



Environmental Services, Inc

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June 5, 2017

Mr. Kevin Huddell
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Attorneys at Law
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601 Poydras Street, Suite 2655
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**Subject: Comments to BP's Limited Admission Plan
Harold J. Guidry et al v BP America Production Co, et al.;
Case No. 82537, Div. "G"; 16th JDC, St. Martin Parish, LA;
Anse La Butte Oil Field, St. Martin Parish, LA**

Dear Mr. Huddell,

ICON Environmental Services, Inc. (ICON) has reviewed BP's Plan entitled "Proposed Plan for Evaluation and Remediation, If Necessary, of Property Pursuant to Limited Admission, April 27, 2017", and we offer the following comments.

Comments Pertaining to Groundwater:

- 1) The BP Plan is unclear as to exactly what standards are being applied to evaluate groundwater contamination. Despite including a discussion in Section 2.4.2 entitled "Background Concentrations of Constituents", the discussion fails to identify a single background constituent concentration. A discussion of groundwater investigation results in Section 4.2 mentions standards including EPA MCLs or SMCLs, RECAP Screening Standards, and RECAP Table 3 MO1 standards applicable to a GW1 aquifer; there is no comparison to background benchmark constituent concentrations in that section. The use of RECAP standards for a GW1 aquifer is not compatible with the approach BP has taken in making a limited admission for a (roughly) rectangular box with dimensions of 220 feet by 650 feet by 30 feet thick in the middle of an irregularly-shaped large groundwater plume. RECAP requires:
 - For a GW1, the RECAP standards shall be obtained from Table 3. For a constituent not listed in Table 3, the SDWA MCL shall serve as the GW1 (Section 2.12.5). Chlorides are evaluated as a non-traditional parameter in RECAP (Appendix D-NTP-1). Applicable or Relevant and Appropriate Requirements can include EPA Secondary MCLs.
 - The Groundwater Area of Investigation (AOI) is delineated by comparing the constituent concentration detected at each sampling location with the groundwater SS or limiting groundwater remedial standard (Sec 2.6.1.4). The horizontal and vertical boundaries of the groundwater plume shall be delineated. The delineated

groundwater plume shall be a three-dimensional space which contains all data points with constituent concentrations above the groundwater SS or limiting groundwater RS, and all points **within** that space whether the concentrations are less than, equal to, or greater than the groundwater SS or limiting groundwater RS.

- The point of exposure for a GW1 aquifer shall be assumed to be throughout the aquifer to be protected/restored (Section 2.11.1). The groundwater SS or limiting RS shall be met throughout the aquifer to be protected/restored.

BP’s groundwater limited admission area is in a very small portion of a very large plume that has neither been laterally nor vertically delineated. It is not possible to meet the GW1 restoration requirements of RECAP (*throughout the aquifer to be restored*) by addressing only a small box of contamination within a larger plume and ignoring groundwater constituent concentrations around, below and above that box. BP states in Section 5 of their plan that “*the water bearing zones on the property and within the Limited Admission area are not currently utilized as a source of groundwater*”, but this statement is incorrect and misleading, because those “*water bearing zones*” make up the Atchafalaya Aquifer ranging in depth from 35 to 170 feet bls that is the primary source of groundwater for individual and community/public supply throughout the area; it would be more accurate to simply state that no water supply wells are currently installed in the Limited Admission area.

- 2) The BP Plan included a toxicological analysis of groundwater by MedTox Services LLC in Appendix N. I offer no opinions on toxicological effects of constituents found in groundwater, but upon review of this report I observed the acknowledgment that several wells exhibited exceedances of RECAP MO1 remedial standards and/or USEPA MCLs for arsenic, barium and radium and indeed the report concludes that a water well near the Limited Admission Area in the intermediate aquifer is not suitable for human consumption. A clarification I wish to include is that this report is written in a manner to suggest that the terms “superficial”, “intermediate”, and “deep” aquifers are separate aquifers, when in fact all three horizons are simply portions of a single sand in the Atchafalaya Aquifer, and would be regulated as a single GW1 aquifer with the point of exposure represented by any point in that aquifer.
- 3) Regarding Section 2.4.2 concerning Background Concentrations of Constituents, I provide the following comments:
 - It is stated that the regional water wells installed within the fifty (50) to eighty (80) foot zones are currently being used and are un-impacted. This is not true, potable water supply wells adjacent to the subject groundwater plume that this plan addresses include the Dwayne Grossie well with chlorides of 241 mg/L, and Jean Baptiste well with chlorides of 149 mg/L (Figure 7). Additionally, other potable water supply wells exhibiting contamination from a different and separate AOI located ½ mile south of the subject site include SM6879z (chlorides of 292 mg/L), C Bundricks unregistered (CL of 128 mg/L), G Meats Unregistered (CL of 234 mg/L), and Opie Leblanc Unregistered (CL of 114 mg/L) [Figure 14 of ICON Data Report].

- BP provides no critique of ICON’s background groundwater evaluation presented in our February 24, 2017 Expert Report and Restoration Plan, other than that stated at the start of the second paragraph of Section 2.4.2: “*groundwater data provided by ICON in Table 3 of ICON’s Expert Report include data from currently operating and usable water wells in a wide regional area away from the site at varying depths*”. This meets the requirements of RECAP 2.13 for Identification of a Background Concentration: “*the background concentration shall be established via the collection and analysis of background samples obtained from an area within the vicinity of the AOC or AOI that has not been impacted by site activities (or other contaminant source) and that shares the same basic characteristics as the medium of concern*”. In contrast, the BP wells used for background are within the AOC and include the following contaminated wells:
 - i. HMW3 (chlorides of 170 mg/L and 725 mg/L in a perched zone above the Atchafalaya Aquifer);
 - ii. Dwayne Grossie (CL of 241 mg/L) and Jean Baptiste (CL of 149 mg/L) wells which are both in the AOC on the northwest side of the plume;
 - iii. MW3 (CL of 155 mg/L at the NW side of the plume);
 - iv. GC7B (CL of 166 mg/L at 50-60’ but CL of 1420 mg/L in GC7 in the same location at 28-38’ in the same aquifer and CL of 312 mg/L in GC7D in the same location at 80-90’ in the same aquifer);
 - v. GC9B (CL of 159 mg/L) at the north edge of the plume.

These wells used by BP for background are clearly not appropriate locations for background data, and were intentionally selected to result in an elevated background concentration value. The background wells used by ICON are located away from former exploration and production activities, they surround the entire historical production area, and the chloride concentrations averaged 18.5 mg/L with a standard deviation of 7.8 mg/L, indicating homogeneous chemistry which is to be expected from uncontaminated conditions within a two square mile area of the Atchafalaya Aquifer.

- BP uses concentrations of strontium and calcium to support their selection of background wells, and compares anion and cation concentrations of these wells to a produced water sample collected in 1988 from the Ed Bergeron SWD#1 pump discharge (sn78341). The well history for that well shows that the well was recompleted in January 1975 by plugging the Upper Martin and Castille sands with a cement plug, and recompleting with perfs at 4714-1725 in the Patin Sand. Thus, the produced water report represents water produced from the Patin Sand, whereas by far the most historical production at the subject property was from the deeper Upper and Lower Martin and Castille sands. This produced water report is therefore not representative of the bulk of produced water historically released in this area of the field. Additionally, the use of calcium as an indicator species is not appropriate because of ion exchange that occurs as the produced water seeps through surficial clays before entering the aquifer. As stated in the abstract of a paper included in my reference materials for this case, “*concentrated brine soil*

column studies indicated sodium in the brine solution is able to exchange for calcium and magnesium on the soil, thereby retarding transport of sodium relative to the average groundwater velocity and resulting in the development of a “hardness halo” at the leading edge of the brine plume. In this zone, calcium and magnesium concentrations exceed the values for both the brine and the fresh groundwater” (The Impact of Ion Exchange Processes on Subsurface Brine Transport as Observed on Piper Diagrams, Cates, Knox, Sabatini, Ground Water Vol 34, No. 3, May-June 1996).

- 4) The BP Plan anticipates additional groundwater assessment generally within 350 feet of the groundwater Limited Admission area, at four locations at the top of the Atchafalaya Aquifer, and at five locations at the ~55 ft depth in the aquifer. As stated in Opinion #4 in ICON’s February 24, 2017 Expert Report and Restoration Plan, *‘sources of the north plume are directly related to discharges to the swamp to the east of the Gaidry-Campbell property, which is a source of recharge to the Atchafalaya Aquifer’*. The BP Plan failed to even mention this opinion, so ICON asked to perform sampling in this area to confirm this important potential contaminant source. ICON performed terrain conductivity surveying in the area of the BP SWD and production pit complex and discharge area into the cypress swamp that is evident on the 1963 aerial image (Figure 1). The terrain conductivity survey shows very elevated terrain conductivity at the production pit area, and even higher magnitude of conductivity at the discharge point into the cypress swamp (Figures 2 and 3). ICON performed conductivity logging at multiple boring locations depicted on Figure 4, and boring logs can be found in Attachment A. The conductivity logs show elevated soil conductivity at Borings 20 and 21, and very high conductivity at Borings 22 through 25 from depths of 10 feet bls to the top of the Aquifer at an average depth of 47 feet bls. Soil EC in Boring 20 was as high as 92.8 mmhos/cm, and more importantly was 20.6 mmhos/cm at the interface of the aquifer and overlying clay bed. Nearby Boring GC22 had Soil EC of 37.9 mmhos/cm and 32.3 mmhos/cm at the interface of the aquifer and overlying clay bed. These very high soil conductivity values are in the range of concentrations that represent a continuing mass of leaching of salts into the aquifer. Groundwater data from these borings have been reported and are shown on the table below.

Well	Depth	Specific Conductance (uS/cm)	Chlorides (mg/L)
GC18A	24-29'	4,260	909
GC18B	40-50'	2,409	455
GC20A	30-35'	33,380	12,900
GC20B	44-49'	32,170	12,600
GC23A	33-43'	76,900	35,800
GC23B	50-60'	4,191	1,180
GC25A	28-38'	118,100	56,800
GC25B	50-60'	1,220	170
GC25C	90-100'	2,228	499

These data were used to revise the groundwater chloride isopleth maps presented as Figures 6, 7 and 8. These maps clearly show that a large mass of produced water contamination is present hydraulically upgradient and extending onto the Guidry-Campbell property, and any plan for additional assessment and/or remediation of the groundwater must also consider this portion of the overall mass of contamination in the aquifer. The provisions for additional assessment in the Section 7.2 of the BP Plan for four locations at the top of the Atchafalaya Aquifer, and at five locations at the ~55 ft depth in the aquifer are grossly underestimated. Additionally, the vertical extent of contamination has not been delineated as shown on the cross section diagram in Figure 9; provisions for installation of wells screened below depths of 120 feet are required to meet requirements of Statewide Order 29B, Chapter 6 as well as requirements in RECAP. The BP estimate of \$1,004,198 for additional assessment should be increased by a factor of 6 to 10 to account for this additional assessment.

- 5) The BP Plan has provisions for the installation of a water well at a depth of eighty feet bls in the Limited Admission Area (Section 9.4), and states that *“in this area, the deeper zone is not impacted and is capable of being utilized for its intended purpose”*. As shown on the cross section diagram in Figure 10, groundwater is contaminated with chlorides at concentrations above background but below the secondary MCL of 250 mg/L below a depth of 75 feet bls in the Limited Admission Area; however 800 feet to the southwest of the Groundwater Limited Admission Area, the chloride plume exceeds 250 mg/L at this depth of the aquifer. A well installed below a depth of 80 feet in the Limited Admission Area would likely draw in contamination from both lateral and vertical locations where the plume exceeding 250 mg/L exists. Again, the plume exists in a single sand of the Atchafalaya Aquifer and groundwater is free to move anywhere within this sand.
- 6) The BP Plan has selected MNA as the most feasible plan for remediation of groundwater (Section 11). BP supports this plan by stating that *“existing levels have already dramatically declined from their presumed origin in produced brine with a concentration of 77,000 ppm chlorides”*. There is absolutely no information to suggest that original groundwater chlorides ever reached a concentration of 77,000 ppm in the Limited Admission area. BP also supports MNA by stating that *“there are no identified on-going*

sources affecting groundwater in the Limited Admission area, and further contamination is not anticipated". Recent sampling at the BP SWD and salt water pit complex located 470 feet east of the Limited Admission area (and hydraulically upgradient) indicates that this pit complex exhibits very high salt contamination throughout the soil profile to the top of the Atchafalaya Aquifer, and represents an ongoing source for leaching of salts (and other constituents) to the aquifer. Historical aerial images suggest that the production pit complex was closed sometime between 1980 and 1987. Hydraulic conductivity and groundwater gradient suggest an average Darcy seepage velocity of 54 feet/year at the 50 to 80 ft depth of the aquifer (Opinion 7 of the February 2017 ICON Expert Report and Restoration Plan). If the source leaching salts to the aquifer (pit complex and discharge to swamp) was no longer present, we would no longer see these very high soil EC concentrations and groundwater contamination would have dissipated over the last 30 years, yet we continue to see high levels of groundwater contamination (11,000 mg/L at GC20A and GC20B). Data collected throughout the duration of this assessment indicates that the groundwater plume originating from the BP saltwater pit complex and from the historical discharges to the cypress swamp is flowing both laterally towards the Guidry-Campbell property, and also vertically downward due to density effects of the brine. As stated in RECAP (Section 2.16 Monitored Natural Attenuation), *"as with any remedial process, monitored natural attenuation should be selected only where it can meet all of the remedial goals for the site and where it can obtain those goals in an appropriate timeframe. An appropriate timeframe is one that is reasonable compared to that offered by other remedial methods"*. A condition of MNA listed in RECAP is that *"constituent concentrations reaching human or ecological receptors do not result in unacceptable risks"* (RECAP 2.16.1(4)). The COCs already exist in the GW1 aquifer, and the point of exposure is anywhere within the aquifer; thus *"unacceptable risks"* already exist. The horizontal and vertical extent of contamination has not yet been delineated, and thus it is premature to even consider MNA; active groundwater recovery can (and should) be implemented to remove contaminant mass and to control migration of the plume while delineation is completed.

- 7) The BP Plan has provisions for active remediation via pumping groundwater in the Limited Admission Area between depths of 50 and 80 feet bls using two wells pumping at 36.4 gpm (Appendix Q). The target extraction area is within the 1000 mg/L plume, and the target remedial standard is 250 mg/L (the EPA Secondary MCL). The EPA Batch Flushing Model (BFM) was used to calculate ~3 pore volumes would have to be removed to achieve the 250 mg/L target remedial standard. My calculations confirm that the modeling considered only the volume of the Limited Admission Area with a thickness of 30 feet. The EPA BFM inherently assumes that clean groundwater will be entering the remediation zone. This entire model is flawed because:
- The groundwater plume extends far beyond the Limited Admission Area.
 - Groundwater will be extracted from areas laterally outside of the Groundwater Limited Admission Area, there are no provisions to eliminate capture of groundwater from lateral portions of the property once pumping begins.

- Groundwater will also be extracted from areas above and below the Groundwater Limited Admission Area, it is not possible to eliminate this zone of capture.
- The calculated pore flushing volumes are underestimated because of these omissions.
- The likelihood of capturing portions of the groundwater contaminant plume that exists offsite to the east (hydraulically upgradient of the Guidry-Campbell property) have been totally ignored. Recent sampling indicates that much higher contaminant concentrations exist in this area, and will enter the recovery well zone of capture.

The cost estimate provided in the BP Plan is unrealistic and assumes that recovered contaminated groundwater can be directly injected into a salt water disposal well. Although contaminated with salts at concentrations unacceptable in a GW1 aquifer, the TDS content is way too low to be compatible with an injection zone and would result in frequent plugging of the injection formation. ICON has been involved in a long-term groundwater recovery project for several years, and utilized blending with produced water from an active oil well at a rate of 8% groundwater to 92% produced water to make the injectate compatible with formation clays.

- 8) The BP Plan includes estimated costs to actively remediate groundwater only in the Limited Admission Area, which is not technically implementable as presented in the plan. Costs presented in Appendix Q for: II) Groundwater Monitoring (\$766,798), IV) Groundwater Extraction (\$67,102), V) Maintenance of the SWD and Recovery Wells (\$78,086), and VII) Closure and P&A of wells (\$330,129) total **\$1,242,115**. The surface area of the Limited Admission Area comprises 206,054 ft², and is 30 feet thick resulting in an aquifer volume of 6,181,620 ft³. The likely size of the entire chloride plume (ignoring potential contamination below a depth of 120 feet bls) as presented in Figures 6, 7 and 8 was calculated as follows:

	Plume Surface Area (ft2)	Thickness (ft)	Aquifer Volume (ft3)
35 to 50 feet bls	4,582,286	15	68,734,290
50 to 80 feet bls	3,615,640	30	108,469,200
80 to 120 feet bls	3,437,798	40	137,511,920
			314,715,410

Therefore (ignoring the capitol cost for the SWD and the much higher chloride concentrations existing near the salt water pit complex that would increase the pore volume flushes), the cost for active remediation of groundwater in the 6,181,620 ft³ of aquifer in the Limited Admission Area is \$1,242,115. Volumetric analysis indicates that the entire plume volume is 50 times larger than the Limited Admission Area volume; thus a conservative cost adjustment to address the entire plume size would be: \$1,242,115 * 50 = \$62,105,750. This is an indication of how under-funded the BP Plan is. The cost is even more under-funded when a properly applied realistic background

groundwater remedial standard is used as required by Statewide Order 29B. I have seen nothing in the BP Plan concerning an exception to the background groundwater comparative standard required by Statewide Order 29B.

Comments Pertaining to Soil:

- 1) The BP Plan repeatedly refers to the intended use of the property but never states what that intended use is. The plan states (In Section 10.1) that *“the surface and subsurface chloride concentrations have been determined to be protective of the intended use of the property and/or the underlying water bearing zones”*. The BP Plan includes (Appendix M) a root zone analysis that concludes an effective root zone of 8 inches, however the species that were evaluated included sugarberry and Chinese tallow, both largely considered “trash” trees that are generally undesirable as residential shade trees. The most likely intended use of the property is for residential use, as the entire area is gradually converting to private residences, and the area is desirable due to the upland nature and close proximity to the city of Lafayette.
- 2) The BP Plan states that they are unable to provide a 29B compliant plan until the pipeline right-of-way is no longer in operation. Excavation for various purposes (remediation, repair, etc) routinely occurs within active pipeline ROW corridors, and is not a valid excuse to postpone soil remediation.
- 3) The BP Plan states that soil exceeding the upland EC standard from 2 to 4 feet bls will be disposed offsite. Our calculations of the cost estimate included in Appendix P suggests that the depth range could be a typo because the volumes in the Appendix suggest that soil from 2 to 6 feet will be excavated.
- 4) Exceedances if the upland limit for SAR within the soil Limited Admission Area are not addressed.

Comments to the BP Limited Admission Plan

Harold Guidry et al v BP America Production Co, et al; Case #82537, Div "G"; 16th JDC;

Anse La Butte Oil Field, St. Martin Parish, LA

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The opinions and interpretations listed herein are based on the referenced sources and are subject to change upon receipt of additional data. If you have any questions concerning this report, please feel free to contact me at (225) 344-8490.

Sincerely,

ICON Environmental Services, Inc.



Gregory W. Miller

Principal Hydrogeologist, LBOPG License # 939



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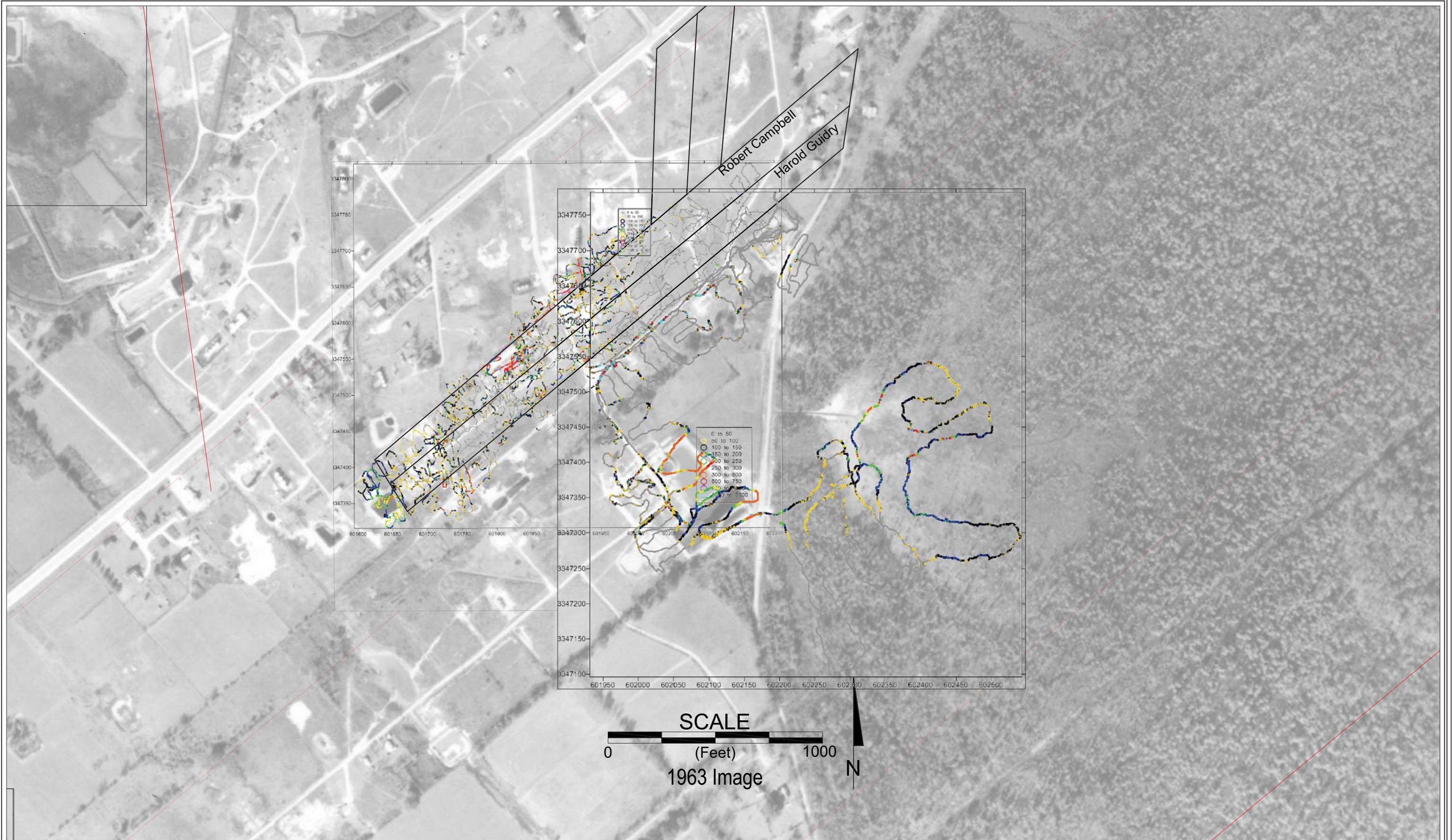


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1963 HISTORICAL AERIAL IMAGE
 Harold Guidry, et al v BP America Production Co., et al; Case #82537, Div G; 16th JDC
 Anse La Butte Oil Field, St. Martin Parish, LA

FILENAME Anse La Butte.dwg	REV #
JOB NO.	DATE FEB 2017
DIRECTORY	FIGURE NO. 1

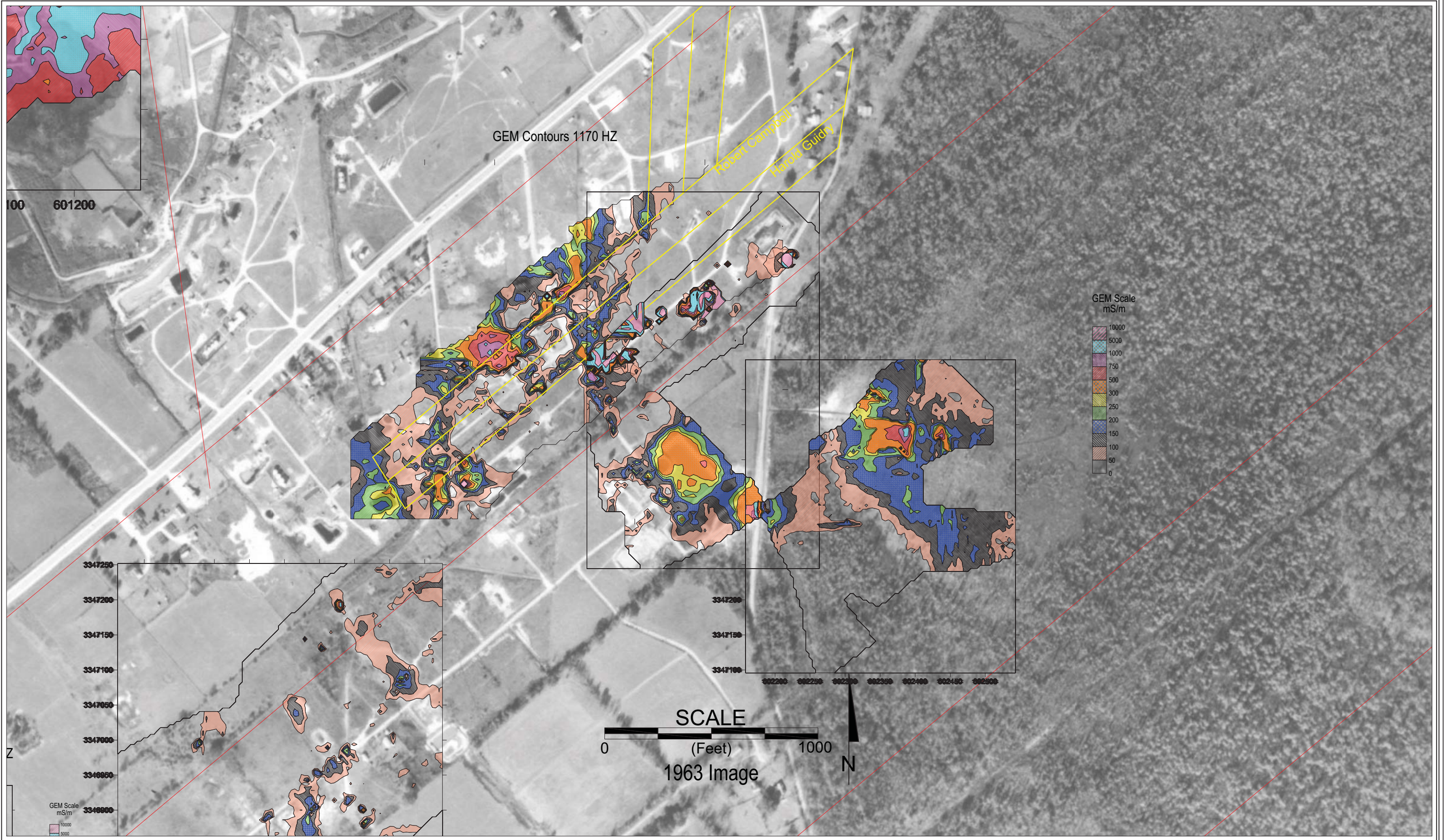


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TERRAIN CONDUCTIVITY (GEM-2) TRANSECT LOCATIONS
 Harold Guidry, et al v BP America Production Co., et al; Case #82537, Div G; 16th JDC
 Anse La Butte Oil Field, St. Martin Parish, LA

FILENAME Anse La Butte.dwg	REV #
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TERRAIN CONDUCTIVITY (GEM2) CONTOURS AT THE DEEP FREQUENCY (1170hz)
 Harold Guidry, et al v BP America Production Co., et al; Case #82537, Div G; 16th JDC
 Anse La Butte Oil Field, St. Martin Parish, LA

FILENAME Anse La Butte.dwg	REV #
JOB NO.	DATE FEB 2017
DIRECTORY	FIGURE NO. 3



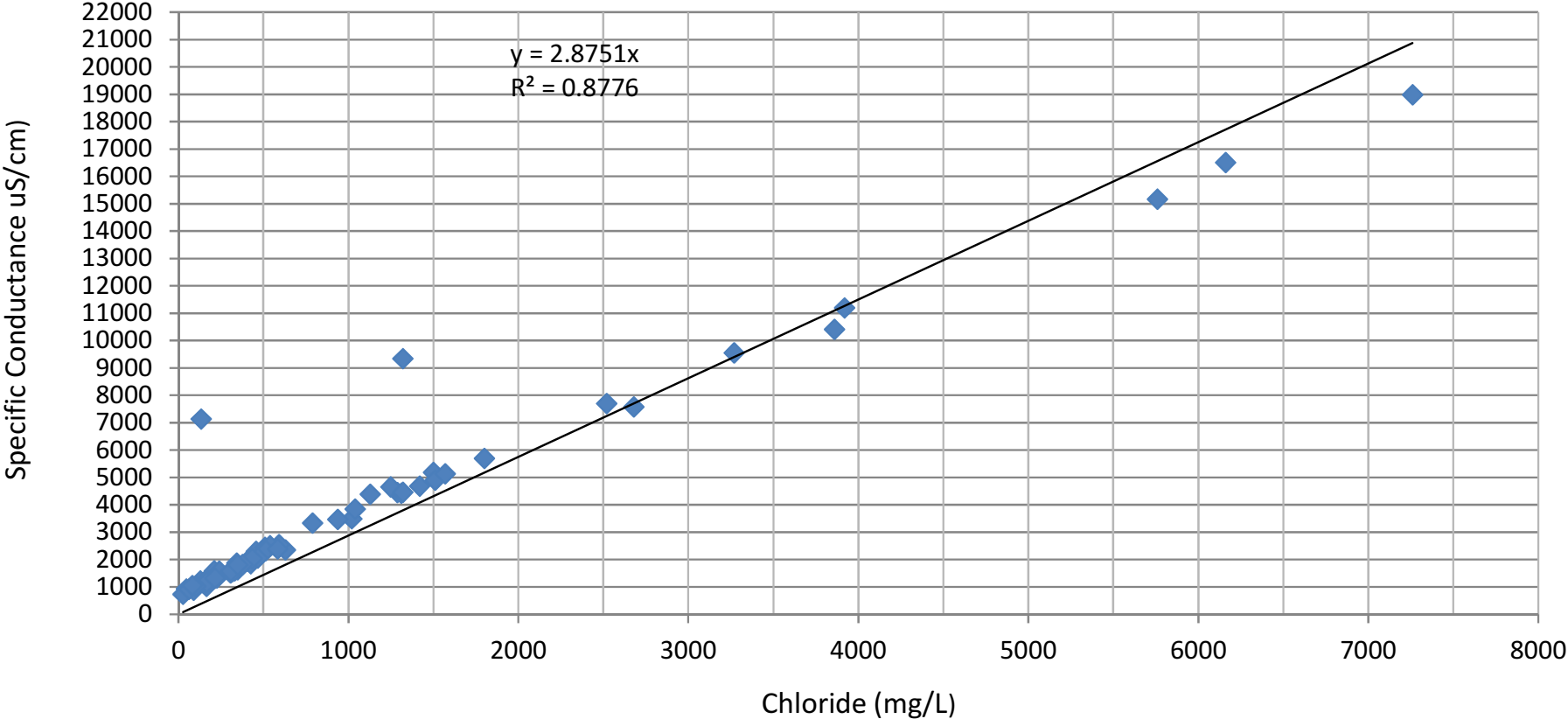
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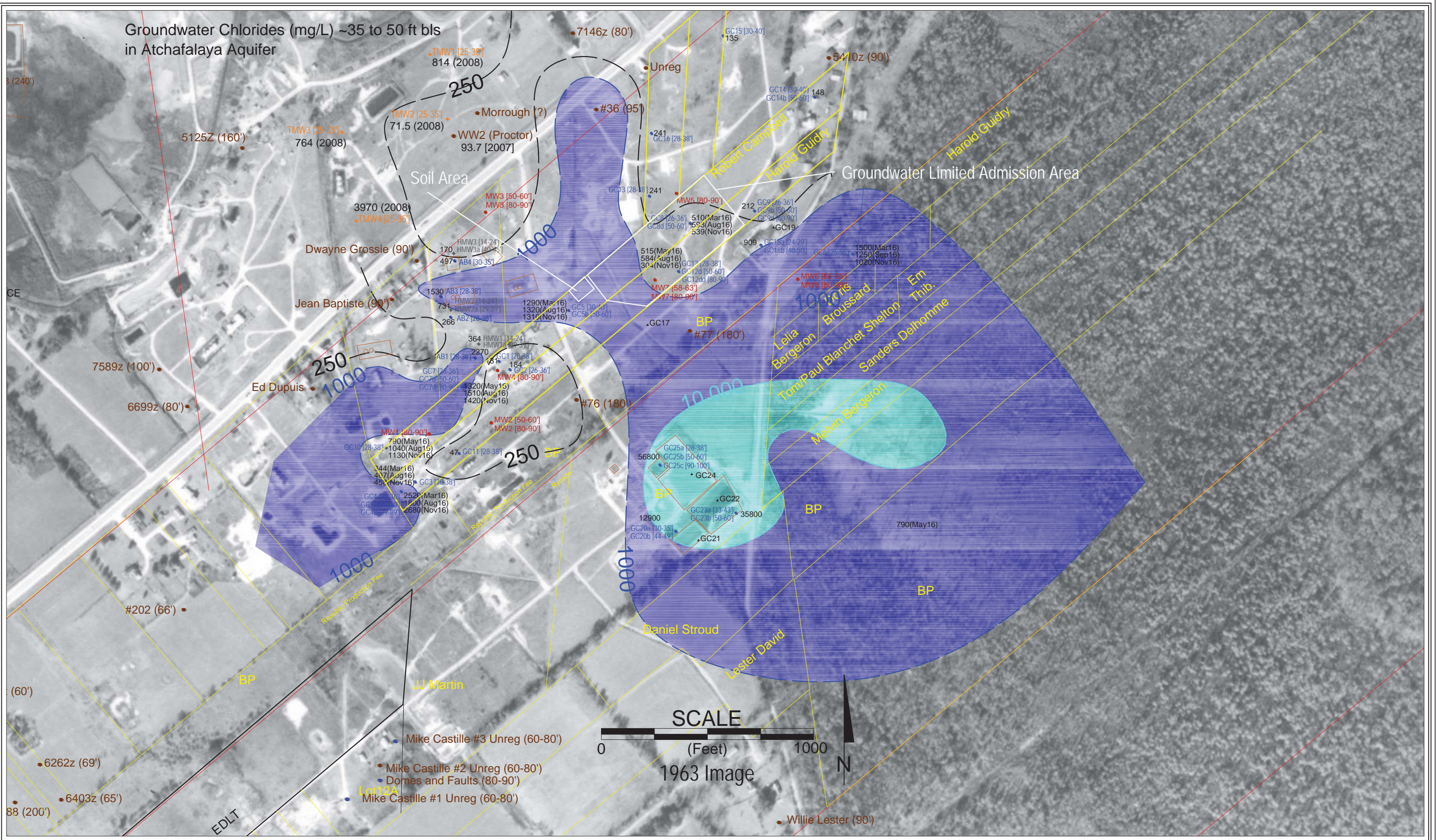
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LOCATIONS OF RECENT BORINGS AND MONITORING WELLS
 Harold Guidry, et al v BP America Production Co., et al; Case #82537, Div G; 16th JDC
 Anse La Butte Oil Field, St. Martin Parish, LA

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DIRECTORY	FIGURE NO. 4

Figure 5
Groundwater Chloride vs Specific Conductance Cross-Plot





Groundwater Chlorides (mg/L) ~35 to 50 ft bls
in Atchafalaya Aquifer

Groundwater Limited Admission Area

SCALE



(Feet)

1963 Image

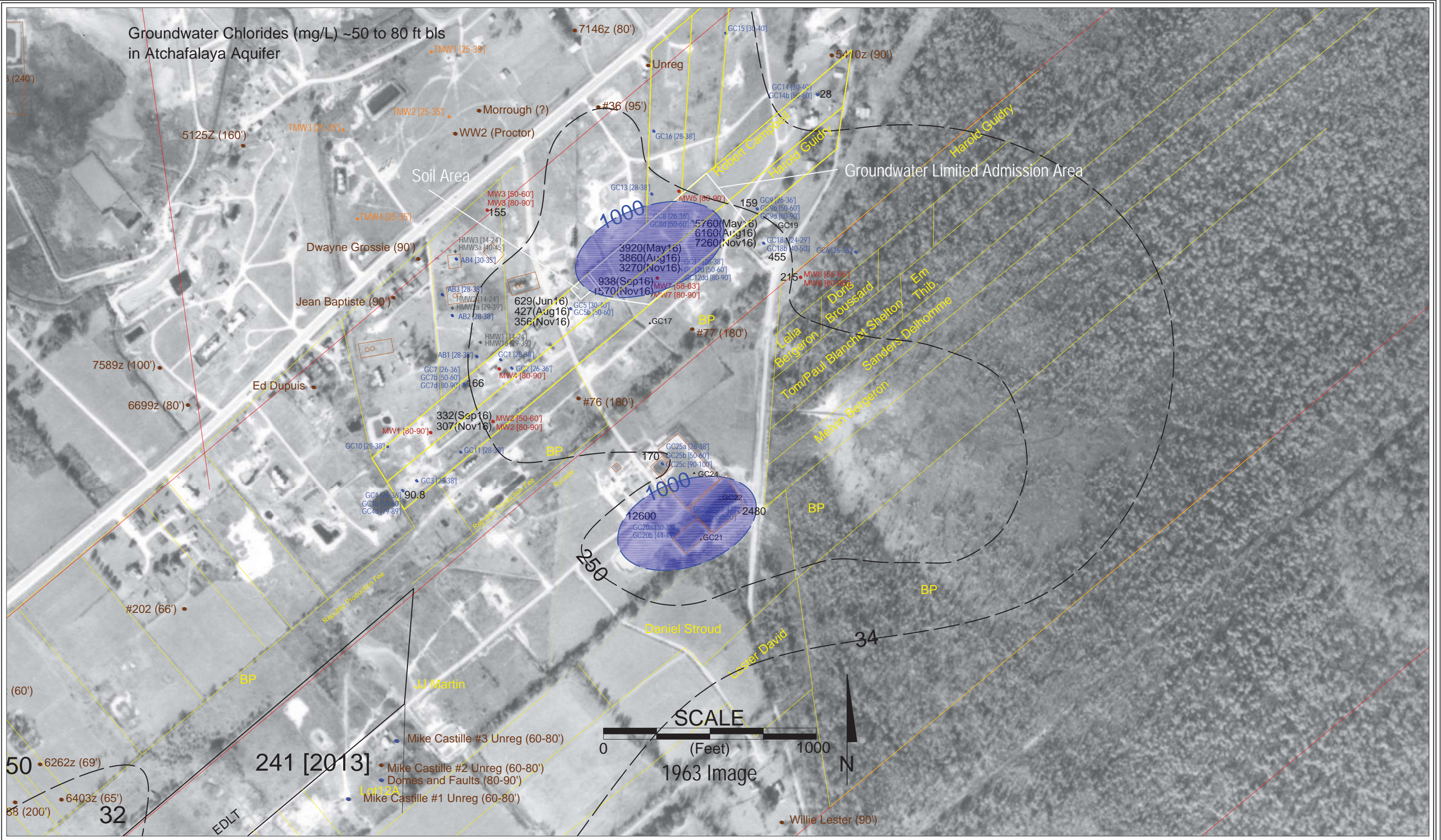


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GROUNDWATER CHLORIDES FOR WELLS AT 35 TO 50 FEET IN THE ATCHAFALAYA AQUIFER
Harold Guidry, et al v BP America Production Co., et al; Case #82537, Div G; 16th JDC
Anse La Butte Oil Field, St. Martin Parish, LA

FILENAME Anse La Butte.dwg	REV #
JOB NO.	DATE MAY 2017
DIRECTORY	FIGURE NO. 6

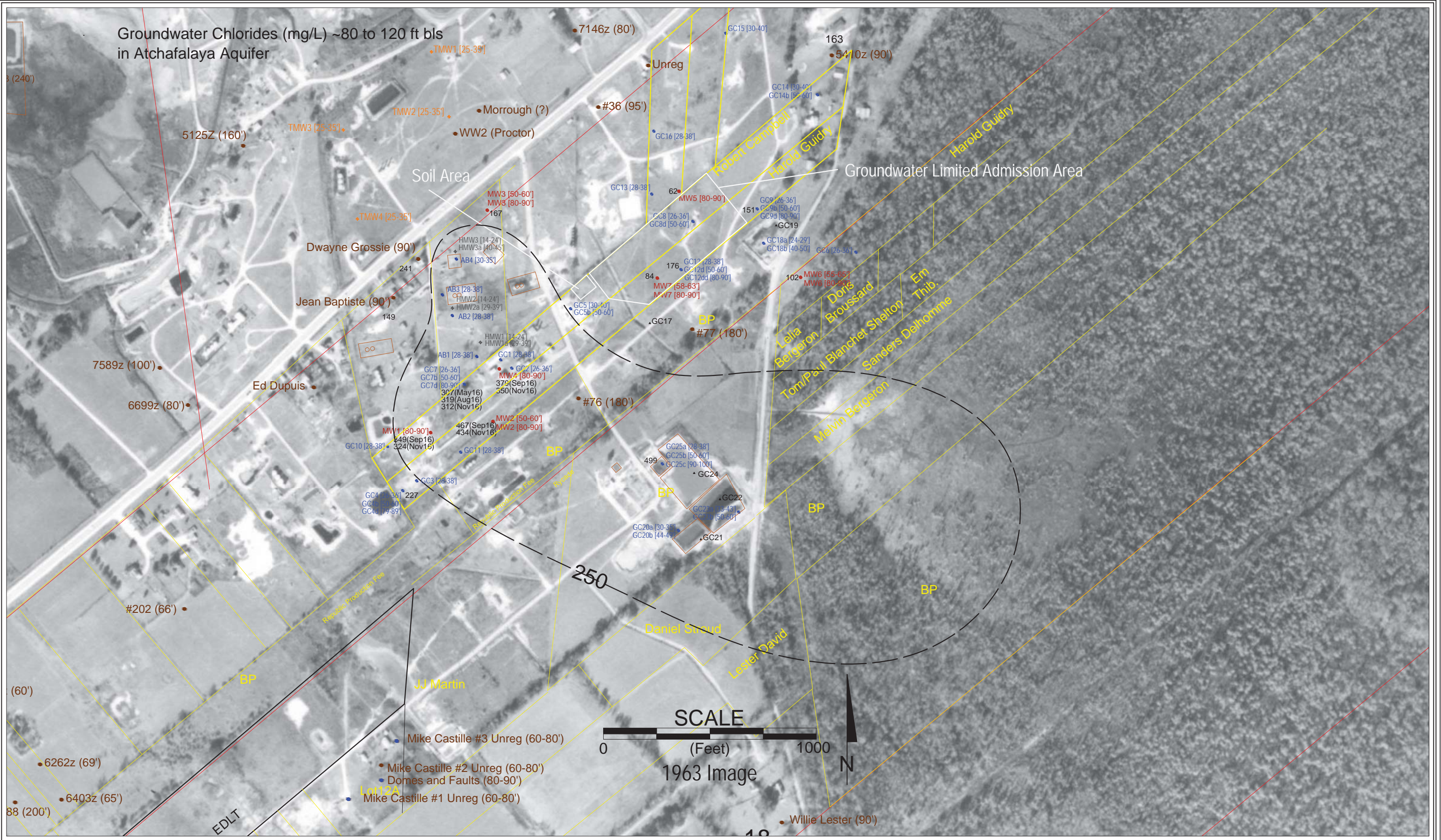


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GROUNDWATER CHLORIDES FOR WELLS AT 50 TO 80 FEET IN THE ATCHAFALAYA AQUIFER
 Harold Guidry, et al v BP America Production Co., et al; Case #82537, Div G; 16th JDC
 Anse La Butte Oil Field, St. Martin Parish, LA

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Groundwater Chlorides (mg/L) ~80 to 120 ft bls
in Atchafalaya Aquifer

Groundwater Limited Admission Area

SCALE



1963 Image

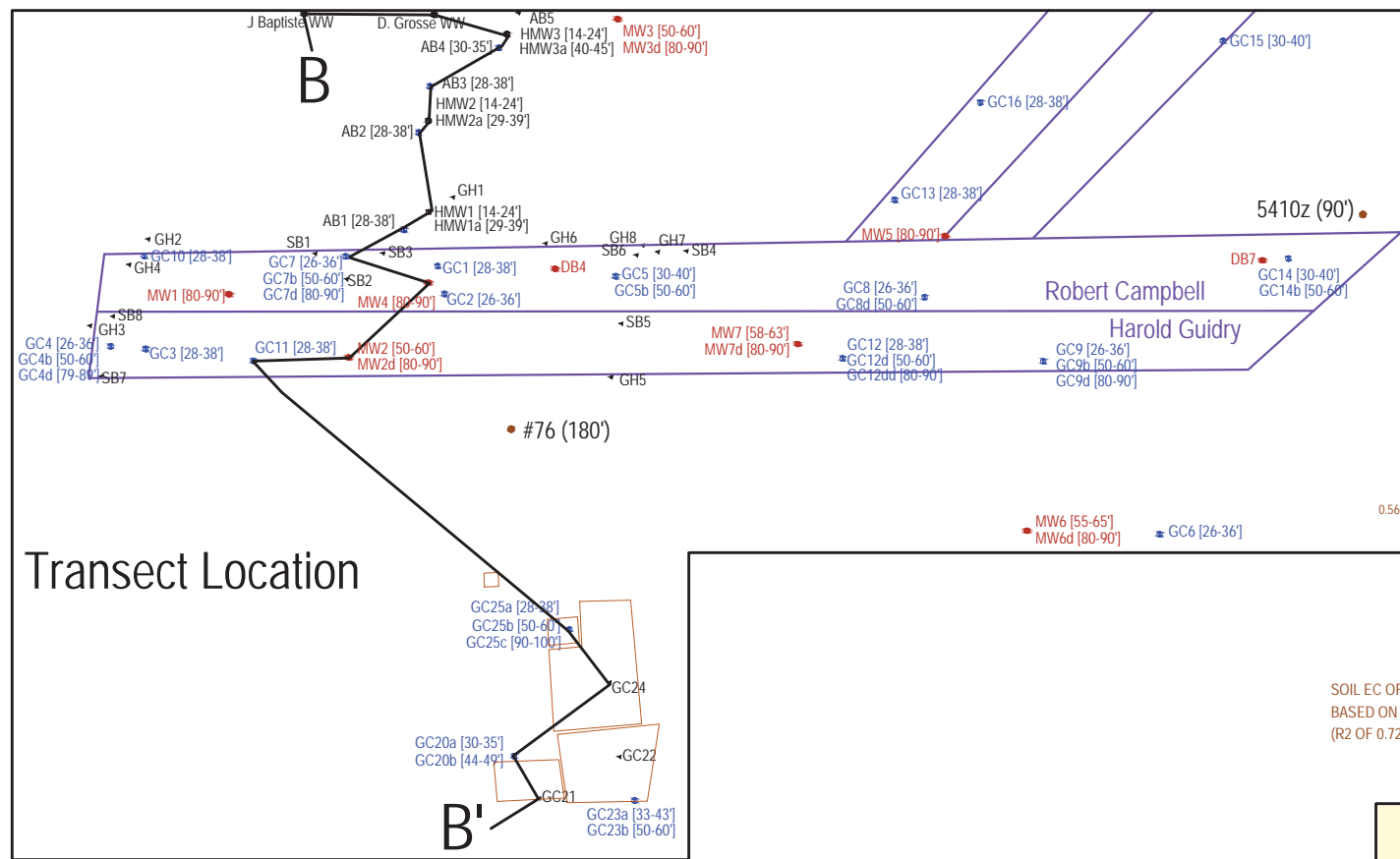


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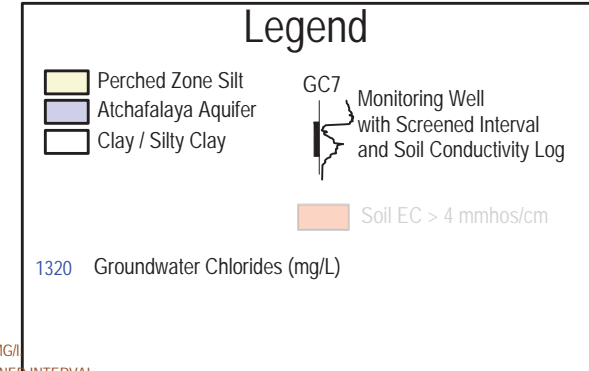
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GROUNDWATER CHLORIDES FOR WELLS AT 80 TO 120 FEET IN THE ATCHAFALAYA AQUIFER
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Anse La Butte Oil Field, St. Martin Parish, LA

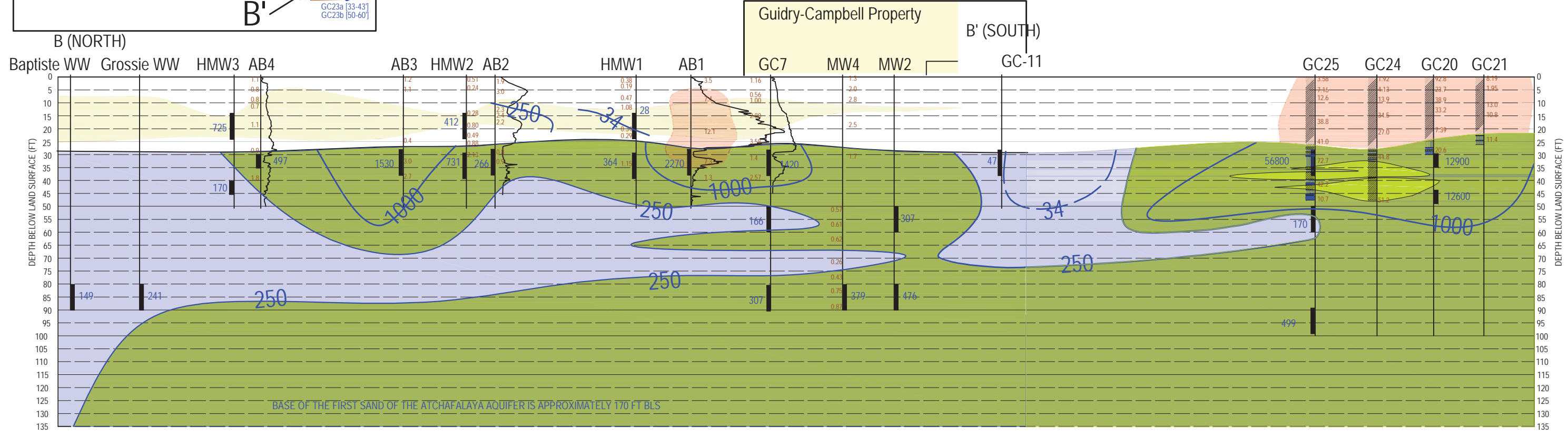
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Transect Location



SOIL EC OF 0.47 MMHOS/CM IS EQUIVALENT TO GROUNDWATER CHLORIDE OF 250 MG/L
 BASED ON REGRESSION ANALYSIS OF 21 WELLS WITH SOIL SAMPLED IN THE SCREENED INTERVAL
 (R2 OF 0.72)

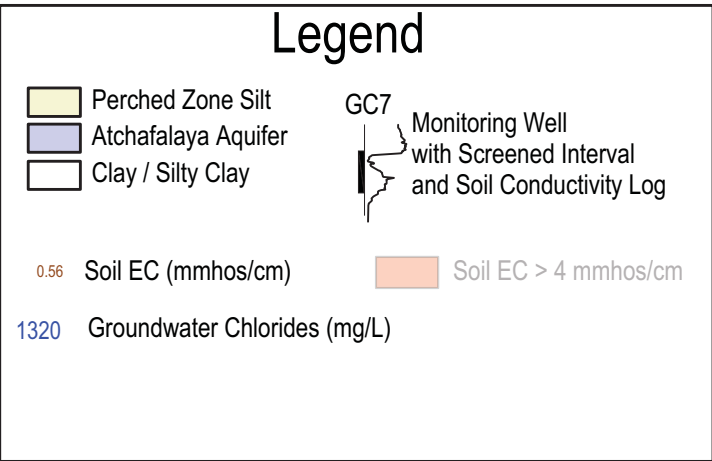
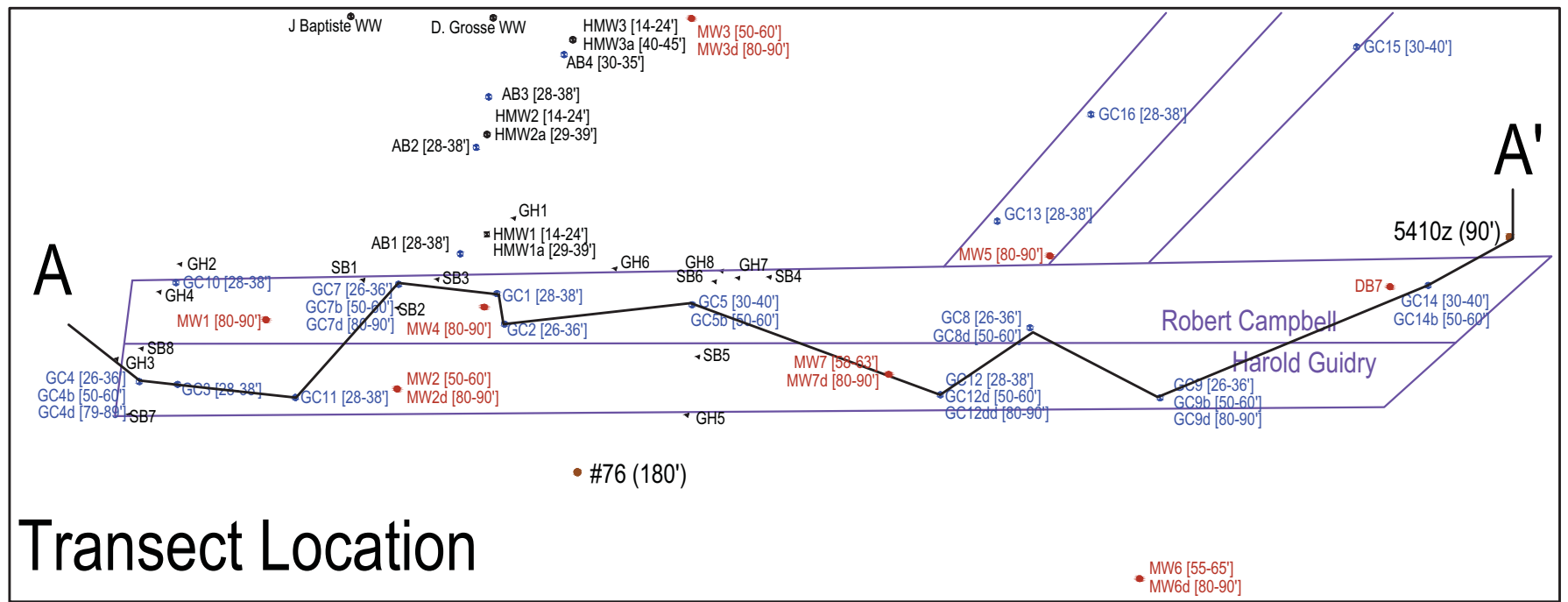


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NW-SE CROSS SECTION SHOWING GROUNDWATER CHLORIDES
 Harold Guidry, et al v BP America Production Co., et al; Case #82537, Div G; 16th JDC
 Anse La Butte Oil Field, St. Martin Parish, LA

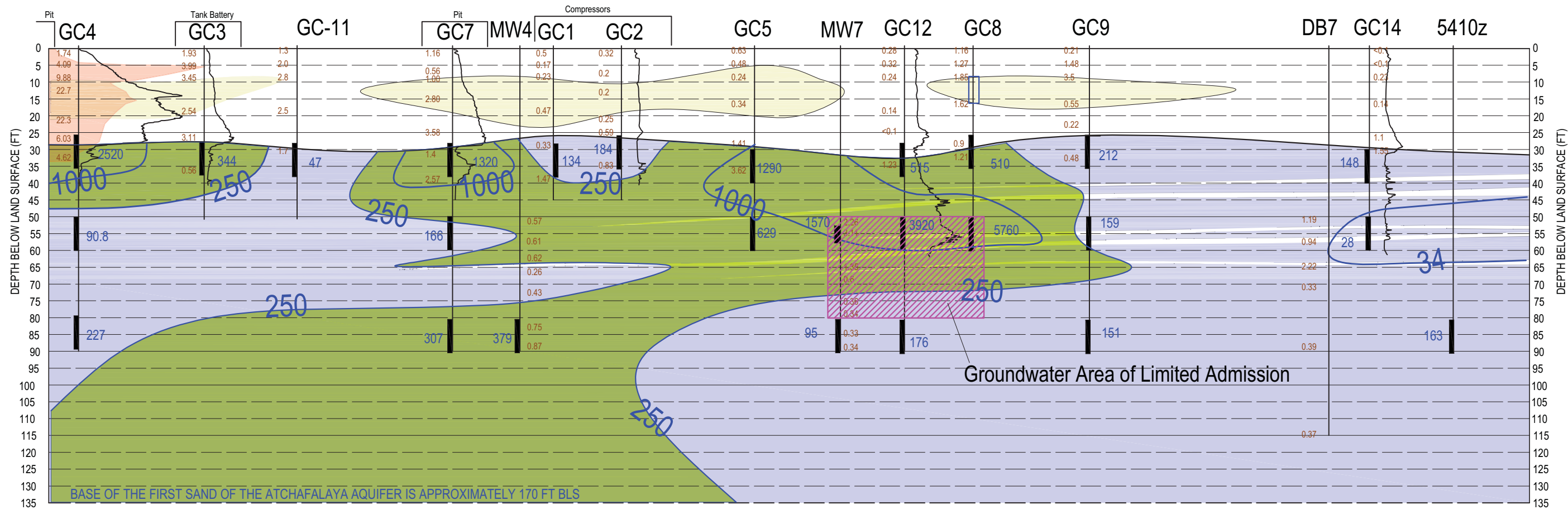
FILENAME Anse La Butte.dwg	REV #
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DIRECTORY	FIGURE NO. 9



SOIL EC OF 0.47 MMHOS/CM IS EQUIVALENT TO GROUNDWATER CHLORIDE OF 250 MG/L. BASED ON REGRESSION ANALYSIS OF 21 WELLS WITH SOIL SAMPLED IN THE SCREENED INTERVAL. (R2 OF 0.72)

A (SOUTHWEST)

A' (NORTHEAST)



PREPARED BY:
 ICON Environmental Services, Inc.
 2049 Commercial Drive
 Port Allen, LA 70767

PREPARED FOR:
 Jones Swanson Huddell & Garrison LLC
 601 Poydras Street, #2655
 New Orleans, LA 70130-6004

NE-SW CROSS SECTION SHOWING LIMITED ADMISSION AREA AND GROUNDWATER CL
 Harold Guidry, et al v BP America Production Co., et al; Case #82537, Div G; 16th JDC
 Anse La Butte Oil Field, St. Martin Parish, LA

FILENAME Anse La Butte.dwg	REV #
JOB NO.	DATE FEB 2017
DIRECTORY	FIGURE NO. 10

TABLE 1
SOIL DATA SUMMARY

Harold Guidry et al v BP America Production Co, et al; Case #82537, Div "G"; 16th JDC
Anse La Butte Oil Field, St. Martin Parish, Louisiana
Prepared for Jones, Swanson, Huddell & Garrison LLC

Boring ID	DEPTH	Sampl er	Date	Metals (mg/kg-DRY WT)										Leachate Chlorides (mg/L)	Cation Exchange Capacity (meq)	EC (mmhos/cm)	ESP (%)	SAR	Soluble Calcium (meq/L)	Soluble Magnesium (meq/L)	Soluble Sodium (meq/L)	Moisture Content (%)	HEM Oil & Grease (% dry wt)	TPH-D (mg/Kg)	TPH-O (mg/Kg)
				Arsenic	Barium	TT Barium	Cadmium	Chromium	Lead	Selenium	Strontium	Zinc	Mercury												
29B Upland Pit Closure Std				10		40000	10	500	500	10		5000	10	500		4	15	12					1		
RECAP Screening Std				12	550		3.9	100	100	20		2300	2.3											65	180
GH-4	0-2'	ICON	19-Feb-15	4.85	132	181	<0.500	10.3	9.23	na	28.7	27.7	<0.10	na	24.7	2.01	18.9	20.1	1.12	<1.00	18.5	21.4	na	na	na
GH-4	2-4'	ICON	19-Feb-15	6.35	136	194	<0.500	11.5	11.5	na	23.2	41.0	<0.10	na	25.0	1.17	27.5	22.4	<1.00	<1.00	9.82	25.0	na	na	na
GH-4	4-6'	ICON	19-Feb-15	7.81	114	154	<0.500	11.6	12.8	na	22.3	47.7	<0.10	na	20.2	1.03	36.2	19.4	<1.00	<1.00	8.44	23.6	0.26	1000	683
GH-7	0-2'	ICON	20-Feb-15	4.46	268	437	<0.500	9.10	12.9	na	24.8	28.4	<0.10	na	24.0	1.37	15.9	16.5	<1.00	<1.00	11.3	na	na	na	na
GH-7	2-4'	ICON	20-Feb-15	7.36	232	320	<0.500	12.6	11.1	na	19.1	40.5	<0.10	na	25.2	7.25	13.4	26.7	5.32	3.97	57.6	na	na	na	na
GH-7	4-6'	ICON	20-Feb-15	8.88	261	300	<0.500	11.2	11.5	na	18.6	50.4	<0.10	na	21.4	8.24	17.7	23.0	7.14	6.19	59.4	na	na	na	na
GH-7	6-8'	ICON	22-Apr-16	9.98	281	355	<0.496	12.8	11.4	<1.99	23.7	50.0	<0.11	204	19.6	3.27	17.0	19.3	1.81	1.48	24.8	18.6	na	na	na
GH-7	8-10'	ICON	22-Apr-16	11.90	213	268	<0.496	12.0	11.4	<1.98	24.4	53.6	<0.10	230	16.8	5.01	15.0	18.6	4.45	3.53	37.2	18.1	na	na	na
GC-1	0-2'	ICON	1-Mar-16	8.43	368	2450	<0.496	13.3	20.4	<1.98	29.8	70.3	3.29	1.89	26.2	0.50	0.509	1.07	2.72	1.35	1.53	17.0	na	na	na
GC-1	0-2'	HET	1-Mar-16	5.67	203	418	0.203	11.2	17.6	<0.500	20.4	56.1	1.1346	na	21.7	0.74	0.924	0.974	3.71	1.61	1.59	17.1	na	na	na
GC-1	4-6'	ICON	1-Mar-16	12.10	219	693	<0.499	12.6	11.7	<2.00	33.5	49.0	<0.10	1.71	24.1	0.17	0.247	0.511	<1.00	<1.00	<1.00	19.5	na	na	na
GC-1	4-6'	HET	1-Mar-16	8.78	152	386	0.118	11.1	9.30	<0.500	23.6	36.9	0.03946	na	na	0.227	na	na	1.02	0.59	0.526	20.1	na	na	na
GC-1	8-10'	ICON	1-Mar-16	8.32	203	442	<0.498	13.2	12.1	<1.99	27.0	51.9	<0.10	1.16	21.1	0.23	0.606	1.13	<1.00	<1.00	<1.00	19.9	na	na	na
GC-1	8-10'	HET	1-Mar-16	5.48	150	329	<0.500	10.9	9.54	<2.50	21.2	42.3	0.03763	na	na	0.287	na	na	1.01	0.648	0.872	21.6	na	na	na
GC-1	18-20'	ICON	1-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	0.47	na	na	na	na	na	25.3	na	na	na
GC-1	18-20'	HET	1-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	0.229	na	na	0.645	0.531	0.812	27.0	na	na	na
GC-1	28-30'	ICON	1-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	0.33	na	na	na	na	na	14.9	na	na	na
GC-1	28-30'	HET	1-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	0.209	na	na	0.568	0.363	0.858	14.8	na	na	na
GC-1	38-40'	ICON	1-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	1.47	na	na	na	na	na	21.2	na	na	na
GC-1	38-40'	HET	1-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	0.636	na	na	2.81	1.45	1.39	19.1	na	na	na
GC-2	0-2'	ICON	2-Mar-16	10.60	369	669	<0.498	16.4	17.7	<1.99	27.6	60.2	8.81	1.86	24.7	0.32	0.119	0.342	1.95	<1.00	<1.00	17.5	na	na	na
GC-2	0-2'	HET	2-Mar-16	6.15	185	341	0.207	13.9	20.8	<0.500	26.7	67.7	19.587	na	20.7	0.542	0.283	0.226	4.00	1.39	0.372	18.2	na	na	na
GC-2	6-8'	ICON	2-Mar-16	11.20	239	369	<0.497	13.2	12.3	<1.99	27.0	51.5	<0.10	<2.5	24.2	0.20	0.731	1.16	<1.00	<1.00	<1.00	19.7	na	na	na
GC-2	12-14'	ICON	2-Mar-16	16.20	192	408	0.507	11.4	11.7	<1.99	27.4	52.8	<0.10	<2.5	16.9	0.20	1.12	1.55	<1.00	<1.00	<1.00	25.2	na	na	na
GC-2	12-14'	HET	2-Mar-16	7.71	105	299	0.305	7.72	7.55	<0.500	17.1	34.4	0.20029	na	na	0.259	na	na	0.835	0.405	1.01	25.7	na	na	na
GC-2	20-22'	ICON	2-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	0.25	na	na	na	na	na	20.6	na	na	na
GC-2	20-22'	HET	2-Mar-16	5.89	74.6	202	0.194	10.4	8.46	<0.500	10.1	30.8	0.06674	na	na	0.256	na	na	0.815	0.476	1.17	20.5	na	na	na
GC-2	24-26'	ICON	2-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	0.59	na	na	na	na	na	12.9	na	na	na
GC-2	24-26'	HET	2-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	0.145	na	na	0.275	0.182	0.861	17.8	na	na	na

TABLE 1

SOIL DATA SUMMARY

Harold Guidry et al v BP America Production Co, et al; Case #82537, Div "G"; 16th JDC

Anse La Butte Oil Field, St. Martin Parish, Louisiana

Prepared for Jones, Swanson, Huddell & Garrison LLC

Boring ID	DEPTH	Sampl er	Date	Metals (mg/kg-DRY WT)										Leachate Chlorides (mg/L)	Cation Exchange Capacity (meq)	EC (mmhos/cm)	ESP (%)	SAR	Soluble Calcium (meq/L)	Soluble Magnesium (meq/L)	Soluble Sodium (meq/L)	Moisture Content (%)	HEM Oil & Grease (% dry wt)	TPH-D (mg/Kg)	TPH-O (mg/Kg)
				Arsenic	Barium	TT Barium	Cadmium	Chromium	Lead	Selenium	Strontium	Zinc	Mercury												
29B Upland Pit Closure Std				10		40000	10	500	500	10		5000	10	500		4	15	12					1		
RECAP Screening Std				12	550		3.9	100	100	20		2300	2.3											65	180
GC-2	34-36'	ICON	2-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	0.83	na	na	na	na	na	23.4	na	na	na
GC-2	34-36'	HET	2-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	0.395	na	na	0.996	0.673	1.34	25.9	na	na	na
GC-3	0-2'	ICON	2-Mar-16	9.10	286	373	<0.498	15.0	10.2	<1.99	25.7	48.0	0.110	30.0	28.8	1.93	5.35	11.4	1.51	1.15	1.15	17.8	na	na	na
GC-3	0-2'	HET	2-Mar-16	7.46	231	231	0.138	11.4	11.3	<0.500	17.6	36.1	0.05047	na	22.1	1.29	7.88	8.86	1.05	0.693	8.27	18.8	na	na	na
GC-3	4-6'	ICON	2-Mar-16	10.70	263	362	<0.499	12.8	11.2	<2.00	25.5	51.0	<0.10	223	26.0	3.99	4.67	11.6	5.08	4.71	25.7	18.7	na	na	na
GC-3	4-6'	HET	2-Mar-16	6.38	168	520	0.151	9.68	8.15	<0.500	17.1	36.2	0.03527	na	na	2.69	na	na	3.03	2.43	17.1	18.9	na	na	na
GC-3	8-10'	ICON	2-Mar-16	9.29	189	318	<0.497	11.7	12.3	<1.99	28.1	54.2	<0.09	158	19.7	3.45	3.53	7.8	6.36	5.11	18.7	20.7	na	na	na
GC-3	8-10'	HET	2-Mar-16	5.60	134	361	0.181	8.31	7.77	<0.500	18.1	35.8	0.02378	na	na	1.83	na	na	2.59	1.95	10.2	21.3	na	na	na
GC-3	18-20'	ICON	2-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	2.54	na	na	na	na	na	23.1	na	na	na
GC-3	18-20'	HET	2-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	1.73	na	na	2.17	1.13	11.3	23.9	na	na	na
GC-3	26-28'	ICON	2-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	3.11	na	na	na	na	na	13.9	na	na	na
GC-3	26-28'	HET	2-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	3.63	na	na	2.51	1.52	28.6	17.7	na	na	na
GC-3	36-38'	ICON	2-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	0.56	na	na	na	na	na	17.6	na	na	na
GC-3	36-38'	HET	2-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	0.405	na	na	0.781	0.492	2.07	16.4	na	na	na
GC-4	0-2'	ICON	3-Mar-16	12.90	343	459	<0.499	13.9	13.9	<2.00	34.6	44.8	<0.10	64.0	25.2	1.74	25.5	22.3	<1.00	<1.00	13.8	17.9	na	na	na
GC-4	0-2'	HET	3-Mar-16	4.92	360	403	<0.100	10.9	11.7	<0.500	27.4	41.0	0.10523	na	21.6	2.14	16.0	18.9	0.884	0.641	16.5	18.3	na	na	na
GC-4	4-6'	ICON	3-Mar-16	11.20	178	318	<0.498	13.2	12.0	<1.99	25.7	48.6	<0.10	372	24.9	4.09	23.9	44.9	<1.00	<1.00	33.9	17.4	na	na	na
GC-4	4-6'	HET	3-Mar-16	7.12	128	769	<0.500	11.4	8.26	<2.50	18.9	38.8	0.05106	na	na	3.88	na	na	0.831	0.590	32.4	18.4	na	na	na
GC-4	8-10'	ICON	3-Mar-16	10.40	228	353	1.320	12.3	11.6	<1.99	29.7	53.8	0.100	659	na	9.88	na	na	na	na	na	19.1	na	1020	590
GC-4	8-10'	HET	3-Mar-16	5.97	172	341	<0.500	11.5	9.77	<2.50	23.7	48.0	0.04457	na	na	7.53	na	na	3.80	2.96	68.5	19.9	0.23	na	na
GC-4	12-14'	ICON	3-Mar-16	10.40	214	314	0.509	10.9	11.3	<2.00	38.2	53.9	<0.10	na	na	22.7	na	na	na	na	na	24.4	na	93.5	73.1
GC-4	12-14'	HET	3-Mar-16	7.07	157	258	<0.500	9.25	8.93	<2.50	27.7	43.5	0.03619	na	na	15.4	na	na	12.9	9.42	97.7	25.2	0.26	na	na
GC-4	20-22'	ICON	3-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	22.3	na	na	na	na	na	22.1	na	na	na
GC-4	20-22'	HET	3-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	15.7	na	na	5.10	2.25	107	23.7	na	na	na
GC-4	26-28'	ICON	3-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	6.03	na	na	na	na	na	17.2	na	na	na
GC-4	26-28'	HET	3-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	12.1	na	na	1.81	0.883	95.7	17.7	na	na	na
GC-4	32-34'	ICON	3-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	4.62	na	na	na	na	na	20.7	na	na	na
GC-4	32-34'	HET	3-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	3.28	na	na	2.43	1.40	25.5	18.2	na	na	na
GC-5	0-2'	ICON	3-Mar-16	10.20	2460	4360	<0.498	12.9	31.4	<1.99	210	56.4	0.640	4.52	23.9	0.63	0.755	0.668	4.27	<1.00	1.03	17.7	na	na	na

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Boring ID	DEPTH	Sampl er	Date	Metals (mg/kg-DRY WT)									Leachate Chlorides (mg/L)	Cation Exchange Capacity (meq)	EC (mmhos/cm)	ESP (%)	SAR	Soluble Calcium (meq/L)	Soluble Magnesium (meq/L)	Soluble Sodium (meq/L)	Moisture Content (%)	HEM Oil & Grease (% dry wt)	TPH-D (mg/Kg)	TPH-O (mg/Kg)	
				Arsenic	Barium	TT Barium	Cadmium	Chromium	Lead	Selenium	Strontium	Zinc													Mercury
29B Upland Pit Closure Std				10		40000	10	500	500	10		5000	10	500		4	15	12					1		
RECAP Screening Std				12	550		3.9	100	100	20		2300	2.3											65	180
GC-5	0-2'	HET	3-Mar-16	5.65	633	299	0.147	11.4	27.5	<0.500	64.5	40.4	0.45845	na	20.1	0.803	0.882	0.792	5.53	0.896	1.42	13.5	na	na	na
GC-5	4-6'	ICON	3-Mar-16	11.90	223	383	<0.496	14.0	12.3	<1.98	25.0	48.8	<0.10	16.9	22.5	0.48	6.74	7.87	<1.00	<1.00	3.56	19.8	na	na	na
GC-5	4-6'	HET	3-Mar-16	8.32	175	432	<0.500	10.7	9.86	<2.50	17.7	39.1	0.03165	na	na	0.550	na	na	0.337	0.209	4.43	20.6	na	na	na
GC-5	8-10'	ICON	3-Mar-16	13.00	203	284	<0.495	13.4	11.8	<1.98	23.1	53.8	<0.10	<5.0	16.4	0.24	3.76	3.53	<1.00	<1.00	1.71	22.1	na	na	na
GC-5	8-10'	HET	3-Mar-16	6.63	117	314	0.157	8.67	7.83	<0.500	14.7	34.7	0.02514	na	na	0.292	na	na	0.326	0.200	2.05	22.9	na	na	na
GC-5	16-18'	ICON	3-Mar-16	10.70	212	310	0.607	10.0	10.2	<1.99	28.4	54.2	<0.11	na	na	0.34	na	na	na	na	na	25.0	na	na	na
GC-5	16-18'	HET	3-Mar-16	6.70	147	429	0.341	6.56	6.75	<0.500	16.7	34.7	0.02639	na	na	0.482	na	na	1.02	0.571	3.20	25.5	na	na	na
GC-5	28-30'	ICON	3-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	1.41	na	na	na	na	na	21.2	na	na	na
GC-5	28-30'	HET	3-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	1.06	na	na	4.37	2.54	2.25	23.00	na	na	na
GC-5	36-38'	ICON	3-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	3.62	na	na	na	na	na	19.8	na	na	na
GC-5	36-38'	HET	3-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	2.37	na	na	9.92	5.58	3.87	20.1	na	na	na
GC-6	0-2'	ICON	4-Mar-16	8.37	2680	5730	<0.497	14.4	36.1	<1.99	64.7	93.5	<0.10	<2.5	50.4	0.61	0.223	0.937	4.53	1.88	1.68	25.0	na	na	na
GC-6	4-6'	ICON	4-Mar-16	4.62	172	229	<0.495	12.5	11.1	<1.98	24.2	49.0	<0.10	<2.5	39.7	0.41	1.77	2.54	<1.00	<1.00	2.21	21.3	na	na	na
GC-6	4-6'	HET	4-Mar-16	2.04	97.1	297	0.155	11.2	8.91	<0.500	17.9	36.3	0.03367	na	na	0.541	na	na	1.54	1.04	2.74	22.6	na	na	na
GC-6	8-10'	ICON	4-Mar-16	16.00	261	312	<0.496	11.7	12.3	<1.98	18.4	55.0	<0.10	9.89	20.7	0.42	1.87	2.38	1.00	<1.00	2.10	20.6	na	na	na
GC-6	8-10'	HET	4-Mar-16	8.88	156	290	<0.500	10.2	9.32	<2.50	13.1	46.0	0.02934	na	na	0.442	na	na	1.08	0.573	2.08	21.4	na	na	na
GC-6	16-18'	ICON	4-Mar-16	9.47	175	350	0.647	9.83	11.0	<1.99	21.2	55.3	<0.11	na	na	2.00	na	na	na	na	na	27.3	na	na	na
GC-6	16-18'	HET	4-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	1.26	na	na	1.92	1.13	7.19	27.3	na	na	na
GC-6	22-24'	ICON	4-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	3.44	na	na	na	na	na	25.8	na	na	na
GC-6	22-24'	HET	4-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	0.662	na	na	2.36	1.17	1.84	18.5	na	na	na
GC-6	32-34'	ICON	4-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	1.27	na	na	na	na	na	20.6	na	na	na
GC-6	32-34'	HET	4-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	2.62	na	na	7.93	4.01	9.70	26.7	na	na	na
GC-7	0-2'	ICON	7-Mar-16	13.00	240	299	<0.496	14.0	14.8	<1.98	23.4	45.1	<0.11	<5.0	25.4	1.16	16.1	15.2	<1.00	<1.00	9.84	20.5	na	na	na
GC-7	0-2'	HET	7-Mar-16	7.79	167	313	0.110	12.7	9.06	<0.500	16.9	30.3	0.05368	na	20.0	1.08	9.17	11.6	0.813	0.456	9.23	20.0	na	na	na
GC-7	4-6'	HET	7-Mar-16	6.32	157	285	<0.500	9.82	9.57	<2.50	15.1	34.8	0.03703	na	na	0.530	na	na	0.370	0.232	3.83	19.2	0.24	na	na
GC-7	6-8'	ICON	7-Mar-16	11.40	254	335	<0.500	12.9	13.3	<2.00	26.0	51.6	<0.10	27.7	22.4	0.56	8.15	9.04	<1.00	<1.00	3.82	20.2	na	2470	1370
GC-7	8-10'	ICON	7-Mar-16	13.00	224	262	<0.496	12.1	12.7	<1.99	27.1	54.3	<0.10	44.7	19.4	1.00	7.53	12.1	<1.00	<1.00	6.57	20.3	na	1390	689
GC-7	8-10'	HET	7-Mar-16	7.08	155	435	<0.500	9.26	8.72	<2.50	20.5	43.1	0.02920	na	na	0.800	na	na	0.389	0.297	6.17	19.9	0.30	na	na
GC-7	14-16'	ICON	7-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	2.80	na	na	na	na	na	24.9	na	1010	531

TABLE 1

SOIL DATA SUMMARY

Harold Guidry et al v BP America Production Co, et al; Case #82537, Div "G"; 16th JDC

Anse La Butte Oil Field, St. Martin Parish, Louisiana

Prepared for Jones, Swanson, Huddell & Garrison LLC

Boring ID	DEPTH	Sampl er	Date	Metals (mg/kg-DRY WT)										Leachate Chlorides (mg/L)	Cation Exchange Capacity (meq)	EC (mmhos/cm)	ESP (%)	SAR	Soluble Calcium (meq/L)	Soluble Magnesium (meq/L)	Soluble Sodium (meq/L)	Moisture Content (%)	HEM Oil & Grease (% dry wt)	TPH-D (mg/Kg)	TPH-O (mg/Kg)
				Arsenic	Barium	TT Barium	Cadmium	Chromium	Lead	Selenium	Strontium	Zinc	Mercury												
29B Upland Pit Closure Std				10		40000	10	500	500	10		5000	10	500		4	15	12					1		
RECAP Screening Std				12	550		3.9	100	100	20		2300	2.3											65	180
GC-7	14-16'	HET	7-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	1.71	na	na	0.952	0.652	12.9	27.4	<0.10	na	
GC-7	24-26'	ICON	7-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	3.58	na	na	na	na	na	17.4	na	na	na
GC-7	24-26'	HET	7-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	3.14	na	na	3.18	2.03	21.9	18.3	na	na	na
GC-7	30-32'	ICON	7-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	1.40	na	na	na	na	na	17.8	na	na	na
GC-7	30-32'	HET	7-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	0.798	na	na	1.42	1.02	4.06	16.3	na	na	na
GC-7	38-40'	ICON	7-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	2.57	na	na	na	na	na	16.9	na	na	na
GC-7	38-40'	HET	7-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	1.27	na	na	3.70	2.07	4.51	12.6	na	na	na
GC-8	0-2'	ICON	9-Mar-16	12.80	2000	3110	<0.497	11.9	15.5	<1.99	44.3	43.9	<0.10	12.8	25.8	1.16	9.30	11.6	<1.00	<1.00	9.39	19.1	na	na	na
GC-8	0-2'	HET	9-Mar-16	5.51	949	2610	0.117	10.3	14.3	<0.500	33.6	33.1	0.04623	na	20.6	0.884	7.96	8.88	1.02	0.440	7.59	20.5	na	na	na
GC-8	4-6'	ICON	9-Mar-16	11.90	234	313	<0.497	12.2	14.0	<1.99	19.0	48.7	<0.10	26.9	22.1	1.27	11.3	11.8	<1.00	<1.00	8.10	19.8	na	na	na
GC-8	4-6'	HET	9-Mar-16	7.24	190	735	<0.100	11.6	8.59	<0.500	14.8	36.9	0.03162	na	na	1.13	na	na	0.582	0.372	8.60	11.9	na	na	na
GC-8	8-10'	ICON	9-Mar-16	11.20	208	261	<0.495	12.0	18.6	<1.98	22.5	128	<0.10	75.9	17.6	1.85	7.69	8.46	1.69	1.25	10.3	21.4	na	na	na
GC-8	8-10'	HET	9-Mar-16	6.86	131	338	0.264	9.75	9.19	<0.500	15.3	39.8	0.03179	na	na	1.38	na	na	1.12	0.807	9.59	15.5	na	na	na
GC-8	16-18'	ICON	9-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	1.62	na	na	na	na	na	24.2	na	na	na
GC-8	16-18'	HET	9-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	1.04	na	na	0.640	0.360	9.46	20.8	na	na	na
GC-8	28-30'	ICON	9-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	0.90	na	na	na	na	na	15.7	na	na	na
GC-8	28-30'	HET	9-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	0.661	na	na	1.99	1.15	2.41	26.2	na	na	na
GC-8	32-34'	ICON	9-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	1.21	na	na	na	na	na	17.0	na	na	na
GC-8	32-34'	HET	9-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	1.00	na	na	2.14	1.24	5.20	22.8	na	na	na
GC-9	0-2'	ICON	8-Mar-16	12.70	363	473	<0.497	12.7	14.8	<1.99	22.4	45.9	<0.10	1.99	26.6	0.21	1.49	2.61	<1.00	<1.00	1.22	19.5	na	na	na
GC-9	0-2'	HET	8-Mar-16	8.19	208	427	0.118	10.5	10.1	<0.500	15.2	32.2	0.03682	na	19.5	0.332	1.11	1.77	0.903	0.541	1.50	20.5	na	na	na
GC-9	4-6'	ICON	8-Mar-16	9.63	223	293	<0.497	13.3	11.3	<1.99	23.5	49.8	<0.11	63.1	25.0	1.48	2.98	4.61	2.31	1.68	6.51	20.8	na	na	na
GC-9	4-6'	HET	8-Mar-16	7.45	162	338	<0.500	11.0	9.16	<2.50	17.2	41.9	0.03461	na	na	1.05	na	na	1.61	1.10	5.30	22.3	na	na	na
GC-9	8-10'	ICON	8-Mar-16	10.70	187	283	<0.497	10.9	11.0	<1.99	22.7	51.0	<0.10	160	19.6	3.50	2.64	3.80	9.53	5.95	10.6	22.8	na	na	na
GC-9	8-10'	HET	8-Mar-16	6.11	112	321	0.229	8.18	7.8	<0.500	14.9	35.6	0.02434	na	na	2.14	na	na	5.82	3.54	7.58	24.5	na	na	na
GC-9	16-18'	ICON	8-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	0.55	na	na	na	na	na	22.9	na	na	na
GC-9	16-18'	HET	8-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	1.09	na	na	1.55	0.971	7.05	25.0	na	na	na
GC-9	22-24'	ICON	8-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	0.22	na	na	na	na	na	15.8	na	na	na
GC-9	22-24'	HET	8-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	0.404	na	na	0.531	0.532	2.84	16.1	na	na	na

**TABLE 1
SOIL DATA SUMMARY**

Harold Guidry et al v BP America Production Co, et al; Case #82537, Div "G"; 16th JDC
Anse La Butte Oil Field, St. Martin Parish, Louisiana
Prepared for Jones, Swanson, Huddell & Garrison LLC

Boring ID	DEPTH	Sampl er	Date	Metals (mg/kg-DRY WT)										Leachate Chlorides (mg/L)	Cation Exchange Capacity (meq)	EC (mmhos/cm)	ESP (%)	SAR	Soluble Calcium (meq/L)	Soluble Magnesium (meq/L)	Soluble Sodium (meq/L)	Moisture Content (%)	HEM Oil & Grease (% dry wt)	TPH-D (mg/Kg)	TPH-O (mg/Kg)
				Arsenic	Barium	TT Barium	Cadmium	Chromium	Lead	Selenium	Strontium	Zinc	Mercury												
29B Upland Pit Closure Std				10		40000	10	500	500	10		5000	10	500		4	15	12					1		
RECAP Screening Std				12	550		3.9	100	100	20		2300	2.3											65	180
GC-9	32-34'	ICON	8-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	0.48	na	na	na	na	na	14.0	na	na	na
GC-9	32-34'	HET	8-Mar-16	na	na	na	na	na	na	na	na	na	na	na	na	0.491	na	na	0.326	0.228	3.74	15.2	na	na	na
GC-10	0-2'	ICON	25-Apr-16	11.80	176	227	<0.498	17.3	13.7	<1.99	28.6	43.9	<0.10	58.3	27.9	1.32	20.6	18.5	<1.00	<1.00	9.97	20.5	na	na	na
GC-10	6-8'	ICON	25-Apr-16	14.20	218	287	<0.499	15.4	13.6	<2.00	25.9	57.5	<0.10	214	na	3.63	na	na	na	na	na	20.5	na	652	244
GC-10	8-10'	ICON	25-Apr-16	12.60	226	301	<0.497	16.9	12.2	<1.99	29.5	60.0	<0.10	336	na	7.72	na	na	na	na	na	21.9	na	319	136
GC-10	14-16'	ICON	25-Apr-16	na	na	na	na	na	na	na	na	na	na	na	na	14.0	na	na	na	na	na	25.7	na	na	na
GC-10	20-22'	ICON	25-Apr-16	na	na	na	na	na	na	na	na	na	na	na	na	12.6	na	na	na	na	na	23.5	na	na	na
GC-10	28-30'	ICON	25-Apr-16	na	na	na	na	na	na	na	na	na	na	na	na	2.37	na	na	na	na	na	20.4	na	na	na
GC-10	36-38'	ICON	25-Apr-16	na	na	na	na	na	na	na	na	na	na	na	na	0.79	na	na	na	na	na	17.7	na	na	na
GC-11	0-2'	ICON	25-Apr-16	4.97	181	245	<0.495	12.0	12.2	<1.98	24.8	26.4	<0.10	19.0	28.3	0.28	3.69	4.31	<1.00	<1.00	1.99	19.1	na	na	na
GC-11	4-6'	ICON	25-Apr-16	16.80	379	388	0.566	15.1	15.6	<1.99	40.1	72.2	<0.09	26.5	28.8	0.83	3.81	4.97	1.01	<1.00	4.66	16.6	na	na	na
GC-11	8-10'	ICON	25-Apr-16	13.00	246	310	0.548	15.2	13.6	<1.99	34.5	70.2	<0.10	41.3	24.3	1.32	1.08	5.97	2.65	1.99	9.10	19.9	na	na	na
GC-11	18-20'	ICON	25-Apr-16	na	na	na	na	na	na	na	na	na	na	na	na	0.90	na	na	na	na	na	23.6	na	na	na
GC-11	30-32'	ICON	25-Apr-16	na	na	na	na	na	na	na	na	na	na	na	na	0.39	na	na	na	na	na	16.7	na	na	na
GC-12	0-2'	ICON	26-Apr-16	12.70	227	299	<0.497	16.3	12.7	<1.99	23.2	49.8	<0.10	3.20	29.1	0.28	2.39	3.65	<1.00	<1.00	1.70	18.7	na	na	na
GC-12	4-6'	ICON	26-Apr-16	12.00	241	300	0.517	15.2	15.2	<1.99	21.8	54.1	<0.10	9.71	28.2	0.32	1.84	3.13	<1.00	<1.00	1.77	14.0	na	na	na
GC-12	8-10'	ICON	26-Apr-16	11.70	194	282	0.496	15.0	12.5	<1.98	24.1	58.6	<0.10	7.50	19.7	0.24	1.70	2.32	<1.00	<1.00	1.24	18.6	na	na	na
GC-12	18-20'	ICON	26-Apr-16	na	na	na	na	na	na	na	na	na	na	<5.0	na	0.14	na	na	na	na	na	26.2	na	na	na
GC-12	24-26'	ICON	26-Apr-16	na	na	na	na	na	na	na	na	na	na	na	na	<0.10	na	na	na	na	na	14.7	na	na	na
GC-12	34-36'	ICON	26-Apr-16	na	na	na	na	na	na	na	na	na	na	na	na	1.23	na	na	na	na	na	15.3	na	na	na
GC-13	0-2'	ICON	29-Apr-16	10.30	273	332	0.495	16.3	22.4	<1.98	32.4	41.1	<0.11	<5.0	30.7	0.29	3.00	2.34	<1.00	<1.00	<1.00	18.9	na	na	na
GC-13	4-6'	ICON	29-Apr-16	10.80	234	314	<0.499	15.2	13.3	<2.00	28.0	55.8	<0.09	5.32	26.7	0.14	2.45	2.73	<1.00	<1.00	<1.00	20.1	na	na	na
GC-13	8-10'	ICON	29-Apr-16	12.20	193	295	0.519	14.0	12.2	<2.00	26.9	57.2	<0.10	<5.0	19.0	<0.10	1.68	1.54	<1.00	<1.00	<1.00	21.3	na	na	na
GC-13	18-20'	ICON	29-Apr-16	na	na	na	na	na	na	na	na	na	na	5.09	na	0.30	na	na	na	na	na	27.3	na	na	na
GC-13	26-28'	ICON	29-Apr-16	na	na	na	na	na	na	na	na	na	na	na	na	<0.10	na	na	na	na	na	17.4	na	na	na
GC-13	34-36'	ICON	29-Apr-16	na	na	na	na	na	na	na	na	na	na	na	na	0.68	na	na	na	na	na	14.8	na	na	na
GC-14	0-2'	ICON	2-May-16	10.20	312	354	<0.499	14.8	17.1	<1.99	31.4	59.9	<0.10	<5.0	35.1	<0.10	1.41	1.07	<1.00	<1.00	<1.00	17.5	na	na	na
GC-14	4-6'	ICON	2-May-16	11.40	224	282	0.549	14.6	12.5	<2.00	28.7	68.3	<0.11	<5.0	24.2	<0.10	2.91	1.81	<1.00	<1.00	<1.00	18.8	na	na	na
GC-14	8-10'	ICON	2-May-16	12.40	548	675	<0.498	16.3	15.9	<1.99	33.8	66.6	<0.10	<5.0	21.9	0.23	2.42	2.52	<1.00	<1.00	1.41	21.5	na	na	na

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Anse La Butte Oil Field, St. Martin Parish, Louisiana
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Boring ID	DEPTH	Sampl er	Date	Metals (mg/kg-DRY WT)										Leachate Chlorides (mg/L)	Cation Exchange Capacity (meq)	EC (mmhos/cm)	ESP (%)	SAR	Soluble Calcium (meq/L)	Soluble Magnesium (meq/L)	Soluble Sodium (meq/L)	Moisture Content (%)	HEM Oil & Grease (% dry wt)	TPH-D (mg/Kg)	TPH-O (mg/Kg)
				Arsenic	Barium	TT Barium	Cadmium	Chromium	Lead	Selenium	Strontium	Zinc	Mercury												
29B Upland Pit Closure Std				10		40000	10	500	500	10		5000	10	500		4	15	12					1		
RECAP Screening Std				12	550		3.9	100	100	20		2300	2.3											65	180
GC-14	16-18'	ICON	2-May-16	na	na	na	na	na	na	na	na	na	na	<5.0	na	0.14	na	na	na	na	na	26.5	na	na	na
GC-14	26-28'	ICON	2-May-16	na	na	na	na	na	na	na	na	na	na	na	na	1.10	na	na	na	na	na	15.2	na	na	na
GC-14	30-32'	ICON	2-May-16	na	na	na	na	na	na	na	na	na	na	na	na	1.55	na	na	na	na	na	16.3	na	na	na
GC-15	0-2'	ICON	3-May-16	14.70	355	392	<0.496	16.9	16.3	<1.98	25.6	55.8	<0.10	49.8	28.1	1.57	12.7	13.6	<1.00	<1.00	12.4	18.4	na	na	na
GC-15	6-8'	ICON	3-May-16	10.70	232	283	<0.498	15.9	12.3	<1.99	26.2	56.3	<0.11	198	27.1	3.10	11.9	15.8	2.30	1.90	22.9	19.7	na	na	na
GC-15	8-10'	ICON	3-May-16	13.70	232	259	0.608	14.5	13.3	<2.00	26.1	61.0	<0.11	163	20.5	3.03	11.5	17.1	1.99	1.51	22.7	21.3	na	na	na
GC-15	18-20'	ICON	3-May-16	na	na	na	na	na	na	na	na	na	na	1.99	na	1.11	na	na	na	na	na	22.9	na	na	na
GC-15	24-26'	ICON	3-May-16	na	na	na	na	na	na	na	na	na	na	na	na	0.11	na	na	na	na	na	17.5	na	na	na
GC-15	30-32'	ICON	3-May-16	na	na	na	na	na	na	na	na	na	na	na	na	0.38	na	na	na	na	na	16.5	na	na	na
GC-16	0-2'	ICON	3-May-16	10.30	274	326	<0.498	16.6	11.4	<1.99	35.5	46.4	<0.10	<5.0	34.5	0.17	1.01	1.00	<1.00	<1.00	<1.00	20.5	na	na	na
GC-16	4-6'	ICON	3-May-16	13.20	414	417	<0.497	16.1	13.8	<1.99	26.0	57.6	<0.11	<5.0	25.2	0.14	1.36	1.33	<1.00	<1.00	<1.00	20.1	na	na	na
GC-16	8-10'	ICON	3-May-16	12.60	181	133	0.507	14.3	12.3	<1.99	18.9	57.5	<0.10	<5.0	18.3	0.10	1.89	1.53	<1.00	<1.00	<1.00	21.4	na	na	na
GC-16	18-20'	ICON	3-May-16	na	na	na	na	na	na	na	na	na	na	<5.0	na	0.22	na	na	na	na	na	23.5	na	na	na
GC-16	26-28'	ICON	3-May-16	na	na	na	na	na	na	na	na	na	na	na	na	0.30	na	na	na	na	na	18.7	na	na	na
GC-16	30-32'	ICON	3-May-16	na	na	na	na	na	na	na	na	na	na	na	na	0.69	na	na	na	na	na	13.5	na	na	na
GC-17	0-2'	ICON	11-May-17	6.03	327	396	<0.498	12.6	12.3	<3.98	29.9	29.9	<0.103	1.46	35	0.29	1.08	2.33	<1.00	<1.00	1.53	16.6	na	na	na
GC-17	4-6'	ICON	11-May-17	9.87	239	280	<0.498	13.6	12.2	<3.98	27.9	54.3	<0.103	16.7	23.3	0.48	2.25	2.69	<1.00	<1.00	2.44	15.3	na	na	na
GC-17	8-10'	ICON	11-May-17	6.75	231	281	<0.497	13.2	10.1	<3.98	26.3	46.7	<0.0995	na	na	0.33	na	na	na	na	na	21.4	na	784	323
GC-17	10-12'	ICON	11-May-17	11.10	188	254	<0.496	13.1	10.8	<3.97	22.8	47.1	<0.0987	na	na	0.39	na	na	na	na	na	21.8	na	452	194
GC-17	20-22'	ICON	11-May-17	na	na	na	na	na	na	na	na	na	na	na	na	0.82	na	na	na	na	na	25.3	na	na	na
GC-17	32-34'	ICON	11-May-17	na	na	na	na	na	na	na	na	na	na	na	na	0.42	na	na	na	na	na	18.9	na	na	na
GC-18	0-2'	ICON	16-May-17	5.98	3540	23000	<0.495	17.3	37.3	<3.96	223	44.7	0.5	2.91	10	1.19	1.77	3.02	5.51	2.2	5.92	20.8	na	12600	1630
GC-18	4-6'	ICON	16-May-17	9.48	1380	3590	<0.496	12.7	14	<3.96	136	51.7	<0.107	<1.25	19	0.92	7.67	10.2	<1.00	<1.00	7.73	23	na	1590	1630
GC-18	8-10'	ICON	16-May-17	12.10	277	329	<0.495	11.7	9.34	<3.96	54.2	50.4	<0.108	<2.50	13.7	0.86	52.8	18.8	<1.00	<1.00	9.28	24.6	na	<10	10.4
GC-18	16-18'	ICON	16-May-17	3.84	123	160	<0.496	18.6	8.7	<3.97	34.5	39.8	<0.105	na	na	0.74	na	na	na	na	na	19	na	na	na
GC-18	26-28'	ICON	16-May-17	na	na	na	na	na	na	na	na	na	na	na	na	1.73	na	na	na	na	na	15.9	na	na	na
GC-18	30-32'	ICON	16-May-17	na	na	na	na	na	na	na	na	na	na	na	na	0.71	na	na	na	na	na	15.6	na	na	na
GC-19	0-2'	ICON	15-May-17	10.8	317	484	<0.496	15.7	14.5	<3.97	41.4	49.6	<0.106	82.7	24.7	2.33	31.3	33.6	<1.00	<1.00	19	17.3	na	na	na
GC-19	4-6'	ICON	15-May-17	9.57	218	261	<0.496	15.6	11	<3.96	32.2	56.5	<0.106	115	16.2	2.66	52.4	30.2	<1.00	<1.00	21.6	17.8	na	na	na

TABLE 1

SOIL DATA SUMMARY

Harold Guidry et al v BP America Production Co, et al; Case #82537, Div "G"; 16th JDC

Anse La Butte Oil Field, St. Martin Parish, Louisiana

Prepared for Jones, Swanson, Huddell & Garrison LLC

Boring ID	DEPTH	Sampl er	Date	Metals (mg/kg-DRY WT)										Leachate Chlorides (mg/L)	Cation Exchange Capacity (meq)	EC (mmhos/cm)	ESP (%)	SAR	Soluble Calcium (meq/L)	Soluble Magnesium (meq/L)	Soluble Sodium (meq/L)	Moisture Content (%)	HEM Oil & Grease (% dry wt)	TPH-D (mg/Kg)	TPH-O (mg/Kg)
				Arsenic	Barium	TT Barium	Cadmium	Chromium	Lead	Selenium	Strontium	Zinc	Mercury												
29B Upland Pit Closure Std				10		40000	10	500	500	10		5000	10	500		4	15	12					1		
RECAP Screening Std				12	550		3.9	100	100	20		2300	2.3											65	180
GC-19	8-10'	ICON	15-May-17	12.1	218	282	<0.496	11.5	10.5	<3.97	44.7	53.2	<0.0997	37.4	15.1	1.54	42.4	21.5	<1.00	<1.00	13.5	24.2	na	na	na
GC-19	16-18'	ICON	15-May-17	4.61	134	177	<0.496	19.2	9.27	<3.97	40.8	47.7	<0.108	na	na	1.59	na	na	na	na	na	22	na	na	na
GC-19	22-24'	ICON	15-May-17	na	na	na	na	na	na	na	na	na	na	na	na	1.83	na	na	na	na	na	15.3	na	na	na
GC-19	26-28'	ICON	15-May-17	na	na	na	na	na	na	na	na	na	na	na	na	1.47	na	na	na	na	na	18.2	na	na	na
GC-20	0-2'	ICON	17-May-17	44.80	6130	169000	2.150	103	954	<3.99	631	631	0.36	5050	29	92.8	100	132	111	14.9	1050	39.1	12.3	65700	35100
GC-20	4-6'	ICON	17-May-17	11.90	339	353	<0.496	14.4	12.7	<3.97	36.4	55.2	<0.104	1670	17.8	23.7	75.5	116	6.75	<1.00	218	19.9	2.91	9700	6450
GC-20	8-10'	ICON	17-May-17	9.44	190	232	<0.50	12.1	12	<4.0	41.6	55.8	<0.104	2380	16.2	38.9	87.6	124	16.2	2.43	378	22.7	na	2300	1580
GC-20	12-14'	ICON	17-May-17	7.11	153	193	<0.496	9.52	8.64	<3.97	55.3	50.4	0.137	2340	na	33.2	na	na	na	na	na	21.6	na	3040	1820
GC-20	20-22'	ICON	17-May-17	6.13	116	120	<0.499	15.3	7.26	<3.99	33.4	38.7	<0.102	406	na	7.39	na	na	na	na	na	18.9	na	na	na
GC-20	28-30'	ICON	17-May-17	na	na	na	na	na	na	na	na	na	na	na	na	20.6	na	na	na	na	na	21.4	na	na	na
GC-21	0-2'	ICON	18-May-17	8.55	182	190	1.300	15	11.3	<3.97	39.6	54.2	<0.106	542	17.6	8.19	63.9	75.3	1.36	<1.00	74.7	20.9	na	na	na
GC-21	4-6'	ICON	18-May-17	10.20	251	259	<0.499	15.4	14.2	<3.99	35.2	44.4	<0.098	120	24.8	1.95	44.7	35.9	<1.00	<1.00	16.6	17.9	na	na	na
GC-21	10-12'	ICON	18-May-17	9.43	114	157	<0.498	10.2	10.5	<3.99	48.5	57	<0.104	760	16.2	13	68	103	1.73	<1.00	115	24.6	na	na	na
GC-21	14-16'	ICON	18-May-17	9.60	85.1	118	<0.498	11.2	9.06	<3.98	42.6	47.1	<0.104	492	na	10.8	na	na	na	na	na	23.7	na	na	na
GC-21	24-26'	ICON	18-May-17	na	na	na	na	na	na	na	na	na	na	na	na	11.4	na	na	na	na	na	19.9	na	na	na
GC-22	0-2'	ICON	18-May-17	7.99	1600	3500	<0.498	15.6	24.2	<3.98	83.2	55.3	0.11	38.2	24.1	1.46	10.7	15.7	1.02	<1.00	12.9	14.4	na	na	na
GC-22	4-7'	ICON	18-May-17	14.90	192	220	<0.498	13.9	12.1	<3.98	59.5	52.5	<0.106	253	21	3.28	39	43.8	<1.00	<1.00	32.9	20.6	na	14.7	15.3
GC-22	12-14'	ICON	18-May-17	8.41	157	195	<0.497	11	10.3	<3.97	49.4	51.5	<0.105	633	na	14.7	na	na	na	na	na	25.7	na	na	na
GC-22	18-20'	ICON	18-May-17	7.27	185	228	<0.499	11.1	9.47	<3.99	60.7	52.8	<0.107	1950	na	25.4	na	na	na	na	na	24.9	na	na	na
GC-22	26-28'	ICON	18-May-17	<2.00	170	543	<0.499	17.7	6.98	<3.99	41.7	37.1	<0.093	na	na	2.31	na	na	na	na	na	18	na	na	na
GC-22	32-34'	ICON	18-May-17	na	na	na	na	na	na	na	na	na	na	na	na	37.9	na	na	na	na	na	22.9	na	na	na
GC-22	38-40'	ICON	18-May-17	na	na	na	na	na	na	na	na	na	na	na	na	32.3	na	na	na	na	na	22.7	na	na	na
GC-23	0-2'	ICON	22-May-17	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	1.49	pend	27.6	<1.00	<1.00	13.7	pend	na	na	na
GC-23	4-6'	ICON	22-May-17	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	2.58	pend	43.5	<1.00	<1.00	22.5	pend	na	1600	749
GC-23	8-10'	ICON	22-May-17	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	3.89	pend	59.4	<1.00	<1.00	35.1	pend	na	na	na
GC-23	16-18'	ICON	22-May-17	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	na	25	na	na	na	na	na	pend	na	na	na
GC-23	22-24'	ICON	22-May-17	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	na	na	54.2	na	na	na	na	na	pend	na	na	na
GC-23	30-32'	ICON	22-May-17	na	na	na	na	na	na	na	na	na	na	na	na	46.4	na	na	na	na	na	pend	na	na	na
GC-23	36-38'	ICON	22-May-17	na	na	na	na	na	na	na	na	na	na	na	na	70.7	na	na	na	na	na	pend	na	na	na

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Harold Guidry et al v BP America Production Co, et al; Case #82537, Div "G"; 16th JDC
Anse La Butte Oil Field, St. Martin Parish, Louisiana
Prepared for Jones, Swanson, Huddell & Garrison LLC

Boring ID	DEPTH	Sampl er	Date	Metals (mg/kg-DRY WT)										Leachate Chlorides (mg/L)	Cation Exchange Capacity (meq)	EC (mmhos/cm)	ESP (%)	SAR	Soluble Calcium (meq/L)	Soluble Magnesium (meq/L)	Soluble Sodium (meq/L)	Moisture Content (%)	HEM Oil & Grease (% dry wt)	TPH-D (mg/Kg)	TPH-O (mg/Kg)	
				Arsenic	Barium	TT Barium	Cadmium	Chromium	Lead	Selenium	Strontium	Zinc	Mercury													
29B Upland Pit Closure Std				10		40000	10	500	500	10		5000	10	500		4	15	12					1			
RECAP Screening Std				12	550		3.9	100	100	20		2300	2.3											65	180	
GC-23	44-46'	ICON	22-May-17	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	
GC-24	0-2'	ICON	22-May-17	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	na	na	
GC-24	4-6'	ICON	22-May-17	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	na	na	
GC-24	8-10'	ICON	22-May-17	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	na	na	
GC-24	16-18'	ICON	22-May-17	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	na	34.5	na	na	na	na	na	na	pend	na	na	
GC-24	20-22'	ICON	22-May-17	na	na	na	na	na	na	na	na	na	na	na	na	27	na	na	na	na	na	na	pend	na	na	
GC-24	32-34'	ICON	22-May-17	na	na	na	na	na	na	na	na	na	na	na	na	44.8	na	na	na	na	na	na	pend	na	na	
GC-24	46-48'	ICON	22-May-17	na	na	na	na	na	na	na	na	na	na	na	na	51.2	na	na	na	na	na	na	pend	na	na	
GC-25	0-2'	ICON	23-May-17	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	na	na	
GC-25	4-6'	ICON	23-May-17	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	na	7.16	na	na	na	na	na	na	pend	na	5210	2510
GC-25	8-10'	ICON	23-May-17	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	na	5000	2250
GC-25	16-18'	ICON	23-May-17	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	na	38.8	na	na	na	na	na	na	pend	na	4540	1890
GC-25	24-26'	ICON	23-May-17	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	na	41	na	na	na	na	na	na	pend	na	na	na
GC-25	32-34'	ICON	23-May-17	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	pend	na	72.7	na	na	na	na	na	na	pend	na	na	na
GC-25	40-42'	ICON	23-May-17	na	na	na	na	na	na	na	na	na	na	na	na	42.2	na	na	na	na	na	na	pend	na	na	na
GC-25	46-48'	ICON	23-May-17	na	na	na	na	na	na	na	na	na	na	na	na	10.7	na	na	na	na	na	na	pend	na	na	na
SB-1	0-2'	ICON	21-Apr-16	7.96	1040	1910	<0.499	14.0	17.8	<1.99	39.4	36.1	<0.10	9.56	21.9	0.65	6.86	7.32	<1.00	<1.00	4.91	17.7	na	na	na	
SB-1	4-6'	ICON	21-Apr-16	12.50	228	263	<0.496	19.5	14.5	<1.98	26.1	53.6	<0.10	47.2	22.2	1.67	7.87	12.0	1.11	<1.00	11.9	18.4	na	na	na	
SB-1	6-8'	ICON	21-Apr-16	10.50	149	213	<0.499	12.8	12.4	<2.00	26.1	50.5	<0.10	123	21.8	3.52	3.82	11.5	5.42	4.32	25.3	19.6	na	na	na	
SB-1	8-10'	ICON	21-Apr-16	9.95	268	359	<0.498	13.8	11.9	<1.99	29.8	54.6	<0.10	157	20.0	3.87	2.82	10.1	7.01	5.31	25.0	21.0	na	na	na	
SB-1	10-12'	ICON	21-Apr-16	10.40	229	234	<0.499	12.3	11.7	<1.99	31.7	54.8	<0.10	99.7	20.6	2.58	3.59	7.08	4.33	3.21	13.7	21.9	na	na	na	
SB-2	0-2'	ICON	21-Apr-16	10.10	565	696	<0.499	16.6	12.3	<2.00	27.3	39.1	<0.10	<5.0	27.6	0.21	0.27	0.60	<1.00	<1.00	<1.00	17.3	na	na	na	
SB-2	2-4'	ICON	21-Apr-16	13.20	151	182	<0.498	15.0	12.1	<1.99	23.2	44.2	<0.10	2.14	27.6	0.13	0.43	0.67	<1.00	<1.00	<1.00	18.3	na	na	na	
SB-2	4-6'	ICON	21-Apr-16	9.62	155	201	<0.497	13.1	10.8	<1.99	20.6	45.2	<0.09	<5.0	23.9	0.14	1.65	2.28	<1.00	<1.00	<1.00	18.4	na	na	na	
SB-2	6-8'	ICON	21-Apr-16	11.60	167	195	<0.496	13.2	12.4	<1.98	21.8	52.0	<0.10	<5.0	22.0	0.12	2.19	2.55	<1.00	<1.00	<1.00	18.0	na	na	na	
SB-2	8-10'	ICON	21-Apr-16	10.90	160	230	<0.496	12.8	11.3	<1.98	22.2	55.9	<0.09	<5.0	17.4	0.20	2.85	2.53	<1.00	<1.00	1.28	22.1	na	na	na	
SB-3	0-2'	ICON	22-Apr-16	8.99	194	261	<0.499	14.6	17.2	<1.99	26.7	43.9	0.260	8.97	25.4	0.64	13.3	9.10	<1.00	<1.00	4.50	20.3	na	na	na	

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Anse La Butte Oil Field, St. Martin Parish, Louisiana

Prepared for Jones, Swanson, Huddell & Garrison LLC

Boring ID	DEPTH	Sampl er	Date	Metals (mg/kg-DRY WT)									Leachate Chlorides (mg/L)	Cation Exchange Capacity (meq)	EC (mmhos/cm)	ESP (%)	SAR	Soluble Calcium (meq/L)	Soluble Magnesium (meq/L)	Soluble Sodium (meq/L)	Moisture Content (%)	HEM Oil & Grease (% dry wt)	TPH-D (mg/Kg)	TPH-O (mg/Kg)	
				Arsenic	Barium	TT Barium	Cadmium	Chromium	Lead	Selenium	Strontium	Zinc													Mercury
29B Upland Pit Closure Std				10		40000	10	500	500	10		5000	10	500		4	15	12					1		
RECAP Screening Std				12	550		3.9	100	100	20		2300	2.3											65	180
SB-3	4-6'	ICON	22-Apr-16	9.03	196	273	<0.495	14.0	11.7	<1.98	21.9	46.2	<0.10	43.7	21.8	0.74	13.4	10.6	<1.00	<1.00	5.23	20.0	na	na	na
SB-3	6-8'	ICON	22-Apr-16	11.60	248	291	<0.497	13.6	13.2	<1.99	24.6	52.2	<0.10	44.9	22.0	0.98	9.90	13.5	<1.00	<1.00	7.05	20.3	na	na	na
SB-3	8-10'	ICON	22-Apr-16	9.05	224	343	<0.496	12.4	11.8	<1.98	27.7	53.2	<0.10	53.3	16.0	1.51	11.1	12.1	<1.00	<1.00	10.5	21.3	na	na	na
SB-4	0-2'	ICON	22-Apr-16	8.25	693	939	<0.497	13.3	12.4	<1.99	42.0	36.0	<0.11	5.73	26.2	0.78	5.08	7.34	<1.00	<1.00	5.32	15.5	na	na	na
SB-4	4-6'	ICON	22-Apr-16	12.80	275	314	<0.499	13.3	15.0	<2.00	22.7	49.3	<0.11	137	21.7	2.74	3.38	6.50	4.36	4.23	13.5	14.6	na	na	na
SB-4	6-8'	ICON	22-Apr-16	11.70	246	303	<0.499	13.2	13.4	<2.00	22.8	51.7	<0.10	123	19.3	2.42	3.04	5.01	4.48	4.04	10.3	19.0	na	na	na
SB-4	8-10'	ICON	22-Apr-16	10.20	196	295	0.498	13.4	12.2	<1.99	23.0	54.8	<0.10	93.9	17.4	2.18	2.55	4.44	4.49	3.57	8.92	20.6	na	na	na
SB-5	0-2'	ICON	22-Apr-16	8.84	535	572	<0.498	12.7	13.3	<1.99	24.2	39.8	0.320	10.8	24.2	0.99	16.2	15.7	<1.00	<1.00	7.82	18.5	na	na	na
SB-5	4-6'	ICON	22-Apr-16	9.25	283	308	<0.496	12.8	11.1	<1.98	19.8	47.5	<0.10	43.7	21.5	0.83	7.75	10.7	<1.00	<1.00	6.10	19.3	na	na	na
SB-5	8-10'	ICON	22-Apr-16	10.30	181	196	<0.497	13.2	11.8	<1.99	20.8	51.9	<0.10	76.5	16.1	1.88	5.88	8.71	1.85	1.53	11.3	21.5	na	na	na
SB-6	0-2'	ICON	22-Apr-16	11.80	2230	4750	<0.496	13.4	16.2	<1.98	147	46.9	0.130	24.7	23.7	0.95	0.28	0.35	7.30	<1.00	<1.00	17.6	na	na	na
SB-6	4-6'	ICON	22-Apr-16	10.50	674	787	<0.496	13.7	10.7	<1.98	33.3	46.1	<0.10	2.07	20.9	1.13	1.17	1.89	4.67	3.09	3.72	17.6	na	na	na
SB-6	6-8'	ICON	22-Apr-16	9.39	189	262	<0.498	12.2	9.54	<1.99	20.7	44.7	<0.09	<5.0	18.6	0.31	3.58	4.31	<1.00	<1.00	2.18	18.4	na	na	na
SB-6	8-10'	ICON	22-Apr-16	10.10	216	291	<0.498	13.3	11.6	<1.99	23.5	53.8	<0.10	<5.0	na	0.51	na	na	na	na	na	21.6	na	262	206
SB-6	12-14'	ICON	22-Apr-16	8.24	481	544	<0.497	11.6	11.5	<1.99	30.2	51.3	<0.10	<5.0	na	0.87	na	na	na	na	na	25.8	na	99.5	84.6
SB-6	14-16'	ICON	22-Apr-16	11.50	244	415	0.578	9.92	10.2	<1.99	28.8	52.0	<0.10	<5.0	na	0.50	na	na	na	na	na	25.9	na	84.2	56.5
SB-7	0-2'	ICON	3-May-16	9.10	146	157	<0.497	14.8	13.1	<1.99	15.3	30.9	0.310	11.3	25.4	0.12	1.15	1.61	<1.00	<1.00	<1.00	23.0	na	na	na
SB-7	2-4'	ICON	3-May-16	7.75	178	189	<0.498	14.4	13.3	<1.99	20.0	36.7	0.450	6.71	30.3	0.22	2.22	3.00	<1.00	<1.00	1.29	22.3	na	na	na
SB-7	4-6'	ICON	3-May-16	12.10	293	293	<0.496	14.9	13.3	<1.98	26.6	51.5	<0.10	6.85	29.3	0.38	2.72	4.04	<1.00	<1.00	2.45	20.3	na	na	na
SB-7	6-8'	ICON	3-May-16	11.40	217	256	<0.497	15.4	12.7	<1.99	22.9	57.2	<0.09	7.97	na	0.26	na	na	na	na	na	20.9	na	759	352
SB-7	8-10'	ICON	3-May-16	12.70	192	229	0.575	15.4	12.9	<1.98	24.1	60.8	<0.10	11.3	na	0.45	na	na	na	na	na	20.8	na	785	368
SB-7	10-11'	ICON	3-May-16	10.60	189	265	0.555	15.4	11.9	<1.98	24.1	56.7	<0.10	16.4	na	0.54	na	na	na	na	na	22.4	na	375	185
SB-8	0-2'	ICON	6-May-16	9.78	3440	3610	<0.496	15.3	17.3	<1.98	61.1	50.2	0.150	13.4	27.9	0.47	5.21	7.87	<1.00	<1.00	3.47	26.4	na	na	na
SB-8	2-4'	ICON	6-May-16	14.40	352	375	<0.497	17.5	15.5	<1.99	32.8	46.7	<0.10	48.2	25.0	0.81	26.4	19.0	<1.00	<1.00	6.44	25.1	na	na	na
SB-8	4-6'	ICON	6-May-16	12.60	307	348	<0.496	16.2	14.3	<1.98	28.1	51.8	<0.10	102	23.1	1.41	30.5	20.2	<1.00	<1.00	12.0	24.1	na	na	na
SB-8	6-8'	ICON	6-May-16	12.70	246	308	<0.497	16.2	13.5	<1.99	26.8	57.7	<0.11	192	20.6	3.65	30.8	35.3	<1.00	<1.00	31.1	24.2	na	na	na
SB-8	8-10'	ICON	6-May-16	12.40	225	309	<0.496	15.4	12.9	<1.98	28.0	58.2	<0.10	301	19.1	5.17	29.4	40.7	1.52	<1.00	45.0	23.3	na	43.4	32.4
SB-8	10-12'	ICON	6-May-16	11.50	250	295	<0.498	14.9	12.1	<1.99	29.7	58.5	<0.11	402	19.9	8.00	25.9	43.4	3.38	2.16	72.2	24.5	na	na	na

TABLE 1
SOIL DATA SUMMARY

Harold Guidry et al v BP America Production Co, et al; Case #82537, Div "G"; 16th JDC
Anse La Butte Oil Field, St. Martin Parish, Louisiana
Prepared for Jones, Swanson, Huddell & Garrison LLC

Boring ID	DEPTH	Sampl er	Date	Metals (mg/kg-DRY WT)										Leachate Chlorides (mg/L)	Cation Exchange Capacity (meq)	EC (mmhos/cm)	ESP (%)	SAR	Soluble Calcium (meq/L)	Soluble Magnesium (meq/L)	Soluble Sodium (meq/L)	Moisture Content (%)	HEM Oil & Grease (% dry wt)	TPH-D (mg/Kg)	TPH-O (mg/Kg)
				Arsenic	Barium	TT Barium	Cadmium	Chromium	Lead	Selenium	Strontium	Zinc	Mercury												
29B Upland Pit Closure Std				10		40000	10	500	500	10		5000	10	500		4	15	12					1		
RECAP Screening Std				12	550		3.9	100	100	20		2300	2.3											65	180
MW4	50-52'	HET	20-Sep-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	2.44	1.23	1.88	15.8	na	na	na
MW4	56-58'	HET	20-Sep-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	3.11	1.57	1.47	15.6	na	na	na
MW4	62-64'	HET	20-Sep-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	2.71	1.40	1.82	15.0	na	na	na
MW4	70-72'	HET	20-Sep-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1.20	0.638	0.666	19.7	na	na	na
MW4	76-78'	HET	20-Sep-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1.75	0.845	1.44	14.7	na	na	na
MW4	82-84'	HET	20-Sep-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	2.15	1.11	3.93	19.4	na	na	na
MW4	88-90'	HET	20-Sep-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	2.10	1.03	5.11	13.1	na	na	na
MW5	50-52'	ICON	1-Aug-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	18.3	na	na	na
MW5	50-52'	HET	1-Aug-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	4.86	2.13	9.76	14.8	na	na	na
MW5	56-58'	ICON	1-Aug-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	18.3	na	na	na
MW5	56-58'	HET	1-Aug-16	<1.00	13.0	51.6	<0.100	3.11	1.68	<0.500	5.34	6.67	<0.0133	na	na	na	na	na	27.3	12.5	105	17.9	na	na	na
MW5	62-64'	ICON	1-Aug-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	18.9	na	na	na
MW5	62-64'	HET	1-Aug-16	1.76	26.0	91.5	0.115	6.15	3.31	<0.500	11.6	13.8	<0.0133	na	na	na	na	na	27.8	10.7	87.7	19.0	na	na	na
MW5	68-70'	ICON	1-Aug-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	14.5	na	na	na
MW5	68-70'	HET	1-Aug-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	2.67	1.24	4.84	18.4	na	na	na
MW5	72-74'	HET	1-Aug-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1.78	0.769	2.13	15.0	na	na	na
MW5	84-86'	HET	1-Aug-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1.16	0.499	0.833	11.4	na	na	na
MW5	88-90'	HET	1-Aug-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.66	0.329	1.05	13.3	na	na	na
MW7	50-52'	HET	21-Sep-16	2.21	10.9	64.1	<0.100	3.46	1.82	<0.500	3.26	7.36	<0.0133	na	na	na	na	na	2.11	1.12	24.2	15.4	na	na	na
MW7	54-56'	HET	21-Sep-16	1.47	16.0	90.3	<0.100	4.90	2.37	<0.500	5.58	9.86	<0.0133	na	na	na	na	na	3.09	1.45	29.0	17.7	na	na	na
MW7	64-66'	HET	21-Sep-16	1.70	28.9	121	<0.100	6.91	3.31	<0.500	12.6	15.5	<0.0133	na	na	na	na	na	3.32	1.59	9.79	19.5	na	na	na
MW7	68-70'	HET	21-Sep-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1.03	0.544	4.01	16.0	na	na	na
MW7	74-76'	HET	21-Sep-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.848	0.440	2.15	16.8	na	na	na
MW7	78-80'	HET	21-Sep-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1.08	0.524	1.60	15.2	na	na	na
MW7	84-86'	HET	21-Sep-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1.02	0.557	1.71	13.5	na	na	na
MW7	88-90'	HET	21-Sep-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	0.657	0.342	2.23	14.6	na	na	na
DB4	50-52'	HET	2-Aug-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	7.41	3.32	1.84	15.8	na	na	na
DB4	56-58'	HET	2-Aug-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	3.48	1.54	0.998	15.6	na	na	na
DB4	62-64'	HET	2-Aug-16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	3.63	1.56	0.914	15.2	na	na	na

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Anse La Butte Oil Field, St. Martin Parish, Louisiana

Prepared for Jones, Swanson, Huddell & Garrison LLC

Boring ID	DEPTH	Sampl er	Date	Metals (mg/kg-DRY WT)									Leachate Chlorides (mg/L)	Cation Exchange Capacity (meq)	EC (mmhos/cm)	ESP (%)	SAR	Soluble Calcium (meq/L)	Soluble Magnesium (meq/L)	Soluble Sodium (meq/L)	Moisture Content (%)	HEM Oil & Grease (% dry wt)	TPH-D (mg/Kg)	TPH-O (mg/Kg)	
				Arsenic	Barium	TT Barium	Cadmium	Chromium	Lead	Selenium	Strontium	Zinc													Mercury
29B Upland Pit Closure Std				10		40000	10	500	500	10		5000	10	500		4	15	12					1		
RECAP Screening Std				12	550		3.9	100	100	20		2300	2.3											65	180
DB4	70-72'	HET	2-Aug-16	na	na	na	na	na	na	na	na	na	na	na	0.684	na	na	3.30	1.51	1.66	13.3	na	na	na	
DB4	88-90'	HET	2-Aug-16	na	na	na	na	na	na	na	na	na	na	na	0.775	na	na	2.38	1.11	3.55	16.8	na	na	na	
DB6/MW6	50-52'	HET	13-Sep-16	na	na	na	na	na	na	na	na	na	na	na	0.738	na	na	0.917	0.437	5.80	16.4	na	na	na	
DB6/MW6	54-56'	HET	13-Sep-16	na	na	na	na	na	na	na	na	na	na	na	0.438	na	na	1.26	0.650	2.14	18.5	na	na	na	
DB6/MW6	62-64'	HET	13-Sep-16	na	na	na	na	na	na	na	na	na	na	na	0.316	na	na	1.03	0.520	1.30	14.4	na	na	na	
DB6/MW6	68-70'	HET	13-Sep-16	na	na	na	na	na	na	na	na	na	na	na	0.436	na	na	1.27	0.695	1.99	16.2	na	na	na	
DB6/MW6	72-74'	HET	13-Sep-16	na	na	na	na	na	na	na	na	na	na	na	0.346	na	na	0.946	0.481	1.75	15.8	na	na	na	
DB6/MW6	76-78'	HET	13-Sep-16	na	na	na	na	na	na	na	na	na	na	na	0.564	na	na	1.61	0.857	2.92	12.3	na	na	na	
DB6/MW6	82-84'	HET	13-Sep-16	na	na	na	na	na	na	na	na	na	na	na	0.230	na	na	0.935	0.446	0.633	9.24	na	na	na	
DB6/MW6	88-90'	HET	13-Sep-16	na	na	na	na	na	na	na	na	na	na	na	0.297	na	na	1.24	0.614	0.916	9.40	na	na	na	
DB7	50-52'	HET	3-Aug-16	na	na	na	na	na	na	na	na	na	na	na	1.19	na	na	3.44	1.45	5.82	12.5	na	na	na	
DB7	56-58'	HET	3-Aug-16	na	na	na	na	na	na	na	na	na	na	na	0.943	na	na	3.23	1.25	4.80	14.6	na	na	na	
DB7	64-66'	HET	3-Aug-16	na	na	na	na	na	na	na	na	na	na	na	2.22	na	na	4.88	1.87	12.7	11.4	na	na	na	
DB7	70-72'	HET	4-Aug-16	na	na	na	na	na	na	na	na	na	na	na	0.330	na	na	1.29	0.650	0.793	17.1	na	na	na	
DB7	88-90'	HET	4-Aug-16	na	na	na	na	na	na	na	na	na	na	na	0.388	na	na	1.58	0.744	1.38	13.9	na	na	na	
DB7	114-116'	HET	4-Aug-16	na	na	na	na	na	na	na	na	na	na	na	0.365	na	na	1.34	0.625	1.20	13.9	na	na	na	

TABLE 2
GROUNDWATER DATA SUMMARY
Harold Guidry et al v BP America Production Co, et al; Case #82537, Div "G"; 16th JDC
Anse La Butte Oil Field, St. Martin Parish, Louisiana
Prepared for Jones, Swanson, Huddell & Garrison LLC

Table with columns: Well ID, Screened Interval (ft bgs), Sampler, Date Sampled, Metals (mg/L) [Arsenic, Barium, Cadmium, Chromium, Iron, Lead, Manganese, Selenium, Strontium, Zinc, Mercury], Cations (mg/L) [Calcium, Magnesium, Potassium, Sodium], Anions [Alkalinity, Bicarbonate, Alkalinity, Carbonate, Sulfate], TDS, Chloride, HYDROCARBONS (mg/L) [TPH-D, TPH-O, TPH-G], VOCs (mg/L) [Benzene, Ethylbenzene, Toluene, Xylenes, Total], Radionuclides (pCi/L) [Ra-226, Ra-228, Combined Ra-226/228], Field Parameters [Temperature (°C), pH (std units), Spec. Conductance (uS/cm), ORP (mV), Dissolved Oxygen (mg/L), Turbidity (NTU)].