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December 29, 2022

Michael Matherne
Administrator, Louisiana Tax Commission
1051 North Third Street, Room 224
Baton Rouge, Louisiana 70802

RE: Comments of The Louisiana Assessor's Association to Chapter 10 of the Emergency Rule Published in Louisiana Register Vol. 48, No. 12 (December, 2022)

Dear Mr. Matherne:

Pursuant to the provisions of La.R.S. 49:953(A)(2) please consider this letter as the Louisiana Assessor's Association formal comment on and request for reconsideration of Chapter 10 of the Emergency Rule(s) adopted by the Louisiana Tax Commission addressing the valuation of brine operation properties which were recently published in the Louisiana Register.

As you are no doubt aware, La.R.S. 47:2323 sets forth the statutorily mandated criteria for determining fair market value as follows:

> The fair market value of real and personal property shall be determined by the following generally recognized appraisal procedures: the market approach, the cost approach, and/or the income approach.
>
> (1) In utilizing the market approach, the assessor shall use an appraisal technique in which the market value estimate is predicated upon prices paid in actual market transactions and current listings.
>
> (2) In utilizing the cost approach, the assessor shall use a method in which the value of a property is derived by estimating the replacement or reproduction cost of the improvements; deducting therefrom the estimated depreciation; and then adding the market value of the land, if any.
>
> (3) In utilizing the income approach, the assessor shall use an appraisal technique in which the anticipated net income is capitalized to indicate the capital amount of the investment which produces the net income.

This statute further provides that "Uniform guidelines, procedures and rules and regulations as are necessary to implement said criteria shall be adopted by the Louisiana Tax Commission."

As set forth in the correspondence from consulting engineer Rodney Kret submitted to the Tax Commission on November 4, 2022 (copy attached), the cost tables set forth in the "new" Chapter 10 do not reflect the actual replacement or reproduction cost of brine operation properties. These valuation tables likewise do not represent the prices paid in actual market transactions and current listings or the capital amount of the investment which produces the net income of the property.

While this Commission has the authority to establish rules and regulations governing the valuation of property for *ad valorem* taxation purposes, it must do so by utilizing the three (3) statutorily approved "approaches to value." Stated differently, this Commission does not possess the authority to promulgate valuation regulations which are not based in the cost, market or income approaches. And as the mandated valuation tables set forth in the newly adopted Chapter 10 do not represent fair market value under the cost approach, the market approach and/or the income approach, the provisions of Chapter 10 are in excess of this Commission's rulemaking authority.

Accordingly, the Louisiana Assessor's Association would request that the Tax Commission pass upon the validity of the regulation in question and, upon reconsideration, vacate Chapter 10 of the Emergency Rules and promulgate regulations (a) providing for valuation based on the actual estimated replacement or reproduction cost of brine operation properties; (b) providing for valuation based upon prices paid in actual market transactions and current listings of brine operation properties; and/or (c) providing for the valuation of brine operation properties utilizing the "income approach" as was recently done for oil and gas properties.

Please note that La.R.S. 49:953(A)(2)(b)(ii) requires the Commission to provide a response describing its reasons for or against adoption of the changes suggested in these comments.

Respectfully submitted

Brian A. Eddington,
General Counsel

PRITCHARD & ABBOTT, INC.
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November 4, 2022

Mr. Lawrence E. Chehardy, Chairman
Mr. Ben Jeffers, Member
Ms. Sandra Potier, Member
Mr. Joey Vercher, Member
Ms. Regina Lynch Wood, Member
Louisiana Tax Commission
1051 North Third St., 2nd Floor
Baton Rouge, Louisiana 70802

RE: Submission of LAA Comments for Chapter 10 (Brine Operation Properties)
LTC Real/Personal Property Rules and Regulations, Tax Year 2023

Dear Chairman Chehardy and Members,

On behalf of our client Louisiana Assessors' Association (LAA), we offer the following comments and objections to the recent tentative adoption of newly created Chapter 10 of the LTC's 2023 Rules and Regulations. This new chapter concerns brine operation (solution mining in salt dome) properties and apparently originated concurrent with the rewrite of Chapter 9 (oil and gas properties) which, apparently in the LTC's eyes,"stranded" the assessment of brine mining wells which were being assessed using a particular cost new table in Chapter 9 per the LTC's statewide advisory of January, 2021. LAA respectfully disagrees with the idea that a new chapter was needed for the proper assessment of brine mining wells. Alternatively, in the event this new Chapter 10 is ultimately the final adopted assessment vehicle in Louisiana, LAA wishes to submit more appropriate cost-new figures for Table 1007.A.

These LAA comments are respectfully submitted under provisions of Section 1. R.S. 47:1837(G)(3) as amended in the 2022 Regular Session of the Louisiana Legislature (Act 287): *"The tax commission shall post the current draft of any proposed emergency rule on the commission's website at least sixty days before the publication of the final version of the emergency rule in the Louisiana Register and shall provide for the submission of comments. All comments received within thirty days of the posting of the draft emergency rule shall be reviewed and considered by the commission. The commission may revise the draft before the final version of the emergency rule is submitted to the Office of the State Register."* The LTC, by all accounts on its sole volition, formulated and posted a new Chapter 10 on its website only a few days before the tentative adoption hearing, with no input from, or opportunity for review and/or rebuttal by, the various stakeholders.

PRIMARY ARGUMENT: UTILIZING CHAPTER 25

LAA's proposal submitted to the LTC earlier this year requested the LTC take action on three items that would clarify how Chapter 25 can and legitimately should be (and, before 2021, was successfully being) used to assess wells injecting fresh water into salt domes for the purpose of commercially producing salt through a solution mining process. Our proposal outlined the various ways that Chapter 9 was inappropriate and ill-suited for the task. To summarize these three LAA proposal items:

- Amend the LTC's "Property Classification Standards" with regards to "brine wells" listed in subclass 6820 (injection and service wells) on page RP-19.
- Amend the explanation of "Injection Wells" in §901.C to exclude salt dome brine mining wells.
- Amend Table 2503.A to specifically include a recommended depreciable life for brine mining wells as a general business asset.

We assume the second bullet point item above was accomplished with the tentative adoption of the reformulated Chapter 9 for tax year 2023 per the joint industry and LAA proposal. We also assume the LTC could easily accomplish the first and third bullet points, as the Classifications Standards along with the Rules and Regulations are both documents certainly within the LTC's purview to clarify as needed to stop the conflation of brine *mining* wells with brine or injection wells used in oil and gas producing and/or disposal operations.

The Court Case Issue:

In *Axiall, LLC v. Assumption Par. Bd. of Review*, 18-0542 (La. App. 1 Cir. 12/30/19); 302 So. 3d 1136, writ denied, 20-0155 (La. 12/22/20) and *Blue Cube Operations, LLC v. Assumption Par. Bd. of Review*, 20-0157 (La. App. 1 Cir. 11/6/20), the Louisiana First Circuit Court of Appeal ruled in favor of the taxpayers, not through rejection of the merits of the parish's arguments concerning proper assessment levels or application of depreciation or obsolescence within provisions of Chapter 25, but by complete deference to the LTC's Rules and Regulations and Property Classification Standards, saying that:

A reviewing court should afford considerable weight to an administrative agency's construction and interpretation of its rules and regulations adopted under a statutory scheme the agency is entrusted to administer, and its construction and interpretation should control unless found to be arbitrary, capricious, or manifestly contrary to its rules and regulations.

The three action items listed above and as recommended in LAA's proposal for tax year 2023 specifically address the court's citations of documents and rationale the court relied upon when ultimately ruling that *"the Commission's construction and interpretation valuing the brine wells under Chapter 9 was not arbitrary, capricious, or contrary to its rules and regulations."* With the rewrite of Chapter 9 that clarifies the explanation for injection well, and in conjunction with LTC action on the other two items listed above, the ruling's logic is left intact but becomes essentially moot. Chapter 25 then becomes the undeniably most logical, practicable, appropriate, and legally unassailable assessment vehicle for brine mining wells in Louisiana. In fact, Chapter 25 was itself rewritten through the rules-making process last year, at the behest of industry taxpayers, to require the assessor perform a more rigorous and property-flexible examination of both cost-new and all forms of depreciation, when using the cost approach to value. Chapter 25 now even includes instructions to examine other approaches to value that can be more appropriate or useful for the task at hand: *"However, when market and/or income data is presented or reasonably available, all of the three approaches to value with reliable data should be considered to determine the reconciled fair market value of the assessed property."* This makes Chapter 25 even more perfect **for all parties involved** for the assessment of complex income-producing properties such as brine mining operations.

LAA believes solution mining wells accessing salt domes, along with the related machinery and equipment, are inextricably similarly situated to other salt dome property such as hydrocarbon storage

wells and caverns. Leaching a cavern from the outset for eventual storage purposes is exactly the same process as solution (brine) mining, just on an accelerated timeline whereas production and/or sale of salt is not the goal. Per the book *Fluid-Structure Interactions* (Second Edition), 2014, by Michael P. Paidoussis:

Solution mining refers to the production of salt (or potash, or other soluble products) by pumping water into subterranean salt deposits, found in many parts of the world, dissolving the salts and pumping the brine to the surface for drying and further use. A by-product is a huge brine-filled cavern — as large as 5 million petroleum-barrels (Ratigan 1995). About 60 years ago it was realized that these caverns are ideal for storage of large volumes of liquid or gaseous hydrocarbons for long durations. Salt exhibits an extremely valuable characteristic in this respect: it creeps, and small fractures in the cavern walls are therefore self-healing; the cavern is thus air/water-tight (Ratigan 1995). The use of solution-mined caverns for storage is now as important as the production of salt (Fiedelman and Voigt, 1993; Ratigan 1995; Reidy 2010).

Whether by a short-term leaching project or a longer-term brine mining operation, a salt dome cavern is the result (whether that cavern is useful or has value is not the thrust of these comments). Therefore Chapter 25, currently being used to appraise salt dome hydrocarbon storage wells and caverns, should also be used to appraise brine mining wells that are operating in these same salt dome caverns. In fact, the wells used for solution mining are **the same wells** used for cavern storage purposes, albeit with modifications as required for a particular operator's specific injection/withdrawal needs.

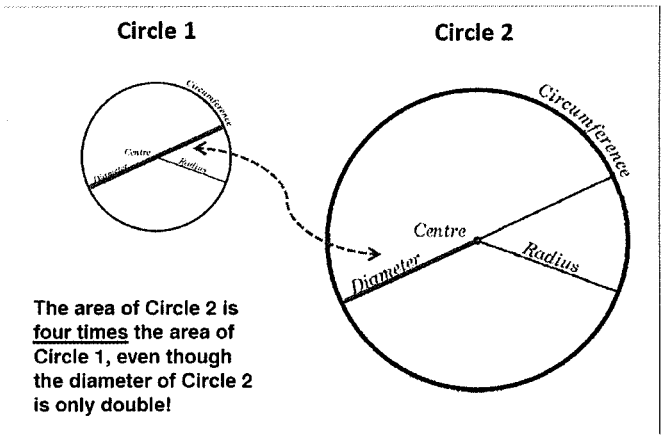
The Casing Diameter Size Issue:

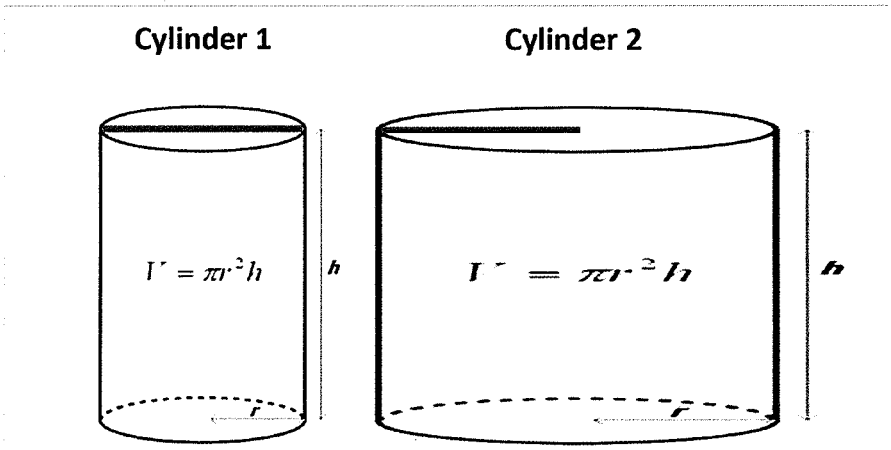
Another reason that Chapter 25 is the appropriate assessment vehicle for solution mining (brine) wells operating in salt domes, versus the newly adopted Chapter 10, is that **wellbore diameter size** is a critical input parameter for determination of cost-new (Replacement Cost New) in the cost approach. Table 1007.A in Chapter 10 is based only on depth ranges. However, long-string casing diameter sizes for brine mining wells are not nearly as uniform as for oil and gas wells. For any particular depth range, for example, there is a wide variety of solution mining wells vis-a-vis their wellbore diameters which drastically affects their cost basis. Larger diameter wellbores require orders of magnitude more materials and labor to construct than smaller diameter wellbores. This is related to the relationship of diameter to circumference and area of a circle, and in turn of cylinders. When the diameter of a circle doubles, the circumference of the circle also doubles but the area within the circle quadruples:

When a circle's diameter is 1 unit, its circumference is π (PI) units = 3.14159 units. The area of a circle is π (PI) times the Radius squared, which is written: $A = \pi \times r^2$.

	DIAMETER (inches)	RADIUS (inches)	CIRCUMFERENCE (inches)	AREA (sq. inches)
Circle 1:	3.00	1.50	9.42	7.07
Circle 2:	6.00	3.00	18.85	28.27
Circle 2 relative to Circle 1:	**2.0**	2.0	2.0	**4.0**

Note that when the diameter of a circle doubles, the circumference of the circle also doubles but the area within the circle *quadruples.*

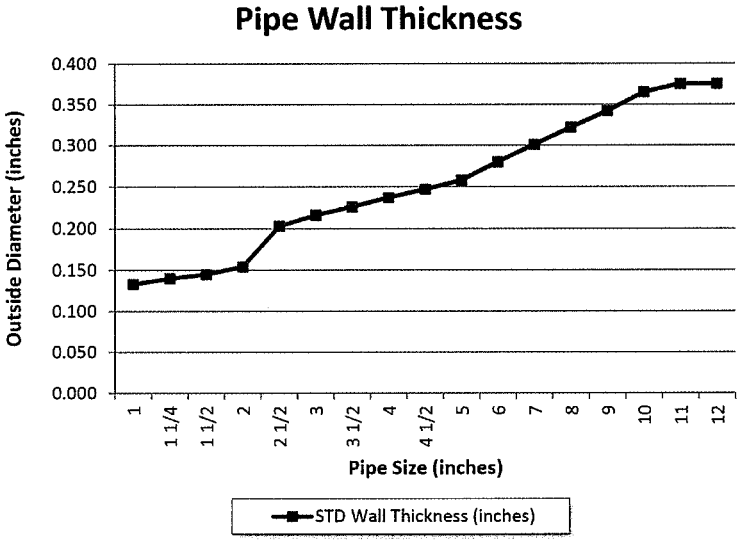




The volume of a cylinder (aka, a "hole in the ground") is the area of a circle times the height (depth) of the hole. The volume of Cylinder 2 is four times the volume of Cylinder 1, even though it's only twice as wide.

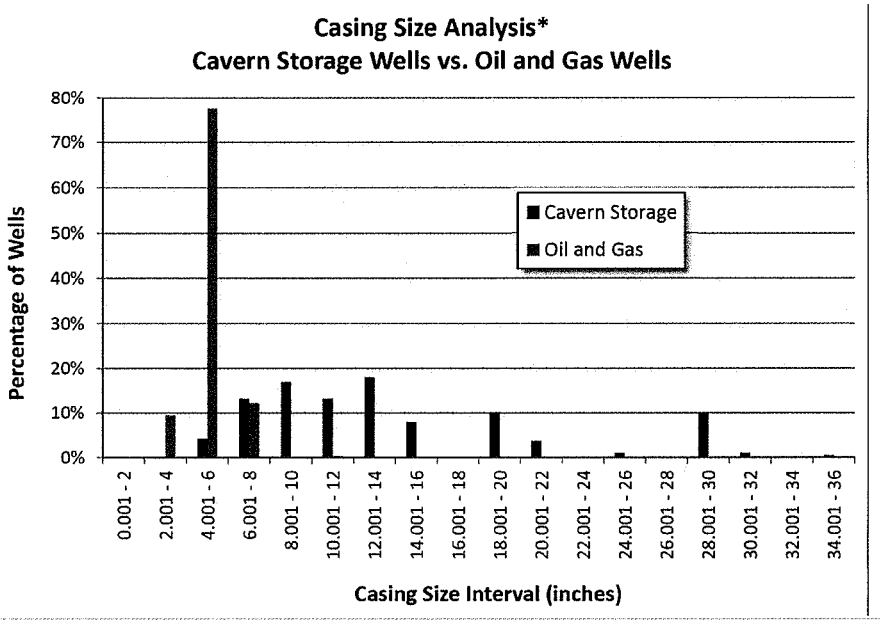
The point of going through this math is that a man or machine digging a hole in the ground will have to remove four times the amount of dirt for Cylinder 2 compared to Cylinder 1 (assuming both holes are of equal depth). The cost of time and labor will naturally be much higher for Cylinder 2 versus Cylinder 1. THE EXACT SAME CONCEPT APPLIES TO THE COST OF DRILLING A WELL.

In addition to the labor (installation cost), the cost of the pipe (i.e., casing) that would be needed for Cylinder 2 will be at least double the cost of the pipe for Cylinder 1. Not only is the circumference of the larger diameter casing double, but the wall thickness of the casing increases with increasing diameter size (see chart, next page). This has a multiplicative effect on the amount of steel needed:



Per a study by Pritchard & Abbott, Inc., and previously presented to the LTC at a Rules and Regulations rebuttal hearing on July 24, 2013, please note the variety of long-string casing diameter sizes for all wells in Louisiana at that time operating in salt domes, compared to the relative uniformity of the long-string casing diameter for oil and gas wells:

	Cavern Storage Wells		**Oil and Gas Wells**	
Casing Diameter Interval (inches)*	Interval Count	Interval Percent	Interval Count	Interval Percent
0.001 - 2	-	0.0%	1	0.0%
2.001 - 4	-	0.0%	2,369	9.5%
4.001 - 6	8	4.2%	19,308	77.6%
6.001 - 8	25	13.2%	3,057	12.3%
8.001 - 10	32	16.9%	42	0.2%
10.001 - 12	25	13.2%	105	0.4%
12.001 - 14	34	18.0%	1	0.0%
14.001 - 16	15	7.9%	-	0.0%
16.001 - 18	-	0.0%	-	0.0%
18.001 - 20	19	10.1%	-	0.0%
20.001 - 22	7	3.7%	-	0.0%
22.001 - 24	-	0.0%	-	0.0%
24.001 - 26	2	1.1%	-	0.0%
26.001 - 28	-	0.0%	-	0.0%
28.001 - 30	19	10.1%	-	0.0%
30.001 - 32	2	1.1%	-	0.0%
32.001 - 34	-	0.0%	-	0.0%
34.001 - 36	1	0.5%	-	0.0%
	189	100.0%	24,883	100.0%



*Refers to "long-string" casing diameter, which is the inner-most and deepest set casing in the wellbore and which involves drilling expenditures beyond the surface and/or any intermediate strings of casing. The long-string casing diameter is a fundamental driver of total drilling cost of the wellbore.

Note the uniformity of diameter size for oil and gas wells tightly centered on the 4-6" range. This is why the three cost-new tables formerly in Chapter 9 (Tables 907.A-1, 2, and 3) were viable as styled for the assessment of oil and gas wells with a singular cost-new figure for any particular depth range. Conversely, the relative non-uniformity of casing diameter sizes for salt dome wells will cause assessment issues if Table 1007.A is adopted in final version as is currently tentatively adopted. This table needs more than a single one-size-fits-all column of cost-new figures. There needs to be multiple columns for different diameter sizes. **This will be difficult to create, maintain, and use.** Utilizing Chapter 25 to assess brine mining wells will let the parties get around these issues related to diameter size, just as it currently does for the assessment of salt dome wells being used for storage purposes.

ALTERNATIVE ARGUMENT: APPROPRIATE COST-NEW FIGURES FOR TABLE 1007.A

The cost-new figures in tentatively adopted Table 1007.A are far short of actual cost to construct a typical salt dome solution mining well, because casing diameter size for solution mining wells far exceeds the 4-6" diameter size typical for oil and gas wells. *Size matters!* The figures in Table 1007.A are woefully inadequate and inappropriate for several reasons:

- These figures are an exact duplication of the cost-new figures in Table 907.A-2 for oil wells in Region 2-South Louisiana, as adopted for tax year 2022. As the LTC is aware, the cost-new figures in Tables 907.A-1, 2, and 3 for oil, gas, and associated wells have not been rigorously updated for over five years while the Chapter 9 stakeholder committee was developing a new appraisal model for oil and gas wells. This committee was formed, in part, precisely because the Louisiana well cost data needed to update these tables was no longer available, which meant

a reliable indicator of value using the cost approach was no longer feasible.

- RCN tables 907.A-1, 2, and 3 in prior versions of the Rules and Regulations were built with actual drilling and completion costs gathered by American Petroleum Institute (API) for oil and gas wells. Per API, no injection wells of any kind were included in this cost data.
- Most importantly, brine wells used for solution mining purposes in salt domes are typically constructed with much larger diameters of casing strings than for oil and gas wells (over 14" long-string casing diameter on average for salt dome wells statewide vs. 4.5" typical diameter for the long-stream casing diameter of oil and gas wells). Construction costs ramp up exponentially (actually, geometrically), and not linearly, with larger casing diameters.

Below are LAA's recommended cost-new figures for salt dome cavern wells, keying on long-string casing diameter size. Each figure in the table applies to a well's entire drilled footage. The underlying calculations are attached in EXHIBIT 1. Known actual construction costs from a base year of CY2014 are trended to CY2022 with a composite index built on yearly changes in drilling rig day rates and completion cost services. Efficiency gains through the years are taken into account to recognize the fewer days needed to drill a well now versus then. In addition, the index's weighting between the cost to drill component vs. the cost to complete component gradually shifts whereas more weighting is assigned to the completion component.

LTC TENTATIVE ADOPTION, OCTOBER 5, 2022:

Table 1007.A
Brine Operation Wells
All Regions - Louisiana

Producing Depths	Cost – New by depth, per foot for Brine Operation Wells	
	Cost @ 100%	15% Assessed
0 - 1,249 ft.	163.31	24.50
1,250 - 2,499 ft.	120.98	18.15
2,500 - 3,749 ft.	118.13	17.72
3,750 - 4,999 ft.	104.13	15.62
5,000 - 7,499 ft.	142.25	21.34
7,500 - 9,999 ft.	194.06	29.11
10,000 - 12,499 ft.	264.61	39.69
12,500 - 14,999 ft.	347.13	52.07
15,000 - 17,499 ft.	562.28	84.34
17,500 - 19,999 ft.	686.51	102.98
20,000 - Deeper ft.	366.58	54.99

LAA RECOMMENDATION, NOVEMBER 4, 2022:

Table 1007.A
Brine Operation Wells
All Regions - Louisiana

Long-String Casing Diameter Size	Cost – New $ per foot for Brine Operation Wells	
Inches	Cost @ 100%	15% Assessed
4	671.00	100.65
5	807.08	121.06
6	941.50	141.23
7	1,074.91	161.24
8	1,207.71	181.16
9	1,340.19	201.03
10	1,472.51	220.88
11	1,604.82	240.72
12	1,737.19	260.58
13	1,867.71	280.16
14	2,002.42	300.36
15	2,135.37	320.31
16	2,268.57	340.29
17	2,402.07	360.31
18	2,535.87	380.38
19	2,669.99	400.50
20	2,804.43	420.66
21	2,939.21	440.88
22	3,074.34	461.15
23	3,209.81	481.47
24	3,345.63	501.84
25	3,481.80	522.27
26	3,618.32	542.75
27	3,755.20	563.28
28	3,892.42	583.86
29	4,030.00	604.50
30	4,167.93	625.19
31	4,306.21	645.93
32	4,444.83	666.72
33	4,583.80	687.57
34	4,723.11	708.47
35	4,862.76	729.41
36	5,002.74	750.41
37	5,143.07	771.46
38	5,283.72	792.56
39	5,424.71	813.71
40	5,566.02	834.90

Thank you for your consideration of these comments prior to finalizing the Rules and Regulations for tax year 2023. LAA will be glad to expound upon these comments and the underlying calculations supporting the cost-new figures provided above, at the commissioners' convenience.

Sincerely,

PRITCHARD & ABBOTT, INC.

Rodney K. Kret, RPA
Manager, Engineering Services Department

copy: Ms. Belinda Hazel, Chairman, LAA Oil and Gas Committee

enclosures

EXHIBIT 1:

Pritchard & Abbott's Supporting Calculations

Cost per foot to drill a 20" diameter (long-string casing) salt dome cavern well

Diameter (inches):	20	20	20	20	20	20	20	20	20
Year:	2014	2015	2016	2017	2018	2019	2020	2021	2022
Change from Prev Year:*		-15.90%	-21.20%	-3.90%	1.40%	3.10%	-13.40%	4.60%	3.33%
Cost per foot:	$4,500.00	$3,784.50	$2,982.19	$2,865.88	$2,906.00	$2,996.09	$2,594.61	$2,713.97	$2,804.43

Diameter (inches)	Cost per foot based on diameter size (figure applies to well's entire drilled footage)								
4	$1,076.70	$905.50	$713.54	$685.71	$695.31	$716.86	$620.80	$649.36	$671.00
5	$1,295.05	$1,089.14	$858.24	$824.77	$836.32	$862.24	$746.70	$781.05	$807.08
6	$1,510.73	$1,270.52	$1,001.17	$962.13	$975.60	$1,005.84	$871.06	$911.13	$941.50
7	$1,724.80	$1,450.55	$1,143.04	$1,098.46	$1,113.84	$1,148.37	$994.48	$1,040.23	$1,074.91
8	$1,937.90	$1,629.78	$1,284.26	$1,234.18	$1,251.45	$1,290.25	$1,117.36	$1,168.75	$1,207.71
9	$2,150.47	$1,808.55	$1,425.13	$1,369.55	$1,388.73	$1,431.78	$1,239.92	$1,296.96	$1,340.19
10	$2,362.80	$1,987.12	$1,565.85	$1,504.78	$1,525.85	$1,573.15	$1,362.35	$1,425.01	$1,472.51
11	$2,575.09	$2,165.65	$1,706.54	$1,639.98	$1,662.94	$1,714.49	$1,484.75	$1,553.05	$1,604.82
12	$2,787.51	$2,344.29	$1,847.30	$1,775.26	$1,800.11	$1,855.91	$1,607.22	$1,681.15	$1,737.19
13	$3,000.14	$2,523.12	$1,988.22	$1,910.68	$1,937.43	$1,997.49	$1,729.83	$1,809.40	$1,869.71
14	$3,213.09	$2,702.21	$2,129.34	$2,046.30	$2,074.95	$2,139.27	$1,852.61	$1,937.83	$2,002.42
15	$3,426.42	$2,881.62	$2,270.71	$2,182.16	$2,212.71	$2,281.30	$1,975.61	$2,066.48	$2,135.37
16	$3,640.16	$3,061.38	$2,412.36	$2,318.28	$2,350.74	$2,423.61	$2,098.85	$2,195.39	$2,268.57
17	$3,854.37	$3,241.52	$2,554.32	$2,454.70	$2,489.07	$2,566.23	$2,222.35	$2,324.58	$2,402.07
18	$4,069.06	$3,422.08	$2,696.60	$2,591.43	$2,627.71	$2,709.17	$2,346.14	$2,454.07	$2,535.87
19	$4,284.27	$3,603.07	$2,839.22	$2,728.49	$2,766.69	$2,852.46	$2,470.23	$2,583.86	$2,669.99
20	$4,500.00	$3,784.50	$2,982.19	$2,865.88	$2,906.00	$2,996.09	$2,594.61	$2,713.97	$2,804.43
21	$4,716.27	$3,966.38	$3,125.51	$3,003.62	$3,045.67	$3,140.08	$2,719.31	$2,844.40	$2,939.21
22	$4,933.09	$4,148.73	$3,269.20	$3,141.70	$3,185.68	$3,284.44	$2,844.33	$2,975.16	$3,074.34
23	$5,150.47	$4,331.54	$3,413.26	$3,280.14	$3,326.06	$3,429.17	$2,969.66	$3,106.27	$3,209.81
24	$5,368.41	$4,514.83	$3,557.69	$3,418.94	$3,466.80	$3,574.27	$3,095.32	$3,237.70	$3,345.63
25	$5,586.91	$4,698.59	$3,702.49	$3,558.09	$3,607.90	$3,719.75	$3,221.30	$3,369.48	$3,481.80
26	$5,805.97	$4,882.82	$3,847.66	$3,697.60	$3,749.37	$3,865.60	$3,347.61	$3,501.60	$3,618.32
27	$6,025.60	$5,067.53	$3,993.21	$3,837.48	$3,891.20	$4,011.83	$3,474.25	$3,634.06	$3,755.20
28	$6,245.80	$5,252.71	$4,139.14	$3,977.71	$4,033.40	$4,158.44	$3,601.21	$3,766.86	$3,892.42
29	$6,466.56	$5,438.37	$4,285.44	$4,118.31	$4,175.96	$4,305.42	$3,728.49	$3,900.00	$4,030.00
30	$6,687.87	$5,624.50	$4,432.11	$4,259.26	$4,318.89	$4,452.77	$3,856.10	$4,033.48	$4,167.93
31	$6,909.75	$5,811.10	$4,579.15	$4,400.56	$4,462.17	$4,600.50	$3,984.03	$4,167.30	$4,306.21
32	$7,132.19	$5,998.17	$4,726.56	$4,542.22	$4,605.81	$4,748.59	$4,112.28	$4,301.45	$4,444.83
33	$7,355.18	$6,185.70	$4,874.33	$4,684.24	$4,749.81	$4,897.06	$4,240.85	$4,435.93	$4,583.80
34	$7,578.71	$6,373.70	$5,022.47	$4,826.60	$4,894.17	$5,045.89	$4,369.74	$4,570.75	$4,723.11
35	$7,802.80	$6,562.15	$5,170.98	$4,969.31	$5,038.88	$5,195.08	$4,498.94	$4,705.89	$4,862.76
36	$8,027.42	$6,751.06	$5,319.84	$5,112.36	$5,183.94	$5,344.64	$4,628.46	$4,841.37	$5,002.74
37	$8,252.59	$6,940.42	$5,469.05	$5,255.76	$5,329.34	$5,494.55	$4,758.28	$4,977.16	$5,143.07
38	$8,478.28	$7,130.24	$5,618.63	$5,399.50	$5,475.09	$5,644.82	$4,888.41	$5,113.28	$5,283.72
39	$8,704.51	$7,320.49	$5,768.55	$5,543.57	$5,621.18	$5,795.44	$5,018.85	$5,249.72	$5,424.71
40	$8,931.26	$7,511.19	$5,918.82	$5,687.98	$5,767.62	$5,946.41	$5,149.59	$5,386.47	$5,566.02

*The calculations above attempt to derive the yearly change, in percentage terms, of the cost to drill and complete an oil and gas well in the United States, from a base year of 2014. A separate index is constructed for each cost component (drilling vs. completion), and adjustments are made where needed to further account for improvements in efficiency. Each component's indicated percentage change is weighted to account for percent of total cost the component represents for any particular year. The cost per foot is further delineated by diameter size and corresponding volume of wellbore created by the diameter size, both of which affect cost on a non-linear scale.

From Investopedia.com: The day rate includes the cost of drilling an oil well, including the cost to run the rig, supplies, and employees. These costs generally make up half the total cost of an oil well. Tends to have a positive correlation with oil prices and rig utilization rates.

The strength of the correlation between oil prices and day rates is not consistent. The correlation is strong when oil prices and rig utilization are both high. In this situation, day rates increase almost in lockstep with prices. In an environment of rising oil prices and high utilization, the day rates in a long-term contract will shoot up even faster than short term contracts as rig operators demand a premium for being locked in on a project.

In a low price environment with falling utilization, however, the day rate may plunge much faster than the oil prices as rigs enter low bids on long contracts just to keep busy in a potential slowdown. Due to the volatility and the varying strength of the correlation, investors and traders can flip between seeing day rates as a leading or a lagging indicator for oil prices and the health of the oil and gas industry as a whole.