BUFFALO RIVER COALITION
Buffalo River Watershed Alliance – The Ozark Society – Arkansas Canoe Club – National Parks Conservation Asso.
PO Box 101, Jasper, AR 72641

VIA electronic delivery (keogh@adeq.state.ar.us)

March 30, 2016

Becky Keogh, Director
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, Arkansas 72118-5317

Re: C&H Hog Farms 2015 Annual Report, Permit ARG590001

Director Keogh,

The following comments and attachment are submitted on behalf of the Buffalo River Watershed Alliance, the Ozark Society, the Arkansas Canoe Club and the National Parks Conservation Association regarding the 2015 Annual Report and associated documents provided by C & H Hog Farms. Our comments are based in part on the attached analysis which was requested by our organizations and provided by Mike Smolens, PhD, Lithochimeia, LLC, Tulsa, OK. Dr Smolens is a well recognized expert in the field of environmental sciences and engineering.

The C&H 2015 Annual Report contains unexplained omissions, discrepancies and deviations from previous reports, which require explanation, including the following:

- The report is based on soil data collected in April, 2015 rather than on the more recent December, 2015 soil analysis. The April data does not provide a true picture of soil conditions subsequent to the bulk of waste applications throughout the year. The API should be recalculated based on the most recent 2015 soil data.

- No soil data is provided for fields 1, 2 or 3. This omission should be corrected.

- There are unexplained variations in field acreages. An explanation for these deviations is required.

- The stated amount of waste produced (2,529,136 gallons) differs from the amount of waste applied (3,225,000 gallons). This discrepancy requires explanation.

- The nutrient management planner shows a surplus of phosphorus on all fields

throughout the year. Soil test results (Dec. 2015) show that phosphorus levels are "above optimum" on nearly all fields, indicating that waste is being applied in excess of agronomic requirements. This is contrary to the terms of the C&H NMP which states on page 4, *"Timing, Rate, and Frequency of Liquid and Solid Manure Applications. a. Liquid and solid manure will be applied* ***at agronomic rates****."*. This discrepancy should be addressed.

- The API planner is based upon unrealistic crop yields. Also, field usage for grazing rather than hay production will lead to reduced nutrient export and more rapid buildup of nutrients in the soil. An explanation for utilizing these high projected yields in lieu of actual yields should be provided and the planner should be revised to reflect realistic yields and actual land usage.

- Higher than projected rates of waste application are leading to a rapid increase and surplus of soil test phosphorus. This is reflected in the increase in the API risk factor, particularly for fields 3, 7 and 12, and a significant increase in STP for almost all fields. An explanation is required for how current application rates in excess of agronomic rates can be sustained without risking runoff and degradation of waters of the state.

- Field 7 is especially problematic. 985,000 gallons of waste, or approximately 30% of the total, were applied to Field 7. It now has the highest API risk factor of all fields and is also flood-prone. According to the NMP, field 7 is to be used for emergency applications. Increased waste applications to this field during emergency situations could result in excessive API risk, runoff and discharge to waters of the state. Applications to field 7 should be reduced or eliminated and an alternative field should be designated for emergency applications.

- Of greatest concern is the fact that waste applications at C&H are based solely on the Arkansas Phosphorus Index as a risk reduction tool. The API does not take into account risks associated with karst topography. C&H and its application fields are located atop karst. Therefore the API does not adequately evaluate the risks associated with waste management at C&H, particularly given its proximity to the Buffalo National River. The API, when used in karst regions, is not adequate to protect the waters of the state and an alternative risk assessment and management tool should be implemented.

In recent months, letters to ADEQ from our organizations have gone unanswered. We respectfully request a reply to our concerns at your earliest convenience.

On behalf of the Buffalo River Coalition,
Gordon Watkins, President
Buffalo River Watershed Alliance

Attachment, “Notes on C&H 2015 Annual Report by Mike Smolens, PhD”

Cc:

John Bailey, ADEQ, Bailey@adeq.state.ar.us
Carl E. Wills, Wills.carl@Epa.gov
Willie Lane, Lane.willie@Epa.gov
Monica Burrell, burrell.monica@epa.gov
Paul Kaspar ,Kaspar.paul@epa.gov
Laura Hunt, Hunt.Laura@epa.gov
Joel Beauvais, : beauvais.joel@epa.gov
Michael H. Shapiro, : shapiro.mike@epa.gov
Peter C. Grevatt, : grevatt.peter@epa.gov
Becki Clark, : clark.becki@epa.gov

ATTACHMENT

Notes on C&H Annual Report

January 1, 2015 through December 31, 2015

M. D. Smolen

March 21, 2016

There are few changes from the 2014 Annual report, and many of last year's critiques still apply. The Annual Report was based on the same soil samples as last year, collected April 1, 2014. Although this might be acceptable for the Winter applications, they are out of date for the spring and summer applications as the C&H permit require soil tests each year. Data from soil sampling December 4, 2015, were obtained from ADEQ. A summary is shown in Table 1. The complete summary with field designations as presented in UA soil reports is presented in the Appendix. There is an increasing trend apparent in soil test P (STP). Minor changes in field acreages were not explained in the report, as they were not explained last year. No data on STP were provided for Fields 1-3.

Table 1 Soil test results and areas reported in 2012, April 2014, and December 2015

	Phosphorus Levels STP					
Field	----------mg/L---------			-------Area in Acres--------		
	2012	**2014**	**2015***	**2012**	**2014**	**2015**
1	83	48		15.57	7.3	7.3
2	72	67		17	6	6
3	42	79		13.6	15.2	13.6
4	50	46	75	8.79	6.8	6.8
7	178	94	89	74.29	64.3	64.3
8	46	80	77	15.5	8.6	8.6
9	52	53	75	41.24	35.5	35.5
10	69	31	86	33.15	29.3	29.3
11	57	27	62	20.7	14.2	14.2
12	19	72	88	28.7	10.9	11.4
13	48	23	74	66.9	50.9	50.9
14	52	15	75	18	7.3	8.1
15	15	29	52	61.02	32.2	37.5
16	48	50	68	79.6	15.2	15.2
17	50	21	86	88.7	31.9	31.9
Average	**59**	**50**	**76**	**641**	**336**	**341**

*STP is average of all samples from the same field, see Appendix

RUSLE values (shown in Table 2) used in calculation of API are the same as last year, and they have still not explained why the RUSLE1 and RUSLE2 values are identical instead of the values from NRCS.

Table 2 Sampling of Changes in the RUSLE2 and effect on API

Field	2012 RUSLE2	2014 RUSLE2	Smolen RUSLE2	EFFECT ON API
1	0.18	0.12	0.79	No change
2		0.28	2.1	increase
3	.006	.05	.29	No change
4		.28	1.8	Increase
7	.01	.05	.47	increase

Total application of waste was higher in 2015 than in 2014 and higher than the estimate of waste generated as stated on the cover page (this year's cover page says 2,529,136 gallons produced, whereas 3,225,000 gallons were applied to fields). Last year 2.6 million gallons were produced, but only 2.4 million gallons were applied. These numbers may even out over time.

It is unclear to me what guidance was used to determine waste application rates in the C&H nutrient management plan. I reviewed the application rates in the planner at the end of this year's report (last 11 pages) and found the input (waste analyses, volumes, and timing) consistent with the information presented in the waste application forms. The planner in the last 11 pages of the report look different from the planner sheets in previous years, but I verified that they work the same way. The new forms allow the user to compute API for multiple time periods with different waste source and different analyses.

As expected, the planner shows a nitrogen deficit and phosphorus surplus for every field in each application period. However, I would question these results because the crop yields on which they are based are unrealistic, even more so than last year. The waste application forms indicate winter crop yield goals of 4 tons/acre and spring and summer yield goals of 6 tons/acre for the same fields (or 10 tons/acre for the year). A high yield for "mixed" forage in the area, however, would be more like 4-6 tons for the entire year. It would require exceptionally good management of a high yielding grass species to obtain such high forage yields. Further the forms indicate these fields will be grazed (rotational grazing) rather than harvested for hay. Grazing, however, removes very little nutrient (less than 10%), and if the cattle are fed during winter or summer drought, they may add more nutrients than they remove.1 The high rates of waste application are likely to produce a large surplus of nitrogen and soluble phosphorus rather than a deficit. Further the action of grazing and depositing manure and urine in the field will increase the losses to runoff and leachate, regardless of the "risk index."

Table 3 shows the application rates for nitrogen and phosphate (P_2O_5) along with the increase in STP from 2014 to 2015 and the API (phosphorus risk index) as calculated by the planner in the Annual Report. It appears that high rate application of waste is showing up in a rapidly increasing STP, but another year or two may be needed to confirm this trend. The cutoff from Low risk to Medium risk API is at 33 and the cutoff from Medium to High API is at 66. As I have noted previously the API does not recognize the special concern for karstic areas, and its response to buildup of STP is very small, so in my opinion the risk is very much underestimated. Note that phosphate application rates are extremely high, much higher than required by the crop (note most fields had no requirement for P based on the UA soil

[1] Dick, A.C. and V. Baron. 2009. Agri-Facts: Nutrient Management on Intensively Managed Pastures. Government Alberta, CA. Agdes 130/538-1.
http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex12813/$file/130_538-1.pdf?OpenElement

test reports). Nitrogen application rates are at a reasonable level for a well-managed hay crop (note the plan assumes 25% loss of Plant Available N, a reasonably protective assumption). The fact that these fields are not planned for hay harvest and the large surplus of phosphate are my biggest concerns.

Table 3 Nitrogen and Phosphate application rates and P risk index (API)

Field	acres	STP 2014	STP Change 2015	Nitrogen lb/ac	P_2O_5 lb/ac	API "risk index"
1	7.3	45		147	234	27
2	6	67		148	171	20
3	13.6	79		110	89	35*
4	6.8	46	+29	117	225	24
7	64.3	94	-5	235	176	52*
8	8.6	80	-3	115	112	19
9	35.5	53	+22	100	122	26
10	29.3	31	+55	249	331	23
11	14.2	27	+35	26	21	5
12	11.4	72	+16	123	164	31*
13	50.9	23	+51	152	259	22
14	8.1	15	+60	141	149	17
15	37.5	29	+23	124	191	23
16	15.2	50	+18	112	123	16
17	31.9	21	+65	198	263	23

*Note Fields 3 and 7 are rated Medium risk, and Field 12 is approaching a Medium risk.

A comparison of 2014 and 2015 application records is presented in Table 4. Table 4 shows that about 73% of the waste was applied to four of the 17 fields, 7, 10, 13, and 15. These fields account for about half of the acreage used (176 acres). More than 30% goes to Field 7, but it appears that an effort was made to apply wastes that are relatively low in P to Field 7. Field 7 already has the highest STP, and the highest risk index (API). Field 7 is also subject to flooding, yet it is designated for emergency application of waste even though Field 7 is likely to be flooded in wet weather when it would be needed. Although N application rates are reasonable for hay production, they are considerably higher than what would be recommended for grazing. Phosphorus applications are very much in excess of the recommended rate and seem to be increasing.

In summary the planner calculations appear to be correct and consistent with the Arkansas rules, but the phosphorus applications are extremely high, and the highest application (more than 30% of the waste) goes to the field with the highest risk, the highest STP, and the least need for P, Field 7. Using their numbers, they come out with all low and medium API values, although Field 7 is approaching a High Risk Index value. In my opinion, however, the ARI is not a good indicator of risk in these karstic bottom lands.

Table 4 Comparison of waste application 2014 and 2015 based on annual reports

Field	2014 Applied Gal X1000	2015 Applied Gal X1000	acres	2014 N lb/ac	2015 N lb/ac	2014 P2O5 lb/ac	2015 P2O5 lb/ac	STP 2014
1	46	48	7.3	60	147	114	234	45
2	23	51	6	36	148	68	171	67
3	118	60	15.2/13.5	73	110	141	89	79
4	29	39	6.8	40	117	77	225	46
7	396	985	64.3	58	235	111	176	94
8	25	48	8.6	28	115	53	112	80
9	104	216	35.5	28	100	53	122	53
10	249	483	29.3	80	249	154	331	31
11	51	15	14.2	34	26	65	21	27
12	48	93	10.9	42	123	80	164	72
13	453	429	50.9	84	152	161	259	23
14	73	60	7.3	95	141	181	149	15
15	401	187	32.2	118	124	226	191	29
16	56	63	15.2	35	111	67	123	50
17	294	448	31.9	87	198	167	263	21
Total	2,367	3,225	335.6					

APPENDIX

Table 1 Soil test results and areas reported in 2012, April 2014, and December 2015

	2012		2014		2015		
Field	acres	STP	acres	STP	Field ID*	acres	STP
1	15.57	83	7.3	45			
2	17	72	6	67			
3	13.6	42	13.6	79			
4	8.79	50	6.8	46	JH 4	11	75
5	23.75	65					
6	34.53	76					
7	74.29	178	64.3	94	EGC 7	73	89
8	15.5	46	8.6	80	CC 8	11	82
					CC 8A	3	72
9	41.24	52	35.5	53	CC 9	30	82
					CC 9A	12	67
10	33.15	69	29.3	31	FD 10	15	72
					BC 10A	18	100
11	20.7	57	14.2	27	FC 11	19	62
12	28.7	19	11.4	72	RF 12	13	88
13	66.9	48	50.9	23	CC 13	13	86
					CC 13A	37	75
					CC 13B	16	61
14	18	52	8.1	15	CC 14	15	75
15	61.02	15	37.5	29	C1C 15	28	72
					C1C 15A	14	18
					C1C 15B	21	66
16	79.6	48	15.2	50	BH 16	21	68
17	88.7	50	31.9	21	JC 17	36	86
Total	641		340.6			406	
Average		60.12		48.8			73.5

Soil samples were designated differently in the 2015 soil test reports