoring for the biosolids is six times per year.

Site-Specific Process to Further Reduce Pathogens

For the Calumet and Stickney WRPs, the USEPA Region 5 designated, on a site-specific basis, the District's two biosolids processing trains as equivalent to PFRP, according to Section 503.32(a)(8). The PFRP equivalency commenced on August 1, 2002 (Appendix). The current renewable certification of the PFRP designation is valid from August 1, 2017, through July 31, 2022, and requires the analysis of six samples annually for helminth ova and enteric viruses during this period and the submittal of the data together with the annual Part 503 report.

None of the Stickney WRP air-dried EQ biosolids generated or utilized in 2021 were PFRP-compliant with respect to the minimum required duration of lagoon aging (18 months) due to operational constraints. Therefore, all air-dried biosolids utilized as EQ material in 2021 were tested for helminth ova and enteric virus compliance in August, September, and October 2020 and April, May, and June 2021 (Table 8), and for fecal coliform compliance in May, June, July, September, October, and November 2021 (Table 9), according to Section 503.32(a)(5).

TABLE 7: CONCENTRATIONS OF NITROGEN AND METALS AND VOLATILE SOLIDS REDUCTION IN AIR-DRIED EXCEPTIONAL QUALITY BIOSOLIDS GENERATED AT THE STICKNEY WATER RECLAMATION PLANT AND APPLIED TO URBAN LAND IN 2021

Date	TVS ²		TKN	NO ₃ ⁻ +NO ₂ ⁻ -N	NH ₃ -N	As	Cd	Cu	Hg	Mo	Ni	Pb	Se	Zn
	TVS ¹	Reduction												
	-----%		-----mg/dry kg-----											
05/19/21	41.1	54.3	19,222	788	3,705	15.7	3.26	457	0.31	13.2	45.8	95.2	<10.0	871
05/26/21	36.3	62.7	23,116	776	4,642	16.1	3.09	413	0.43	12.4	41.5	85.0	<10.0	792
06/01/21	39.0	58.3	28,826	181	5,719	15.1	3.00	406	0.52	12.0	40.6	84.0	<10.0	778
06/16/21	39.7	57.0	31,767	458	6,387	14.5	3.35	459	0.54	14.5	46.5	96.8	<10.0	892
07/13/21	36.6	62.3	23,661	285	5,944	14.0	3.29	437	0.52	13.0	44.1	92.8	<10.0	818
07/20/21	37.7	53.6	23,534	265	2,186	11.1	3.49	462	0.52	13.6	43.1	104	<10.0	900
07/27/21	37.7	53.8	24,037	355	2,853	10.0	3.50	462	0.69	14.3	45.9	105	<10.0	961
08/16/21	31.5	64.8	15,955	<6.6	3,773	12.8	3.13	471	0.60	14.3	46.3	106	<10.0	961
08/31/21	35.4	58.1	22,432	<7.2	5,733	12.9	3.25	446	0.67	14.5	41.8	103	<10.0	889
09/14/21	39.1	50.8	18,656	25	4,993	<10.0	3.57	450	0.42	14.6	45.0	107	<10.0	915
10/06/21	39.6	49.9	19,419	459	4,041	10.0	3.43	452	0.88	15.3	45.6	105	<10.0	932
10/20/21	NRR ³	NRR	22,673	3.8	287	15.1	3.11	443	0.76	15.0	45.8	105	<10.0	946
11/17/21	38.1	52.9	31,455	435	5,136	15.4	3.42	426	0.57	13.9	44.4	99.4	<10.0	881
Minimum	31.5	49.9	15,955	3.8	287	10.0	3.00	406	0.31	12.0	40.6	84.0	<10.0	778
Mean ⁴	37.7	56.5	23,443	311	4,261	13.6	3.30	445	0.57	13.9	44.3	99.0	<10.0	887
Maximum	41.1	64.8	31,767	788	6,387	16.1	3.57	471	0.88	15.3	46.5	107	<10.0	961
503 Limit	NL ⁵	38	NL	NL	NL	41	39	1,500	17	75	420	300	100	2,800

¹Total volatile solids as percentage of total solids.

²Total volatile solids for digester feed during months when lagoons were loaded from 2016 to 2020 was used to calculate TVS reduction.

³No reportable result due to sample mislabeling.

⁴In calculating each mean, any value less than the reporting limit was treated as equal to the reporting limit divided by the square root of two.

⁵No limit.

TABLE 8: PATHOGEN ANALYSIS OF AIR-DRIED EXCEPTIONAL QUALITY BIOSOLIDS GENERATED AT THE STICKNEY WATER RECLAMATION PLANT AND APPLIED TO URBAN LAND IN 2021

Sample Date	Lagoon No.	Enteric Virus PFU ¹ /4g	Helminth Ova Viable Ova/4g
08/11/20	30	<0.8000	<0.0800
09/09/20	24	<0.8000	0.0800
10/13/20	24	<0.8000	<0.0800
04/14/21	24	<0.8000	<0.0800
05/11/21	24	<0.8000	<0.0800
06/08/21	27	<0.8000	<0.0800

¹Plaque-forming unit.

TABLE 9: FECAL COLIFORM ANALYSIS OF AIR-DRIED EXCEPTIONAL QUALITY BIOSOLIDS GENERATED AT THE STICKNEY WATER RECLAMATION PLANT AND TESTED PRIOR TO UTILIZATION ON URBAN LAND IN 2021

Sample Date	Lagoon No.	Total Solids %	Fecal Coliform MPN ¹ /g
05/19/21	24	64.9	91
06/16/21	24	71.0	710
07/27/21	27	73.0	16
09/14/21	27	71.1	36
10/20/21	27	63.7	18
11/17/21	27	61.2	11

¹Most probable number.

TABLE 10: CONCENTRATIONS OF NITROGEN AND METALS IN COMPOSTED EXCEPTIONAL QUALITY BIOSOLIDS PRODUCED AT THE HARLEM AVENUE SOLIDS MANAGEMENT AREA IN 2020 AND APPLIED TO URBAN LAND IN 2021¹

Date ¹	TKN	NO ₃ ⁻ +NO ₂ ⁻ -N	NH ₃ -N	As	Cd	Cu	Hg	Mo	Ni	Pb	Se	Zn
	mg/dry kg											
03/10/21	19,272	539	358	15.9	3.66	445	NRR ²	7.23	38.4	71.6	<10.0	598
03/10/21	19,824	421	362	18.1	2.85	356	NRR	6.15	32.0	74.4	<10.0	570
03/10/21	12,855	48	548	17.9	2.04	262	NRR	5.12	24.9	102	<10.0	522
03/10/21	17,002	489	65.9	14.8	3.29	411	NRR	7.48	36.7	70.5	<10.0	622
03/10/21	14,303	126	245	33.2	2.23	298	NRR	5.78	24.8	267	<10.0	633
04/13/21	16,460	1,215	155	16	1.76	241	0.27	7.75	20.9	152	<10.0	479
07/13/21	19,615	338	33.2	<10.0	3.38	396	0.33	7.67	34.8	70.6	<10.0	547
07/13/21	20,620	350	36.4	<10.0	3.36	394	0.33	7.91	34.9	67.1	<10.0	536
08/18/21	19,252	153	99.9	20.2	1.60	274	0.29	7.17	26.1	136	<10.0	535
09/14/21	16,082	223	98.0	<10.0	3.61	478	0.25	9.32	28.7	19.3	<10.0	588
10/13/21	14,637	1,173	35.1	26.6	2.04	289	0.32	7.34	26.3	265	<10.0	519
10/14/21	15,707	583	141	<10.0	<1.00	107	<0.25	4.06	11.6	58.2	<10.0	228
Minimum	12,855	48.4	33.2	<10.0	<1.00	107	<0.25	4.06	11.6	19.3	<10.0	228
Mean ³	17,136	472	181	15.9	2.54	329	0.28	6.91	28.3	113	<10.0	531
Maximum	20,620	1,215	548	33.2	3.66	478	0.33	9.32	38.4	267	<10.0	633
503 Limit	NL ⁴	NL	NL	41	39	1,500	17	75	420	300	100	2,800

¹Materials produced in 2020 and tested in 2021 prior to utilization.

²No reportable result because the thermometer used for digestion was not calibrated.

³In calculating each mean, any value less than the reporting limit was treated as equal to the reporting limit divided by the square root of two.

⁴No limit.

TABLE 11: FECAL COLIFORM ANALYSIS OF CURED COMPOSTED EXCEPTIONAL QUALITY BIOSOLIDS PRODUCED AT THE HARLEM AVENUE SOLIDS MANAGEMENT AREA IN 2020 AND SAMPLED PRIOR TO UTILIZATION ON URBAN LAND IN 2021

Sample Date ¹	Total Solids %	Fecal Coliform MPN ² /g
01/21/21	46.0	210
03/10/21	36.3	79
04/08/21	51.1	740
04/08/21	35.3	190
04/13/21	50.0	23
05/05/21	39.1	970
05/05/21	50.6	3
05/06/21	36.9	180
05/25/21	42.0	9
07/20/21	53.2	210
08/18/21	54.3	1
09/14/21	54.3	9
10/14/21	52.7	66
11/17/21	42.5	890

¹Materials produced in 2020 and tested in 2021 prior to utilization.

²Most probable number.

CALUMET WATER RECLAMATION PLANT

Treatment Plant and Biosolids Process Train Description

The Calumet WRP, located in Chicago, Illinois, has a design average flow of 354 MGD. The annual average treated flow in 2021 was 233 MGD. Wastewater reclamation processes at this WRP include primary settling and secondary activated sludge processes. All solids produced at the Calumet WRP are anaerobically digested. The Calumet WRP biosolids are then:

1. Placed in lagoons for dewatering, aging, and stabilization and then transported to paved cells and air-dried prior to:
 - a. Application to urban land as EQ biosolids.
 - b. Use at local municipal solid waste landfills as final cover. No biosolids were utilized through this outlet in 2021.
2. Placed in lagoons for dewatering and transported to paved cells for air-drying prior to:
 - a. Application to farmland as dewatered Class B biosolids by a private contractor.
 - b. Use as daily landfill cover. No biosolids were utilized through this outlet in 2021.

Composted EQ biosolids are also produced at the Calumet SMA by co-composting biosolids with woodchips and curing. Class A pathogen reduction was achieved using the open windrow composting process through which all the requirements of Section 503.32(a)(7) were met. The temperature of the compost piles in 2021 was maintained at $\geq 55^{\circ}\text{C}$ for at least 15 days, and the piles were turned five times during this period (Table 12). The VAR requirement was achieved through the same open windrow composting process and met the established standards of Section 503.33(b)(5) by achieving the temperature and time requirements ($\geq 45^{\circ}\text{C}$ for at least 14 days) in the open windrows (Table 12).

In 2021, a total of 24,863 DT of biosolids was produced at the Calumet WRP (Table 1). The total quantity of 14,382 DT of biosolids utilized was less than the total 2021 production for the Calumet WRP; hence, a significant amount of biosolids was stored in lagoons or on drying cells for further processing and/or later use.

Biosolids to Landfills

In 2021, no biosolids produced at the Calumet WRP were sent to landfill for co-disposal with municipal solid wastes or used as daily or final landfill cover (Table 1).

TABLE 12: SUMMARY OF TEMPERATURE READINGS AND TURNING DATES OF OPEN WINDROWS DURING PRODUCTION OF COMPOSTED EXCEPTIONAL QUALITY BIOSOLIDS AT THE CALUMET EAST SOLIDS MANAGEMENT AREA IN 2021

Pile ID Number ¹	Composting Date (Range) ²	Turning Date ²					Composting Temperature, °C (range)
21-1	03/28–04/19	04/01	04/05	04/09	04/12	04/15	56–70
21-2	04/07–04/26	04/09	04/12	04/15	04/19	04/22	56–71
21-3	04/09–04/29	04/12	04/15	04/19	04/22	04/26	60–72
21-4	04/17–05/06	04/19	04/22	04/26	04/29	05/03	55–72
21-5	04/24–05/13	04/26	04/29	05/03	05/06	05/10	57–75
21-6	05/03–05/27	05/06	05/10	05/13	05/17	05/20	59–70

¹All piles reported are certified in accordance with the temperature and turning time requirements.

²Dates are month/day in 2021.

Application of Class B Biosolids to Farmland

In 2021, the Calumet WRP land-applied 7,974 DT of dewatered (semi-dried) Class B biosolids to farmland ([Table 1](#)) under IEPA Permit No. 2018-SC-63703 through contracts with Synagro Midwest, Inc. (Contract No. 18-692-11) and Stewart Environmental, Inc. (Contract No. 14-690-11). In accordance with Table 1 of Section 503.16, the frequency of monitoring for these biosolids is six times per year.

All Calumet WRP dewatered Class B biosolids land-applied in 2021 met the pollutant concentration limits in Table 3 of Section 503.13 ([Table 13](#)), the vector attraction reduction requirements of Section 503.33(b)(10) (by incorporation in soil within six hours after application), and the anaerobic digestion time and temperature requirements of the Class B pathogen standard of Section 503.32(b)(3) ([Table 14](#)). The biosolids nitrogen concentrations ([Table 13](#)) were used to compute the agronomic rates for farmland application.

Application of Exceptional Quality Biosolids to Urban Land

In 2021, a total of 6,408 DT of air-dried and composted EQ biosolids generated at the Calumet WRP was applied to urban land and District property for various uses such as for maintenance of golf courses and recreation fields, landscaping, and for the construction of new recreation fields. The sites and method of utilization of these biosolids are listed in [Table 15](#).

Air-Dried Exceptional Quality Biosolids. In 2021, a total of 5,824 DT of air-dried EQ biosolids generated at the Calumet WRP was applied to urban land. All Calumet WRP air-dried EQ biosolids land-applied in 2021 met the pollutant concentration limits in Table 3 of Section 503.13 ([Table 16](#)), the vector attraction reduction requirements of Section 503.33(b)(1) ([Table 16](#)), and the Class A pathogen limits of Section 503.32(a)(5) ([Tables 17](#) and [18](#)). Enteric viruses and helminth ova ([Table 17](#)) were analyzed before biosolids were dried. The fecal coliform analyses ([Table 18](#)) were performed after the biosolids were dried and prior to utilization on urban land. In accordance with Table 1 of Section 503.16, the frequency of monitoring for these biosolids is six times per year.

Composted Exceptional Quality Biosolids. In 2021, a total of 584 DT of composted EQ biosolids generated at the Calumet WRP during 2020 was applied to urban land. No composted EQ biosolids generated during 2021 were land applied in 2021. All composted biosolids land-applied in 2021 met composting temperature and time requirements in 2020, and they met the pollutant concentration limits in Table 3 of Section 503.13 ([Table 19](#)). The fecal coliform analyses were performed after the composted EQ biosolids were cured and prior to utilization on urban land ([Table 20](#)). In accordance with Table 1 of Section 503.16, the frequency of monitoring for these biosolids is four times per year.

Site-Specific Process to Further Reduce Pathogens

For the Calumet and Stickney WRPs, USEPA Region 5 designated, on a site-specific basis, the District's two biosolids processing trains as equivalent to PFRP, according to Section 503.32(a)(8). The PFRP equivalency commenced on August 1, 2002 ([Appendix](#)). The

TABLE 13: CONCENTRATIONS OF NITROGEN AND METALS IN DEWATERED BIOSOLIDS GENERATED AT THE CALUMET WATER RECLAMATION PLANT AND APPLIED TO FARMLAND IN 2021

Date	TKN	NH ₃ -N	As	Cd	Cu	Hg	Mo	Ni	Pb	Se	Zn
	mg/dry kg										
04/16/21	34,859	5,017	15.6	2.52	407	0.60	17.8	34.7	72.5	<10.0	1,157
06/04/21	28,035	2,721	17.8	2.42	408	0.39	15.5	33.0	70.7	<10.0	1,074
07/24/21	31,080	2,224	11.8	2.60	373	0.48	19.5	33.7	71.6	<10.0	1,128
07/24/21	25,597	4,038	10.8	2.68	386	0.49	16.2	33.0	74.6	<10.0	1,090
09/09/21	26,203	4,672	<10.0	2.37	357	0.52	15.4	30.3	68.0	<10.0	988
09/09/21	40,406	5,567	<10.0	2.67	389	0.37	17.1	32.8	74.2	<10.0	1,086
09/27/21	21,882	3,826	10.5	2.49	284	0.39	12.7	28.6	65.1	<10.0	798
11/18/21	25,065	7,809	14.2	2.24	356	0.42	17.5	32.3	66.0	<10.0	936
Minimum	21,882	2,224	<10.0	2.24	284	0.37	12.7	28.6	65.1	<10.0	798
Mean ¹	29,141	4,484	11.9	2.50	370	0.46	16.5	32.3	70.3	<10.0	1,032
Maximum	40,406	7,809	17.8	2.68	408	0.60	19.5	34.7	74.6	<10.0	1,157
503 Limit	NL ²	NL	41	39	1,500	17	75	420	300	100	2,800

¹In calculating each mean, any value less than the reporting limit was treated as equal to the reporting limit divided by the square root of two.

²No limit.

TABLE 14: DIGESTER¹ TEMPERATURES AND DETENTION TIMES DURING PROCESSING OF BIOSOLIDS GENERATED AT THE CALUMET WATER RECLAMATION PLANT AND APPLIED TO FARMLAND IN 2021

Month	Average Temperature °F	Average Detention Time	Minimum Detention Time Required by 503.32(b)(3) ²	Meets Part 503 Class B Requirements
		-----days-----	-----days-----	
January	96.5	25.0	15.0	Yes
February	96.2	25.8	15.0	Yes
March	96.1	27.5	15.0	Yes
April	97.1	52.1	15.0	Yes
May	96.2	31.5	15.0	Yes
June	96.9	19.1	15.0	Yes
July	96.7	20.3	15.0	Yes
August	96.9	21.0	15.0	Yes
September	97.1	25.1	15.0	Yes
October	96.0	20.1	15.0	Yes
November	96.5	22.1	15.0	Yes
December	96.9	29.6	15.0	Yes

¹Temperatures and detention times are for primary digesters 1 through 12 at the Calumet WRP.

²For anaerobic digestion at average temperature achieved.

TABLE 15: PROFILE OF USERS THAT UTILIZED CALUMET WATER RECLAMATION PLANT AIR-DRIED AND COMPOSTED EXCEPTIONAL QUALITY BIOSOLIDS IN 2021¹

User Type	Use	Number of Users
Composted Biosolids		
Nongovernmental organizations	Landscaping	1
Park districts and municipalities	Brownfields and construction sites	2
Distribution at the Calumet Water Reclamation Plant	Direct pickup by residents	NA
Residents of Metropolitan Chicago area	Private residential use	8
Air-Dried Biosolids		
Park districts and municipalities	Topdressing	5
Schools and universities	Topdressing	3
Golf courses and athletic clubs	Topdressing	1
Non-governmental organizations	Topdressing	1
Park districts and municipalities	Brownfields and construction sites	2
Landscaping and construction companies	Brownfields and construction sites	1
Residents of Metropolitan Chicago area	Private residential use	1

¹Individual users and organizations on file.

TABLE 16: CONCENTRATIONS OF NITROGEN AND METALS AND VOLATILE SOLIDS REDUCTION IN AIR-DRIED EXCEPTIONAL QUALITY BIOSOLIDS GENERATED AT THE CALUMET WATER RECLAMATION PLANT AND APPLIED TO URBAN LAND IN 2021

Date	TVS ²		TKN	NO ₃ ⁻ +NO ₂ ⁻ -N	NH ₃ -N	As	Cd	Cu	Hg	Mo	Ni	Pb	Se	Zn
	TVS ¹	Reduction												
	-----%		-----mg/dry kg-----											
5/25/2021	36.9	70.2	32,326	382	1,297	17.1	2.78	372	0.65	17.2	31.8	70.8	<10.0	1,120
6/16/2021	37.6	76.6	29,851	591	2,185	18.1	2.50	376	0.43	18.6	32.8	73.4	<10.0	1,131
6/16/2021	40.4	65.4	36,805	<68.0	3,095	18.2	2.38	371	0.39	14.8	31.2	69.7	<10.0	1,084
6/22/2021	36.2	71.0	25,461	80.5	3,120	15.4	2.75	NA ³	0.34	19.1	35.1	76.9	<10.0	1,183
6/23/2021	36.1	71.1	13,647	138	53.1	13.9	3.20	NA	0.88	15.7	35.3	100	<10.0	1,228
7/8/2021	40.5	65.2	22,674	82.8	2,695	14.7	2.85	412	0.40	18.4	35.5	79.4	<10.0	1,221
7/8/2021	40.2	73.9	25,825	136	1,491	15.2	2.64	406	0.49	14.3	33.3	72.1	<10.0	1,121
7/13/2021	37.7	69.0	15,341	<62.1	3,734	14.5	3.03	393	0.34	18.5	33.8	75.7	<10.0	1,116
7/14/2021	40.0	65.9	15,377	<65.4	3,421	16.0	3.07	389	0.35	18.3	33.9	74.0	<10.0	1,114
7/14/2021	36.5	70.6	23,752	798	1,442	15.8	3.16	392	0.55	17.8	34.3	76.9	<10.0	1,140
7/21/2021	35.2	72.3	27,978	<57.3	2,587	15.5	3.20	402	0.43	18.4	33.8	75.2	<10.0	1,129
7/21/2021	36.0	71.2	27,442	789	1,312	10.4	2.90	401	0.66	18.0	35.0	77.1	<10.0	1,188
7/21/2021	37.3	76.9	27,592	231	851	13.5	2.69	384	0.54	15.6	33.9	72.0	<10.0	1,142
7/22/2021	37.9	68.8	28,332	155	736	13.0	2.95	395	0.50	15.2	33.4	74.4	<10.0	1,114
7/22/2021	35.9	71.4	25,880	1,441	887	13.4	3.14	406	0.57	18.1	34.6	78.2	<10.0	1,157
8/4/2021	36.7	77.5	11,443	499	1,242	10.2	2.74	401	0.40	16.2	35.2	77.0	<10.0	1,155
8/4/2021	37.5	76.7	7,702	1,496	1,006	14.0	3.48	414	0.54	19.7	35.7	79.1	<10.0	1,211
8/18/2021	44.8	68.4	30,257	26.2	7,742	16.8	1.95	406	0.52	15.5	35.0	73.9	<10.0	1,181
9/8/2021	37.8	71.0	26,514	531	1,825	13.1	2.92	419	0.59	17.3	34.0	78.8	<10.0	1,137
9/9/2021	37.6	76.6	3,968	457	2,660	40.2	2.84	373	0.43	8.75	32.3	269	<10.0	654
9/17/2021	35.6	71.8	NDR ⁴	1,864	253	15.8	2.88	398	0.51	18.2	33.2	72.8	<10.0	1,113

TABLE 16 (Continued): CONCENTRATIONS OF NITROGEN AND METALS AND VOLATILE SOLIDS REDUCTION IN AIR-DRIED EXCEPTIONAL QUALITY BIOSOLIDS GENERATED AT THE CALUMET WATER RECLAMATION PLANT AND APPLIED TO URBAN LAND IN 2021

Date	TVS ²		TKN	NO ₃ ⁻ +NO ₂ ⁻ -N	NH ₃ -N	As	Cd	Cu	Hg	Mo	Ni	Pb	Se	Zn
	TVS ¹	Reduction												
	-----%		-----mg/dry kg-----											
11/9/2021	32.3	77.2	18,405	184	382	13.1	2.89	367	0.49	14.8	32.5	78.1	<10.0	1,058
11/9/2021	36.3	72.8	26,242	205	1,423	12.3	2.72	423	0.49	16.2	34.5	76.3	<10.0	1,160
Minimum	32.3	65.2	3,968	26.2	53.1	10.2	1.95	367	0.34	8.75	31.2	69.7	<10.0	654
Mean ⁵	37.5	71.8	22,855	446	1,976	15.7	2.85	395	0.50	16.7	33.9	84.8	<10.0	1,124
Maximum	44.8	77.5	36,805	1,864	7,742	40.2	3.48	423	0.88	19.7	35.7	269	<10.0	1,228
503 Limit	NL ⁶	38	NL	NL	NL	41	39	1,500	17	75	420	300	100	2,800

¹Total volatile solids as percentage of total solids.

²Total volatile solids for digester feed during months when lagoons were loaded from 2013 to 2020 was used to calculate TVS reduction.

³Samples were inadvertently not analyzed for Cu and could not be reanalyzed due to holding time.

⁴No data reportable because of possibly incomplete digestion for TKN.

⁵In calculating each mean, any value less than the reporting limit was treated as equal to the reporting limit divided by the square root of two.

⁶No limit.

TABLE 17: PATHOGEN ANALYSIS OF AIR-DRIED EXCEPTIONAL QUALITY BIOSOLIDS GENERATED AT THE CALUMET WATER RECLAMATION PLANT AND APPLIED TO URBAN LAND IN 2021

Sample Date	Lagoon No.	Enteric Virus PFU ¹ /4g	Helminth Ova Viable Ova/4g
08/11/20	1	<0.8000	<0.0800
09/11/20	3	<0.8000	<0.0800
10/13/20	4	<0.8000	<0.0800
04/13/21	17	<0.8000	<0.0800
05/11/21	17	<0.8000	<0.0800
06/08/21	14	<0.8000	<0.0800

¹Plaque-forming unit.

TABLE 18: FECAL COLIFORM ANALYSIS OF AIR-DRIED EXCEPTIONAL QUALITY BIOSOLIDS GENERATED AT THE CALUMET WATER RECLAMATION PLANT AND TESTED PRIOR TO UTILIZATION ON URBAN LAND IN 2021

Sample Date	Lagoon No.	Total Solids %	Fecal Coliform MPN ¹ /dry g
05/25/21	17	85.5	4
05/25/21	17	89.5	110
06/03/21	17	76.9	130
06/03/21	17	73.9	39
06/16/21	17	90.0	39
06/22/21	7	66.0	2
07/08/21	14	86.5	5
07/08/21	17	73.7	920
07/13/21	17	79.4	630
07/21/21	17	85.0	9
07/22/21	17	91.9	74
08/04/21	14	91.7	970
08/04/21	14	75.8	470
08/17/21	7	72.6	520
09/14/21	8	91.6	410
09/28/21	14	87.9	51
09/28/21	8	88.2	880
09/28/21	8	81.9	46
10/19/21	14	61.5	82
10/21/21	8	70.4	180

¹Most probable number.

TABLE 19: CONCENTRATIONS OF NITROGEN AND METALS IN COMPOSTED EXCEPTIONAL QUALITY BIOSOLIDS PRODUCED AT THE CALUMET EAST SOLIDS MANAGEMENT AREA IN 2020 AND APPLIED TO URBAN LAND IN 2021

Sample Date ¹	TKN	NO ₃ ⁻ +NO ₂ ⁻ -N	NH ₃ -N	As	Cd	Cu	Hg	Mo	Ni	Pb	Se	Zn
	mg/dry kg											
05/13/21	14,244	45.2	25.8	16.4	<1.00	188	NRR ²	4.57	20.2	74.1	<10.0	372
07/14/21	14,773	75.9	31.6	<10.0	1.72	187	<0.25	3.87	21.1	69.8	<10.0	351
07/14/21	16,292	68.2	41.0	<10.0	1.78	197	<0.25	3.70	21.7	70.4	<10.0	366
07/16/21	17,581	245	<54.7	<10.0	1.56	178	<0.25	4.88	20.1	70.2	<10.0	334
08/18/21	17,941	332	76.0	<10.0	1.38	217	0.29	5.12	23.6	73.0	<10.0	416
09/23/21	17,506	75.5	43.0	<10.0	1.64	176	0.25	4.21	22.0	66.9	<10.0	341
10/13/21	16,113	49.7	25.4	<10.0	1.37	148	0.36	4.10	16.5	52.7	<10.0	297
Minimum	14,244	45.2	25.4	<10.0	1.37	148	<0.25	3.70	16.5	52.7	<10.0	297
Mean ³	16,350	127	40.2	8.4	1.57	184	0.24	4.35	20.8	68.2	<10.0	354
Maximum	17,941	332	76.0	16.4	1.78	217	0.36	5.12	23.6	74.1	<10.0	416
503 Limit	NL ⁴	NL	NL	41	39	1,500	17	75	420	300	100	2,800

¹Materials produced in 2020 and tested in 2021 prior to utilization.

²No reportable result because the thermometer used for digestion was not calibrated.

³In calculating each mean, any value less than the reporting limit was treated as equal to the reporting limit divided by the square root of two.

⁴No limit.

TABLE 20: FECAL COLIFORM ANALYSIS OF CURED COMPOSTED EXCEPTIONAL QUALITY BIOSOLIDS PRODUCED AT THE CALUMET EAST SOLIDS MANAGEMENT AREA IN 2020 AND TESTED PRIOR TO UTILIZATION ON URBAN LAND IN 2021

Sample Date ¹	Total Solids %	Fecal Coliform MPN ² /dry g
04/13/21	48.2	8
07/14/21	51.6	13
08/18/21	57.9	5
09/28/21	57.3	5
10/13/21	47.5	6

¹Materials produced in 2020 and tested in 2021 prior to utilization.

²Most probable number.

current renewable certification of the PFRP designation is valid from August 1, 2017, through July 31, 2022, and requires the analysis of six samples annually for helminth ova and enteric viruses during this period and the submittal of the data together with the annual Part 503 report.

None of the Calumet WRP air-dried EQ biosolids generated or utilized in 2021 were PFRP-compliant with respect to the minimum required duration of lagoon aging (18 months) due to operational constraints. Therefore, all air-dried biosolids utilized as EQ material in 2021 were tested for helminth ova and enteric virus compliance in August, September, and October 2020 and April, May, and June 2021 (Table 17), and for fecal coliform compliance in May, June, July, August, September, and October 2021 (Table 18), according to Section 503.32(a)(5).

HANOVER PARK WATER RECLAMATION PLANT

Treatment Plant and Biosolids Process Train Description

The Hanover Park WRP, located in Hanover Park, Illinois, has a design average flow of 12 MGD. The annual average treated flow in 2021 was 6.56 MGD. Wastewater reclamation processes at this WRP include primary (primary settling), secondary (activated sludge process), and tertiary (sand filtration) treatments. All solids produced at the Hanover Park WRP are anaerobically digested and stored in lagoons and later land-applied by injection at the on-site Fischer Farm.

In 2021, the total biosolids production at this WRP was 755 DT (Table 1).

Land Application of Class B Liquid Biosolids

In 2021, the Hanover Park WRP land-applied a total of 1,244 DT of lagooned biosolids and lagoon supernatant at the on-site Fischer Farm under IEPA Permit No. 2016-61315. The total quantity of biosolids utilized (1,244 DT) was more than the total 2021 production for the Hanover Park WRP (755 DT) with the excess coming from the on-site storage lagoons. Hence, net storage of biosolids in lagoons was reduced by 489 DT in 2021. In accordance with Table 1 of Section 503.16, the frequency of monitoring for these biosolids is four times per year.

All Hanover Park WRP lagoon biosolids land-applied in 2021 met the pollutant concentration limits in Table 3 of Section 503.13 for all metals (Table 21), the anaerobic digestion time and temperature requirements of the Class B pathogen standards of Section 503.32(b)(3) (Table 22), and the vector attraction reduction requirements of Section 503.33(b)(1) (Table 23). Management practices at this land-application site complied with Section 503.14.

TABLE 21: CONCENTRATIONS OF NITROGEN AND METALS IN BIOSOLIDS GENERATED AT THE HANOVER PARK WATER RECLAMATION PLANT AND APPLIED AT THE FISCHER FARM SITE IN 2021

Sample Date	TKN	NO ₃ ⁻ +NO ₂ ⁻ -N	NH ₃ -N	As	Cd	Cu	Hg	Mo	Ni	Pb	Se	Zn
-----Supernatant, mg/L-----												
06/26/21	955	0.489	818	0.014	<0.002	0.264	<0.0005	0.010	0.027	0.005	0.007	0.428
08/15/21	744	0.374	730	0.013	<0.002	0.161	<0.0005	0.007	0.026	0.003	0.006	0.299
09/18/21	823	<0.25	866	0.014	<0.002	0.129	<0.0005	0.008	0.026	0.003	0.006	0.222
11/06/21	762	<0.25	672	0.012	<0.002	0.123	<0.0005	0.006	0.022	0.002	0.006	0.203
Minimum	744	<0.25	672	0.012	<0.002	0.123	<0.0005	0.006	0.022	0.002	0.006	0.203
Mean ¹	821	0.304	772	0.013	<0.002	0.169	<0.0005	0.007	0.026	0.003	0.006	0.288
Maximum	955	0.489	866	0.014	<0.002	0.264	<0.0005	0.010	0.027	0.005	0.007	0.428
-----Liquid Biosolids, mg/kg-----												
11/27/21	81,086	<67.2	26,726	<10	1.49	834	0.729	14.9	32.1	25.0	<10	904
503 Limit	NL ²	NL	NL	41	39	1,500	17	75	420	300	100	2,800

¹In calculating each mean, any value less than the reporting limit was treated as equal to the reporting limit divided by the square root of two.

²No limit.

TABLE 22: DIGESTER TEMPERATURES AND DETENTION TIMES DURING PROCESSING OF BIOSOLIDS GENERATED AT THE HANOVER PARK WATER RECLAMATION PLANT AND APPLIED AT THE FISCHER FARM SITE IN 2021

Month	Average Temperature °F	Average Detention Time	Minimum Detention Time Required by 503.32(b)(3) ¹ days	Meets Part 503 Class B Requirements
January	97.4	26.4	15.0	Yes
February	98.0	26.6	15.0	Yes
March	98.0	26.7	15.0	Yes
April	98.0	26.4	15.0	Yes
May	98.0	29.4	15.0	Yes
June	98.0	30.3	15.0	Yes
July	98.0	32.7	15.0	Yes
August	98.0	32.3	15.0	Yes
September	98.0	30.8	15.0	Yes
October	98.0	27.9	15.0	Yes
November	98.0	27.1	15.0	Yes
December	98.0	27.2	15.0	Yes

¹For anaerobic digestion at average temperature achieved.

TABLE 23: VOLATILE SOLIDS REDUCTION IN BIOSOLIDS GENERATED AT THE HANOVER PARK WATER RECLAMATION PLANT AND APPLIED AT THE FISCHER FARM SITE IN 2021

Month ¹	Digester	Digester	Applied	Volatile Solids Reduction ² %
	Feed	Draw	Biosolids	
	-----% Total Volatile Solids-----			
June	87.6	75.1	63.5	75.4
August	85.9	75.5	60.4	74.9
September	86.1	75.5	61.1	74.6
November	86.8	74.7	65.6	70.1

¹Biosolids applied as lagoon supernatant in June, August, and September, and as both supernatant and liquid biosolids in November.

²Volatile solids reduction computed using total volatile solids data for digester feed and applied biosolids.

JOHN E. EGAN WATER RECLAMATION PLANT

The Egan WRP, located in Schaumburg, Illinois, has a design average flow of 30 MGD. The annual average treated flow in 2021 was 22.0 MGD. Wastewater reclamation processes include primary (primary settling), secondary (activated sludge process), and tertiary (sand filtration) treatments. Under normal operations, all solids generated at the Egan WRP, including solids conveyed from the Kirie WRP, are anaerobically digested. During some winters or when the centrifuges are not operating, liquid digested biosolids are sent via sewers to the O'Brien WRP. Centrifuge centrate is also sent via sewers to the O'Brien WRP.

In 2021, a total amount of 5,734 DT biosolids were produced at the Egan WRP, all of which were conveyed to other WRPs for further processing and storage (Table 1). Anaerobic digestion at the Egan WRP in 2021 met the time and temperature requirements of the Class B pathogen standards of Section 503.32(b)(3) (Table 24). All biosolids produced at Egan WRP were pumped to the O'Brien WRP and then to the Stickney WRP for further processing and utilization.

TABLE 24: DIGESTER¹ TEMPERATURES AND DETENTION TIMES DURING PROCESSING OF BIOSOLIDS GENERATED AT THE JOHN E. EGAN WATER RECLAMATION PLANT AND APPLIED TO FARMLAND IN 2021

Month	Average Temperature °F	Average Detention Time	Minimum Detention Time Required by 503.32(b)(3) ² days	Meets Part 503 Class B Requirements
January	95.5	28.5	15.0	Yes
February	96.3	28.8	15.0	Yes
March	97.5	30.4	15.0	Yes
April	97.5	35.3	15.0	Yes
May	96.6	30.9	15.0	Yes
June	97.1	29.9	15.0	Yes
July	97.9	28.5	15.0	Yes
August	97.8	31.6	15.0	Yes
September	97.7	34.5	15.0	Yes
October	97.3	29.2	15.0	Yes
November	97.2	34.9	15.0	Yes
December	97.6	33.9	15.0	Yes

¹Temperatures and detention times are for primary digesters A and C at the Egan WRP.

²For anaerobic digestion at average temperature achieved.

TERRENCE J. O'BRIEN WATER RECLAMATION PLANT

The O'Brien WRP, located in Skokie, Illinois, has a design average flow of 333 MGD. The annual average treated flow in 2021 was 204 MGD. Wastewater reclamation processes at the O'Brien WRP include primary (primary settling) and secondary (activated sludge process) treatments. In 2021, the O'Brien WRP produced 38,990 DT of solids (Table 1), which were sent via pipeline to the Stickney WRP where they were commingled with the solids from that WRP for anaerobic digestion and further processing. This total includes solids generated from water reclamation at the O'Brien WRP and solids conveyed from the Egan WRP to the O'Brien WRP via sewer, which includes solids generated at the Kirie WRP, as described in the next section.

JAMES C. KIRIE WATER RECLAMATION PLANT

The Kirie WRP, located in Des Plaines, Illinois, has a design average flow of 52 MGD. The annual average treated flow in 2021 was 32.65 MGD. Wastewater reclamation processes include grit tanks, secondary (activated sludge process), and tertiary (sand filtration) treatments. In 2021, the Kirie WRP produced 5,735 DT of solids (Table 1), which were sent via force main to the Egan WRP, then to the O'Brien WRP, and finally to the Stickney WRP and were commingled with the solids from these WRPs for anaerobic digestion and further processing.

LEMONT WATER RECLAMATION PLANT

The Lemont WRP, located in Lemont, Illinois, has a design average flow of 2.3 million MGD. The annual average treated flow in 2021 was 2.42 MGD. Wastewater reclamation processes include both primary (primary settling) and secondary (activated sludge process) treatments. In 2021, the Lemont WRP produced 434 DT of solids (Table 1), which were gravity concentrated and transported to the Stickney WRP where they were commingled with the solids from that WRP for anaerobic digestion and further processing.

APPENDIX

DESIGNATION OF SITE-SPECIFIC EQUIVALENCY TO PROCESS TO FURTHER
REDUCE PATHOGENS FOR METROPOLITAN WATER RECLAMATION DISTRICT OF
GREATER CHICAGO BIOSOLIDS PROCESSING TRAINS