Appendix N
Hypothetical 29-B Plan
Pursuant to LAC 43:XIX.611.F.1

Chevron and Key's proposed most feasible plan (MFP) is located in the main body of this document. The proposed MFP complies with the Louisiana Department of Environmental Quality's Risk Evaluation/Corrective Action Program (RECAP), the State's risk-based protocol for environmental evaluation and remediation, Statewide Order 29-B (29-B), and the Louisiana Department of Energy and Natural Resources (LDENR)'s demonstrated implementation of Order 29-B, utilizing recognized exceptions approved and accepted by LDENR in developing evaluation and remediation plans for exploration and production sites (e.g., MFPs issued by LDENR in the Tensas Poppadoc, Savoie, Moore, Sweet Lake, Vermillion Parish School Board, Hero Lands, LA Wetlands, Jeanerette Lumber, Neumin Production, and Henning matters). See Appendix P, December 12, 2018, LDENR Office of Conservation Memorandum.

As required by LAC 43:XIX.611.F.1, this Appendix presents a hypothetical remediation plan to address both soil and groundwater that complies with all the provisions of Order 29-B, exclusive of Subchapter 319, and is submitted solely in fulfillment of that requirement. Unlike its soil standards, 29-B contains no groundwater standards. Therefore, this Hypothetical 29-B Plan includes a theoretical cost estimate, if RECAP were ignored, to attempt to remediate soil and/or groundwater at the Chevron and Key Limited Admission Areas, to comply with the technical requirements of LAC 43:XIX.611.F.1. ERM does not support or endorse such remediation as an alternative approach to RECAP and such an approach would be inconsistent with most feasible plans developed by LDENR at other sites. The cost estimate associated with this appendix represents the unnecessary, worst-case, unreliable and least feasible cost. Actual costs would be truncated if this approach were attempted because any attempt to operate a shallow groundwater pumping system would likely fail and implementation of the soil remedy would be infeasible.

Statewide Order 29-B numeric standards apply to soil. RECAP provides the specific relevant and applicable regulatory standards for soil and groundwater that address protection of the environment, public health, safety and welfare as required for a most feasible plan under La. R.S. 30:29 ("Act 312"). The RECAP regulation has therefore been applied to E&P sites subject to LDENR review and Most Feasible Plan (MFP) approval or development. The implementation of this Hypothetical 29-B Plan would be excessive, wasteful, unnecessary, technically impracticable, infeasible, potentially harmful, economically unsound, unreasonable, and would result in significantly more damage than benefit to the property at issue. This Hypothetical 29-B Plan is therefore a hypothetical plan, which would be impractical or impossible to implement. Therefore, ERM does not support or endorse the adoption of this plan as the most feasible plan for this site for the following reasons:

- It is unnecessary because an alternative scope provided as the proposed MFP meets RECAP standards and United States Environmental Protection Agency (USEPA) human health and ecological standards that require no use restrictions;
- It is technically impracticable because it would result in significantly more damage than benefit to the environment and potentially public health;
- The target concentrations that are the basis for implementation of the groundwater response are not attainable via this or any other method;
- It would necessarily disrupt current and future recreational activities on the site;
- It would ignore LDENR's adoption of RECAP as an applicable regulatory standard in the LDENR/LDEQ Memorandum of Understanding (MOU) (original MOU dated 2010, amended in 2011 and 2023) and in multiple MFPs including 29-B exceptions issued to reviewing courts based on evidence presented at Act 312 hearings (see Appendix P); and,
- It is not the most feasible plan to protect the health, safety and welfare of the people of Louisiana.

Chevron and Key's MFP includes the application of appropriate and recognized exceptions and alternate soil standards allowed under Section 319 of the 29-B regulations and the LDENR/LDEQ MOU to support the application of RECAP and soil standards that are based on current and anticipated future land use. These exceptions have been adopted and applied by this Department on a consistent basis. The MFP issued by LDENR in the H.C. Drew Estate v. Neumin matter states that "[u]se of LDEQ's RECAP, at least in part, to demonstrate compliance with Section 319.A has been proposed by responsible parties, considered and ultimately accepted by LDENR on case-by-case basis for over 20 years beginning October 2001 with Guillory Landfarm Facility Closure, Site Code 0103, located in Eunice, Louisiana". ERM requests that its plan that applies RECAP and multiple lines of scientific evidence be adopted as the most feasible plan for this property. The use of RECAP to determine whether and to what extent soil and groundwater should be remediated has consistently been recognized by LDENR as an appropriate exception to 29-B. Therefore, the application of RECAP to the soil and groundwater in this case is appropriate for the following reasons:

- The 2003 RECAP regulation provides the comprehensive risk-based program necessary for fully evaluating this multi-media site. The United States Environmental Protection Agency (USEPA), Louisiana, and other state risk-based standards have been developed and refined after the 1986 amendment to Order 29-B; therefore, they provide standards that appropriately supplement 29-B standards;

- The MOU between the LDENR and the LDEQ recognizes the application of RECAP, a risk-based approach to assessing the need for remediation as compared to the 1986 Statewide Order 29-B pit closure standards, which are not risk-based and do not include numeric groundwater standards. Furthermore, the MOU provides LDENR with the authority to receive and approve site evaluation, remediation plans, or final results submitted pursuant to all RECAP Management Options;

- RECAP has been consistently applied in previous MFPs issued by LDENR under Act 312. The June 29, 2022 MFP issued by LDENR in the H.C. Drew Estate vs. Neumin Production Company matter (Appendix P) states that "LDEQ's RECAP procedures have been recognized as containing groundwater evaluation and/or remediation standards applicable to E&P sites, and RECAP has been used as the principal regulatory standard for groundwater evaluation and/or remediation in every Act 312 [case] where groundwater has been an issue." Previous MFPs issued by LDENR have also routinely applied RECAP and additional lines of scientific evidence to soil for salt parameters below the effective root zone, and for non 29-B parameters; and

- The extensive, site-specific Human Health and Ecological Risk Assessments performed by Chevron and Key's experts in this case demonstrate that the proposed MFP scope results in site conditions that pose no unacceptable risk to human health and the environment. As outlined in the LDEQ RECAP preamble, risk to human health and the environment is the primary consideration when remedial decisions are made. The full RECAP Risk Assessment and Ecological Assessment findings fully support an MFP with exceptions to Statewide Order 29-B (i.e., use of the rigorous and widely accepted RECAP standards to address the requirement for protection of public health and the environment).

This Hypothetical 29-B Plan is not appropriate and should be rejected by LDENR because, as identified in the US National Contingency Plan (NCP), the ultimate selection of a remedy by the agency is dependent upon five primary balancing criteria including (1) long-term effectiveness and permanence; (2) reduction of toxicity, mobility, or volume through treatment; (3) short-term effectiveness; (4) implementability; and (5) cost. Rigid application of Order 29-B (i.e.,

implementation of this Hypothetical 29-B Plan), is not consistent with these criteria. If two remedies are equally feasible, reliable, and provide the same level of protection, then the most cost-effective remedy should be selected. Both the capital and long-term operational and maintenance costs for the remedial period must be considered. The most expensive remedy is not always the most feasible or best approach.

This Hypothetical 29-B Plan should be rejected for the following additional reasons:

- The shallow water bearing zone that is encountered at a depth of between approximately 12 and 26 feet below the ground surface is a Class 3 aquifer as defined by RECAP. This zone has a very low hydraulic conductivity (average of approximately 0.8 feet per day) and consequently a very low yield (310 gallons per day [gpd]). The low hydraulic conductivity in this zone demonstrates not only that it is unsuited as a source of usable water, but also that it would be infeasible to treat through a long-term, large-scale pumping remedy.

- The shallow water-bearing zone has naturally poor, non-potable water quality, with arsenic, iron, and manganese concentrations exceeding the corresponding RECAP screening standard or EPA Secondary Maximum Contaminant Levels (SMCLs). An attempt to reduce constituents to background levels will likely not achieve any benefit; further, the remedy would not make the water potable or desirable to drink because arsenic, iron, and manganese would naturally remain above the corresponding standards.

- The only Class 1 aquifer, the Mississippi River Alluvial Aquifer (MRAA), underlying the property occurs at depths below approximately 80 feet, and has historically been utilized as a source of water for industrial, rig supply, public supply, and domestic purposes in water wells within a one-mile radius of the property.

- A remedy of the magnitude required to attempt to fully comply with Order 29-B is technically impracticable (not able to achieve end goals in a reasonable time frame) for both soil and groundwater.

- Implementation of this Hypothetical 29-B Plan would destroy portions of a thriving ecosystem in the effort to attain groundwater and/or soil concentrations that would provide no environmental benefit.

- The Hypothetical 29-B Plan remedy would consume valuable and limited disposal capacity at commercial disposal facilities, with no benefit.

- The Hypothetical 29-B Plan remedy would result in an increased risk of environmental damage from transportation and disposal of site residues.

- The implementation of this Hypothetical 29-B Plan would do nothing to change the current or reasonably anticipated future use of the property and would, in fact, impede use of the property for the duration of the remedy.

- The risks posed by implementation of a massive Hypothetical 29-B Plan are significant and must be considered. They include destruction of a healthy ecosystem as a result of installation and operation of a groundwater remediation system and/or extensive dig and haul soil remediation, and potential for subsidence due to the extraction of large volumes of shallow groundwater.

- Although long-term industrial operations, as expected, have left an industrial footprint on the property, that footprint has not affected the past or current uses of the property and the proposed MFP scope (in contrast to this Hypothetical Plan) is protective for reasonably anticipated future highest and best use of the property, and results in no unacceptable risk to human health or the environment.

For these reasons, ERM neither seeks approval nor supports the implementation of this Hypothetical 29-B Plan. ERM recommends the adoption of its proposed remediation plan that applies RECAP (as provided for in the MOU between LDENR and LDEQ) and additional scientific evidence to meet the requirements of a feasible plan.

The Hypothetical 29-B Plan is based on the following scope and general assumptions.

- Salt parameters in soil are agronomic standards under 29-B. They apply to the effective root zone (See July 19, 2000 LDENR Decision on MAR Services Site Remediation [Exhibit 1]), which is up to approximately 16 inches on the property per Mr. Patrick Ritchie's site-specific root zone study. However, this hypothetical remedy is based on remediation (i.e., removal or amendment) of soil with salt concentrations above the 29-B standard at all depths above the water-bearing zone within the soil limited admission areas. The 29-B regulations include a provision that allows the use of higher limits for salt parameters if "the operator can show that higher limits for EC, SAR, and ESP can be justified for future land use". We recommend that LDENR apply 29-B standards only to the effective root zone per this provision without requiring an exception to 29-B. However, this Hypothetical Plan has been prepared with the overly conservative assumption that exceedances of 29-B salt parameters may be addressed through remediation at all depths above the water bearing zone.

- Exceedances of 29-B salt parameters were detected on the property below the effective root zone. The proposed remediation in the main body of this report addresses exceedances of 29-B salt parameters within the root zone, and exceedances of other 29-B standards at all depths. This hypothetical plan expands the soil remediation to also include exceedances of 29-B salt standards below the root zone in the soil limited admission areas. Therefore, this Hypothetical Plan for soil includes a massive excavation to address only 29-B salt parameters below the effective root zone, which would provide no benefit to the current or anticipated future use of the property.

- The maximum excavation depth on the property would be limited to the depth of the top of the shallow water-bearing zone, which is variable across the property. The top of this zone is present at depths ranging from approximately 12 to 21 feet below the ground surface. The exact depth of the top of the zone is difficult to define due to the typically gradational transition which lacks a clearly defined, sharp boundary, and final excavation depth would be determined at time of implementation (if such a plan were to be implemented). The approximate depth to the top of the shallow water bearing zone and assumed maximum depth of remediation is 16 feet in LAA 1 (based on boring logs L-3, L-4, and MW-1), 17 feet in LAA 2 (based on boring log L-7), and 12 feet in LAA 3. It is assumed that any salt impacts below that depth would be remediated by the hypothetical groundwater remedy.

- Excavation of soil, especially to greater depths, requires assessment of soil conditions and may result in the requirement for slope stabilization (such as shoring, benching, sloping, or other measures). Benching/sloping would require the aerial extent of the excavation to expand dramatically in all directions, causing unnecessary destruction to the established healthy ecosystem, and is not proposed as part of the hypothetical plan. An estimated cost has been included for shoring to stabilize the excavations.

- Implementation of the Hypothetical Plan for soil would likely require additional hydrogeological, geotechnical, and chemical evaluation to refine the excavation areas, depths, and engineering. The lateral extent of the hypothetical soil remediation areas are limited for purposes of this plan to the soil limited admission areas shown in Figure 100.

- Evaluation and remediation will address groundwater where concentrations indicate any increase in concentrations over background. This is based on the assumption that Statewide Order 29-B requires that groundwater be remediated to background conditions, regardless of risk or lack of risk posed by the conditions, which is contrary to EPA and state risk-based regulations and guidance.

- In accordance with USEPA guidance, background threshold values (BTVs) can be calculated to establish a site-specific background concentration for comparison with site data. The ProUCL software tool is recommended by LDEQ for statistical analysis in support of RECAP and was used to develop potential BTVs for chlorides in groundwater based on data from monitoring wells located on the Levert, Dupont, and Wilbert properties with data indicating background/unimpacted conditions. A 95% upper tolerance limit (UTL) of 113 mg/L was selected as the most appropriate BTV based on the distribution of the background chlorides dataset. The extent of this area was assumed to be the entire groundwater limited admission area (see Figure 101). The ProUCL input/output tables are presented in Exhibit 2, which include a list of wells used for the background calculation. The locations of the background wells on the adjacent properties are included in the maps provided in Appendix B.

- This Hypothetical 29-B Plan for groundwater relies on an estimated capture zone for each recovery well based on *U.S. EPA., 1987, Guidelines for delineation of wellhead protection area, EPA 440/6-87-010, Washington, D.C., Office of Groundwater Protection*, along with various other assumptions outlined in Table N-1. These assumptions would be further evaluated after the *Initial Remediation Well Installation, Pump Test, and Pilot Evaluation* component of the hypothetical remedy. It is anticipated that this initial step in the remedy would demonstrate that the implementation of the full Hypothetical 29-B Plan would be impractical or impossible.

- It is assumed that the groundwater generated in the hypothetical remediation would be disposed via subsurface injection on or near the property. For the purposes of the hypothetical plan, it is assumed that the generated groundwater would be disposed in the existing active brine disposal well located on the property, which would be the most feasible and cost-effective method of disposal if such a plan were to be implemented.

The following steps would be implemented as part of this Hypothetical 29-B Plan:

- Submit a plan to LDENR Office of Conservation (OOC) for assessment and design activities;
- Perform assessment and design activities;
- Submit a detailed implementation plan to LDENR OOC for soil remediation activities;
- Implement soil remediation activities, if practical and feasible;
- Perform *Initial Remediation Well Installation, Pump Test, and Pilot Evaluation* to obtain data needed to design a groundwater pumping system, if practical and feasible;
- Perform design activities for groundwater pumping;
- Submit a detailed implementation plan to LDENR OOC for remediation activities;
- Revise the injection permit for well SN76522 and address legal approvals to allow for the use of this well for the disposition of recovered groundwater. Alternatively, install a saltwater disposal well (SWD) for on-site disposal of extracted groundwater;

- Install groundwater extraction wells; and
- Install groundwater recovery system and operate for a period of up to approximately 45 years.

It has been assumed that the groundwater pumping remedy in the hypothetical plan will continue for a period of up to approximately 45 years. The time to implement the hypothetical plan, along with the number of recovery wells needed, cannot be determined until pump tests and pilot testing is completed. The cost estimates assume the number of recovery wells based on estimated capture zones calculated from EPA wellhead protection equations and the total estimated impacted area. In reality, the ability to implement groundwater pumping from numerous wells would likely be impeded by recovery wells pumping dry over time due to very low yield in some portions of the highly variable shallow water-bearing zone. Additionally, the length of remediation may be extended due to pumping-induced flow of impacted groundwater from adjacent properties.

In addition, the soil and groundwater remedy will cause the disruption, or complete shutdown, of current and anticipated future uses of the property, including recreational (e.g., hunting) activities across portions of the property.

The details of this hypothetical plan and estimated implementation cost are included in Tables N-1 and N-2.

The hypothetical schedule for implementing this Hypothetical 29-B Plan would be generally as follows:

- Implement soil assessment, geotechnical assessment and engineering design activities. Soil assessment and design would require approximately 6-9 months to complete;
- Soil remediation would require approximately 7-9 months to implement;
- Implement groundwater assessment activities within 60 days of LDENR approval of the plan. Groundwater assessment activities (pilot testing) would require approximately 3 months to complete;
- Groundwater treatment system design and installation would require approximately 6 months to complete; and
- The groundwater extraction and disposal would be performed for up to approximately 45 years.

Table N-1
Groundwater Remediation: Target Chloride 113 mg/L (Hypothetical 29-B Plan)

Paul M. Levert, et al. v Union Texas, et al.
Bayou Choctaw Oil and Gas Field
West Baton Rouge Parish, Louisiana

Volume Calculations	Unit	Value	Basis
Impacted Thickness (b)	feet	6.4	Average shallow water-bearing zone thickness in limited admission area
Porosity (n)	unitless	0.3	Assumed
Area of Plume (A)	square feet	2,016,800	Area of limited admission area
Pore Volume	cubic feet	3,872,256	Calculated: Pore Volume = b * n * A
Pore Volume	gal	28,966,488	Calculated: Unit conversion
Retardation Factor (Rf)	unitless	1	Constant value for chloride
Target Concentration (C_f)	mg/L	113	Calculated background concentration
Initial Concentration (C_o)	mg/L	12,789	Average of ICON and ERM Splits for shallow wells in limited admission a
Number Pore Volumes	unitless	4.73	Calculated: Number Pore Volumes = -Rf * ln(C_f/C_o)
Recovery Volume	gallons	136,981,159	Calculated: Recovery Volume = Pore Volume * Number Pore Volumes
Recovery Well Calculations			
Aquifer Pumping Rate	gallons per minute	0.22	Geometric mean of well yield for slug tested wells in the shallow zone
Aquifer Pumping Rate (Q)	ft^3/day	42.35	Calculated: Unit conversion
Time (t)	days	3,650	Assume 10 years for Capture Zone Area Estimate
Estimated Radius (r)	feet	160	Calculated: $r = \sqrt{\frac{Qt}{\pi bn}}$ (EPA, 1987)
Estimated Capture Zone Area	square feet	80,509	Calculated
Estimated Number of Recovery Wells	unitless	26	Calculated: Area of Plume / Estimated Capture Zone Area
Time Calculations			
Groundwater Recovery Rate	gallons per day	8,237	Calculated: Pumping Rate * Number of Wells
Recovery System Operation Time	years	45.5	Calculated: Recovery Volume / Recovery Rate
Other Assumptions			
Well Depth	feet	23	Approximate average bottom of shallow water-bearing zone in limited admission area
Well Diameter	inch	4	Assumed

Initial RW Installation, Pump Test, and Pilot Evaluation	Unit Cost	Units	Quantity	Cost	Cost Basis
Drill Rig Mobilization/Demobilization	$1,170	unit	1	$1,170	4/21/2025 DEPS Estimate
Drill Rig and Crew (one four-inch well and one two-inch well)	$2,740	day	2	$5,480	4/21/2025 DEPS Estimate
Well Construction Materials and Surface Completions	$450	unit	2	$900	4/21/2025 DEPS Estimate
Drill Crew Meals	$150	day	2	$300	4/21/2025 DEPS Estimate
Drill Crew Hotels	$350	day	1	$350	4/21/2025 DEPS Estimate
Drill Crew Trucks and Tools	$150	day	2	$300	4/21/2025 DEPS Estimate
55-Gallon Drums for Soil IDW	$90	unit	2	$180	4/21/2025 DEPS Estimate
1/2 HP 5 GPM Well Pump and Control Box	$1,500	unit	1	$1,500	ERM Estimate
Generator for Pump	$100	day	3	$300	ERM Estimate
ERM Oversight, Development, and Equipment	$2,000	day	2	$4,000	ERM Estimate
ERM Labor for 24-Hour Pump Test	$6,000	day	1	$6,000	ERM Estimate
Data Loggers for Pump Test	$300	week	2	$600	ERM Estimate, Ajax Rentals
55-Gallon Drums for Purge Pump Test IDW	$90	unit	10	$900	ERM Estimate, DEPS Estimate (8 drums for well development, pump test, and decon water)
Purge Water and Soil IDW Drum Disposal	$355	unit	12	$4,260	ERM Estimate, Kent and Ecoserv Invoices
Data Evaluation and Reporting	$15,000	unit	1	$15,000	ERM Estimate
Initial RW Installation, Pump Test, and Pilot Evaluation Subtotal				*$41,240*	

Table N-1
Groundwater Remediation: Target Chloride 113 mg/L (Hypothetical 29-B Plan)

Paul M. Levert, et al. v Union Texas, et al.
Bayou Choctaw Oil and Gas Field
West Baton Rouge Parish, Louisiana

Additional RW Installation	Unit Cost	Units	Quantity	Cost	Cost Basis
Drill Rig Mobilization/Demobilization	$1,170	unit	1	$1,170	4/21/2025 DEPS Estimate
Drill Rig and Crew (26 four-inch wells)	$2,740	day	25	$68,500	4/21/2025 DEPS Estimate
Well Construction Materials and Surface Completions	$450	unit	25	$11,250	4/21/2025 DEPS Estimate
Drill Crew Meals	$150	day	25	$3,750	4/21/2025 DEPS Estimate
Drill Crew Hotels	$350	day	24	$8,400	4/21/2025 DEPS Estimate
Drill Crew Trucks and Tools	$150	day	25	$3,750	4/21/2025 DEPS Estimate
55-Gallon Drums for Soil IDW	$90	unit	12	$1,080	4/21/2025 DEPS Estimate
Soil IDW Drum Disposal	$355	unit	25	$8,875	ERM Estimate, Kent and Ecoserv Invoices
1/2 HP 5 GPM Well Pump and Control Box	$1,500	unit	25	$37,500	ERM Estimate
Electrical Hookup	$40	feet	8,500	$340,000	ERM Estimate
ERM Oversight, Development, and Equipment	$2,000	day	25	$50,000	ERM Estimate
Additional RW Installation Subtotal				*$534,275*	

On-site Disposal Capital Costs	Unit Cost	Units	Quantity	Cost	Cost Basis
Disposal Well	-	unit	-	-	Assume disposal at existing brine disposal well
Planning, Permitting, Setup, and Engineering	$80,000	unit	1	$80,000	ERM Estimate
Three-inch Flowline at 9,000 Linear Feet to Connect to SWD	$40	feet	9,000	$360,000	ERM Estimate (assume 26 wells at an average distance of 320' spacing and 1,000' of collector to disposal well)
10,000 Gallon Storage Tanks	$14,000	unit	2	$28,000	ERM Estimate, National Tank Outlet
On-site Disposal Capital Costs Subtotal				*$468,000*	

Recovery Operation and Maintenance	Unit Cost	Units	Quantity	Quarterly or Annual	Cost	Cost Basis
Energy Consumption (Recovery Pumps)	$0.0961	kWh	20,948	183	$368,392	https://www.electricitylocal.com/
Personnel (O&M)	$75	hr	156	183	$2,141,100	ERM Estimate - Assumes 12 hours per week
Project Management	$120	hr	20	183	$439,200	ERM Estimate - Assumes 20 hours per quarter
Miscellaneous Equipment	$2,000	year	1	45.5	$91,000	ERM Estimate
Pump Replacement	$3,000	year	1	45.5	$136,500	ERM Estimate - Assumes replacing 2 pumps per year
Annual Sampling	$3,000	year	1	45.5	$136,500	ERM Estimate - Performed in conjunction with a quarterly inspection
Recovery Operation and Maintenance Subtotal					*$3,312,692*	
Onsite Disposal Operation and Maintenance						
Disposal Cost	$0.50	barrel	71,582	45.5	$1,628,484	ERM Estimate
Maintenance	-	unit	-	-	-	Assume maintenance performed by brine well operator, costs included in disposal cost
Onsite Disposal Operation and Maintenance Subtotal					$1,628,484	

Project Management and Reporting	Unit Cost	Units	Quantity	Years	Cost	Cost Basis
Project Management	$10,000	year	1	45.5	$455,000	ERM Estimate
Data Evaluation and Reporting	$20,000	year	1	45.5	$910,000	ERM Estimate
Project Management and Reporting Subtotal					*$1,365,000*	

Total Cost - 45.5 Years of Operation **$7,349,691**

Table N-2
Soil Remediation Cost Estimate (Hypothetical 29-B Plan)
Paul M. Levert, et al v Union Texas Petroleum, et al
Bayou Choctaw Oil & Gas Field
West Baton Rouge Parish, Louisiana

Cost Basis	Unit	Value	Basis
LAA 1			
Soil removal Area (L-3/L-4 West)	square feet	2,640	ERM Report (Section 10)
Soil removal Area (L-3/L-4 West)	acre	0.06	Conversion
Soil removal Depth (L-3/L-4 West)	feet	14.0	ERM Report (Section 10), Excavate 2-16', also 200 CY overburden
Soil removal Volume (L-3/L-4 West)	cubic yards	1369	Calculation
Soil removal Area (L-3/L-4 Central)	square feet	5,231	ERM Report (Section 10)
Soil removal Area (L-3/L-4 Central)	acre	0.12	Conversion
Soil removal Depth (L-3/L-4 Central)	feet	10.0	ERM Report (Section 10) Excavate 0-2' & 8-16'
Soil removal Volume (L-3/L-4 Central)	cubic yards	1937	Calculation
Soil amendment Area (L-3/L-4 Central)	square feet	5,231	ERM Report (Section 10)
Soil amendment Area (L-3/L-4 Central)	acre	0.12	Conversion
Soil amendment Depth (L-3/L-4 Central)	feet	6.0	ERM Report (Section 10) amend 2-8'
Soil amendment Volume (L-3/L-4 Central)	cubic yards	1162	Calculation
Soil removal Area (L-3/L-4 South)	square feet	3,725	ERM Report (Section 10)
Soil removal Area (L-3/L-4 South)	acre	0.09	Conversion
Soil removal Depth (L-3/L-4 South)	feet	16.0	ERM Report (Section 10) Excavate 0-16'
Soil removal Volume (L-3/L-4 South)	cubic yards	2207	Calculation
Soil removal Area (HA-10 Area)	square feet	2,902	ERM Report (Section 10)
Soil removal Area (HA-10 Area)	acre	0.07	Conversion
Soil removal Depth (HA-10 Area)	feet	16.0	ERM Report (Section 10) Excavate 0-16'
Soil removal Volume (HA-10 Area)	cubic yards	1719.7	Calculation
LAA 2			
Soil removal Area (HA-9 Area)	square feet	13,182	ERM Report (Section 10)
Soil removal Area (HA-9 Area)	acre	0.30	Conversion
Soil removal Depth (HA-9 Area)	feet	13.0	ERM Report (Section 10), Excavate 4-17'
Soil removal Volume (HA-9 Area)	cubic yards	6346.9	Calculation
Soil amendment Area (HA-9 Area)	square feet	13,182	ERM Report (Section 10)
Soil amendment Area (HA-9 Area)	acre	0.30	Conversion
Soil amendment Depth (HA-9 Area)	feet	4.0	ERM Report (Section 10), amend 0-4'
Soil amendment Volume (HA-9 Area)	cubic yards	1952.9	Calculation
LAA 3			
Soil solidification Area (HA-1/HA-1R Area)	square feet	3,139	ERM Report (Section 10)
Soil solidification Area (HA-1/HA-1R Area)	acre	0.07	Conversion
Soil solidification Depth (HA-1/HA-1R Area)	feet	2.0	ERM Report (Section 10), Solidify 0-2'
Soil solidification Volume (HA-1/HA-1R Area)	cubic yards	232.5	Calculation
Soil amendment Area (HA-1/HA-1R Area)	square feet	3,139	ERM Report (Section 10)
Soil amendment Area (HA-1/HA-1R Area)	acre	0.07	Conversion
Soil amendment Depth (HA-1/HA-1R Area)	feet	10.0	ERM Report (Section 10), amend 2-12'
Soil amendment Volume (HA-1/HA-1R Area)	cubic yards	1162.6	Calculation
Soil removal Volume (Total)	cubic yards	13,580	Calculation
Soil disposal quantity	Tons	16,296	Conversion (cu yds * 1.2) - Diversified Estimate
Soil backfill quantity	cubic yards	18,191	Diversified Calculation - replace excavation plus backfill HA-9
Soil amendment volume	cubic yards	4,278	Calculation
Soil solidification volume	cubic yards	233	Calculation
Time to Complete (Excavation, trucking and disposal)	days	140	Diversified Estimate

Table N-2
Soil Remediation Cost Estimate (Hypothetical 29-B Plan)
Paul M. Levert, et al v Union Texas Petroleum, et al
Bayou Choctaw Oil & Gas Field
West Baton Rouge Parish, Louisiana

Work Plan Development	**Unit Cost**	**Units**	**Quantity**	**Cost**	**Cost Basis**
Geotechnical Evaluation and Sampling, if Needed	$30,000	unit	1	$30,000	ERM Estimate
Work Plan Preparation and Submittal to LDNR	$25,000	unit	1	$25,000	ERM Estimate
Work Plan Development Subtotal				*$55,000*	

Soil Removal and Remediation	**Unit Cost**	**Units**	**Quantity**	**Cost**	**Cost Basis**
Site Subsurface Clearance	$5,000	unit	1	$5,000	ERM Estimate
Pre-job Planning and Deliverables	$2,500	unit	1	$2,500	Diversified Estimate
Mobilization/Site Prep (Equipment, Tankage, Board Mats)	$77,067	unit	1	$77,067	Diversified Estimate
LAA 1 (L-3/L-4/HA-10 Area) Remediation (Soil Excavation, Soil Blending, Backfill)	$1,620,737	unit	1	$1,620,737	Diversified Estimate
LAA 2 (HA-9 Area) Remediation (Water Management, Soil Blending, Soil Excavation, Backfill)	$1,337,618	unit	1	$1,337,618	Diversified Estimate
LAA 3 (HA-1 Area) Remediation (Soil Blending, Soil Solidification	$28,925	unit	1	$28,925	Diversified Estimate
Sheet Piling Installation/Removal	$40,000	unit	1	$40,000	Diversified Estimate
ERM Oversight (Labor and Expenses)	$2,000	day	141	$282,000	ERM Estimate (with 1 additional day for site subsurface clearance)
Sampling	$500	unit	48	$24,000	ERM Estimate, 6 areas (including HA-1/HA-1R), 8 samples per area
Soil Removal and Remediation Subtotal				*$3,417,847*	

Project Management and Reporting	**Unit Cost**	**Units**	**Quantity**	**Cost**	**Cost Basis**
Project Management	$20,000	unit	1	$20,000	ERM Estimate
Data Evaluation and Reporting	$20,000	unit	1	$20,000	ERM Estimate
Project Management and Reporting Subtotal				*$40,000*	

Total Cost		***$3,512,847***
	10% Contingency	*$351,285*
Total with Contingency		***$3,864,131***

Exhibit 1

State of Louisiana

M.J."MIKE" FOSTER, JR.
GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
OFFICE OF CONSERVATION

JACK C. CALDWELL
SECRETARY

PHILIP N. ASPRODITES
COMMISSIONER OF CONSERVATION

July 19,2000

Ian A. Webster
Project Navigator, Ltd.
2600 East Nutwood Avenue
Suite 830
Fullerton, California 92831

Re: MAR Services Site Remediation Project Slide Presentation (May 3, 2000)
Phase II: Soils Management Proposed Remedy
Mar Services, St. Landry Parish, Louisiana

Dear Mr. Webster:

The Office of Conservation, Injection and Mining Division (IMD) has reviewed the proposed Phase II soils remedy outline for the referenced site contained in the handouts submitted in your presentation on May 3, 2000. Based on the material presented during your presentation in addition to subsequent discussions regarding the same, IMD staff considers the items listed below to represent the most significant aspects of the proposal.

- All metal (barium, zinc) and hydrocarbon (oil & grease) impacted soils, regardless of depth, shall be treated on-site or excavated for off-site disposal for compliance with closure criteria as established in Statewide Order No. 29-B, Section 129.M.7.e.ii.
- All salt impacted areas shall be treated to a depth of three (3) feet to meet closure criteria of 29-B, Section 129.M.7.e.ii.
- All remediated areas shall be graded and vegetated for adequate surface water management.
- New up-gradient and down-gradient groundwater monitoring wells shall be installed.
- All new and existing groundwater monitoring wells shall be maintained and sampled (monitored).

IMD has no objection to this conceptional approach toward closure certification for the referenced site as relates to previous nonhazardous oilfield waste (NOW) commercial facility operations. However, salt impacted soils below three (3) feet and any groundwater concerns are considered to be associated with onsite production waste activities occurring prior to commercial facility operations. Future activities to address groundwater at the MAR site shall be referred to Office of Conservation's Engineering Division.

Therefore, Office of Conservation authorization to conduct Phase II activities shall be contingent upon submission of a written plan for closure certification in accordance with Statewide Order No. 29-B, Section 129.M.7.e. Such plan must be submitted for review and approval before any Phase II soil remediation activities may be initiated. The plan must also address the question of salt wicking upon completion of Phase II activities.

You may contact Mr. Pierre H. Catrou or Mr. Gary Snellgrove at 225/342-5515, if you have any questions about this letter.

Yours truly,

Philip N. Asprodites
Commissioner of Conservation

By: Carroll D. Wascom
Carroll D. Wascom, Director
Injection & Mining Division

DW:PHC:gs

CC: John Aldridge, Office of Conservation, Engineering Division
Earl Moran, ExxonMobil
Nick Longo, Unocal

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Exhibit 2

Table 1

Background Dataset for Chlorides in Groundwater

Paul M. Levert, et al. v Union Texas International Corporation, et al.

Bayou Choctaw Oil Gas Field

West Baton Rouge Parish, Louisiana

Samples in Background Dataset (a)					Chlorides Results (mg/L)	
Site	**Loc ID**	**Depth**	**Date**	**Consultant**	**Individual**	**Averages (b)**
Dupont	B-1	22-32'	9/30/2005	ICON	32	32
Dupont	B-2	18-28'	9/30/2005	ICON	22	22
Dupont	B-3	22-32'	9/30/2005	ICON	26	26
Dupont	B-6	18-28'	9/30/2005	ICON	20	20
Dupont	B-8	18-28'	9/29/2005	ICON	32	32
Dupont	B-11	17-32'	9/30/2005	ICON	14	14
Dupont	B-14	18-28'	3/2/2006	ICON	34	34
Dupont	B-26	18-28'	3/2/2006	ICON	68	68
Dupont	B-27	20-30'	3/2/2006	ICON	20	20
Dupont	B-28	16-26'	3/2/2006	ICON	70	70
Dupont	Well-1 (MW-1)	18.5-28.5'	3/8/2007	MPA	22	38
Dupont				ICON	54	
Dupont	Well-4 (MW-4)	18-28'	3/8/2007	MPA	98	103.5
Dupont				ICON	109	
Wilbert	BC-09	12-22'	7/23/2014	MPA	81.4	83.2
Wilbert				ICON	85	
Wilbert	BC-41	22-32'	10/20/2014	MPA	30.0	24
Wilbert				ICON	18.0	
Wilbert	BC-42	20-30'	10/21/2014	MPA	15.0	16.5
Wilbert				ICON	18.0	
Wilbert	BC-44	21-36'	10/22/2014	MPA	14.1	17.55
Wilbert				ICON	21.0	
Wilbert	BC-45	21-36'	10/22/2014	MPA	15.0	16.5
Wilbert				ICON	18.0	
Wilbert	BC-46	22-32'	10/22/2014	MPA	43.0	46.5
Wilbert				ICON	50.0	
Wilbert	MW-1 Wilbert	18-28'	2/2/2015	MPA	36.3	27.8
Wilbert			1/15/2020	MPA	39.2	
Wilbert			7/22/2020	MPA	18.9	
Wilbert			1/13/2021	MPA	24.6	
Wilbert			9/20/2021	MPA	28.6	
Wilbert			3/29/2022	MPA	25.7	
Wilbert			10/25/2022	MPA	21	
Levert	L-12A	19-29'	10/17/2023	ERM	8.12	8.63
Levert				ICON	8.34	
Levert			10/16/2024	ERM	8.09	
Levert				ICON	9.97	

Notes:

(a) Background sample locations were selected for chlorides based on groundwater flow direction and other chemical indicators.

(b) To reduce bias towards any single location, the dataset used to estimate the BTVs used location averages (i.e., split sample results and samples over time were averaged). For the purpose of calculating location averages, detection limits were used for non-detect results.

Blue shading indicates an ICON sample where TPH mixtures were detected and no fraction data are available.

As a sensitivity measure, chlorides BTVs were estimated using two datasets (1) the full background dataset presented in this table and (2) a subset of the background dataset that excludes samples with TPH mixture detections where no fractions were analyzed (blue shaded samples).

Table 2

BTV Estimates for Chlorides in Groundwater

Paul M. Levert, et al. v Union Texas International Corporation, et al.

Bayou Choctaw Oil Gas Field

West Baton Rouge Parish, Louisiana

Background Data						BTV (b)
Dataset (a)	**n**	**Max**	**Mean**	**SD**	**Distribution**	**95-UTL-95**
Chlorides (mg/L)	20	103.5	36.01	25.62	Gamma	**112.9**
Chlorides (mg/L) (subset)	15	103.5	39.21	28.95	Normal	**113.5**

Notes:

(a) Background dataset includes groundwater samples (upper zone) from Dupont, Wilbert, and Levert properties that were identified as background based on groundwater flow direction and other chemical indicators. Sample locations with multiple results (i.e., split results and/or samples collected over time) were averaged prior to BTV estimation.

(b) BTV = Background threshold value calculated using ProUCL 5.2.

n = Number of samples in dataset

SD = Standard deviation

Distribution identified by ProUCL 5.2 as part of the BTV estimation.

95-UTL-95 = 95% Upper Tolerance Limit (UTL) with 95% Coverage for the identified distribution.

For Gamma distributions, UTLs are provided by ProUCL using both Wilson Hilferty (WH) and Hawkins Wixley (HW) methods. For conservatism, the lower value was selected.

Table 3

ProUCL Chloride BTV Output

Paul M. Levert, et al. v Union Texas International Corporation, et al.

Bayou Choctaw Oil Gas Field

West Baton Rouge Parish, Louisiana

Background Statistics for Uncensored Full Data Sets

User Selected Options

Date/Time of Computation	ProUCL 5.2 4/30/2025 11:41:45 PM
From File	C:\Users\Alyson.Hubbs\OneDrive - ERM\Lit\Levert\GW BTV Calcs\Levert_ProUCL Input_GW BTVs.xlsx
Full Precision	OFF
Confidence Coefficient	95%
Coverage	95%
New or Future K Observations	1
Number of Bootstrap Operations	2000

Chloride_Avg

General Statistics

Total Number of Observations	20	Number of Distinct Observations	17
		Number of Missing Observations	14
Minimum	8.63	First Quartile	19.39
Second Largest	83.2	Median	26.88
Maximum	103.5	Third Quartile	40.13
Mean	36.01	SD	25.62
Coefficient of Variation	0.711	Skewness	1.458
Mean of logged Data	3.379	SD of logged Data	0.643

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.396	d2max (for USL)	2.557

Normal GOF Test

Shapiro Wilk Test Statistic	0.824	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.868	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.231	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.223	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with	95% Coverage	97.38	90% Percentile (z)	68.84
	95% UPL (t)	81.4	95% Percentile (z)	78.14
	95% USL	101.5	99% Percentile (z)	95.6

Gamma GOF Test

A-D Test Statistic	0.604	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.153	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.195	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Table 3

ProUCL Chloride BTV Output

Paul M. Levert, et al. v Union Texas International Corporation, et al.

Bayou Choctaw Oil Gas Field

West Baton Rouge Parish, Louisiana

Gamma Statistics

k hat (MLE)	2.592	k star (bias corrected MLE)	2.237
Theta hat (MLE)	13.89	Theta star (bias corrected MLE)	16.1
nu hat (MLE)	103.7	nu star (bias corrected)	89.47
MLE Mean (bias corrected)	36.01	MLE Sd (bias corrected)	24.08

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	84.93	90% Percentile	68.23
95% Hawkins Wixley (HW) Approx. Gamma UPL	86.1	95% Percentile	82.47
95% WH Approx. Gamma UTL with 95% Coverage	112.9	99% Percentile	113.9
95% HW Approx. Gamma UTL with 95% Coverage	117		
95% WH USL	121	95% HW USL	126.2

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.967	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.92	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.109	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.176	Data appear Lognormal at 10% Significance Level	

Data appear Lognormal at 10% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	137	90% Percentile (z)	66.88
95% UPL (t)	91.67	95% Percentile (z)	84.48
95% USL	151.9	99% Percentile (z)	131

Nonparametric Distribution Free Background Statistics

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	20	95% UTL with 95% Coverage	103.5
Approx, f used to compute achieved CC	1.053	Approximate Actual Confidence Coefficient achieved by UTL	0.642
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	103.5	95% BCA Bootstrap UTL with 95% Coverage	103.5
95% UPL	102.5	90% Percentile	71.32
90% Chebyshev UPL	114.8	95% Percentile	84.22
95% Chebyshev UPL	150.4	99% Percentile	99.64
95% USL	103.5		

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.
Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Table 4

ProUCL Chloride BTV Output - TPH Mixture Detections Excluded

Paul M. Levert, et al. v Union Texas International Corporation, et al.

Bayou Choctaw Oil Gas Field

West Baton Rouge Parish, Louisiana

Background Statistics for Uncensored Full Data Sets

User Selected Options

Date/Time of Computation	ProUCL 5.2 5/1/2025 12:02:54 AM
From File	C:\Users\Alyson.Hubbs\OneDrive - ERM\Lit\Levert\GW BTV Calcs\Levert_ProUCL Input_GW BTVs.xlsx
Full Precision	OFF
Confidence Coefficient	95%
Coverage	95%
New or Future K Observations	1
Number of Bootstrap Operations	2000

Chloride_Avg(TPH Ex)

General Statistics

Total Number of Observations	15	Number of Distinct Observations	14
		Number of Missing Observations	19
Minimum	8.63	First Quartile	17.03
Second Largest	83.2	Median	27.76
Maximum	103.5	Third Quartile	57.25
Mean	39.21	SD	28.95
Coefficient of Variation	0.738	Skewness	1.067
Mean of logged Data	3.42	SD of logged Data	0.736

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.566	d2max (for USL)	2.409

Normal GOF Test

Shapiro Wilk Test Statistic	0.864	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.835	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.187	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.255	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with	95% Coverage	113.5	90% Percentile (z)	76.3
	95% UPL (t)	91.86	95% Percentile (z)	86.82
	95% USL	108.9	99% Percentile (z)	106.5

Gamma GOF Test

A-D Test Statistic	0.419	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.142	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.224	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Table 4

ProUCL Chloride BTV Output - TPH Mixture Detections Excluded

Paul M. Levert, et al. v Union Texas International Corporation, et al.

Bayou Choctaw Oil Gas Field

West Baton Rouge Parish, Louisiana

Gamma Statistics

k hat (MLE)	2.158	k star (bias corrected MLE)	1.771
Theta hat (MLE)	18.17	Theta star (bias corrected MLE)	22.14
nu hat (MLE)	64.75	nu star (bias corrected)	53.13
MLE Mean (bias corrected)	39.21	MLE Sd (bias corrected)	29.46

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	101.8	90% Percentile	78.49
95% Hawkins Wixley (HW) Approx. Gamma UPL	104.4	95% Percentile	96.7
95% WH Approx. Gamma UTL with 95% Coverage	145.9	99% Percentile	137.4
95% HW Approx. Gamma UTL with 95% Coverage	154.9		
95% WH USL	135.8	95% HW USL	143

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.961	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.901	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.128	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.202	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	201.8	90% Percentile (z)	78.45
95% UPL (t)	116.5	95% Percentile (z)	102.5
95% USL	179.8	99% Percentile (z)	169.2

Nonparametric Distribution Free Background Statistics

Data appear Normal at 1% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, order	15	95% UTL with 95% Coverage	103.5
Approx, f used to compute achieved CC	0.789	Approximate Actual Confidence Coefficient achieved by UTL	0.537
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	103.5	95% BCA Bootstrap UTL with 95% Coverage	103.5
95% UPL	103.5	90% Percentile	77.92
90% Chebyshev UPL	128.9	95% Percentile	89.29
95% Chebyshev UPL	169.5	99% Percentile	100.7
95% USL	103.5		

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.
Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.