COMPANY: Standard Lithium Ltd. | NYSE AMEX: SLI
INDUSTRY: Direct Lithium Extraction

<table>
<thead>
<tr>
<th>PRICE (AS OF CLOSE 11/17/2021)</th>
<th>MARKET CAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>USD 9.87</td>
<td>USD 1.46 BN</td>
</tr>
</tbody>
</table>

Standard Lithium Ltd. ("Standard Lithium" or the "Company") is a former penny stock whose shares soared 3,000% in the past two years on a favorable commodities cycle and a wave of investor euphoria for electric vehicles and their component parts.

Standard Lithium generates zero revenues. Its valuation is predicated on the claim that its direct lithium extraction ("DLE") technology can achieve 90% recovery rates in extracting battery grade lithium from the tail brine at its Demonstration Plant situated on a bromine production facility in Arkansas.

Standard Lithium has told investors that the technology has already achieved “proof of concept” and that its Demonstration Plant is a success. Yet undisclosed to investors, production records filed by Standard Lithium with the Arkansas regulator indicate that actual recovery rates are far lower than projected by the Company, indicating that the Demonstration Plant is extracting far lower quantities of lithium than should be the case. The data also shows that recovery rates are getting substantially worse the more brine is processed, suggesting the pilot facility has negative scale. In short, we think this regulatory data is a smoking gun which indicates that the technology is neither economically viable nor scalable. Standard Lithium’s absurd valuation rests solely on the viability of this Demonstration Plant, making this data, in our opinion, near fatal to the Company’s NPV projections and therefore its stock price.

1. Arkansas Regulatory Filings Indicate Lithium Recovery Rates Far Less than Forecasted. Standard Lithium has repeatedly claimed that its DLE technology will achieve 90% recovery rates at its Demonstration Plant, built on the LANXESS AG ("LANXESS") (FRA: LXS) bromine facility in Southern Arkansas. Yet undisclosed to investors, production data submitted by Standard Lithium to the Arkansas Oil & Gas Commission (the “AOGC”) appears to show that the Demonstration Plant, which has been operating for 18 months, is barely achieving a fraction of this projected recovery rate. We calculate that in the past 12 months, based on the data, the Demonstration Plant achieved an average lithium recovery rate of just 13%. The data also indicates that the Demonstration Plant is displaying negative scale, with recovery rates substantially worse the longer the plant operates and the more brine it processes. We corroborated our analysis with an expert in DLE. In our opinion, this data suggests that the technology is neither economically viable nor scalable.

2. Why Hasn’t the Demonstration Plant Produced More Lithium Carbonate? Standard Lithium claims that it has already produced “large quantities” of battery-grade lithium carbonate from the Arkansas brine. Yet according to the Arkansas regulatory records, the Demonstration Plant has produced just 66 pounds of lithium carbonate to date – or USD 900 worth. For context, the Demonstration Plant has been operational since May 2020 and is supposed to produce 100–150 tonnes of lithium carbonate per year. The Demonstration Plant is permitted to operate for 18 months, so it is already well on its way to the end of its operating life. This begs the obvious question: if the Demonstration Plant is up and running and the technology is viable, why hasn’t the Company produced any more than de minimis amounts of lithium carbonate? We think it is because, as the data suggests, the technology is neither as viable nor as scalable as the Company projects.

3. German Partner Denies that Technology Has Met “Proof of Concept.” Standard Lithium’s valuation is predicated largely on its claim that its technology already achieved “proof of concept” in December 2020. This is critical because upon “proof of concept,” LANXESS has agreed, as part of a potential 70/30 JV, to fund the construction of Standard Lithium’s commercial flagship DLE project. Sell side analysts predicted in early 2021 that the formal JV announcement would be “imminent.” It never came. LANXESS’s CEO said in 2021 that proof of concept had yet to be achieved and that the “extraction is not fully there where we would like it to be.” Not only are such statements consistent with the Arkansas data, but directly contradict the Company’s claims to investors that the critical “proof of concept” milestone has been reached.
4. **Chemicals Giant Albemarle Chose Not to Pursue DLE Project in Smackover.** In 2011, Albemarle Corporation ("Albemarle") (NYSE:ALB) – a USD 34 billion multinational chemicals company – announced that it was developing proprietary technology to extract lithium from brine in the Smackover formation in southern Arkansas. However, Albemarle eventually chose not to pursue DLE in Arkansas because the operating costs and capital requirements were too onerous given the quality problems with the lithium extracted. We think this is consistent with Standard Lithium’s results to date. If Albemarle was unable to achieve economically viable lithium extraction in southern Arkansas in 10 years of trying, despite deeper technical expertise and a balance sheet 100x the size of the Company, we think it is highly unlikely that Standard Lithium has much more success.

5. **Classic Penny Stock.** Standard Lithium bears many of the hallmarks of a classic penny stock. Since 2017, the Company has raised more than USD 80 million (CAD 100 million) via dilutive equity issuances, causing its share count to soar 549%. Despite zero revenues and shareholder dilution, Standard Lithium has enriched management with generous consulting payments and equity grants. The Company is burning cash, prompting a "going concern" warning from its auditor and sell side predictions that further dilutive equity issuances are on the way.

Today, Standard Lithium, despite zero revenues and mere speculation that its technology will work as advertised, trades at 25x book value and 64% of the Company’s own ludicrous NPV projections. Even compared to other Lithium hype stocks, Standard Lithium is wildly overpriced.

![Bar Chart: EV/NPV – DLE Peers](chart.png)

*Source: Capital IQ, Company Filings. Refers to post tax NPV*

Ultimately, the bull narrative for the stock is that the Company’s unproven (and questionable) technology has already achieved "proof of concept," yet the Arkansas data suggests that Standard Lithium is recovering far less lithium than it projects to investors. In our opinion, such data is a **smoking gun** indicating that the technology is neither economically viable nor scalable, which we think is near fatal for a zero-revenue story stock like Standard Lithium.
1. Arkansas Regulatory Filings Indicate Lithium Recovery Rates Far Less than Forecasted.

Standard Lithium’s valuation is predicated on the claim that its technology can achieve high lithium recovery rates of 90% (vs 40%–60% for conventional processes). Standard Lithium claims that it has successfully proven this technology at its Demonstration Plant, which has been operating “full-time” since May 2020 in Southern Arkansas. But undisclosed to investors, independent data submitted by Standard Lithium to the Arkansas regulator appears to show otherwise.

When Standard Lithium completed commissioning of its Demonstration Plant in May 2020, it claimed that one of the key features of the technology was that it increased lithium recovery efficiencies to more than 90%. The Company repeated this claim at its ribbon cutting ceremony in September 2020.

![Standard Lithium Completes Commissioning and Commences Full-time Operation of Its Lithium Extraction Demonstration Plant](image)

Not only is this key to Standard Lithium’s bull narrative, but it is also the key assumption underpinning the Company’s lofty NPV forecasts. For example, Standard Lithium forecasts that its LANXESS Project is worth USD 989 million based on the assumption that it can recover 90% of the lithium from the brine.

![Table 16-3 Annualized Production Summary (metric)](image)

1 Standard Lithium defines this as “final product” lithium recovery.
Standard Lithium built its Demonstration Plant to prove the viability and scalability of both its LANXESS Project and its technology. The Company spent over USD 26.7 million (CAD 33 million) building and operating the Demonstration Plant to date.²

Despite being in operation for 18 months, Standard Lithium has been coy about disclosing any details to investors regarding the performance of the plant, only claiming that testing at the plant has been “successful.” We disagree.

The Arkansas Oil & Gas Commission (the “AOGC”) is the state-level regulatory body responsible for oil and gas related activities in Arkansas. Pursuant to its operating permit, Standard Lithium must disclose the Demonstration Plant’s performance to the AOGC. Specifically, the order dictates that Standard Lithium must report the total quantities of tail-brine processed, and of lithium chloride and lithium carbonate produced from the Demonstration Plant every quarter.

![Order from AOGC](image)

Source: AOGC

Although difficult to find, the AOGC publishes these quarterly reports on its website, making them publicly available for any investor to review. Because the government website is difficult to navigate, we think that these filings have not been widely read or understood by the market.

² As shown in Standard Lithium’s 2021 Annual Report, the Company spent USD 20,771,220 (CAD 25,964,026) in construction costs, USD 2,211,310 (CAD 2,764,138) on subsequent additions and USD 3,676,924 (CAD 4,596,156) in pilot plant operating expenses.
Lithium from Brine - Quarterly Analysis

The following management’s discussion and analysis ("MD&A") for Standard Lithium Ltd. was prepared as of the filing, and it should be reviewed in conjunction with the audited consolidated financial statements for the six months ended June 30, 2018. The financial statements have been prepared in accordance with generally accepted accounting principles in Canada. All dollar figures are expressed in Canadian dollars.

Quarterly Reports:
- Select a report year.
- Select a report from the folder:
  - 2018
  - 2019
  - 2020
  - 2021

Source: AOGC

<table>
<thead>
<tr>
<th></th>
<th>2020 Q2</th>
<th>2020 Q3</th>
<th>2020 Q4</th>
</tr>
</thead>
<tbody>
<tr>
<td>The total volumes of tail brine throughput at the Pilot Plant.</td>
<td>US gal</td>
<td>362,952</td>
<td>1,618,731</td>
</tr>
<tr>
<td>The minimum, maximum, and average concentrations of lithium in the source tail brine.</td>
<td>Minimum (mg/L)</td>
<td>194</td>
<td>184</td>
</tr>
<tr>
<td></td>
<td>Maximum (mg/L)</td>
<td>223</td>
<td>215</td>
</tr>
<tr>
<td></td>
<td>Average (mg/L)</td>
<td>210</td>
<td>202</td>
</tr>
<tr>
<td>The output of lithium carbonate, lithium chloride, and lithium hydroxide.</td>
<td>Lithium carbonate (lbs)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Lithium chloride (US gal)</td>
<td>23,658</td>
<td>39,501</td>
</tr>
<tr>
<td></td>
<td>Lithium hydroxide (lbs)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>The disposition of volumes of lithium carbonate, lithium chloride, and lithium hydroxide produced/sent to any user. Applicant’s estimate of the volume of each product it has determined to be unmarketable.</td>
<td>Lithium carbonate</td>
<td>No lithium carbonate produced.</td>
<td>No lithium carbonate produced.</td>
</tr>
<tr>
<td></td>
<td>Lithium chloride</td>
<td>All lithium chloride sent for reinjection.</td>
<td>4,560 US gal sent off-site</td>
</tr>
</tbody>
</table>

Source: AOGC
Given that the Demonstration Plant was commissioned in May 2020 (with a ribbon cutting in September 2020), we would expect the results to generally match the Company’s claims, especially regarding the efficiency of the technology.

Yet the records show that in the last 12 months, Standard Lithium’s Demonstration Plant processed 6.2 million gallons of raw brine, containing a total of 5.1 tonnes of lithium (based on the reported average concentration of 217 mg/L). From this, the data indicates that the Demonstration Plant produced only 30 thousand gallons of lithium chloride.

### Lithium Production to Date at the Demonstration Plant

<table>
<thead>
<tr>
<th></th>
<th>Q2 20</th>
<th>Q3 20</th>
<th>Q4 20</th>
<th>Q1 21</th>
<th>Q2 21</th>
<th>Q3 21</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Raw Brine Throughput</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(gallons)</td>
<td>362,952</td>
<td>1,618,731</td>
<td>1,566,221</td>
<td>733,854</td>
<td>1,702,835</td>
<td>2,176,775</td>
</tr>
<tr>
<td><strong>Average Li concentration (mg/L)</strong></td>
<td>210</td>
<td>202</td>
<td>225</td>
<td>216</td>
<td>218</td>
<td>212</td>
</tr>
<tr>
<td><strong>Lithium Chloride Output (gallons)</strong></td>
<td>23,658</td>
<td>39,501</td>
<td>4,435</td>
<td>8,005</td>
<td>8,866</td>
<td>8,983</td>
</tr>
<tr>
<td>of which sent off site (gallons)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>5,280</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Lithium Carbonate Produced (lbs)</strong></td>
<td>-</td>
<td>-</td>
<td>44</td>
<td>-</td>
<td>22</td>
<td>-</td>
</tr>
</tbody>
</table>

*Source: AOGC*

The concentration of this lithium chloride is not included in the Arkansas data. However, in its June 2021 prospectus, Standard Lithium stated that the Demonstration Plant will produce lithium chloride at a “high” concentration of 3,000–5,000 mg/L.
This is in line with the concentration of the lithium chloride assumed in the Company’s economic projections.

Even if we assume that the concentration of the lithium chloride produced by the Demonstration Plant is at the top end of the Company’s forecasted range, we calculate that the implied average recovery rate for the Demonstration Plant over the past 12 months was just 13%.

### Demonstration Plant Recovery Rate Calculation

<table>
<thead>
<tr>
<th></th>
<th>Q2 20</th>
<th>Q3 20</th>
<th>Q4 20</th>
<th>Q1 21</th>
<th>Q2 21</th>
<th>Q3 21</th>
<th>TTM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw Brine Throughput (gallons)</td>
<td>362,952</td>
<td>1,618,731</td>
<td>1,566,221</td>
<td>733,854</td>
<td>1,702,835</td>
<td>2,176,775</td>
<td>6,179,685</td>
</tr>
<tr>
<td>Average Li Concentration (mg/L)</td>
<td>210</td>
<td>202</td>
<td>225</td>
<td>216</td>
<td>218</td>
<td>212</td>
<td>217</td>
</tr>
<tr>
<td>Li Content in Raw Brine (tonnes)</td>
<td>0.29</td>
<td>1.24</td>
<td>1.33</td>
<td>0.60</td>
<td>1.41</td>
<td>1.75</td>
<td>5.09</td>
</tr>
<tr>
<td>Lithium Chloride Output (gallons)</td>
<td>23,658</td>
<td>39,501</td>
<td>4,435</td>
<td>8,005</td>
<td>8,866</td>
<td>8,983</td>
<td>30,289</td>
</tr>
<tr>
<td>Average Li Concentration (mg/L)</td>
<td>5,949</td>
<td>5,949</td>
<td>5,949</td>
<td>5,949</td>
<td>5,949</td>
<td>5,949</td>
<td>5,949</td>
</tr>
<tr>
<td>Li Recovered in Lithium Chloride (tonnes)</td>
<td>0.53</td>
<td>0.89</td>
<td>0.10</td>
<td>0.18</td>
<td>0.20</td>
<td>0.20</td>
<td>0.68</td>
</tr>
<tr>
<td>% Lithium Recovery Rate</td>
<td>185%</td>
<td>72%</td>
<td>7%</td>
<td>30%</td>
<td>14%</td>
<td>12%</td>
<td>13%</td>
</tr>
</tbody>
</table>

Source: AOGC Blue: Reported Number, Red: BOC Assumption.

*We assume a concentration of 5,949 mg/L for lithium chloride produced at the Demonstration Plant which is the concentration used in Standard Lithium’s economic assessment and at the top end of the range for the plant.*

The entire purpose of the pilot facility is to show that the technology is scalable. **Yet, the data shows that as the Demonstration Plant has continued to operate, recovery rates have plummeted.** In Q3 2021, the Arkansas data

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3 The implied recovery rate in Q2 2020, at the opening of the plant, using our concentration assumption (5949 mg/L) is 185%, which indicates that not only is our assumption is highly generous but also the actual concentration of lithium chloride recovered at the Demonstration Plant is far lower than assumed.

4 Patent documents indicate that the maximum concentration of lithium chloride produced by Standard Lithium’s LiSTR technology during testing at its mini pilot plant was 4,500 mg/L. Based on this, we think that our concentration assumption is likely generous.
shows that the plant processed over 2 million gallons of brine yet generated only 8,983 gallons of lithium chloride. Despite processing 6x more brine in Q3 2021 than Q2 2020, the data shows that Standard Lithium recovered 62% less lithium chloride.

**Demo Plant Lithium Recovery Rate vs Cumulative Brine Processed**

![Graph showing lithium recovery rate](image)

Source: AOGC, BOC Calculation

Not only does this undermine the viability of the technology but we think this data undermines the narrative that the technology is commercially scalable, as recovery rates appear to be decreasing as the Demonstration Plant processes more brine.

For an apples-to-apples comparison between the Company’s projected 90% recovery rate and the Arkansas data, the only assumption we make is to give Standard Lithium the benefit of the doubt regarding the concentration of the lithium chloride extracted from the brine.

**Lithium Recovery Rate: Claims vs. Arkansas Data for the Demo Plant**

<table>
<thead>
<tr>
<th>Per Annum</th>
<th>Economic Assessment (South Plant)</th>
<th>Demonstration Plant TTM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw Brine Processed (cbm)</td>
<td>9,878,443</td>
<td>23,393</td>
</tr>
<tr>
<td>Li Concentration (mg/L)</td>
<td>205</td>
<td>217</td>
</tr>
<tr>
<td>Li Content in Raw Brine (tonnes)</td>
<td>2,025</td>
<td>5.1</td>
</tr>
<tr>
<td>Lithium Chloride Produced (cbm)</td>
<td>306,342</td>
<td>115</td>
</tr>
<tr>
<td>Li Concentration (mg/L)</td>
<td>5,949</td>
<td>5,949</td>
</tr>
<tr>
<td>Li Content in Lithium Chloride Produced (tonnes)</td>
<td>1,822</td>
<td>0.7</td>
</tr>
<tr>
<td>% Recovery Rate</td>
<td>90%</td>
<td>13%</td>
</tr>
</tbody>
</table>


To verify our analysis, we submitted both the Arkansas data and the Company’s technical reports to a DLE expert, who confirmed not only our calculations but also our conclusion that the Arkansas data indicated that the Demonstration Plant was falling far, far short of Standard Lithium’s claims.
We also spoke to a former Albemarle executive, who told us that the Demonstration Plant should be able to perform at least as well as the Company projects in its commercial scale forecasts. This is because as the process scales up, projects such as this typically become less efficient.

“What I would tell you is, in theory they ought to be able to do at least as well in the pilot plant as they expect to do commercially. I mean, that’s why you do a pilot plant, and sometimes a process like this is frankly easier to do on a smaller scale in terms of what you can do in terms of recovery and things like that. As you scale up you actually lose some efficiency as opposed to gaining some. I would tend to be skeptical of any numbers that say there is going to be a dramatic improvement between the pilot plant and commercial production.”

— Former Albemarle Executive

Standard Lithium cannot claim that the Demonstration Plant is in ramp up phase. The Demonstration Plant has been running full time since May 2020, meaning that it is now almost at the end of its two-year operating life as per the Company’s financial disclosures. In their operating permit, the AOGC actually stipulated that the plant should not run for more than 18 months.

1. The term of the Pilot Plant testing period shall not exceed 18 months once commencement of extraction begins. The Applicants shall inform Arkansas Oil and Gas Commission staff, in writing, of the commencement of operations at the Pilot Plant.

Source: AOGC

Standard Lithium’s NPV and stock price rest on the notion that it is able to achieve recovery rates of 90%. Yet the Arkansas records show that the Demonstration Plant is recovering far less lithium than forecasted. In our opinion, the results at the Demonstration Plant are a damning indictment of the viability of the project and the value of Standard Lithium’s technology.
2. Why Hasn’t the Demonstration Plant Produced More Lithium Carbonate?

Standard Lithium claims that it has already produced large quantities of battery-grade lithium carbonate from the brine in Arkansas. Yet the AOGC data states that Standard Lithium has produced just 66 lbs of lithium carbonate in 18 months.

Company disclosures state that the Demonstration Plant is designed to produce an equivalent production of 100–150 tonnes of lithium carbonate per year.

Between September 2020 and July 2021, Standard Lithium shipped bulk volumes of lithium chloride from its Demonstration Plant in Arkansas to its SiFT Plant in Vancouver for conversion to lithium carbonate. The first of these shipments was a 20,000-liter shipment of lithium chloride in September 2020. Standard Lithium claimed that it continued these shipments until border restrictions were lifted in July 2021 at which time it relocated the SiFT Plant from Vancouver to Arkansas.

In the July 2021 press release announcing the relocation of the SiFT Plant, Standard Lithium’s COO, Andy Robinson, told investors that the SiFT Plant’s operations in Vancouver had been “extremely successful,” and the plant had produced “large volumes” of lithium carbonate.

Robinson explicitly qualified that these large volumes of lithium carbonate were made using “lithium chloride made by the El Dorado Plant” (the Demonstration Plant) in Arkansas.

If a plant designed to produce between 100–150 tonnes per annum of lithium carbonate has been operating since May 2020, then we would expect, as the Company claims, to see it produce “large volumes of lithium carbonate.” But the Arkansas regulatory filings state that the Company has produced just 66 lbs, or USD 900 worth, of lithium carbonate to date from the Arkansas brine.

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5 Q3 2021 Interim Report MD&A Page 8.
6 Based on price per tonne of USD 30,000.
The disposition of volumes of lithium carbonate, lithium chloride, and lithium hydroxide produced sent to any user. Applicant’s estimate of the volume of each product it has determined to be unmarketable.

<table>
<thead>
<tr>
<th>Lithium carbonate</th>
<th>Q2 20</th>
<th>Q3 20</th>
<th>Q4 20</th>
<th>Q1 21</th>
<th>Q2 21</th>
<th>Q3 21</th>
</tr>
</thead>
<tbody>
<tr>
<td>No lithium carbonate produced.</td>
<td>No lithium carbonate produced.</td>
<td>44 lbs lithium carbonate produced off-site</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lithium chloride</th>
<th>Q2 20</th>
<th>Q3 20</th>
<th>Q4 20</th>
<th>Q1 21</th>
<th>Q2 21</th>
<th>Q3 21</th>
</tr>
</thead>
<tbody>
<tr>
<td>All lithium chloride sent for re-injection.</td>
<td>4,560 US gal sent off-site</td>
<td>All lithium chloride sent for re-injection.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
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<th>Q1 21</th>
<th>Q2 21</th>
<th>Q3 21</th>
</tr>
</thead>
<tbody>
<tr>
<td>No lithium carbonate produced.</td>
<td>22 lbs lithium carbonate produced placed into storage off-site</td>
<td>No lithium carbonate produced.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
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<tr>
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<th>Q1 21</th>
<th>Q2 21</th>
<th>Q3 21</th>
</tr>
</thead>
<tbody>
<tr>
<td>All lithium chloride sent for re-injection.</td>
<td>5,280 US gal sent off-site</td>
<td>All lithium chloride sent for re-injection.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: AOGC

Lithium Carbonate Production

<table>
<thead>
<tr>
<th>Q2 20</th>
<th>Q3 20</th>
<th>Q4 20</th>
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<td>4,435</td>
<td>8,005</td>
<td>8,866</td>
</tr>
<tr>
<td>Lithium Chloride Sent Off Site (gallons)</td>
<td>-</td>
<td>4,560</td>
<td>-</td>
<td>-</td>
<td>5,280</td>
</tr>
<tr>
<td>Lithium Carbonate Produced (lbs)</td>
<td>-</td>
<td>-</td>
<td>44</td>
<td>-</td>
<td>22</td>
</tr>
</tbody>
</table>

Source: AOGC

Under the terms of its operating permit, Standard Lithium is required to report all outputs of lithium carbonate and lithium hydroxide produced from the brine. This is important because Arkansas law stipulates that brine processors have a duty to make royalty payments to the owner of the brine for any additional substances extracted.

ORDER

Now, therefore, the Applicants’ request for operation of a Pilot Plant to test the commercial viability of the extraction of Lithium from processed brine (“tail brine”) produced from the Smackover Formation underlying certain lands within the South Unit and South Expansion Unit in Union County, Arkansas, is granted, subject to the following requirements:

1. The term of the Pilot Plant testing period shall not exceed 18 months once commencement of extraction begins. The Applicants shall inform Arkansas Oil and Gas Commission staff, in writing, of the commencement of operations at the Pilot Plant.

2. The Applicants shall file a quarterly report, within 15 days of the conclusion of each calendar quarter, which shall include the following information:
   a. The total volumes of tail brine throughput at the Pilot Plant.
   b. The minimum, maximum, and average concentrations of Lithium in the source tail brine.
   c. The output of Lithium Carbonate, Lithium Chloride, and Lithium Hydroxide.
   d. The disposition of volumes of Lithium Carbonate, Lithium Chloride, and Lithium Hydroxide produced and the disposition of volumes of Lithium Carbonate, Lithium Chloride, and Lithium Hydroxide sent to any user.
   e. The volumes of Lithium Carbonate, Lithium Chloride, and Lithium Hydroxide that are stored on-site along with Applicant’s estimate of the volume of each product it has determined to be unmarketable. Applicant will provide comment as to the standard it has used to determine marketability.
   f. Any other information deemed necessary by the Director.

Source: AOGC
The Arkansas filings state Standard Lithium produced 44 lbs of lithium carbonate offsite in 2020 and 22 lbs in 2021. To put that in context, that figure is less than 0.03% of the nameplate annual capacity of lithium carbonate at the Demonstration Plant.

### Lithium Carbonate Produced from Lithium Chloride from Demonstration Plant

<table>
<thead>
<tr>
<th>Q2-20 - Q3-21</th>
<th>(tonnes)</th>
<th>(lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstration Plant Capacity (LCE)</td>
<td>100</td>
<td>220,400</td>
</tr>
<tr>
<td>Total Lithium Carbonate Produced to Date</td>
<td>0.03</td>
<td>66</td>
</tr>
<tr>
<td><strong>Production % of Capacity</strong></td>
<td><strong>0.03%</strong></td>
<td><strong>0.03%</strong></td>
</tr>
</tbody>
</table>

Source: Company filings, AOGC

Standard Lithium cannot claim that this is deliberate. Since September 2020, the Company has shipped significant volumes of lithium chloride to its SiFT Plant specifically for the purpose of converting to lithium carbonate.
The Arkansas data indicates that Standard Lithium produced just 66 lbs of lithium carbonate in total. Even at today’s prices, that’s less than USD 900 worth.\footnote{Based on price per tonne of USD 30,000.}

The AOGC filings state that in total, Standard Lithium sent 9,840 gallons of lithium chloride off-site (37,248 liters) in the past 18 months. Assuming that this lithium chloride was of the concentration projected by the Company in its economic forecast, it should have contained enough lithium to produce more than 2,599 lbs of lithium carbonate, which is still a far cry from the 100–150 tonnes of lithium carbonate in annual production capacity which Standard Lithium initially claimed for the Demonstration Plant.\footnote{Lithium carbonate conversion based on an assumed lithium concentration of 5,949 mg/L and a conversion factor of 5.319 lithium to lithium carbonate equivalent.}

The point is, Standard Lithium designed a plant to produce 100–150 tonnes of lithium carbonate per year. The Company claims that its extraction process is working well, and that it has produced significant quantities of lithium carbonate specifically from the Arkansas brine.

But according to the AOGC data, it has produced very little lithium carbonate using the Arkansas brine. And this is not for lack of trying. In our opinion, such meager recoveries are another data point indicating that the Company’s technology is neither economically viable nor scalable.
3. German Partner Denies that Technology Has Met “Proof of Concept.”

Standard Lithium’s valuation is predicated largely on the Company’s claims that its technology has already achieved “proof of concept.” Yet the comments and actions of its proposed joint venture partner appear to directly contradict such claims, undermining both the status of Standard Lithium’s technology and the value of its projects.

Standard Lithium’s flagship project and the cornerstone of its USD 1.44 billion valuation is a contemplated joint venture with LANXESS which the Company claims is worth USD 989 million. The proposed 70/30 joint venture will be funded by LANXESS, but only once the technology has shown “proof of concept” at the Demonstration Plant.

Standard Lithium claims to have already achieved this milestone. In December 2020, Standard Lithium claimed that it had successfully completed “start-to-finish proof-of-concept” of its extraction and crystallization technology.

The announcement prompted sell side analysts to initiate coverage on Standard Lithium, speculating that a formal joint venture announcement with LANXESS was “imminent.”

Yet 11 months later and no such formal JV announcement has materialized, despite Standard Lithium continuing to reaffirm that it has achieved proof of concept, including in an October 2021 Press Release where Standard Lithium claimed to have “done it at a large scale.”

Critically, LANXESS appears to reject Standard Lithium’s claims that the project has already achieved “proof of concept.” On an August 2021 earnings call, LANXESS’s CEO reminded shareholders that LANXESS will only

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9 Proof of concept is met when the economic feasibility has been proven by testing carried out at a pilot plant.
provide capital for the extraction project once “proof of concept” is achieved, which according to LANXESS, **has still not happened.**

On a call in May 2021, LANXESS’s CEO went so far as to state that the “**extraction is not fully there where we would like it to be.**”

LANXESS's own investor presentations also appear to paint a decidedly more tempered view of the technology, referring to the LANXESS Project as a mere “**free option.**”

On recent a conference call in November 2021, just two weeks ago, LANXESS’s CEO confirmed that there was no update.

Standard Lithium claimed to achieve “proof of concept” nearly a year ago. Yet its partner – a large German specialty chemical producer likely extremely familiar with the project – quite clearly does not consider this to be the case. Not only has it yet to agree funding, but comments from its CEO also clearly indicate that **the technology has not sufficiently progressed to reach this milestone.** This is consistent with the Arkansas regulatory filings, which show
that the Demonstration Plant is extracting far less lithium and producing far less lithium carbonate than the Company claimed would be the case.
4. **Chemicals Giant Albemarle Chose Not to Pursue DLE Project in Smackover.**

Attempts to extract the lithium via alternative methods stretch back decades, yet have not succeeded in Southern Arkansas because of the relatively poor concentration of Lithium in the Smackover compared to other geographies. Dow Chemical Corporation first filed a patent for extraction from Arkansas brines in 1979.

![Lithium Concentration – Brine Projects](image)

Source: *University of Texas 2018*

In 2011, Albemarle – a USD 34 billion multinational chemicals company – announced that it had developed a proprietary technology to extract lithium from Smackover brines at its southern Arkansas bromine production facilities.

For context, Albemarle is a large specialty chemicals company with brine leases in Arkansas located directly in the middle of Standard Lithium’s two projects.

![Map of Standard Lithium and Albemarle](image)

Source: *Standard Lithium*

*Note: Albemarle’s brine asset is shaded in green.*

Albemarle launched its DLE project in the same location as Standard Lithium. Unlike Standard Lithium, Albemarle had far greater financial resources, technical expertise, and experience operating in the area. As an operator of bromine
facilities, it had a significant incentive to make DLE work, given its potential to generate profits from byproduct of Albemarle’s existing bromine production operations.

Yet, in 2014, even amidst an uptick in the commodity price of lithium, Albemarle announced that the project costs—both capex and operating—were proving prohibitively high.

When recently interviewed by a local Arkansas newspaper in August, Albemarle’s President of Lithium and Chief Strategy Officer Eric Norris stated that oilfield brines—such as those used by Standard Lithium in Arkansas—produce lithium with quality problems. He also noted that direct extraction is more capital intensive and consumes a lot more water and energy—both of which are significant drawbacks to the economic viability of the process.

When asked about lithium extraction in Arkansas on a recent earnings call, Albemarle’s CEO indicated that Albemarle would most likely not consider revisiting the Arkansas lithium project until later in the decade, due to the “technical challenges” and “cost profile” involved.
We spoke to a former Albemarle executive who said that lithium extraction in Arkansas was unlikely to make sense even at today’s high lithium prices.

**Blue Orca:** Do you think it would make sense for Albemarle to revisit the project at today’s prices?

**Former Albemarle Executive:** “If you’re going to really develop a [lithium] project, Arkansas is not the place to do it. You need a brine which is 500–600 ppm to really compete in the industry no matter what.... Our [lithium] recycling economics are better than going through this [lithium extraction] process.”

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Former Albemarle Director

Albemarle halted its DLE in southern Arkansas because the process was not economically viable, given the costs and the quality of lithium extracted from the brine.

If Albemarle passed on extracting DLE from brine at its bromine facility, we think it is highly unlikely that Standard Lithium would have any more success. Indeed, this tracks with the Arkansas regulatory filings, which show that the pilot plant is extracting far less lithium than it told investors to expect. Albemarle, it seems, knew best.
5. **Classic Penny Stock.**

Standard Lithium bears many of the hallmarks of a classic penny stock, with serial capital raising in the form of dilutive equity issuances which, despite generating zero revenues for the Company, have enriched management.

- **Dilutive Equity Issuances Used to Fund Cash Burn**

Since 2017, the Company has raised more than USD 80 million (CAD 100 million) via dilutive equity issuances, causing its share count to soar 549%.

<table>
<thead>
<tr>
<th>Standard Lithium Shares Outstanding from 2017–2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shares Outstanding (m)</td>
</tr>
<tr>
<td>% Cumulative Dilution</td>
</tr>
</tbody>
</table>

*Source: Company Financial Statements*

The Company has already burned through nearly USD 60 million (CAD 74 million) of this, funding speculative pilot plant projects and generous payments to management.

<table>
<thead>
<tr>
<th>Standard Lithium Cash Flows from 2017–2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAD M</td>
</tr>
<tr>
<td>Cash Flows from Operations</td>
</tr>
<tr>
<td>Cash Flows from Investments</td>
</tr>
<tr>
<td>CFO + CFI</td>
</tr>
<tr>
<td>Cash Flows from Financing</td>
</tr>
</tbody>
</table>

*Source: Company Financial Statements*

Since 2017, Standard Lithium’s handful of executives have received more than USD 3.8 million (CAD 4.7 million) in management fees and a further USD 9.68 million (CAD 12.1 million) in share-based payments. That’s more than USD 1.6 million (CAD 2 million) per executive.

<table>
<thead>
<tr>
<th>Standard Lithium Related Party Transactions by Type from 2017–2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAD M</td>
</tr>
<tr>
<td>Management and Consulting Fees</td>
</tr>
<tr>
<td>Share-Based Payments</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

*Source: Notes to the Financial Statements: Related Party Transactions*

The Company also supposedly spent USD 26.7 million (CAD 33 million) on its Demonstration Plant. Yet financial disclosures reveal that the salvage value of the plant as of next year is just USD 0.64 million (CAD 0.8 million).

- **Going Concern Warning from Auditor**

With Standard Lithium years away from generating revenue and an annual cash burn of USD 15.4 million (CAD 19 million), the Company’s auditor appears to be concerned. In its most recent accounts, Standard Lithium’s auditor expressed a going concern warning; a rare occurrence for a company with over USD 1.4 billion market capitalization.

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11 22 million shares outstanding as of 2017. 141 million shares as of June 2021.
With a cash balance of just USD 18 million (CAD 23 million), the only way for Standard Lithium to avoid a liquidity crisis will be to dilute current shareholders. The sell-side forecasts that Standard Lithium will need to raise a further USD 200 million (CAD 250 million) in the coming years.

Yet this is likely an under-estimate. The recent assessment for Standard Lithium’s TETRA Project estimated that the project would cost USD 870 million to fund. The supposed funding partner for its other project LANXESS, appears to be stalling.
Conclusion

Having soared 3,000% in the past two years, Standard Lithium’s stock is now close to pricing in even its own highly dubious NPV projections. Today, the Company trades at an enterprise value of USD 1.44 billion, which is 64% of the combined post tax NPV for its two flagship projects, LANXESS and Tetra. By comparison, DLE peers trade at 15%–49% of their NPV’s.

### Standard Lithium NPV Projections

<table>
<thead>
<tr>
<th>Project</th>
<th>USDm</th>
<th>Post Tax NPV</th>
<th>% Ownership</th>
<th>PF Post Tax NPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>LANXESS</td>
<td>989</td>
<td>30%</td>
<td>297</td>
<td></td>
</tr>
<tr>
<td>Tetra</td>
<td>1,965</td>
<td>100%</td>
<td>1,965</td>
<td></td>
</tr>
<tr>
<td><strong>Total post tax NPV</strong></td>
<td></td>
<td></td>
<td><strong>2,262</strong></td>
<td></td>
</tr>
</tbody>
</table>

_Source: Company Filings_

For context, Standard Lithium paid a combined USD 8.5 million for its initial interests in these two projects. Today the Company values them at more than USD 2 billion.

### EV/NPV – Listed DLE Peers

And the comparison is also generous, since Standard Lithium’s NPV is substantially inflated by its Tetra Project, which the Company recently announced but for which it has yet to publish a preliminary economic assessment. Excluding the Tetra project, Standard Lithium trades at an EV/NPV of 485%.

Ultimately, Standard Lithium is another ludicrously valued lithium story stock which trades on the notion, propagated by the Company, that its Lithium technology achieves a 90% efficiency rate and has already achieved “proof of concept.” We think the independent data from the Arkansas regulator indicates compellingly that the technology is neither economically viable nor scalable.
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