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VIA EMAIL AND FIRST CLASS U.S. MAIL

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Re: *Jack R. Gamble, Jr., LLC v. Indigo Minerals, LLC*
42nd Judicial District Court, Parish of DeSoto, No. 81488, Division "B"
DNR OC Legacy File No. 042-003

Dear Mr. Rice and Mr. Holley,

On behalf of the plaintiff, Jack R. Gamble, Jr., LLC, in the above-captioned case, we respectfully submit these comments regarding the Limited Admission Plan, dated March 15, 2023, submitted by Hydro-Environmental Technology, Inc. ("HET") on behalf of Indigo Minerals, LLC ("Indigo").

Indigo constructed reserve pits for each well site to support drilling wells, placing toxic and hazardous chemicals within the pits. Mud reports indicate the use of toxic products and the characteristics of the mud contents. The pits were improperly constructed by excavating near or into the underlying groundwater zones. Despite digging into the underlying groundwater zones, Indigo reported to the Louisiana Department of Natural Resources ("LDNR" or "Department") that they complied with Statewide Order ("SWO") 29-B pit closure requirements, indicating pit bottoms were buried at least 5 feet above the seasonal high water table; however, there is no evidence any groundwater testing was performed at the time of pit closure to substantiate this claim. Indigo improperly closed the pits out of compliance with the requirements contained within SWO 29-B. More recent sampling results indicate that, as a result of the improper construction and closure of the pits, contaminated soil and groundwater remain on the Gamble property.

Indigo's plan ignores the rules set forth in SWO 29-B and the Louisiana Department of Environmental Quality's Risk Evaluation / Corrective Action Program ("RECAP"). Instead, the plan Indigo presents to the LDNR is flawed because it fails to address the serious contamination problems on the Gamble property. For example, Indigo proposes to leave its oilfield wastes in the usable groundwater, classified as a drinking water source, underlying the Gamble property.

If the Department determines that appropriate analytical data and other information is available to develop a Most Feasible Plan ("MFP"), the plan adopted should be consistent with SWO 29-B without

exception. By using SWO 29-B as a basis for developing the MFP, the plan would protect a usable drinking groundwater resource and remove Indigo's wastes from the Gamble property.

I. Pits were improperly constructed by excavating near or into the underlying groundwater.

Operators on the Gamble property constructed reserve pits at each of the five different well sites. These pits contained mud and cuttings used to support the drilling operations. Construction of the pits involved excavation of the natural soils to depths ranging from approximately 7 to 15 feet below ground surface ("bgs"). When compared with the depth of the first encountered groundwater bearing zone, the data indicates that the pits were excavated within 5 feet or below the top of the underlying groundwater.

At the Gamble Jr. 35 No. 1 (sn239274) well site, the pit was excavated to a depth of 10 feet bgs. Based on data collected at the site, the depth to the top of the first encountered groundwater bearing zone ranges from 11.5 to 15 feet bgs. Therefore, based on these measurements, the pit bottoms were not buried at least 5 feet above the seasonal high water table.

Table 1. Pit and Groundwater Depth Measurements for Gamble Jr. 35 #1 (sn239274)

	MW-1 (Approach)	MW-1 (HET)	MW-2 (HET)	MW-3 (HET)
<i>Depth below ground surface to first encountered groundwater bearing zone (Boring Logs)¹</i>	13.5	12.5	15	11.5
<i>Depth of Pit (Form ENG-16)²</i>	10	10	10	10
<i>Measured interval between bottom of pit and top of first encountered water bearing zone**</i>	+3.5	+2.5	+5	+1.5

*Note: measurements in feet

**pit bottom above water bearing zone = "+"

pit bottom below water bearing zone = "-"

At the J. Gamble Jr. 34 No. 1 (sn239592) well site, the pit was excavated to a depth of 15 feet. Based on data collected at the site, the depth to the top of the first encountered groundwater bearing zone ranges from 10 to 24 feet bgs. Therefore, based on an average of these measurements, the pit bottoms were not buried at least 5 feet above the seasonal high water table.

Table 2. Pit and Groundwater Depth Measurements for Gamble Jr. 34 No. 1 (sn239592)

	MW-1 (Approach)	MW-2 (Approach)	MW-3 (Approach)
<i>Depth below ground surface to first encountered groundwater bearing zone (Boring Logs)³</i>	15	24	10
<i>Depth of Pit (Form ENG-16)⁴</i>	15	15	15
<i>Measured interval between bottom of pit and top of first encountered water bearing zone**</i>	0	+9	+5

*Note: measurements in feet

**pit bottom above water bearing zone = "+"

pit bottom below water bearing zone = "-"

¹ Exhibit 1-Boring Logs - Well Site 239274

² Exhibit 2-ENG 16 Form - Well Site 239274

³ Exhibit 3-Boring Logs - Well Site 239592

⁴ Exhibit 4-ENG 16 Form - Well Site 239592

At the J. Gamble Jr. 2 No. 2 (sn240035) well site, the pit was excavated to a depth of 15 feet bgs. Based on data collected at the site, the depth to the top of the first encountered groundwater bearing zone ranges from 2 to 8 feet bgs. Therefore, based on these measurements, the pit bottoms were not buried at least 5 feet above the seasonal high water table.

Table 3. Pit and Groundwater Depth Measurements for J. Gamble Jr. 2 No. 2 (sn240035)

	MW-1 (Approach)	MW-2 (Approach)	MW-3 (Approach)
<i>Depth below ground surface to first encountered groundwater bearing zone (Boring Logs)⁵</i>	2	8	4
<i>Depth of Pit (Form ENG-16)⁶</i>	15	15	15
<i>Measured interval between bottom of pit and top of first encountered water bearing zone**</i>	-13	-7	-11

*Note: measurements in feet

**pit bottom above water bearing zone = "+"

pit bottom below water bearing zone = "-"

At the Gamble Jr. 35-13-16H No. 1 (sn240037) well site, the pit was excavated to a depth of approximately 7 feet bgs. Based on data collected at the site, the depth to the top of the first encountered groundwater bearing zone ranges from 5 to 12.5 feet bgs. Therefore, based on these measurements, the pit bottoms were not buried at least 5 feet above the seasonal high water table.

Table 4. Pit and Groundwater Depth Measurements for Gamble Jr. 35-13-16H No. 1 (sn240037)

	MW-1 (Approach)	MW-2 (Approach)	MW-3 (Approach)
<i>Depth below ground surface to first encountered groundwater bearing zone (Boring Logs)⁷</i>	5	11	12.5
<i>Depth of Pit (Reserve Pit Site Sketch, PEC Report)⁸</i>	~7	~7	~7
<i>Measured interval between bottom of pit and top of first encountered water bearing zone**</i>	-2	+4	+5.5

*Note: measurements in feet

**pit bottom above water bearing zone = "+"

pit bottom below water bearing zone = "-"

At the Gamble Jr. 34-13-16H No. 1 (sn240833) well site, the pit was excavated to a depth of 14 feet bgs. Based on data collected at the site, the depth to the top of the first encountered groundwater bearing zone ranges from 3 to 20 feet bgs. Therefore, based on an average of these measurements, the pit bottoms were not buried at least 5 feet above the seasonal high water table.

⁵ Exhibit 5-Boring Logs - Well Site 240035

⁶ Exhibit 6-ENG 16 Form - Well Site 240035

⁷ Exhibit 7-Boring Logs - Well Site 240037

⁸ Exhibit 8-Reserve Pit Site Sketch, PEC Report - Well Site 240037

Table 5. Pit and Groundwater Depth Measurements for Gamble Jr. 34-13-16H No. 1 (sn240833)

	MW-1 (Approach)	MW-2 (Approach)	MW-5 (HET)	MW-6 (Approach)	MW-7 (Approach)
<i>Depth below ground surface to first encountered groundwater bearing zone (Boring Logs)⁹</i>	13.75	3	16	5	20
<i>Depth of Pit (Form ENG-16)¹⁰</i>	14	14	14	14	14
<i>Measured interval between bottom of pit and top of first encountered water bearing zone**</i>	-0.25	-11	+2	-9	+6

*Note: measurements in feet

**pit bottom above water bearing zone = “+”

pit bottom below water bearing zone = “-”

II. Pits were not closed in accordance with Statewide Order 29-B.

HET’s Limited Admission plan states, “Pit closure records reveal that each pit qualified for closure by on-site mixing and blending in accordance with LAC 43:XIX.313D, which does not require landowner permission.” This reference to Section 313(D) refers to “land treatment,” a SWO 29-B approved pit closure technique. However, despite the pits being qualified for land treatment, documentation from the operators indicate that the closures on the Gamble property were actually accomplished using “burial and trenching.” Burial or trenching involves closing of pits by mixing the waste with soil and burying the mixture onsite. Though “burial and trenching” is another SWO 29-B approved pit closure technique, in order to comply with these rules, the buried materials must meet the following criteria:

1. the pH and metals criteria in §313.C above;
2. moisture content: < 50 percent by weight;
3. electrical conductivity (EC): < 12 mmhos/cm;
4. oil and grease content: < 3 percent by weight;
5. top of buried mixture must be at least 5 feet below ground level and then covered with 5 feet of native soil;
6. bottom of burial cell must be at least 5 feet above the seasonal high water table.¹¹

Letters from Brammer Engineering and/or Chesapeake document that the pits at each site were closed via on-site burial and trenching, which requires the buried mixture to be at least 5 feet bgs and 5 feet above the seasonal high water table.

- 239274 – 7/23/2009 letter from Brammer stating pit was closed via on-site burial and trenching¹²;
- 239592 – 8/4/2009 letter from Brammer stating pit was closed via on-site burial and trenching¹³;
- 240035 – 3/18/2010 letter from Brammer stating pit was closed via on-site burial and trenching¹⁴;

⁹ Exhibit 9-Boring Logs - Well Site 240833

¹⁰ Exhibit 10-ENG 16 Form - Well Site 240833

¹¹ See LAC 43:XIX.313(E)

¹² Exhibit 11-July 23, 2009 Brammer Letter

¹³ Exhibit 12-August 4, 2009 Brammer Letter

¹⁴ Exhibit 13-March 18, 2010 Brammer Letter

- 240833 – 3/10/2011 letter from Chesapeake stating pit was closed via on-site burial and trenching¹⁵.

However, as indicated in the section above, none of the pits at these well sites meet the requisite SWO 29-B criteria.

III. Excavation of the pits into the underlying groundwater and their improper closure has resulted in the contamination of a class 2 groundwater.

Groundwater classification is a regulatory determination made under RECAP, the use of which constitutes an exception to SWO 29-B and its background groundwater standard.¹⁶ Under RECAP, the groundwater on the Gamble property meets a groundwater 2 classification. RECAP classifies groundwater as follows:

Groundwater Classification 2 - Class 2A: Groundwater within an aquifer that currently supplies water to a domestic water supply, agricultural supply, or any other supply.

A domestic water supply is defined as one which provides water to an individual household or households but is not considered to be a public water supply as defined in Groundwater Classification 1; or Class 2B: Groundwater within an aquifer that could potentially supply drinking water to a domestic water supply. The aquifer should be sufficiently permeable to transmit water to a well at a maximum sustainable yield of greater than or equal to 800 gpd and less than 4,800 gpd (4 persons per household x 100 gpd x peaking factor of 2); and groundwater quality is such that it has a TDS concentration less than or equal to 1,000 mg/l; or **Class 2C: Groundwater within an aquifer that could potentially supply drinking water to a domestic water supply. The aquifer should be sufficiently permeable to transmit water to a well at a maximum sustainable yield of greater than or equal to 800 gpd; and groundwater quality is such that it has a TDS concentration greater than 1,000 mg/l and less than or equal to 10,000 mg/l.**

Groundwater Classification 3 - Class 3A: Groundwater within an aquifer that is sufficiently permeable to transmit water to a well at a maximum sustainable yield of less than 800 gpd; or Class 3B: Groundwater quality is such that it has a TDS concentration greater than 10,000 mg/l. NOTE: If a domestic or agricultural water supply well is located within one mile of the site property boundaries and is screened in the same stratum as the aquifer of concern or has a direct hydraulic connection, then the aquifer shall be classified as a Groundwater Classification 2 aquifer. For groundwater in communication with a surface water body, groundwater shall be classified as surface water at the point of discharge to the surface water body. Refer to Figure 3 for an illustration of the groundwater classifications.

According to our environmental site assessment conducted at the five (5) Indigo sites, a shallow groundwater bearing unit was consistently encountered at depths ranging from ~2 to 24 feet bgs; this unit is believed to be the same Wilcox Sand unit throughout the site. Slug tests were conducted on a total of ten (10) two-inch (2”) monitoring wells installed by Approach at the five (5) Indigo sites. No slug tests were conducted on the one-inch (1”) monitoring wells installed by HET, as slug tests from one-inch (1”) diameter wells are considered unreliable.

¹⁵ Exhibit 14-March 10, 2011Chesapeake Letter

¹⁶ See Exhibit 15-Second Amended Memorandum of Understanding between Louisiana Department of Natural Resources Office of Conservation and Louisiana Department of Environmental Quality regarding Approval of RECAP Evaluation and Remediation Plans at Oilfield Sites, dated February 6, 2023

The maximum yield of the aquifer was calculated in accordance with RECAP Appendix F using the “estimated well yield equation” for an unconfined aquifer, the geometric mean of each well’s hydraulic conductivity, and the average saturated aquifer thickness. Yield was also calculated using the confined aquifer equations presented in RECAP Appendix F protocol. In both instances, the yield was greater than 800 gallons in a 24 hour period.

The calculations resulted in the following maximum calculated aquifer yields.

Well ID	K ¹⁷ (cm/sec)	B (feet)	Q (gallons / minute)	24-Hour Yield (gallons)
239274 MW1	0.000231	16.55	0.26	375
239592 MW1	0.000876	14.85	0.7	1008
239592 MW3	0.000237	19.65	0.37	531
240035 MW1	0.00209	9.39	0.64	924
240035 MW2	0.00132	8.73	0.37	531
240037 MW2	0.00101	18.69	1.23	1776
240037 MW3	0.000265	21.54	0.48	698
240833 MW1	0.000614	15.43	0.55	788
240833 MW2	0.000502	17.5	0.58	835
240833 MW7	0.000202	27.44	0.6	867
Geometric Mean:	0.000605345			
24-Hour Yield for 2" Well				845

In accordance with the LDEQ RECAP, the aquifer would be classified as a Class 2 groundwater based on the calculated yield from all ten (10) slug tests since it was greater than 800 gallons per day but less than 4,800 gallons per day. Measurements of TDS concentrations indicated levels under 10,000 mg/L. It should be noted that the EPA considers any groundwater zone “capable of yielding a quantity of drinking water to a well or spring sufficient for the minimum needs of an average family” as a “potential source of drinking water.” Further, EPA assumes “that all groundwater units are capable of supplying a yield sufficient to meet the minimum needs of an average family, unless an insufficient yield can be demonstrated as part of a Class III determination” (EPA, 1988, P. 107). It should also be noted that slug tests are known to produce anomalously low calculated yields compared to pumping tests.

In addition, an active domestic well (031-308, E.J. Ramsey) is located ~0.5 mile northwest of the Gamble property and screened within a shallow sand zone of the Wilcox Aquifer with a total depth of 22 feet bgs. HET suggests that this well served to support livestock at a dairy barn. The water well is listed as active and domestic in the SONRIS registration records, which automatically renders the groundwater zone a Class 2A based on RECAP classifications.

Furthermore, according to the LA Geological Survey, SONRIS and well registration records, the surficial sediments at the site are part of the Wilcox Group. The on-site monitoring wells have also been classified by LDNR as being screened within the Wilcox Aquifer. The Wilcox outcrops at the property.

¹⁷ *AquiferTest User’s Manual “Advanced Pumping Test & Slug Test Analysis Software”, 2002.*

Hvorslev, M.J., 1951. “Time Lag and Soil Permeability in Ground-Water Observations”, bul. no. 36, Waterways Experiment Station, Corps of Engineers, U.S. Army, Vicksburg, Mississippi.

HET indicates that the shallow water bearing zones are not in contact with deeper drinking water zones. However, this statement is simply conjecture and not based on data. No on-site borings have been drilled deep enough to determine if this is factually correct. Also, the deeper zones have not been tested for water quality. Literature indicates the Wilcox sands are hydraulically connected.¹⁸

IV. E and P wastes remain on the Gamble property resulting in the continued impact to site media.

A. Oilfield constituents reside in the soil and usable groundwater on the Gamble property in excess of regulatory standards.

In its current condition, oilfield wastes in the soil and groundwater located on the Gamble property exceed regulatory levels, as indicated in the following tables.

Table 6. Concentrations of E and P Wastes on the Gamble Property in Soil Exceed Regulatory Criteria

Constituent	RECAP Standard	SWO 29B Standard	Max Site Value	Xs Exceeds RECAP	Xs Exceeds SWO 29B
Arsenic (mg/kg)	12	10	14.5	1.2	1.5
Barium (mg/kg)	550	n/a	2,390	4.3	--
TPH-D (mg/kg)	65	n/a	295	4.5	--
EC (mmhos/cm)	n/a	4	5.92	--	1.5
SAR (meq)	n/a	12	54.1	--	4.5
ESP (%)	n/a	15	67	--	4.5

Table 7. Concentrations of E and P Wastes on the Gamble Property in Groundwater Exceed Regulatory Criteria

Constituent	RECAP Std. (GW SS)	SWO 29B Std. (Background)	Max Site Value	Xs Exceeds RECAP	Xs Exceeds SWO 29B
Arsenic	0.01	0.01	0.027	2.7	2.7
Barium	2.0	0.3	33	16.5	110
Cobalt	0.22	--	3.23	14.7	--
Lead	0.015	0.015	0.05	3.3	3.3
Mercury	0.002	0.001	0.0567	28.4	56.7
TDS	500	421.88	6,730	13.5	16.0
Chlorides	250	97.64	582	2.3	6.0
TPH-D	0.15	0.15	2.06	13.7	13.7
TPH-O	0.15	0.15	1.3	8.7	8.7
Aromatics C16-C21	0.15	0.15	0.585	3.9	3.9
Aromatics C21-C35	0.15	0.15	0.737	4.9	4.9
Nickel	0.073	--	3.12	42.7	--
Vanadium	0.026	--	0.143	5.5	--
Beryllium	0.004	--	0.19	47.5	--
Sulfate	250	31.79	1790	2.2	17.0

¹⁸ See Exhibit 16 - U.S. Department of the Interior – U.S. Geological Survey – Water Resources Investigations Report 95-4176, Carrizo-Wilcox Aquifer – Potentiometric Surface

Zinc	1.1	0.05	4.3	3.9	86
Chromium	0.1	0.007	0.113	1.13	16.1

Furthermore, HET notes that metals concentrations are protective of the shallow water bearing zone through analyses using the synthetic precipitation leachate procedure (SPLP). However, the pits are located within the groundwater zone and the metals have already impacted the shallow water bearing zones. The use of SPLP is irrelevant.

B. The former pit areas have stunted vegetation and do not appear to support pine growth.

Improperly closed pits contain oilfield waste that continue to impact site media on the Gamble property. Concentrations of ESP and SAR reported above the SWO 29-B standards were collected at several sites (admission areas 239274, 240035, and 240037). SWO 29-B pit closure regulations do not specify a depth limit for these constituents. The former pit areas have stunted vegetation and do not appear to support pine growth.

This is particularly problematic as the Property has attained and maintained the status of a Certified Tree Farm on the Property, which requires that Gamble meet and maintain stringent sustainability standards and best management practices. Further, the Property has been certified as a Certified Wildlife Habitat. Additionally, the creek flowing through the Property has been managed as a Streamside Management Zone pursuant to standards and practices issued by the Louisiana Forestry Association and various state agencies. Maintenance of the creek as a Streamside Management Zone requires adherence to strict best management practices.

Furthermore, HET estimates that the root zone on the Gamble property extends from zero to three feet. However, HET has neither performed any site inspections nor provided any scientific support for the veracity of this assumption. Instead, HET only recommends vegetative planting followed by a period of monitoring.

In an effort to confirm HET's assumptions, Approach personnel contacted Mr. Steve Lenox, a forester that routinely provides consulting services to Jack R. Gamble, Jr., LLC regarding silvicultural practices and timber management. Mr. Lenox was asked about the specific pine tree species planted on the Gamble property and offered the following facts:

- The trees planted at the Gamble property consist of Loblolly pines, which are members of the southern yellow pine group;
- Loblolly pines' primary root is a taproot that grows to depths of 6 to 8 feet below ground surface;
- Lateral roots are also present, but the taproot is the primary root;
- The trees are planted at the Gamble property on 7' x 10' spacings;
- There are 622 trees / acre;
- The trees grow to an average age of 35 years before they are harvested;
- Currently the trees on the Gamble property are about 20-22 years old.

Any proposed remediation should not be based on HET's unsupported assumptions of rooting depths. In fact, SWO 29-B does not limit remediation based on rooting depths. And HET's opinions regarding rooting depths are not consistent with Mr. Lenox, a forester possessing firsthand knowledge of the Gamble property and its timber management practices.

V. E and P wastes remaining in the groundwater on the Gamble property have not been laterally delineated.

Samples taken surrounding the former reserve pit locations indicate a litany of oilfield constituents present in the shallow groundwater that exceed regulatory criteria. However, the lateral extent to which these constituents have migrated through the groundwater is unknown. To date, the sampling has not delineated the contaminated groundwater plumes.

Sincerely,

Approach Environmental, LLC
Louisiana Engineering Firm No. 6953



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