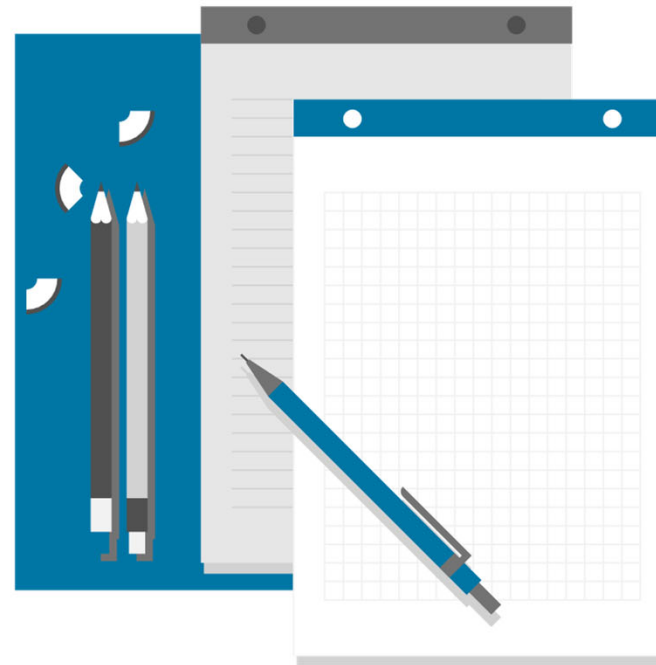


180 Days of Storage Review

2024 Wis. CAFO Workshops

Engineering Team

- Bernie Michaud
- Rob Davis
- Tony Salituro
- Tabatha Davis



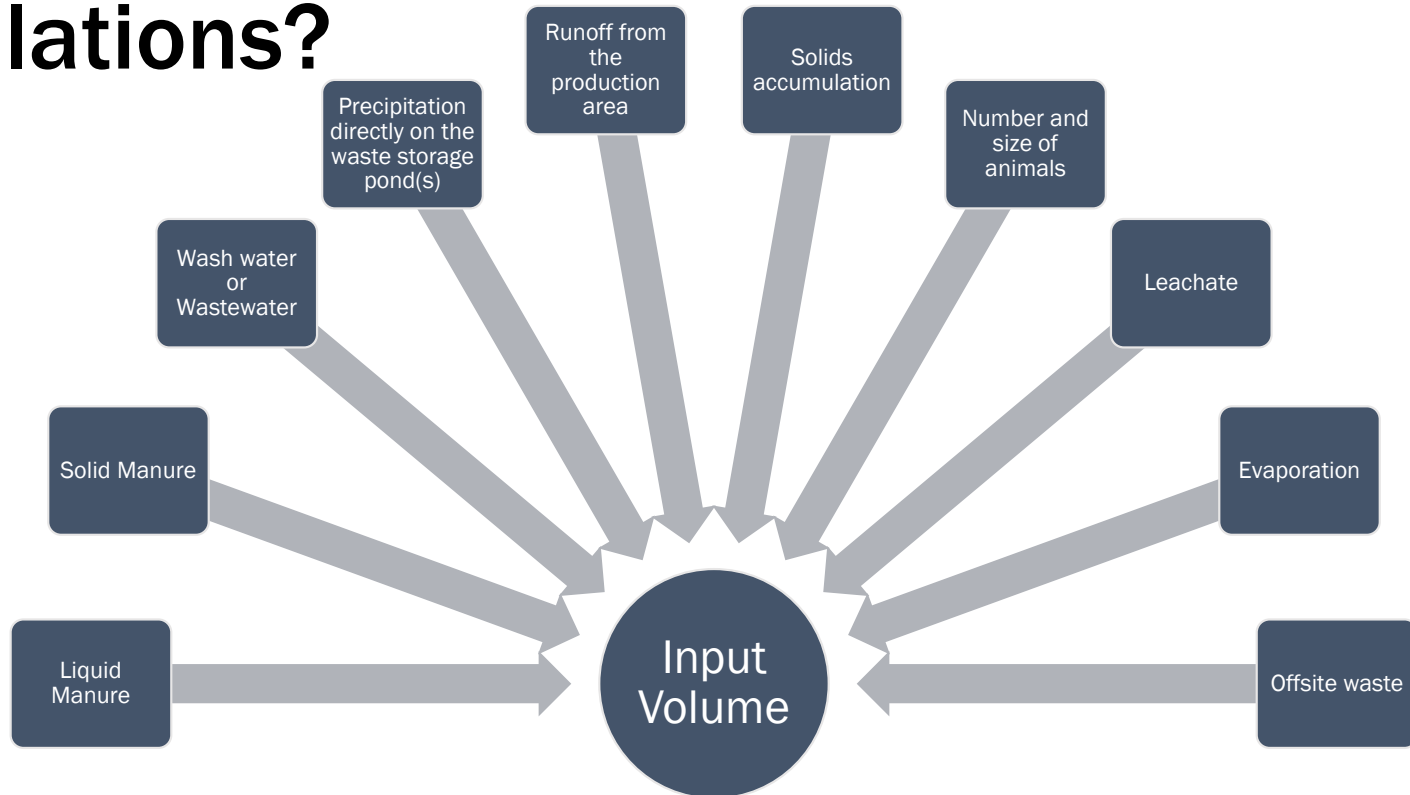
Why Require 180 Days of Storage?

- Reduce Risk of Storage Overtopping and Winter Applications of Liquid Manure
- Required in Code
 - NR 243.14 (9) –Nutrient Management, adequate storage
 - NRNR 243.15(3)(i)&(j) Liquid manure for CAFOs
 - NR 243.15(3)(k) Calculating design volume
 - NR 243.17(3) Liquid manure maintaining 180 days of storage

When are 180 Days of Storage Calculations Required?

- At permit issuance and reissuance
- For engineering plan submittals which change volumes
- For herd expansions of over 20% or by over 1,000 animal units
- In annual reports to the Department

What's Involved in the 180 Days of Storage Calculations?

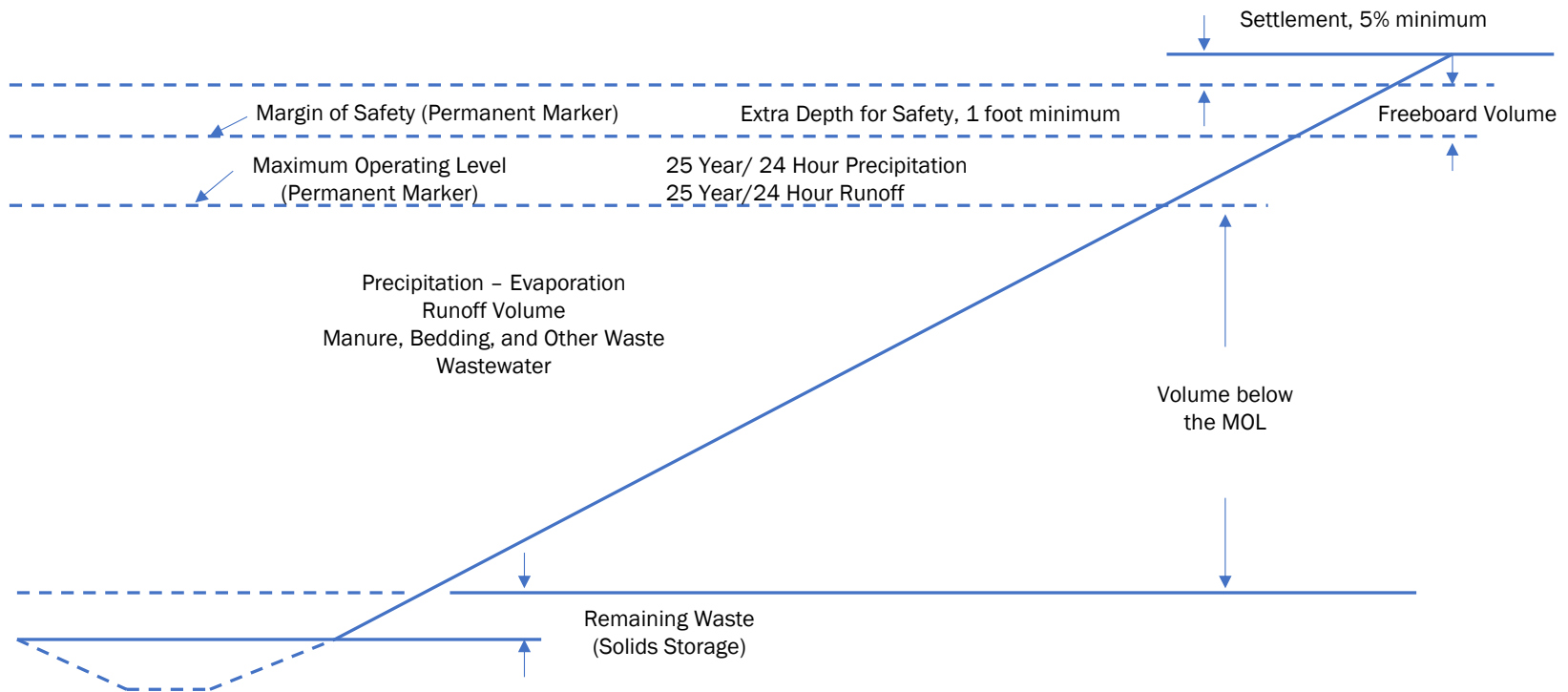


What's NOT Involved

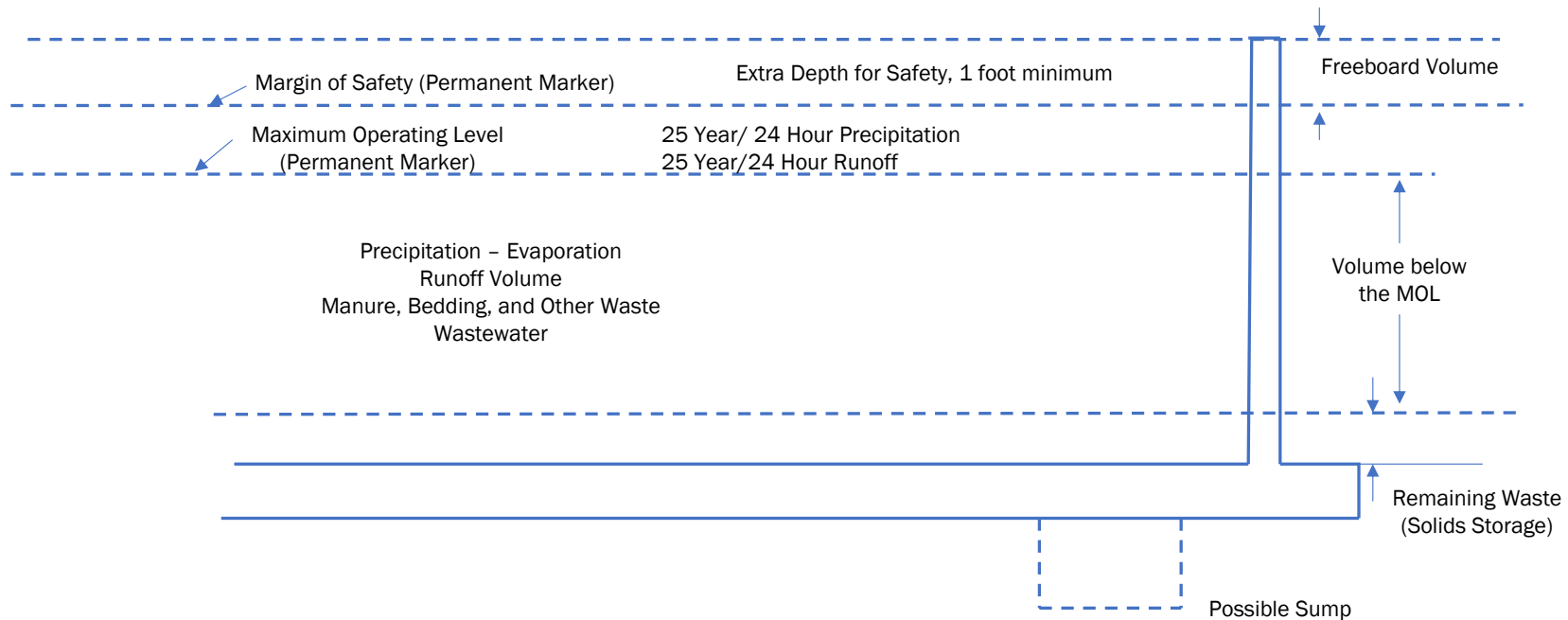
- Process wastewater (i.e. feed storage leachate/runoff) stored separately from manure is NOT included
 - Process wastewater definition--[NR 243.03(53)]
- Solid Manure NOT stored in waste storage facility
 - NR 243.15 (3)(g)



Storage Volume: Impoundment



Storage Volume: Structure



Where is the Maximum Operating Level (MOL) and Margin of Safety (MOS)?

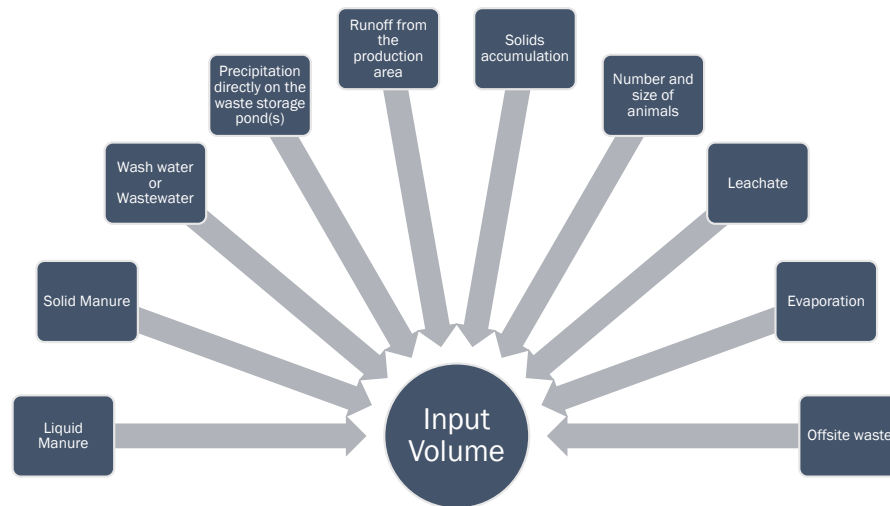
- A 25-year / 24-hour storm event falling onto a waste storage pond is stored above MOL.
- A 25-year / 24-hour storm event falling onto collected runoff areas are stored above MOL.
- The MOS is located 1 foot from the top of the storage.
- For Swine and Poultry (other than Duck) facilities the 100-year/ 24-hour storm event is used for MOL calculations.

What to submit for review?- Waste Storage Capacity

- Waste Storage Facility Dimensions
- Depth of solids and liquids unable to be removed.
- 25-yr direct precipitation and 25-yr runoff volumes
- Tables and/or spreadsheets with storage volume calculations
- Total and Maximum Operating Level (MOL) volumes and MOL depth.

What to submit for review?- Waste Generation

- Include either:
 - Calculations for these inputs:
 - Or five years of manure hauling logs



Calculated Manure Generation- NRCS Waste Storage Design Spreadsheet

Wisconsin | Field Office Technical Guide | NRCS - USDA

	A	B	C	D	E	F	G	H	I	J
1	WASTE STORAGE FACILITY DESIGN - 313 STANDARD									Ver. March 2016
2	CLIENT:	Wis. Example CAFO			COUNTY:	CLARK			DATE:	1/29/18
3	DSN BY:				CHK BY:				DATE:	
4	COMMENTS:									
5	ANIMAL TYPE>	1		(1=DAIRY, 2=BEEF, 3=VEAL, 4=SWINE(finishing), 5=SWINE(farrowing),						
6				6=POULTRY, 0=OTHER)						
7	For Dairy:	Rolling Herd Average	27,000	lbs/cow/yr		Is it a stanchion barn?	N		(Y or N)	
8	MANURE AND WASTEWATER									
9	LIVESTOCK		AVG. WT.	DAILY OUTPUT, CU FT		DAYS OF STORAGE	VOLUME REQUIRED	ANIMAL UNITS		
10	KIND	NUMBER	PER HEAD	MANURE	BEDDING				TOTAL	
11	Cows	2800	1,400	2.64	0.3	8237.6	365	3,006,724	3,920	
12	Heifers	150	700	1.12	0.3	213.0	365	77,745	105	
13	Calves		350							
14										
15										
16	WASTEWATER:		22281	GAL/DAY		2978.8	CU FT/DAY		4,025 TOT. A.U.	
17			TOTAL DAILY VOLUME:		11429.4	CU FT / DAY				
18							31,204,428	GALLONS		
19					Total Manure and Wastewater		4,171,715	CU FT		
20					Expected % solids in waste (Includes runoff and precip.)		8.2	%		

Annual Precipitation on Storage Surface Volume

44	PRECIPITATION	Does the facility collect precipitation? (No roof or lid)	<input type="text" value="1"/>	(1 for yes, 2 for no)
45		Beginning Month for Precip. Collection	<input type="text" value="4"/>	(1=Jan, 2=Feb, etc.)
46	Precipitation minus evaporation			
47		Average Precipitation on Storage Surface	32.7 INCH	2.7 FT
48		Average Evaporation from Storage Surface	- 12.4 INCH	- 1.0 FT
49		Net Precipitation on Storage Surface	20.3 INCH	1.7 FT
50				
51		25-Yr, 24-Hr Precip on Storage Surface	4.7 INCH	0.4 FT

Annual and 25-yr, 24 hr Runoff Volumes from Feed Storage/Animal Lot Collection.

22	RUNOFF VOLUME STORED BELOW THE MOL					
23	RUNOFF VOLUME (ENTIRE DRAINAGE AREA)					
24	MONTHLY RUNOFF					
25	RCN	98	30.85 IN.	X	135,508	Ft ² Drainage Area= 348,389 CU FT
26			<u>12</u>			(Do not include waste storage facility area)
27						
28	25-Year, 24-HOUR RUNOFF	RUNOFF VOLUME STORED ABOVE THE MOL				
29	RCN	98	<u>4.50 IN.</u>	X	135,508	Ft ² Drainage Area= 50,856 CU FT
30			12.00			(Do not include waste storage facility area)

Liquid Waste Volumes from Hauling Logs

2								
3	Annual Manure and Process Wastewater Application Volumes							
4	Year	Gallons Applied	Avg. Yearly AUs	Gallons/AU				
5	2013	22,000,000	2,600	8,462				
6	2014	24,000,000	2,800	8,571				
7	2015	26,000,000	3,000	8,667				
8	2016	27,000,000	3,100	8,710				
9	2017	30,000,000	3,300	9,091				
10								
11	Average Volume/AU			8,700				
12	Average Annual Volume for Current AUs			35,017,677				
13								
14	Note 1. Enter annual manure and process wastewater applications from the previous 5 years of hauling logs.							
15	Note 2. If 5 years of hauling information is not available, "Table" based volumes from the previous tab should be used.							
16	Note 3. The same annual manure and process wastewater volume which is used for the days storage calculation							
17	should also be used for Nutrient Mgmt. planning, whether it is based on the average hauling log values or "Table" values.							

180 Day Storage Submittal to DNR

- Waste Storage Volume Calculations (based on field verified information, such as the waste storage as built survey).
- Liquid Waste Production Calculations.
- Days of Storage Calculation, can use DNR Waste Storage spreadsheets.

DNR Waste Storage Spreadsheet

(See DNR CAFO Permit Application Web Page)

Liquid Waste Storage Volume Calculation Worksheet									
1									
2	Wisconsin Example CAFO	:Permittee Name	# of A.U.'s:	4025	Dsn by:	Date:	01/30/2018		
3	Total Annual Liquid Waste Volume (NRCS Table Values)		Total Liquid Waste Storage Capacity (gallons)						
4	Liquids Collected/Stored	Annual Gallons	Waste Storage	Total Vol. from Settled Top to Bottom	-Solids Storage	-25-yr, 24-hr Precip. on Storage	25-yr, 24-hr Collected Runoff ***	-Freeboard Vol.	Max. Operating Level (MOL) Vol.
5	Manure and Bedding	23,071,708	#1	2,300,000	300,000	119,919	380,403	299,798	1,199,880
6	Parlor Wastewater	8,132,720	#2	27,180,900	2,050,501	678,077		1,655,493	22,796,829
7	Feed Storage Leachate	82,280	#3	1,080,000	186,629	61,640		150,342	681,389
8	Feed Storage Runoff Collected *	2,605,950	#4	420,000	93,350			46,675	279,975
9	Feedlot Runoff*	492,311	#5						0
10	Net Precipitation on Storage Surface(s) **	3,653,454	#6						0
11	Stacking Pad Runoff Collected*							Total MOL Vol:	24,958,073
12	Offsite Waste							Days of Storage:	239
13	Other							Meets Days of Storage Criteria:	YES
14	Other								
15	Other								
16	Other								
17	Other								
18	TOTAL:	38,038,423							
19									
20	Total Annual Liquid Waste from Hauling Logs	35,017,677							
21									
22		1	Total Annual Volume Source (1=NRCS Table Values; 2=Hauling Log Values)						
23									
24	Jan. 2018								

Internal DNR Review Spreadsheet

Liquid Waste Storage Volume Calculation Worksheet																				Version:	20-Mar-19
Permittee Name:		2		Total Annual Vol Source (1-NRCS):	AU: 9,216	County:	SHAWANO	5724:	4.20	Sign by:	Date:	04/19/2019									
Total Annual Liquid Waste Volume (NRCS Table Values)										Total Liquid Manure Waste Storage Capacity											
	Annual Gallons	Included In Manure Storage	Waste Storage	Include In Manure Storage	from Settled Top to Bottom (gal)	Usable Total Volume (gal)	Tap Area (ft ²)	Usable Tap Area	Depth h(ft)	Tap Length or Width (ft)	Slope (x:1)	Bottom Length or Width	Bottom Area	Depth of Solids (ft)	-Solids Storage (gal)	-25-yr, 24-hr Precip. on Storage	Collected Runoff*** (gal)	Frostbear Depth (ft)	-Frostbear Volume (gal)	Max. Operating Level (MOL) Val (gal)	
4	Liquids Collected/Stored																				
5	Manure and Bedding	0	Yes	\$1	Yes	415,064	415,064	6,936	6,936	8.0		0.0	6,936	1.0	51,884	18,159		1.0	51,884	293,140	
6	Parlor/Waterwater	0	Yes	\$2	Yes	6,277,964	6,277,964	79,900	79,900	14.0	470.0	1.5	400.0	40,000	1.0	308,644	209,178		1.0	585,778	5,174,365
7	Calf Hutch Pad	RON: 90	2R/AS	Area: 0	ft ²	0	0	0	0	0	0	0	0	0	0	0	0		1.0	0	0
8	Bedding	0	Yes	\$3	Yes	8,561,982	8,561,982	88,400	88,400	20.0	520.0	1.5	420.0	29,400	0.5	112,258	231,431		1.0	648,423	1,569,870
9	Other	0	Yes	\$4	Yes	25,636,241	25,636,241	309,300	309,300	21.0	598.0	1.5	493.0	120,785	0.0	0	547,947		1.0	1,547,930	21,540,364
10	Other	0	Yes	\$5	Yes	0	0	0	0	0	0	0	0	0	0	0	0		1.0	0	0
11	Other	0	Yes	\$7	Yes	0	0	0	0	0	0	0	0	0	0	0	0		1.0	0	0
12	Other	0	Yes	\$8	Yes	0	0	0	0	0	0	0	0	0	0	0	0		1.0	0	0
13	Net Precipitation on Manure Storage Pond Surface(s)**	4,365,794	Yes	\$9	Yes	0	0	0	0	0	0	0	0	0	0	0	0		1.0	0	0
14	Leachate & Runoff Generation *			\$10	Yes	0	0	0	0	0	0	0	0	0	0	0	0		1.0	0	0
15	Total Feed Storage Leachate	50,000	tonn	136,600	Yes	0	0	0	0	0	0	0	0	0	0	0	0		1.0	0	0
16	Total Feed Storage Runoff Area 1	RON: 90	2R/AS	Area: 383,785	ft ²	7,380,561	Yes														
17	Total Feed Storage Runoff Area 2	RON: 90	2R/AS	Area: 0	ft ²	0	Yes														
18	Net Precipitation on Precursor Wastewater Only Storage Pond Surface(s)**	916,266	Yes	\$11	Yes	0	0	0	0	0	0	0	0	0	0	0	0		1.0	0	0
19	TOTAL:	*****													*****	*****	0		*****	36,577,733	
																				Day of Storage:	271
																				Meets Day of Storage Criteria:	YES
Total Annual Solid & Liquid Waste Volume Removed																				Other waste storages that are not included within manure storage. Calculations for leachate only. (gallons)	
20	Manure Solids Removed	Val: 0	ft ²	0																	
21	Other																				
22	Other																				
23	TOTAL:	0																			
24	TOTAL:	*****																			
25	TOTAL:	*****																			
26	Total Annual Liquid Waste from NRCS Tables Values:	*****																			
27	Total Annual Liquid Waste from Newline Logs:	*****																			
																				Total Leachate Volume:	1,433,527
																				Day of Storage:	70

Key Items to Consider for Submittals

- Total Liquid Waste Storage Capacity
 - Provide current storage dimensions and area/volume calculations in the submittal
 - Use the MOL volume not Total Storage volume when calculating the Days of Storage:
 - Separate out the solids, freeboard, and 25 year/24 hour storm when calculating MOL
 - Provide justification for a remaining waste (solids storage) depth of 0 feet
 - Include 25-year/24-hour precipitation on open liquid waste storages and all surfaces with runoff collection

Key Items to Consider for Submittals

- Total Waste Generation
 - Animal Units used should match those used in NMP and Permit AU form
 - Or an explanation why Animal Units do not match
 - Use maximum number of animals during any 180-day period.
 - Calculations should be based on entire year's runoff and precipitation collection, not just a 180 day period
 - Describe how feed storage runoff is collected on site (first flush, full collection, sunny day, etc.)
 - If process wastewater is stored separate from manure
 - This volume is not included in 180 days storage calculations, but
 - Provide a volume and how and where wastewater is collected
 - Provide the past 5 years of manure hauling logs if they are being used.

CONNECT WITH US

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