

MARYLAND DEPARTMENT OF THE ENVIRONMENT

Land Management Administration • Resource Management Program

Summary of Sewage Sludge Plant Available Nitrogen (PAN) Calculations For CY- 2023

(Results of Sewage Sludge Analyses From 9/16/2020 to 9/15/2022 Used to calculate these rates)

Wastewater Treatment Plant	County	Sewage Sludge Type	Earliest Analysis	Latest Analysis	No. of Analyses	Organic Nitrogen	PAN K=1	PAN K=0.5	% P ₂ O ₅	% K ₂ O	% Solid Content	CCE
Annapolis	Anne Arundel											
Cake		LS	01/19/2021	05/20/2022	9	3.6654	23.51		3.8462	0.1677	27.41	30.72
Back River	Baltimore											
Cake		An Dig	09/30/2020	06/30/2022	22	4.7637	32.14		6.4091	0.1750	21.09	0.00
Ballenger Creek	Frederick											
Cake		LS	10/06/2020	08/02/2022	20	3.0940	19.69		2.9053	0.1952	30.57	26.20
Bowie	Prince George's											
Cake		LS	10/14/2020	06/06/2022	7	4.7844	29.88		3.9922	0.3315	19.59	27.34
Broadneck	Anne Arundel											
Cake		LS	09/16/2020	05/17/2022	9	4.4170	28.12		5.0774	0.2453	20.08	21.82
Broadwater	Anne Arundel											
Cake		LS	02/16/2021	05/17/2022	4	2.8815	19.11		3.3472	0.1550	29.95	34.60
Cox Creek	Anne Arundel											
Cake		LS	01/19/2021	05/17/2022	9	4.0409	25.69		3.7978	0.3808	25.49	24.18
Damascus	Montgomery											
Cake		LS	10/07/2020	07/07/2022	22	5.4231	35.47		7.3571	0.5176	19.11	48.02

Plant Available Nitrogen (PAN) is in terms of pounds of available nitrogen per dry ton of sewage sludge. LS (Lime Stabilized), An Dig (Anaerobically Digested), Ae Dig (Aerobically Digested), Organic nitrogen (NO) is expressed in percent of dry weight of sewage sludge, NO = TKN - NH₄ - NO₃, TKN (Total Kjeldahl Nitrogen), NH₄ (Ammonium), NO₃ (Nitrate).

K=1 (Volatilization Factor for incorporated liquid and dewatered sewage sludge applied in any manner), K=0.5 (Volatilization Factor for surface applied liquid sewage sludge), P₂O₅ (% Available Phosphate), K₂O (% Water Soluble Potash), CCE (% Calcium Carbonate Equivalent, it is the neutralizing power per weight of material of the lime stabilized sewage sludge relative to pure calcium carbonate CaCO₃). P₂O₅ = [(%TP)*2.29], while K₂O = [(%TK)*1.2], %TP (Percent Total Phosphorus), and %TK (Percent Total Potassium).

Wastewater Treatment Plant	County	Sewage Sludge Type	Earliest Analysis	Latest Analysis	No. of Analyses	Organic Nitrogen	PAN K=1	PAN K=0.5	% P2O5	% K2O	% Solid Content	CCE
Deep Creek Lake	Garrett											
Cake		Ae Dig	10/26/2020	10/06/2021	2	3.3645	30.60		15.7438	0.3234	19.40	0.00
Liquid		Ae Dig	10/26/2020	10/26/2020	1	2.2500	44.50	40.70	8.3814	0.5880	2.00	0.00
Dorsey Run Advanced	Anne Arundel											
Cake		LS	11/06/2020	04/27/2022	7	2.3476	17.25		2.3953	0.0729	29.54	36.59
Frederick	Frederick											
Cake		An Dig	11/02/2020	07/06/2022	10	4.8372	33.60		8.7180	0.2281	18.25	2.76
Freedom District	Carroll											
Cake		LS	10/01/2020	04/18/2022	7	3.8815	29.14		4.8221	0.2851	25.47	26.17
Grantsville	Garrett											
Liquid		Ae Dig	04/06/2021	06/01/2022	3	5.5590	46.57	41.23	5.3662	0.6444	1.23	0.00
Havre de Grace	Harford											
Cake		Ae Dig	10/20/2020	11/04/2021	5	2.8569	25.00		7.8318	0.3672	22.56	0.00
Leonardtwn	St. Mary's											
Cake		Ae Dig	10/14/2020	03/01/2022	3	3.7663	33.94		5.3433	0.4840	21.90	0.00
Liquid		Ae Dig	10/05/2021	10/05/2021	1	5.6910	56.33	45.33	13.5110	0.6720	13.30	0.00
Little Patuxent	Howard											
Cake		An Dig	09/16/2020	06/16/2021	7	6.8528	56.56		7.3542	0.3039	19.36	12.60
Marlay-Taylor Water Reclamation Facility	St. Mary's											
Cake		An Dig	10/07/2020	04/06/2022	7	3.9684	33.65		6.6083	0.2331	19.07	0.00

Plant Available Nitrogen (PAN) is in terms of pounds of available nitrogen per dry ton of sewage sludge. LS (Lime Stabilized), An Dig (Anaerobically Digested), Ae Dig (Aerobically Digested), Organic nitrogen (NO) is expressed in percent of dry weight of sewage sludge, NO = TKN - NH4 - NO3, TKN (Total Kjeldahl Nitrogen), NH4 (Ammonium), NO3 (Nitrate).

K=1 (Volatilization Factor for incorporated liquid and dewatered sewage sludge applied in any manner), K=0.5 (Volatilization Factor for surface applied liquid sewage sludge), P2O5 (% Available Phosphate), K2O (% Water Soluble Potash), CCE (% Calcium Carbonate Equivalent, it is the neutralizing power per weight of material of the lime stabilized sewage sludge relative to pure calcium carbonate CaCO3). P2O5 = [(%TP)*2.29], while K2O = [(%TK)*1.2], %TP (Percent Total Phosphorus), and %TK (Percent Total Potassium).

Wastewater Treatment Plant	County	Sewage Sludge Type	Earliest Analysis	Latest Analysis	No. of Analyses	Organic Nitrogen	PAN K=1	PAN K=0.5	% P2O5	% K2O	% Solid Content	CCE
Maryland City Water Reclamation Facility	Anne Arundel											
Cake		LS	02/17/2021	05/16/2022	6	5.6121	34.83		4.1983	0.4924	20.62	27.48
Maryland Correctional Institution (MCI)	Washington											
Cake		LS	10/08/2020	07/07/2022	8	2.8599	22.94		4.2594	0.2381	22.16	30.48
Mattawoman	Charles											
Cake		LS	11/03/2020	07/05/2022	8	3.1686	23.19		3.5839	0.1568	34.43	14.85
Mount Airy	Carroll											
Cake		LS	11/10/2020	05/04/2022	7	5.7029	38.85		4.9464	0.5678	22.39	34.12
Mount Saint Mary's University	Frederick											
Liquid		Ae Dig	02/10/2021	01/19/2022	2	2.2250	86.65	84.78	4.7747	0.7212	0.60	0.00
Ocean City	Worcester											
Cake		LS	09/16/2020	06/20/2022	21	2.3678	16.92		1.9457	0.2308	46.17	66.73
Parkway	Prince George's											
Cake		LS	11/10/2020	07/05/2022	11	4.7199	29.92		5.2503	0.1260	27.54	41.77
Patuxent	Anne Arundel											
Cake		LS	01/19/2021	05/25/2022	8	4.6595	29.92		3.9789	0.2905	22.13	29.11
Piscataway	Prince George's											
Cake		LS	10/08/2020	07/19/2022	43	4.4489	27.36		3.7928	0.0627	25.90	35.27
QA 1-Kent Island	Queen Anne's											
Cake		Ae Dig	12/08/2020	05/02/2022	7	5.0226	37.88		7.2266	0.5095	19.79	0.00

Plant Available Nitrogen (PAN) is in terms of pounds of available nitrogen per dry ton of sewage sludge. LS (Lime Stabilized), An Dig (Anaerobically Digested), Ae Dig (Aerobically Digested), Organic nitrogen (NO) is expressed in percent of dry weight of sewage sludge, NO = TKN - NH4 - NO3, TKN (Total Kjeldahl Nitrogen), NH4 (Ammonium), NO3 (Nitrate).

K=1 (Volatilization Factor for incorporated liquid and dewatered sewage sludge applied in any manner), K=0.5 (Volatilization Factor for surface applied liquid sewage sludge), P2O5 (% Available Phosphate), K2O (% Water Soluble Potash), CCE (% Calcium Carbonate Equivalent, it is the neutralizing power per weight of material of the lime stabilized sewage sludge relative to pure calcium carbonate CaCO3). P2O5 = [(%TP)*2.29], while K2O = [(%TK)*1.2], %TP (Percent Total Phosphorus), and %TK (Percent Total Potassium).

Wastewater Treatment Plant	County	Sewage Sludge Type	Earliest Analysis	Latest Analysis	No. of Analyses	Organic Nitrogen	PAN K=1	PAN K=0.5	% P2O5	% K2O	% Solid Content	CCE
Rock Hall	Kent											
Cake		Ae Dig	02/09/2021	02/09/2021	1	0.0088	0.08		0.1233	0.0020	27.30	0.00
Seneca Creek	Montgomery											
Cake		LS	10/06/2020	07/19/2022	40	5.6942	38.35		6.0868	0.4412	23.98	40.69
Sod Run	Harford											
Cake		An Dig	10/05/2020	08/02/2022	22	3.7162	28.23		7.7329	0.1579	19.93	0.00
Liquid		An Dig	12/07/2020	12/07/2020	1	4.6120	33.81	26.13	7.7402	0.2004	14.90	0.00
Taneytown	Carroll											
Cake		Ae Dig	03/22/2021	03/21/2022	3	5.1433	37.13		6.4731	0.4564	17.97	0.00
Valley Forge Sewage Authority	Outside of Maryland											
Cake		LS	01/14/2021	12/09/2021	12	4.0333	26.93		1.6507	0.1430	32.47	27.76
Wicomico Shores	St. Mary's											
Cake		Ae Dig	04/07/2021	04/07/2021	1	3.3400	31.24		4.5800	0.2400	22.90	0.00
Liquid		Ae Dig	07/25/2022	07/25/2022	1	4.8000	50.80	39.80	2.5190	2.8800	12.30	0.00

Plant Available Nitrogen (PAN) is in terms of pounds of available nitrogen per dry ton of sewage sludge. LS (Lime Stabilized), An Dig (Anaerobically Digested), Ae Dig (Aerobically Digested), Organic nitrogen (NO) is expressed in percent of dry weight of sewage sludge, NO = TKN - NH4 - NO3, TKN (Total Kjeldahl Nitrogen), NH4 (Ammonium), NO3 (Nitrate).

K=1 (Volatilization Factor for incorporated liquid and dewatered sewage sludge applied in any manner), K=0.5 (Volatilization Factor for surface applied liquid sewage sludge), P2O5 (% Available Phosphate), K2O (% Water Soluble Potash), CCE (% Calcium Carbonate Equivalent, it is the neutralizing power per weight of material of the lime stabilized sewage sludge relative to pure calcium carbonate CaCO3). P2O5 = [(%TP)*2.29], while K2O = [(%TK)*1.2], %TP (Percent Total Phosphorus), and %TK (Percent Total Potassium).