Appendix 1. Lagoon Sludge Survey Form

Revised August 2008

Α.	Farm Permitor DWQ Identification Number: ————————————————————————————————————	1	
В.	Lagoon Identification: — RM Haye	s (1)	
C.	Person(s) taking Measurements: Jonathan	Miller	
D.	Date of Measurements:	018	
E.	Methods/Devices Used for Measurement of:		
	a. Distance from the lagoon liquid surface to the top of the sludge layer:	Sona	r Boat
	b. Distance form the lagoon liquid surface to the bottom soil of lagoon:	Rang	e Pole
	c. Thickness of the sludge layer if making a direct measurement with "core sampler":		/a
F.	Lagoon Surface Area (using dimensions at inside to of bank):	3.	00
	(Draw a sketch of the lagoon on separate sheet, list dimensions and calculate surface area. been built different than designed, so measurements should be made.)	The lago	oon may have
G.	. Estimate number of sampling points:		
,	a. Less than 1.33 acre, use 8 points: b. If more than 1.33 acre, surface area acres x 6 = sampling points, with a maxium of		
	24:		8
	(Using sketch and dimensions, develop a uniform grid that has the same number of intersection number of sampling points needed. Number the intersection points on the lagoon grid so that can be easily matched.)		
Н.	Conduct sludge survey and record data on "Sludge Survey Data Sheet" (Appendix 2). Also, a pump intake, take measurement of distance from liquid surface to top of sludge layer a Data Sheet (last row); this must be at least 2.5 ft. when irrigating.		
l.	At time of sludge survey, also measure the distance from the Maximum Liquid Level to the Pricipal Level (measure at the lagoon gage pole):	esent	0.40
J.	Determine distance from top of bank to the Maximum Liquid Level (use lagoon management plan or other lagoon records):	→ _	1.60
K.	Determine distance from Maximum Liquid Level to Minimum Liquid Level (use lagoon management plan or other lagoon records):	→ _	2.80
L.	Calculate distance from present liquid surface level to Minimum Liquid Level (Item K - Item I, assuming present liquid level is below Max. Liq. Level):	→ _	2.40
M.	Record from sludge survey data sheet the distance from the present liquid surface level to the lagoon bottom (average for all the measurement points):)	9.50
N.	Record from sludge survey data sheet the distance from the present liquid surface level to the of the sludge layer (average for all the measurement points):	⇒ top -> _	5.23
Ο.	Record from sludge survey data sheet the average thickness of the Sludge Layer:	→ _	4.27
	Calculate the thickness of the existing Liquid Treatment Zone (Item N - Item L):	→ _	2.83
Q.	If Item O is greater than Item P, proceed to the Worksheet for Sludge Volume and Treat O is equal to or less than Item P, you do not have to determine volumes.	ment Vo	olume. If Item
Со	Print Name Ronnie G. Kennedy Signature		

Appendix 2. Sludge Survey Data Sheet

Revised August 2008

Lagoon Identification:	RM Hayes (1)	Date:	10/29/2018
Completed by:	Ronnie G. Kennedy Print Name		Signature

(A)	(B)	(C)	(C) - (B)
Grid Point No.	Distance from liquid surface to top of sludge	Distance from liquid surface to lagoon bottom (soil)	Thickness of sludge layer
110.	Feet (tenths)	Feet (tenths)	Feet (tenths)
1			
2			
3			. .
4			
5			
6			
7			.,
8			
9			
10			
11			
12	1		
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
# of points with readings	3530	x	x
Average of points	5.23	9.50	4.27
At pump intake	4.00	x	x

^{*}All Grid Points and corresponding sludge layer thickness must be show on a sketch attached to this Sludge Survey

Data Sheet.

Appendix 3. Worksheet for sludge volume and treatment volume

Revised August 2008

The average thickness of the sludge layer and the thickness of the existing liquid (sludge-free) treatment zone (are determined from information on the Lagoon Sludge Survey Form (Item O and P, respectively). If the lagoon has a designed sludge storage volume, see notes at end of the worksheet. The dimensions of the lagoon as measured and the side slope are needed for calculations of sludge volume and of total treatment volume. If the lagoon is a standard geometric shape, the sludge volume and treatment volume in the lagoon can be estimated by using standard equations. For approximate volumes of rectangular lagoons with constant side slope, calculate length and width at the midpoint of the layer, and multily by layer thickness to calculate layer volume. For irregular shapes, convert the total surface area to a square or rectangular shape. For exact volumes for lagoons with constant side slope, the "Prismoidal Equations" may be used.

	1911		
			Lagoon
1 Average S	ludge Layer Thickness (T):		4.27 ft.
2 Depth of la	agoon from top of bank to bottom soil surface	e (D):	11.50 ft.
3 Slope = hc	orizontal/vertical side slope (S):		3.00
4 Length at t	op inside bank (L):		475.00 ft.
5 Width at to	op inside bank (W):		275.00 ft.
6 Length at r	midpoint of sludge layer $(Lm) = L - 2 S (D - C)$	T/2)):	418.81 ft.
7 Width at m	nidpoint of sludge layer (Wm) = W - 2 S (D - ((T/2)):	218.81 ft.
8 Volume of	sludge (Vs) = Lm Wm T:		391,302.01 ft³
9 Volume in	gallons Vsg = V (7.5 gal./ft³):		2,934,765.11 gal.
10 Thickness	of existing liquid tmt. zone (Y)		2.83 ft.
11 Thickness	of total treatment zone $(Z) = T + Y$		7.10 ft.
12 Length at r	midpoint of total tmt. zone Lz = L - 2(S)(D-(Z/	(2)	427.30 ft.
13 Width at m	nidpoint of total tmt. Zone Wz = W - 2(S) (D -	(Z/2)	227.30 ft.
14 Volume of	total treatment zone (Vz) = Lz Wz Z		689,589.56 ft ³
15 Ratio (R) (of sludge layer volume to total Treatment vol	ume R = Vs/Vz	0.57
If the ratio exceeds 5 filing the Plan of Acti	50%, than a sludge Plan of Action may be ion.	required. Check with	DWQ for information on
Note: If the lagoon has a designed sludge storage volume (DSSV), subtract that volume from both the volume of sludge (Vs) (Item 8) and from the volume of total treatment zone (Vz) (Item 14), and take the ratio:			
16 Design slud	lge storage volume (DSSV)		ft³
17 Ratio (R) c	of sludge layer volume to treatment volume a	djusted for (DSSV).	0.57
Lagoon Identification:	RM Hayes (1)	Date:	10/29/2018
Completed by:	Ronnie G. Kennedy		Dell

Signature

Print Name

Appendix 1. Lagoon Sludge Survey Form

A. Farm Permitor DWQ Identification Number:	51-34
B. Lagoon Identification:	RM Hayes (1)
C. Person(s) taking Measurements:	Jonathan Miller
D. Date of Measurements:	12/8/2016
E. Methods/Devices Used for Measurement of:	
a. Distance from the lagoon liquid surface to the top of the slud	dge layer: Sonar Boat
b. Distance form the lagoon liquid surface to the bottom soil of	lagoon: Range Pole
c. Thickness of the sludge layer if making a direct measureme	ent with "core sampler":
F. Lagoon Surface Area (using dimensions at inside to of bank):	3.00
(Draw a sketch of the lagoon on separate sheet, list dimensions been built different than designed, so measurements should be a surement of the lagoon on separate sheet, list dimensions been built different than designed, so measurements should be a surement of the lagoon on separate sheet, list dimensions been built different than designed, so measurements should be a surement of the lagoon on separate sheet.	s and calculate surface area. The lagoon may have
G. Estimate number of sampling points:	
a. Less than 1.33 acre, use 8 points: b. If more than 1.33 acre, surface area acres x 6 = sampling po	oints, with a maxium of 18
24: (Using sketch and dimensions, develop a uniform grid that has number of sampling points needed. Number the intersection po can be easily matched.)	the same number of intersection as the estimated
H. Conduct sludge survey and record data on "Sludge Survey Data pump intake, take measurement of distance from liquid sur Data Sheet (last row); this must be at least 2.5 ft. when irrig	rface to top of sludge layer and record it on the
I. At time of sludge survey, also measure the distance from the M Liquid Level (measure at the lagoon gage pole):	Maximum Liquid Level to the Present 0.73
J. Determine distance from top of bank to the Maximum Liquid Le (use lagoon management plan or other lagoon records):	evel → 1.60
K. Determine distance from Maximum Liquid Level to Minimum Liquid Level to Min	iquid Level
L. Calculate distance from present liquid surface level to Minimum (Item K - Item I, assuming present liquid evel is below Max. Li	
M. Record from sludge survey data sheet the distance from the pro- lagoon bottom (average for all the measurement points):	resent liquid surface level to the 9.17
N. Record from sludge survey data sheet the distance from the proof the sludge layer (average for all the measurement points):	resent liquid surface level to the top 5.79
O. Record from sludge survey data sheet the average thickness of	of the Sludge Layer:
P. Calculate the thickness or the existing Liquid Treatment Zone ((Item N - Item L): 3.72
Q. If Item O is greater than Item P, proceed to the Worksheet to O is equal to or less than Item P, you do not have to determ	for Sludge Volume and Treatment Volume. If Item mine volumes.
Completed by: Romaie G. Kennedy Print Name	Signature

RM Hayes (1)

Appendix 2. Sludge Survey Data Sheet

Lagoon Identification:

Revised August 2008

12/8/2016

Date:

Completed by:	Ronnie G	. Kennedy	1 Male	
••••••••••••••••••••••••••••••••••••••	Print Name		Signature /	
(A)	5)	(C)	(C) - (B)	
Grid Point No.	Distance for diquid surface to to together to be together	Distance from liquid surface to lagoon bottom (soil)	Thickness of sludge layer	
INO.	Function (te nths)	Feet (tenths)	Feet (tenths)	
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
# of points with readings	::71	x	x	
Average of points	/ 79	9.17	3.38	
At pump intake	4.00	x	· x	

^{*}All Grid Points and corresponding sludge layer thickness must be show on a sketch attached to this Sludge Survey Data Sheet.

Appendix 3. Workshoet foldering volume and treatment volume

Revised August 2008

The average thick case of C studge layer and the thickness of the existing liquid (sludge-free) treatment zone (are determined from information, in the Ladoon Sludge Survey Form (Item O and P, respectively). If the lagoon has a designed sludge storage ne, see notes at end of the worksheet. The dimensions of the lagoon as measured and the hide slop e needed for calculations of sludge volume and of total treatment volume. If the hap the sludge volume and treatment volume in the lagoon can be estimated by lagoon is a standard geom. using standard equations. oproximate volumes of rectangular lagoons with constant side slope, calculate length and wid in the mire aver and multily by layer thickness to calculate layer volume. For irregular shapes, convert the total surface area to a square or rectangular shape. For exact volumes for lagoons with date injustions" may be used. constant side say and all F

		Lagoon
1 Average skudge - r	Th .ness (T):	3.38 ft.
2 Depth of fartoon to a lite	op of bank to bottom soil surface (D):	11.50 ft.
3 Slope - harizontal cort	ପ୍ରଥାର de ରଚ୍ଚ pe <i>(S</i>) :	3.00
4 Length at top it to ba	nk (L):	475.00 ft.
5 Width 1150 inside an	kara:	275.00 ft.
6 Length of midp	to sellayer (Lm) = L - 2 S (D - (T/2)):	416.14 ft.
7 Wigth a midpomini	.d layer (Wm) = W - 2 S (D - (T/2)):	216.14 ft.
8 Volume of aluda Vs)	= Wm T:	304,012.41 ft ³
9 Volter in Hallom 15g	= \' 7.5 cal./ft³):	2,280,093.06 gal.
10 Thickmans of en	ett. imi, zone (Y)	3.72 ft.
11 This are soften	p = zone(Z) = T + Y	7.10 ft.
12 Length at hid p	otro ntzune Lz = L - 2(S)(D-(Z/2)	427.31 ft.
13 With that midpole at a to	stal trut. Zone Wz = W - 2(S) (D -(Z/2)	227.31 ft.
14 Vo tar Lof Lota ¹	∵ne (Vz) = Lz Wz Z	689,959.81 ft ³
15 R 5 (3) (18)	tume to total Treatment volume R = Vs/Vz	0.44
filing the Plan of $f \rightarrow n$.	ger m of Action may be required. Check with	
Note: If the lag and fr	ige storage volume (DSSV), subtract that volume for the of total treatment zone (Vz) (Item 14), and take the storage of total treatment zone (Vz) (Item 14), and take the storage volume (Vz) (Item 14	rom both the volume of the ratio:
16 De. 3.81 3.81	計 (DS5∀)	ft³
17 Ra. 5 1 1 5 sky	er - umo to treatment volume adjusted for (DSSV).	0.44
Lagoon Identification	□ VI Haye s (1) Date:	12/8/2016
Completed by	Nam Signa	My Kure