DeHaan, Grabs & Associates, LLC
Consulting Engineers
www.dgaengineering.com

April 12, 2013

RE: Jason Henson, C & H Hog Farms, Permit to Construct, SSection 26, T-15-N, R-20-E, Newton County, AR

Stephen Hogan, P.E.
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118-5317

Dear Stephen Hogan, P.E.:

I have included an update to the certification to address the concerns that range form my engineering stamp to mortality livestock plan to the QA/QC plan. Please call immediately with any concerns.

Cordially

Nathan A. Pesta, P.E.
Senior Project Engineer

Enclosures

cc: Jason Henson, w/encl

North Dakota Office
P.O. Box 522
Mandan, ND 58554-0522
(701) 663-1116
Fax (701) 667-1356

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NOTICE OF COMPLETION OF LIVESTOCK MANURE MANAGEMENT SYSTEM'S CONTAINMENT STRUCTURE

Construction of the livestock manure handling system's **containment structure** is completed.

Final construction of C & H Hog Farm manure storage systems located in Section **26**, Township **15** N, Range **20** W, which was approved by the Arkansas Department of Environmental Quality on August 3, 2012 is completed. Final construction of the containment structure was in accordance with design plans and technical specification submitted to the AR DEQ, which was approved under the Notice of Intent for coverage under the General Permit No. ARG590000 for a concentrated feeding operation. **I certify that to the best of my knowledge, the livestock manure management system's containment structure was constructed in accordance with the plans and specifications; and in my best professional judgment is in compliance with applicable laws, codes, and ordinances as of the date of construction completion.**

Date of construction completion: April 12, 2013

CERTIFICATE OF AUTHORIZATION
DEHAAN, GRABS & ASSOCIATES, LLC
2559
ARKANSAS

STATE OF ARKANSAS
LICENSED PROFESSIONAL ENGINEER
No. 15552
NATHAN A PESTA
4/12/13

Signature of engineer or facility designer:

Name: Nathan A. Pesta (Signature) Date: _____

Name: Nathan A. Pesta

Title and name of company: Senior Project Engineer - DeHaan, Grabs & Associates, LLC

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SECTION C2: DESIGN CALCULATIONS

Waste Production Calculations

A. Facility Information

1. Type of Construction: ☐existing, ☒ proposed-new, or ☐ expansion

2. Building Area, **Barn 1 Gestation Barn** (Proposed): *421.3* feet by *117.5* feet
   Barn 2 Farrowing Barn (Proposed): *367.1* feet by *82.5* feet

3. Animal Capacity (maximum head counts and average weights)

3	head of *Boars*	@ *450*	lbs,	*1,350*	lbs Total
2,100	head of *Gestation Sows*	@ *375*	lbs,	*787,500*	lbs Total
400	head of *Lactating Sow*	@ *425*	lbs,	*170,000*	lbs Total
4,000	head of *Nursery Pig*	@ *10*	lbs,	*40,000*	lbs Total
	head of	@	lbs,		lbs Total

Total: *6,503* **head** **Total Animal Weight (TAW):** *998,850* **lbs**

B. Determine Minimum Storage Requirement

The Minimum Storage Requirement is the sum of the animal waste produced (or treatment volume for an anaerobic lagoon), plus the spillage and washwater, plus the pit recharge produced in 180 days. Generally, outside or contributing drainage area runoff is to be diverted. Runoff which is not diverted must be included in the storage requirement.

STATE OF ARKANSAS
Nathan A. Pesta
LICENSED PROFESSIONAL ENGINEER
No 15552
4/12/13
NATHAN A. PESTA

The following is completed for either Liquid Manure Storage or Anaerobic Lagoon

Liquid Manure Storage

Unit Waste Production (UWP) in cubic feet per day per 1,000 pounds of animal:

Cattle	Swine	Poultry	Other
☐Dairy = 1.3	☒ Nursery Pig = 1.4	☐ Layers = 0.9	☐ Horse = 0.8
☐ Beef = 1.0	☐ Grower/Finisher = 1.0	☐ Broiler = 1.3	☐ Sheep = 0.6
	☒ Boar/Gestating Sow = 0.41	☐ Turkey = 0.7	
	☒ Sow and Litter = 0.97		

(a) Manure produced: (TAW x (UWP x 180 days/1,000)) = *97,979* cubic feet / 1,000 lbs
(TAW x UWP for each type calculated separately and added to find total manure produced)

(b) Spillage and Washwater generated in 180 days: *19,596* cubic feet
(If unknown, 20% of (a) is used)

(c) Total Manure plus Spillage and Washwater, (a)+(b): *117,575* cubic feet.

Rainfall Data

(d) 25 Year- 24 Hour Rainfall Event: *0.58* Feet

(e) Precipitation-Evaporation October 1 – April 1) *0.92* *Feet*
(f) Top of Waste Storage Pond 1 *20,153* Square feet
(g) Top of Waste Storage Pond 2 *32,950* Square feet

(h) Waste Storage Pond 1 25 Yr-24 Hr Storage Requirement (d) x (f): *11,689* cubic feet
(i) Waste Storage Pond 2 25 Yr-24 Hr Storage Requirement (d) x (g): *19,111* cubic feet
(j) Waste Storage Pond 1, 180 Day Net Precip. Requirement (e) x (f): *18,541* cubic feet
(k) Waste Storage Pond 2, 180 Day Net Precip. Requirement (e) x (g): *30,314* cubic feet

Recharge Water -The farrowing barn will be pulled once every three weeks and the Gestation Barn will be pulled once every five weeks on a conservative estimate and will be recharged with 2" of fresh water .

(l) Recharge Water Produced Average: *366*(cubic feet per day) x *180* (180 days in storage period) =*65,880* cubic feet per 180 days.

Runoff

(m) Sand Lane and Stacking Pad Area:_____feet x _____feet = _____square feet

(n) Manure Stacking Pad Area:_____feet x _____feet = _____square feet

(o) Feed Stacking Pad Area:_____feet x _____feet = _____square feet

(p) Total Runoff Area:_____square feet

(q) Minimum Runoff (Figure 1 from Appendix):_____inches

NOTE: If a covered storage is used which collects runoff, then the sum of the 25 year, 24 hour storm runoff and the expected runoff for the 180 day storage period is used as the Minimum Runoff in (m).

(r) Minimum Runoff Storage Requirement (l) x (m)/12 = _____cubic feet

Minimum Overall Storage Requirement

(s) Minimum Storage Requirement (c) + (h-l) + (r): *263,110* cubic feet

Waste Storage Calculations

A. Determine Storage Provided

Type of storage: ☐ Earthen Storage Pit ☒ Earthen Lagoon ☐ Concrete Tank
☐ Underfloor Concrete Pit ☐ Outside Concrete Pit
☐ Other (describe) _____

NOTE: A scale drawing, calculations and other supporting information will be included. Indicate the location of all diversions, diversion dimensions, and flow directions of surface runoff for the entire facility. Concrete pit or tank storage is assumed to be covered unless specified otherwise.

Rectangular Concrete Pit or Tank (capacity = length x width x depth)

420.3 feet x *114.3* feet x *1.5* feet = *72,060* cubic feet (Manure Pit #1)
227.3 feet x *76.3* feet x *1.7* feet = *29,483* cubic feet (Manure Pit #2)

= ***101,543*** **cubic feet TOTAL**

Waste Storage Pond 1 Volume = [(4 x sideslope^2 x depth^3) / 3] + (sideslope x bottomlength x depth^2) + (sideslope x bottomwidth x depth^2) + (bottomwidth x bottomlength x depth)

Bottom Length: _____ Bottom Width: _____

Design Full Depth: *9.7* feet, Overflow Depth: *10.7* feet

Side Slopes: *3* :1 and *3* , End Slopes: *3* :1 and *3* :1

Note: Inside slopes for earthen pits or lagoons will be at least 2:1.

Earthen Storage Pit or Lagoon Capacity: *100,065* cubic feet

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No 15552
NATHANA PESTA
4/12/13

Waste Storage Pond 2 Volume = [(4 x sideslope^2 x depth^3) / 3] + (sideslope x bottomlength x depth^2) + (sideslope x bottomwidth x depth^2) + (bottomwidth x bottomlength x depth)

Bottom Length: _____ Bottom Width: _____

Design Full Depth: *12.2* feet, Overflow Depth: *13.2* feet

Side Slopes: *3* :1 and *3* , End Slopes: *3* :1 and *3* :1

Note: Inside slopes for earthen pits or lagoons will be at least 2:1.

Earthen Storage Pit or Lagoon Capacity: *214,498* cubic feet

NOTE: A minimum of 1.0 foot of freeboard is required for uncovered storage.

TOTAL STORAGE PROVIDED: ***416,106*** **cubic feet**

NOTE: The Total Storage Provided will meet or exceed the Minimum Storage Requirement (item o) from Waste Productions Calculation

SPAW Calculations

A. Facility SPAW Information

SPAW software was used to evaluate the previous weather data to analyze the current proposed design. Weather data used was from weather station AR1900 (Deer, AR). The weather data started in 1960.

1. Pond Depths
   - Pond 1 Overflow Spillway to Pond 2: 9.1'
   - Pond 2 Top of Berm El. 13.2'
   - Initial Water Depth: 1.0'
   - Infiltration into Dry Pond Bottom: 0.5"
   - Irrigation Lower Limit: 0.00'
2. Pond Depth-Area (See Page 14 and 15 of the Plans).
3. Pond Seepage: Rate 0.15 in/day
4. Water Table: Depth: 189 ft
5. External Input (Outflow from the Confinement Barns): The Farrowing barn is pulled once every three weeks for an average of 63,180 gallons. The Gestation barn is pulled once every five weeks for an average of 161,460 gallons.
6. Drawdown Pump (Irrigation for Land Application): The ponds are planned to be pumped April 1 and October 1. The pumping rate is set for 250 GPM and the ponds will be pumped down to 1' of depth.

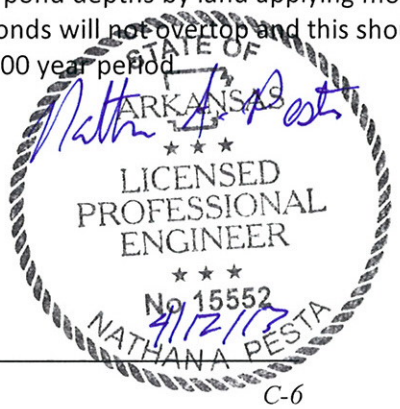
B. Facility SPAW Summary & Calculations

The results were summed up using two different simulations.

2. Simulation 2
   - Pond 1 and Pond 2 were modeled in Series.
   - Results showed that Pond 1 overflowed into Pond 2 and Pond 2 did not overtop using the 47 years of available weather data.
   - The SPAW Model results showed the maximum depth that the pond obtained. I summed up these depths in the attached spreadsheet. The mean maximum depth for each year was 8.99'
   - The standard deviation calculated in EXCEL for this data is 0.96
   - Using statistics namely using the probability normal distribution and using the 68.26-95.44-99.74 rule. The rule goes as follows for property 1: 68.26% of the years all maximum pond depths will be within one standard deviation of the mean. For property 2: 95.44% of the years all maximum pond depths will be within two standard deviations of the mean. For property 3: 99.74% of the years all maximum pond depths will be within three standard deviations of the mean.
   - Using the rules the maximum pond depth for:a 68.26% probability will be 8.99'+0.96'=9.95', for 95.44% probability will 8.99+2*0.96=10.91', for 99.74% probability will be 8.99+3*0.96' = 11.87'
   - Given that the pond overflow depth is 13.2' and at a 99.74% probability that the pond depth will not overtop 11.9' and for the fact that the manager can manage the pond depths by land applying more than what the model shows it is reasonable to expect that the ponds will not overtop and this should conclude that the simulation for the confidence interval over a 100 year period.

C. Facility SPAW Results

The results are attached:



C H Hog Farms
Newton County, AR

SPAW Maximum Water Depth

April 5, 2013

Standard Deviation = 0.96

Date	Year	Max Pond Depth (ft)
1960	1	8.5
1961	2	7.8
1962	3	8.6
1963	4	8.6
1964	5	8.7
1965	6	8
1966	7	7.3
1967	8	9.9
1968	9	10.2
1969	10	8.5
1970	11	8.3
1971	12	8.4
1972	13	10.5
1973	14	10.1
1974	15	10.1
1975	16	8.2
1976	17	8.4
1977	18	8.3
1978	19	9.5
1979	20	8.4
1980	21	7.8
1981	22	8.8
1982	23	9.4
1983	24	9
1984	25	10.8
1985	26	8.5
1986	27	8.5
1987	28	10.3
1988	29	10.1
1989	30	9.3
1990	31	8.8
1991	32	9.8
1992	33	9.7
1993	34	9.7
1994	35	10.1
1995	36	7.1
1996	37	9.6
1997	38	10
1998	39	9
1999	40	8.3
2000	41	9.1
2001	42	10.8
2002	43	8.2
2003	44	8.8
2004	45	9.8
2005	46	7.8
2006	47	7
	Mean =	8.99

A SUMMARY OF ACCUMULATIVE MONTHLY POND VOLUMES

SIMULATION BY:
Nathan A. Pesta
Senior Project Engineer
DeHaan, Grabs & Associates, LLC
PO Box 522
Mandan, ND, 58554

SIMULATION FOR:
File : C:\Program Files\SPAW Hydrology\SPAW\Projects\Ponds\Examples\Henson, Jason_Pond 2\Henson, Jason_Pond 2.pnd
File Creation Date : Jul 06, 2012 14:52:33
File Last Modified Date : Apr 05, 2013 16:52:21
Description : Waste Storage Pond
Simulation Start Date : Jan 01, 1960
Simulation End Date : Dec 31, 2006
Simulation Run Date : Apr 05, 2013 16:52
SPAW Interface Version : Apr 05, 2013 16:52:21
Pond Model Version : 6.02.71

WATERSHED FIELDS:

DESCRIPTION/FILE (DATE)	AREA (AC)
Brookings Pasture -Rainfed (Sample)	0.00
C:\Program Files\SPAW Hydrology\SPAW\Projects\Fields\Examples\Pasture_Henson\Pasture_Henson.fpin Dec 30, 1899 00:00	

IRRIGATED FIELDS:

DESCRIPTION/FILE (DATE)	AREA (AC)
Brookings Pasture -Rainfed (Sample)	630.70
C:\Program Files\SPAW Hydrology\SPAW\Projects\Fields\Examples\Pasture\Pasture.fpin Dec 30, 1899 00:00	

INPUT PONDS:
DESCRIPTION/FILE (DATE)
`Waste Storage Pond
C:\Program Files\SPAW Hydrology\SPAW\Projects\Ponds\Examples\Henson, Jason_Pond 1\Henson, Jason_Pond 1.ppin Apr 05, 2013 16:51

POND PROFILE:

DEPTH (FT)	AREA (AC)	VOLUME (AC-FT)
0.00	0.00	0.00
1.00	0.14	0.07
2.00	0.30	0.29

3.00	0.22	0.55
4.00	0.40	0.86
5.00	0.28	1.20
6.00	0.48	1.58
7.00	0.36	2.00
8.00	0.56	2.46
9.00	0.44	2.96
10.00	0.68	3.52
11.00	0.54	4.13
11.60	0.73	4.51
13.20	0.70	5.66

POND PROFILE
MAX AREA (AC) = 0.70
MAX DEPTH (FT) = 13.20
MAX VOLUME (AC-FT) = 5.66
IRRIGATION LIMIT (FT) = 0.00
EXTERNAL INPUT UPPER LIMIT (FT)= 0.00
EXTERNAL INPUT LOWER LIMIT (FT)= 0.00
SUPPLY PUMP LOWER LIMIT (FT) = 0.00
DRAWDOWN PUMP UPPER LIMIT (FT) = 0.00
DRAWDOWN PUMP LOWER LIMIT (FT) = 2.00
SPILLWAY CREST (FT) = 13.20
INITIAL DEPTH (FT) = 1.00
INFIL. INTO DRY SOIL (IN) = 0.50

SEEPAGE RATE (IN/DAY)
DATE RATE
Jun 14 0.15

MONTHLY VOLUMES BY MAJOR IMPOUNDMENT PROCESSES

Mon	Year	Inflow ac·ft	Outflow ac·ft	Change ac·ft	Precip Vol ac·ft	Bank Runoff ac·ft	Seep In ac·ft	Drwdwn In ac·ft	Spill In ac·ft	Vol Evap ac·ft	Vol Infil ac·ft	Vol Seep ac·ft	Drdn Pump ac·ft	Spillway ac·ft
Jan	1960	0.16	0.08	0.08	0.03	0.06	0.07	0	0	0.01	0	0.069	0	0
Feb	1960	0.22	0.12	0.1	0.06	0.06	0.09	0	0	0.02	0	0.091	0	0
Mar	1960	0.3	0.15	0.15	0.05	0.04	0.12	0	0.09	0.04	0	0.108	0	0
Apr	1960	1.85	1.9	-0.05	0.07	0.02	0.07	1.7	0	0.08	0	0.106	1.72	0
May	1960	0.48	0.2	0.28	0.19	0.21	0.08	0	0	0.1	0	0.098	0	0
Jun	1960	0.19	0.22	-0.03	0.05	0.03	0.11	0	0	0.13	0	0.09	0	0

Mon	Year	Inflow	Outflow	Change	Precip Vol	Bank Runoff	Seep In	Drwdwn In	Spill In	Vol Evap	Vol Infil	Vol Seep	Drdn Pump	Spillway
Jul	1960	0.96	0.36	0.6	0.19	0.08	0.14	0	0.56	0.23	0	0.131	0	0
Aug	1960	0.65	0.43	0.22	0.06	0	0.14	0	0.46	0.27	0.01	0.159	0	0
Sep	1960	1.03	0.34	0.68	0.09	0.01	0.12	0	0.81	0.19	0	0.151	0	0
Oct	1960	1.87	3.71	-1.84	0.06	0	0.07	1.74	0	0.09	0	0.121	3.5	0
Nov	1960	0.12	0.13	-0.02	0.04	0.01	0.07	0	0	0.03	0	0.1	0	0
Dec	1960	0.34	0.11	0.23	0.1	0.13	0.12	0	0	0.01	0	0.101	0	0
Jan	1961	0.67	0.16	0.52	0.03	0.01	0.14	0	0.49	0.02	0	0.139	0	0
Feb	1961	0.9	0.19	0.72	0.11	0.05	0.13	0	0.62	0.04	0	0.147	0	0
Mar	1961	1.32	0.24	1.07	0.22	0.09	0.15	0	0.86	0.07	0	0.174	0	0
Apr	1961	1.93	4.44	-2.51	0.09	0.02	0.07	1.74	0	0.1	0	0.127	4.21	0
May	1961	0.73	0.24	0.49	0.28	0.33	0.11	0	0	0.12	0	0.117	0	0
Jun	1961	0.17	0.28	-0.11	0.05	0	0.12	0	0	0.17	0	0.115	0	0
Jul	1961	0.85	0.35	0.5	0.15	0.04	0.14	0	0.52	0.22	0	0.129	0	0
Aug	1961	0.87	0.45	0.41	0.18	0.02	0.14	0	0.52	0.28	0.01	0.168	0	0
Sep	1961	1.13	0.34	0.79	0.1	0.02	0.13	0	0.87	0.19	0	0.148	0	0
Oct	1961	1.88	3.97	-2.09	0.06	0	0.06	1.76	0	0.09	0	0.126	3.75	0
Nov	1961	0.31	0.14	0.16	0.11	0.12	0.07	0	0	0.04	0	0.107	0	0
Dec	1961	0.36	0.11	0.25	0.08	0.12	0.13	0	0.04	0.01	0	0.1	0	0
Jan	1962	0.92	0.15	0.77	0.08	0.08	0.15	0	0.61	0.02	0	0.129	0	0
Feb	1962	0.81	0.17	0.65	0.07	0.03	0.13	0	0.58	0.04	0	0.134	0	0
Mar	1962	1.02	0.26	0.77	0.1	0.02	0.15	0	0.76	0.07	0	0.18	0	0
Apr	1962	1.86	4.44	-2.58	0.07	0	0.07	1.73	0	0.1	0	0.126	4.21	0
May	1962	0.17	0.19	-0.03	0.05	0.03	0.09	0	0	0.1	0	0.094	0	0
Jun	1962	0.22	0.22	-0.01	0.1	0.03	0.08	0	0	0.13	0	0.091	0	0
Jul	1962	0.58	0.27	0.31	0.09	0.02	0.14	0	0.33	0.17	0	0.098	0	0
Aug	1962	0.86	0.35	0.51	0.14	0.08	0.14	0	0.51	0.22	0	0.132	0	0
Sep	1962	1.36	0.36	1	0.19	0.03	0.13	0	1.01	0.2	0	0.159	0	0
Oct	1962	2.02	3.76	-1.75	0.15	0.06	0.07	1.75	0	0.09	0	0.123	3.55	0
Nov	1962	0.11	0.15	-0.03	0.03	0.01	0.07	0	0	0.04	0	0.11	0	0
Dec	1962	0.15	0.12	0.02	0.03	0.01	0.11	0	0	0.01	0	0.11	0	0
Jan	1963	0.6	0.13	0.47	0.01	0.01	0.14	0	0.44	0.02	0	0.115	0	0
Feb	1963	0.72	0.15	0.57	0.02	0	0.13	0	0.57	0.03	0	0.118	0	0
Mar	1963	1.05	0.22	0.83	0.11	0.04	0.14	0	0.75	0.06	0	0.159	0	0
Apr	1963	1.82	3.7	-1.88	0.04	0.01	0.07	1.7	0	0.09	0	0.117	3.49	0
May	1963	0.26	0.21	0.05	0.1	0.08	0.08	0	0	0.11	0	0.101	0	0
Jun	1963	0.17	0.26	-0.09	0.07	0.02	0.09	0	0	0.16	0	0.106	0	0
Jul	1963	0.48	0.26	0.22	0.05	0	0.13	0	0.31	0.17	0	0.096	0	0
Aug	1963	0.62	0.35	0.27	0.05	0	0.14	0	0.43	0.21	0.01	0.129	0	0

From: Hogan, Stephen
To: Deardoff, Amy
Subject: FW: Part 1-2
Date: Friday, April 12, 2013 2:20:18 PM
Attachments: 20130412141501.pdf

Amy,

Please add this to zylab and the web. ARG590001. This is the final file.

Thanks,

Stephen

From: Nathan Pesta [mailto:Nathanpdga@btinet.net]
Sent: Friday, April 12, 2013 2:16 PM
To: Hogan, Stephen
Subject: Part 1-2

Nathan A.Pesta P.E.
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