NI 43-101 TECHNICAL REPORT FOR THE DEFINITIVE FEASIBILITY STUDY FOR COMMERCIAL LITHIUM EXTRACTION PLANT AT LANXESS SOUTH PLANT

REPORT RSI-3353

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Cautionary Note Regarding Forward-Looking Information

These forward-looking statements relate to, among other things, resource estimates, grades and recoveries, development plans, mining methods and metrics including recovery process and, mining and production expectations including expected cash flows, capital cost estimates and expected life of mine, operating costs, the expected payback period, receipt of government approvals and licenses, time frame for construction, financial forecasts including net present value and internal rate of return estimates, tax and royalty rates, and other expected costs.

Forward-looking information is necessarily based upon a number of estimates and assumptions that, while considered reasonable, are inherently subject to significant political, business, economic and competitive uncertainties and contingencies. There may be factors that cause results, assumptions, performance, achievements, prospects or opportunities in future periods not to be as anticipated, estimated or intended.

There can be no assurances that forward-looking information and statements will prove to be accurate, as many factors and future events, both known and unknown could cause actual results, performance or achievements to vary or differ materially from the results, performance or achievements that are or may be expressed or implied by such forward-looking statements contained herein or incorporated by reference. Accordingly, all such factors should be considered carefully when making decisions with respect to the Project, and prospective investors should not place undue reliance on forward-looking information. Forward-looking information in this technical report is as of the effective date, August 18, 2023. Standard Lithium Ltd. assumes no obligation to update or revise forward-looking information to reflect changes in assumptions, changes in circumstances or any other events affecting such forward-looking information, except as required by applicable law.

CERTIFICATE OF AUTHOR

I, Randal M. "Randy" Brush, PE, as a co-author of the Technical Report titled *Technical Report for the Definitive Feasibility Study for Commercial Lithium Extraction Plant at LANXESS South Plant* (the Technical Report), effective date August 18, 2023, do hereby certify that:

- I am currently employed as President of William M. Cobb & Associates, Inc. with an office at 12770 Coit Road, Suite 907, Dallas, Texas, 75251.
- I hold a Master of Science degree in petroleum engineering from Stanford University and a Bachelor of Science in chemical engineering from Rice University.
- I am a member in good standing of the Society of Petroleum Engineers, a constituent organization within the AIME, the American Institute of Mining, Metallurgical and Petroleum Engineers (Member # 0515460). I am also a member of the Society of Petroleum Evaluation Engineers.
- I am a professional engineer, registered in Texas, and have been practicing in this capacity since 1999.
- As a professional engineer, I have over 42 years of experience in evaluating the injection and production of water, brines, and other fluids into and out of porous formations like the Smackover. This includes 10 years of evaluating this specific field. These tasks have included the following:
  - Using engineering analysis, mathematical modeling, and appropriate data collection and analysis techniques to evaluate the injection of gases, water, and steam into underground geologic formations, and the recovery of oil, gas, and water from those formations.
  - Specializing in reservoir evaluation, management, and simulation studies to define hydrocarbon (crude oil, condensate, and natural gas) and non-hydrocarbon (e.g., bromine, lithium, CO_2, and helium) reserves and inventories, providing ultimate recovery estimates by predicting reservoir performance under alternate development plans and various reservoir drive mechanisms, and evaluating the performance of gas and CO_2 storage reservoirs in response to internal and external operational factors.
- As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43-101.
- I am independent of Standard Lithium applying all the tests in Section 1.5 of NI 43101.
- I am co-responsible for Chapters 7–12 and 14–16 of this Technical Report.
- I have had prior involvement with the Property that is the subject of the Technical Report. The nature of my involvement included 10 years of evaluating the field's bromine recovery performance for *LANXESS*.
- Under my supervision, representatives from William M. Cobb & Associates, Inc. were Robert E. Williams, Jr., geologist, and Tor Meling, reservoir engineer.
- My most recent personal inspection of the Property was on May 17 to 19, 2022.
- I have read National Instrument 43-101, Form 43-101F1, and the Technical Report for which I am responsible, and the document has been prepared in compliance with National Instrument 43-101.
- As of the date of this certificate, to the best of my knowledge, information, and belief, this Technical Report contains all of the scientific and technical information that is required to be disclosed to clearly understand the Technical Report.
- I consent to the filing of this Technical Report with any stock exchange, provided that the Technical Report complies with the framework of that regulatory exchange, and other regulatory authority or publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public.

Signed in Dallas, Texas, October 18, 2023.

S/S Randal M. Brush

Randal M. Brush, PE
William M. Cobb & Associates, Inc.

CERTIFICATE OF AUTHOR

I, Robert E. Williams, Jr., PG, CPG, as a co-author of the Technical Report titled *Technical Report for the Definitive Feasibility Study for Commercial Lithium Extraction Plant at LANXESS South Plant* (the Technical Report), effective date August 18, 2023, do hereby certify that:

- I am currently employed as a Senior Geologist of William M. Cobb & Associates 12770 Coit Road Suite 907, Dallas Texas, 75251.
- I am a graduate of Oklahoma State University and earned a degree Bachelor of Science in Geology in 1991.
- I am a member in good standing of American Institute of Professional Geologists (AIPG) Certification #12158, awarded January 9, 2023.
- I am a professional geologist registered with Texas Board of Professional Geoscientists #3964, awarded August 31, 2003.
- As a Senior Geologist with over three decades of experience in the petroleum and mineral industry, I have worked extensively across various regions in North and South America. Notably, I have dedicated more than 10 years to the Smackover Formation, conducting projects spanning from Alabama to Texas. Throughout my career, my role has involved a diverse range of responsibilities, prominently focused on the detailed mapping of geologic subsurface attributes. This mapping process has played a fundamental role in evaluating reservoir volumetrics and accurate reserve estimates.
- As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43-101.
- I am independent of Standard Lithium applying all the tests in Section 1.5 of NI 43-101.
- I am co-responsible for Chapters 7–12 and 14–16 of this Technical Report.
- Under my supervision, representatives from William M. Cobb & Associates, Inc. was Donald L. Bailey, geologist.
- My most recent personal inspection of the Property was on May 17 to 19, 2022.
- I have read National Instrument 43-101, Form 43-101F1 and the Technical Report for which I am responsible, and the document has been prepared in compliance with NI 43-101.
- As of the date of this certificate, to the best of my knowledge, information, and belief, this Technical Report contains all of the scientific and technical information that is required to be disclosed to clearly understand the Technical Report.
- I consent to the filing of this Technical Report with any stock exchange, provided that the Technical Report complies with the framework of that regulatory exchange, and other regulatory authority or publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public.

Signed in Dallas, Texas, October 18, 2023.

S/S Robert E. Williams, Jr.

Robert E. Williams, Jr., PG, CPG
William M. Cobb & Associates, Inc.

RESPEC

CERTIFICATE OF AUTHOR

I, Charles Daniel Campbell, P.E., as a co-author of the Technical Report titled *Technical Report for the Definitive Feasibility Study for Commercial Lithium Extraction Plant at LANXESS South Plant* (the Technical Report), effective date August 18, 2023, do hereby certify that:

- I am currently retained as a Consulting Engineer by Alliance Technical Group with an office at 219 Brown Lane, Bryant, Arkansas, 72022.
- I hold a Bachelor of Science degree in petroleum engineering from Louisiana Tech University.
- I am a registered professional engineer in AR, KS, LA, MS, MO, OK, SC, and TX, and have been practicing in this capacity since 1983.
- As a professional engineer, I have over 35 years of experience in environmental engineering as a consultant, manager, and state regulator. I have performed environmental planning, cost analysis, design, and contract management for numerous industrial facilities. I have regulatory compliance experience including NPDES, wastewater treatment, evaluation of groundwater data, erosion/sediment control, Air (Title V and Minor Source), hazardous waste, solid waste, underground injection, and site remediation. Specific tasks include:
  - I directed environmental compliance activities programs for petroleum production and specialty chemical processing companies with multiple production, transportation, and distribution facilities in the U.S.
  - I was responsible for the preparation of NPDES, Title V, and RCRA permit applications
  - I have evaluated groundwater hydrology of monitoring well networks and prepared reports for regulatory agencies, conducted transient tests on recovery wells, and developed well rehabilitation projects
- As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43-101.
- I am independent of Standard Lithium applying all the tests in Section 1.5 of National Instrument 43-101.
- I am responsible for Chapter 20 of this Technical Report.
- I have had prior involvement with the Property that is the subject of the Technical Report. The nature of my involvement included consulting as an environmental professional retained by Standard Lithium as a regulatory resource for the subject Property. Related to the subject Property, I have been directly employed as an environmental professional by Great Lakes Chemical Corporation (GLCC), predecessor to LANXESS Corporation, and as a consulting environmental engineer to GLCC, Chemtura Corporation, and LANXESS Corporation.
- Under my supervision, representatives from GBMc & Associates, Inc. (now Alliance) have provided environmental regulatory support to LANXESS Corporation and its predecessors.
- My most recent personal inspection of the Property was on November 8, 2022.
- I have read National Instrument 43-101, Form 43-101F1, and the Technical Report for which I am responsible, and the document has been prepared in compliance with National Instrument 43-101.
- As of the date of this certificate, to the best of my knowledge, information, and belief, this Technical Report contains all of the scientific and technical information that is required to be disclosed to clearly understand the Technical Report.
- I consent to the filing of this Technical Report with any stock exchange, provided that the Technical Report complies with the framework of that regulatory exchange, and other regulatory authority or publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public.

Signed in Bryant, Arkansas, October 18, 2023.

S/S Charles Daniel Campbell

Charles Daniel Campbell, PE
Alliance (formerly GBMc & Associates)

CERTIFICATE OF AUTHOR

I, Frank Gay, PE, as a co-author of the Technical Report titled *Technical Report for the Definitive Feasibility Study for Commercial Lithium Extraction Plant at LANXESS South Plant* (the Technical Report), effective date August 18, 2023, do hereby certify that:

- I am the Vice President, Owner's Representative Services of Hunt, Guillot & Associates, LLC, with an office at 8401 New Trails Drive, Suite 175, The Woodlands, TX 77381.
- I hold a Bachelor of Science degree in chemical engineering from the Massachusetts Institute of Technology and a Master of Science degree in chemical engineering practice also from the Massachusetts Institute of Technology.
- I am a professional engineer, registered in North Carolina, have been practicing in this capacity since 1985, and am in good standing.
- As a professional engineer, I have more than 35 years of experience in project and engineering management, cost and scheduling control, process design, stress analysis, petrochemical industry, and design and execution. These tasks have included the following:
  - I participated in licensor selection, pre-front-end engineering design (pre-FEED), FEED, and Project Management Consulting (PMC) during the engineering, procurement, and construction (EPC) phase. I set up and led the project from early configuration studies through FEED, followed by the PMC role during detailed design, procurement, and construction. The project consisted of the design and installation of four major inside battery limits (ISBL) units, including a naphtha hydrocracker, diesel hydrotreater, a hydrogen production unit, a sulfur recovery unit, and associated utilities and off-sites for a major refinery expansion on the west coast of Saudi Arabia. My responsibilities included overall management of cost schedule and quality for the FEED and capital cost estimate for the project.
  - I developed Pre-FEED (design basis scoping paper [DBSP]) package for a new-technology polyols facility located in Saudi Arabia. The work was performed entirely in Saudi Arabia using approximately 30% Saudi engineers and other project management professionals. I was responsible for the execution of the project.
- As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43-101.
- I am independent of Standard Lithium applying all the tests in Section 1.5 of National Instrument 43-101.
- I am responsible for Chapter 22 of this Technical Report.
- I have not had prior involvement with the Property that is the subject of the Technical Report.
- I have never visited the Property.
- I have read National Instrument 43-101, Form 43-101F1, and the Technical Report for which I am responsible, and the document has been prepared in compliance with National Instrument 43-101.
- As of the date of this certificate, to the best of my knowledge, information, and belief, this Technical Report contains all of the scientific and technical information that is required to be disclosed to clearly understand the Technical Report.
- I consent to the filing of this Technical Report with any stock exchange, provided that the Technical Report complies with the framework of that regulatory exchange, and other regulatory authority or publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public.

Signed in Ruston, Louisiana, October 18, 2023.

S/S Frank Gay

Frank Gay, PE
Hunt, Guillot & Associates, LLC

CERTIFICATE OF AUTHOR

I, Susan B. Patton, PE, Principal Consultant, as a co-author of the Technical Report *Technical Report for the Definitive Feasibility Study for Commercial Lithium Extraction Plant at LANXESS South Plant* (the Technical Report), effective date August 18, 2023, do hereby certify that:

- I am currently employed as a Principal Consultant of RESPEC, 1601 Riverfront Drive, Suite 204, Grand Junction, Colorado, 81501.
- I hold a Bachelor of Science degree in mining engineering from the New Mexico Institute of Mining and Technology, a Master of Science degree in Mineral Engineering from the University of Alabama, and an interdisciplinary Doctorate in Mineral and Environmental Engineering from the University of Alabama.
- I am a registered member in good standing of the Society for Mining, Metallurgy and Exploration (Member #248220).
- I am a professional engineer, registered in Alabama, Colorado, New Mexico, Montana, West Virginia, Pennsylvania, South Dakota, Utah, and Kentucky.
- I am a mining engineer and have been practicing in this capacity since 1983.
- As a Principal Consultant, I have been involved with mineral brines since 2007. These tasks have included resource and reserve estimation for dilute mineral brines for the production of potash, magnesium chloride, and lithium
- As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43-101.
- I am independent of Standard Lithium applying all the tests in Section 1.5 of NI 43-101.
- I am responsible for Chapters 1–6 and 23–27 of this Technical Report.
- I have had no prior involvement with the Property that is the subject of the Technical Report.
- My most recent personal inspection of the Property was on June 27, 2023.
- I have read National Instrument 43-101, Form 43-101F1 and the Technical Report for which I am responsible, and the document has been prepared in compliance with National Instrument 43-101.
- As of the date of this certificate, to the best of my knowledge, information, and belief, this Technical Report contains all of the scientific and technical information that is required to be disclosed to clearly understand the Technical Report.
- I consent to the filing of this Technical Report with any stock exchange, provided that the Technical Report complies with the framework of that regulatory exchange, and other regulatory authority or publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public.

Signed in Grand Junction, Colorado, October 18, 2023.

S/S Susan B. Patton

Susan B. Patton, PE
RESPEC Consulting, Inc.

CERTIFICATE OF AUTHOR

I, Mike Rockandel, President, as an author of the Technical Report titled *Technical Report for the Definitive Feasibility Study for Commercial Lithium Extraction Plant at LANXESS South Plant* (the Technical Report), effective date August 18, 2023, do hereby certify that:

- I am currently employed as President of Mike Rockandel Consulting, LLC with an office at 11414 N. Mountain Breeze, Tucson, Arizona, 85737.
- I hold a Bachelor of Science degree in metallurgical engineering from the University of British Columbia.
- I am a member in good standing of the Society for Mining, Metallurgy and Exploration (Member # 4122579).
- As a process and engineering consultant, I have been involved with lithium since 2018. I have more than 45 years of varied process experience at all levels of project development from laboratory development through commissioning, startup, and operations supervision. I am skilled in process modeling with tools such as Metsim and HSC Chemistry. My career has been broad based covering projects in the hydro and pyrometallurgical, industrial minerals, chemical, and environmental industries. Throughout much of my career, I have worked as a lead process engineer responsible for the preparation of process flow diagrams, mass balances, process design specification, equipment sizing and specification, utility, and operating cost evaluation, bid evaluation, commissioning, start-up, and process optimization. These tasks have included the following:
  - I assisted Lithium Nevada in the development of their clay-based lithium project. My duties have included flowsheet development, simulation, and optimization of the process, preparation of specifications, and assistance with equipment selection.
  - I am the lead process engineer for the American Pacific Borate and Lithium pre-feasibility study (in-situ) colemanite leach process producing 90,000 t/y of boric acid. This project is now advancing to the FEED stage. This project includes a Mannheim potassium sulphate production facility.
- As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43-101.
- I am independent of Standard Lithium applying all the tests in Section 1.5 of NI 43-101.
- I am responsible for Chapters 13, 17, and 21 of this Technical Report.
- I have had no prior involvement with the Property that is the subject of the Technical Report.
- My most recent personal inspection of the Property was on October 10–12, 2022.
- I have read National Instrument 43-101, Form 43-101F1 and the Technical Report for which I am responsible, and the document has been prepared in compliance with National Instrument 43-101.
- As of the date of this certificate, to the best of my knowledge, information, and belief, this Technical Report contains all of the scientific and technical information that is required to be disclosed to clearly understand the Technical Report.
- I consent to the filing of this Technical Report with any stock exchange, provided that the Technical Report complies with the framework of that regulatory exchange, and other regulatory authority or publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public.

Signed in Tucson, Arizona, October 18, 2023.

S/S Mike Rockandel

Mike Rockandel, President
Mike Rockandel Consulting, LLC

TABLE OF CONTENTS

RESPEC

LIST OF TABLES

LIST OF FIGURES

1.0 EXECUTIVE SUMMARY

Standard Lithium Ltd. (Standard Lithium or Company) is a lithium development company with a portfolio of lithium production projects proposed for development in the United States of America (USA). The LANXESS Project refers to a suite of contemplated staged expansion projects relating to the LANXESS South, Central, and West Brine Production Units. This Commercial Lithium Extraction Plant Project at LANXESS South Plant (Phase 1A or Project) is the first stage of development of the LANXESS Project.

It is proposed that the Project will receive lithium-rich brine currently being produced from the Smackover Formation by LANXESS for their existing South Plant, and following bromine processing by LANXESS, extract the lithium from the residual brine using Direct Lithium Extraction technology, convert it to battery quality lithium carbonate, and then return the lithium-depleted brine to the existing South Plant brine disposal network for reinjection into the Smackover Formation.

Standard Lithium is a jointly listed company on the TSX Venture Exchange (stock symbol TSXV:SLI), New York Stock Exchange (stock symbol: NYSE American:SLI), and Frankfurt Stock Exchange (stock symbol: Frankfurt Exchange:S5L), with their head office in Vancouver, BC.

RESPEC Company, LLC (RESPEC) was commissioned by Standard Lithium to provide an independent Qualified Person's (QP) review and National Instrument (NI) 43-101 Technical Report (TR) on the commercial viability of lithium extraction on a mass scale from brine that is already produced for an existing bromine production facility operated by LANXESS Corporation (LANXESS) located near the town of El Dorado in Union County, Arkansas, USA.

LANXESS has the exclusive brine extraction rights for a contiguous block of 60,477 hectares (ha) [149,442 acres (ac)], contained within three brine production units, referred to as the South, Central and West Brine Units of which 15,458 ha [38,198 ac] make up the South Unit, the Property associated with the Project.

The purpose of this report is to summarize the results of the feasibility of the Project at the LANXESS South Plant including establishment of the associated brine Mineral Reserves and update the broader Mineral Resources for the overall LANXESS Project. The Definitive Feasibility Study (DFS) encompassed the geologic modeling, resource and reserve estimation, extraction planning and design, methodology and equipment, hydrogeology modeling, surface infrastructure requirements, labor, lithium processing Demonstration Plant test work results, lithium brine field operations, environmental and permitting, marketing, project economics, project development schedule, and risks in developing the Project.

Standard Lithium's objective is to become a leading American producer of high-quality lithium products from the Smackover region to supply domestic lithium markets and address long-term supply deficits. With the completion of the DFS the Project has demonstrated feasibility and established that lithium can be profitably extracted from Smackover brine.

1.1 PROPERTY DESCRIPTION

The LANXESS property is located south of the City of El Dorado in Union County, AR, USA, as presented in Figure 1-1. The southern and western edges of the Property border the state of Louisiana (LA) and Columbia County, respectively. The Property encompasses Townships 16-19 South, and Ranges 14-18, West of the 5th Meridian (W5M). The Property center is at Universal Transverse Mercator (UTM) 520600 Easting, 3670000 Northing, Zone 15N, NAD83.

LANXESS has the rights to extract brine from the South, Central, and West brine production units through the unitization by the Arkansas Oil and Gas Commission (AOGC). Definitive commercial agreements between LANXESS and Standard Lithium, once in effect, will grant Standard Lithium the associated rights required for lithium extraction. The production units, which are shown on the property overview in Figure 1-1, consist of 60,477 ha [149,442 ac] that cover over 608 square kilometers (km^2). Table 1-1 provides a description of the LANXESS Unitized land holdings. Each of the three Units (South, Central, and West) has their own brine supply wells, pipeline network, and bromine processing (extraction) infrastructure. The South Unit, which where referenced includes the South Unit Expansion, is the focus of the Project.

Standard Lithium and LANXESS signed a binding Revised and Restated Memorandum of Understanding (MOU) which forms the basis on which the parties agree to cooperate in a phased process towards developing commercial opportunities related to the production, marketing, and sale of battery-quality lithium products for South, Central and West Brine units (Standard Lithium Ltd., 2022). Specifically, the MOU sets out the process for the establishment of definitive commercial agreements between the parties, which once in place, will grant Standard Lithium rights required for development of the Project which is associated with the South Brine Unit and govern the broader relationship throughout the life of the Project. The MOU also provides LANXESS an option to acquire an ownership interest in the Project. A separate access, license and reservation agreement between the parties provides Standard Lithium the exclusive rights to 39 ha of surface lands for development of the Project and potential future stages of the LANXESS Project as well as access to the property for development purposes.

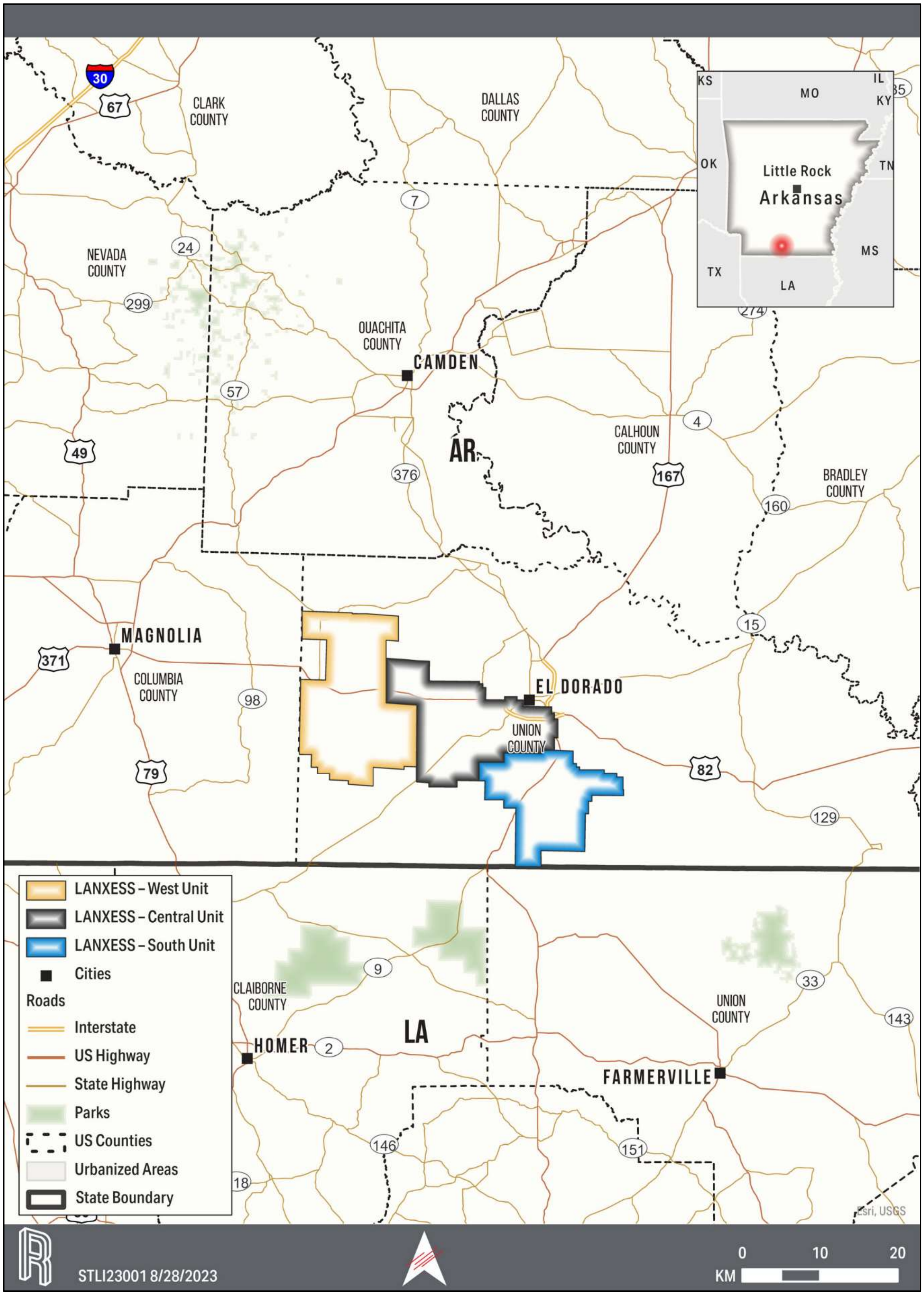


Figure 1-1. Overall Location Map

Table 1-1. Description of LANXESS Unitized and Non-Unitized Land Holdings for Brine Production

	AOGC Order Reference	Date	Acres	Hectares
South Plant Brine Unit	BU 1-1995	March 28, 1995	30,877	12,495
South Expansion Brine Unit	086-1-2016-11	November 28, 2016	7,321	2,963
Central Plant Brine Unit	BU 2-1995	August 22, 1995	42,974	17,391
Central Expansion Brine Unit	095-2022-12	January 5, 2023	6,560	2,655
West Plant Brine Unit	BU 3-1995	November 28, 1995	60,354	24,424
West Expansion Brine Unit-H	048-2-2015-04	May 14, 2015	1,356	549

Notes:

[1] The expansion brine units listed in the table are to differentiate the AOGC orders and dates from the original area brine units. Unless specifically stated in the TR, any reference to an area brine unit includes the associated expansion brine unit.

1.2 GEOLOGY AND MINERALIZATION

The focus of this resource assessment is the lithium bearing Smackover Formation in southern Arkansas. The Smackover Formation, Upper Jurassic in age, is commonly subdivided into two intervals: Upper and Lower.

The Upper Smackover interval is the development target for the Project and has been subdivided into the Reynolds Member oolite, an oolitic limestone, and the Middle Smackover. The Lower Smackover interval, also known as the Brown Dense, is composed of dark, dense limestone with argillaceous bands. The structure of the Smackover in the Property generally dips from north-northeast to south-southwest and varies in depth from approximately 1,920 meters [6,300 feet] subsea to approximately 2,621 meters [8,600 feet] subsea.

The Smackover Formation's productive characteristics have been extensively characterized by the drilling of over 1,000 wells in approximately 600 former and producing oil and gas fields, with approximately 150 of those fields in Arkansas.

1.3 STATUS OF EXPLORATION

No new exploration drilling has occurred for this TR as all production wells proposed for the Project are already constructed and producing. The lithium concentration data used in this TR resulted from brine samples collected by Standard Lithium from 2017 through May 2022 and analyzed by Western Environmental Testing Laboratory (WetLab). The concentration data for each well was used to develop a map of the initial distribution of lithium throughout the Property which formed the basis for the computer simulation model-based estimates. In addition, the brine samples collected at the inlet of each of the processing facilities were used to quantify the inlet lithium concentrations at the three bromine processing facilities for comparison to the simulation model's initial predicted values.

1.4 MINERAL RESOURCE ESTIMATE

A geologic multi-zone model of the Property was constructed using Petra® that serves the basis of the brine body simulation model. The geologic mapping covered the Property and the surrounding area. The volume of porous rock as described in the geologic model and the estimated lithium concentrations present in the brines stored within the formation on the Property serve as the basis for the Mineral Resource estimate.

The geologic multi-zone model was input into a Merlin finite-difference reservoir simulation model to estimate the resources present in each of the three Units. The Merlin finite-difference reservoir simulation model was used to model brine content, brine movement, bromine recovery, and lithium recovery. Simulation was required to estimate the resources because the ongoing production and injection of brine for bromine recovery project, while not altering the overall lithium content of the Property, results in geographical changes in lithium concentration over time.

Mineral Resources are subdivided in order of increasing geological confidence into Inferred, Indicated, and Measured categories. The total in-situ Measured and Indicated Brine Resource for the LANXESS Project are estimated at 2.8 Mt of Lithium Carbonate Equivalent (LCE) or 529,000 tonnes of elemental lithium at an average lithium concentration of 148 mg/L across all three units.

Table 1-2. LANXESS Project Mineral Resource Estimation by Unit

Category	Units	South	West	Central	Central Expansion	Total
Lithium Concentration	mg/L	204	122	164	78	148
Measured Resource	thousand tonnes	148	192	173	-	513
Indicated Resource	thousand tonnes	-	-	-	16	16
Measured LCE Resource	thousand tonnes	788	1,022	921	-	2,731
Indicated LCE Resource	thousand tonnes	-	-	-	85	85

Notes:
[1] Volumes are in-place.
[2] Cutoff of 9% porosity.
[3] The effective date is August 18, 2023.
[4] Mineral Resources are inclusive of Mineral Reserves.
[5] The Qualified Persons for the Mineral Resource Estimates is Randal M. Brush, PE and Robert E. Williams, Jr., PG, CPG.
[6] The Mineral Resource estimate follows 2014 CIM Definition Standards and the 2019 CIM MRMR Best Practice Guidelines.
[7] These Mineral Resources are not Mineral Reserves as they have not demonstrated economic viability.
[8] Calculated brine volumes only include Measured and Indicated Mineral Resource volumes that when blended from the well field result in feed above the cut-off grade of 100 mg/L.
[9] Lithium Carbonate Equivalent (LCE) is calculated using mass of LCE = 5.323 multiplied by mass of lithium metal.
[10] Results are presented in-situ. The number of tonnes was rounded to the nearest thousand. Any discrepancies in the totals are due to rounding effects.
[11] The Qualified Person is not aware of any known environmental, permitting, legal, title-related, taxation, socio-political or market issues, or any other relevant issue that could materially affect the potential development of Mineral Resources other than those discussed in the Mineral Resource Estimates.

1.5 MINERAL RESERVE ESTIMATE

Reserves were calculated from the simulated Smackover Formation brine production rates as applied to the South Unit. Proven and Probable Reserves were estimated from the Measured and Indicated Resources based on the forecast operating capacity of the South Plant brine supply and disposal network projected for a 25 and 40-year period.

Proven and Probable Lithium Brine Reserves are estimated to be recovered by the Project over a 25-year forecast period, with the anticipated Project start-up in 2026. Probable Lithium Brine Reserves are estimated to be recovered from year 26-40.

Table 1-3. LANXESS Project Phase 1A Mineral Reserves Estimation

Category	Units	Proven	Probable	Proven + Probable
Brine Reserves	million m^3	124	84	209
Average Lithium Concentration	mg/L	227	201	217
Lithium Metal	thousand tonnes	28.2	17.0	45.2
LCE Reserves	thousand tonnes	129	79	208

Notes:

[1] The effective date is August18, 2023.
[2] Any discrepancies in the totals are due to rounding effects.
[3] The Qualified Person for the Mineral Reserve estimate is Randal M. Brush, PE.
[4] Converted Reserves are exclusive to the South Brine Unit.
[5] The average lithium concentration is weighted per well simulated extraction rates.
[6] The Proven case assumes a 25-year operating life at 4.96 million m^3/year of brine production at a cut-off of 100 mg/L.
[7] Proven plus Probable reserves assume a 40-year operating life at 5.21 million m^3/year of brine production at a cut-off of 100 mg/L.
[8] The Reserves reference point for the Brine Pumped, Average Lithium Concentration, and Lithium Metal is the brine inlet to the processing plant.
[9] The Reserves reference point for the LCE is the product output of the processing plant.
[10] Lithium Carbonate production values consider plant processing efficiency factors.
[11] The Mineral Reserve estimate follows 2014 CIM Definition Standards and the 2019 CIM MRMR Best Practice Guidelines.
[12] Lithium Carbonate Equivalent ("LCE") is calculated using mass of LCE = 5.323 multiplied by mass of lithium metal.
[13] The Qualified Person is not aware of any known environmental, permitting, legal, title-related, taxation, socio-political or marketing issues, or any other relevant issue, that could materially affect the potential development of Mineral Resources other than those discussed in the Mineral Resource Estimates.

1.6 MINING METHODS

Recovery of the lithium will use the existing LANXESS South Unit brine production facilities to supply the Feed Brine from the LANXESS South Plant to the Project. Once the lithium is extracted from the brine, the processed brine will be reinjected into existing LANXESS South Unit brine disposal wells.

The Project contemplates production of battery-quality lithium carbonate averaging 5,400 tonnes per annum (tpa) over a 25-year operating life, producing 135,000 tonnes LCE from the LANXESS South Brine Unit.

The Project has the potential to operate over a 40-year life based on the Proven and Probable Reserves of 208,000 tonnes LCE. The TR makes very conservative assumptions that production of brine will occur from the existing wellfield, and that no additional wells are drilled in the future to supplement or add to the current brine flow, or to add additional brine from higher lithium content zones available in the production unit(s). See Figure 1-2 for the annual production plan.

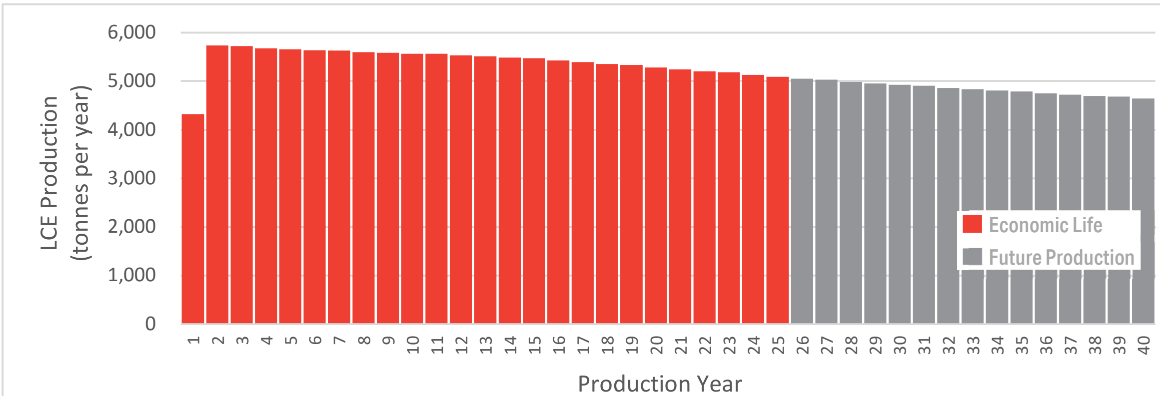


Figure 1-2. LANXESS Project Phase 1A Production Plan

1.7 RECOVERY METHOD

The Standard Lithium plant utilizes the Lithium Selective Sorption (LSS) process to directly extract lithium ions from bromine depleted pretreated Smackover brine delivered from the LANXESS South plant. LSS is a Koch Technology Solutions, LLC (KTS) proprietary technology. Under the joint development agreement with KTS, Standard Lithium has Smackover regional exclusivity for the LSS process for a period of time. Eluate from the LSS process (raw lithium chloride solution) is concentrated and purified and subsequently converted into battery-quality lithium carbonate.

Standard Lithium proposes to process up to 680 m^3/hr [3,000 US gpm] of brine containing on average 227mg/L lithium over the 25-year life of the Project. The brine is filtered, pH and temperature adjusted, followed by lithium extraction using the LSS process. The LSS product eluate is concentrated by conventional reverse osmosis, chemically softened for calcium and magnesium removal, and then passed through ion exchange columns to remove the residual calcium, magnesium, and boron. The treated brine is further concentrated by Osmotically Assisted Reverse Osmosis (OARO) prior to conventional two-stage lithium carbonate crystallization to produce up to 5,730 tonnes per year of lithium carbonate. The effluent brine is returned to the LANXESS facility for reinjection into the Smackover Formation through existing injection wells.

Standard Lithium has operated a Demonstration Plant, exclusively processing Smackover brine from LANXESS South Unit, since May 2020. This has provided a valuable source of knowledge in regard to the behavior of the brine, direct testing of various process elements, and providing a test bed for operator training. In addition, the Demonstration Plant has facilitated an ability to produce lithium chloride samples along with brine samples from various stages of the process to support additional bench scale metallurgical testing, mini-pilot plant testing and vendor testing in support of equipment design and process guarantees. The testing undertaken during the DFS phase produced battery-quality lithium carbonate from LANXESS South Unit brines processed through the Demonstration Plant, confirming the viability of the process.

Based on the performance at the Demonstration Plant, process modelling, and various performance and design criteria from potential equipment vendors, the processing facility is expected to recover 93.1% of the lithium contained in the brine delivered by LANXESS into battery-quality lithium carbonate.

1.8 PROJECT INFRASTRUCTURE

The proposed Project Facility is strategically located on undeveloped lands adjacent to the existing LANXESS South Plant to allow interconnection with key elements of existing LANXESS South Plant infrastructure, specifically the brine handling system. Supporting services including power, natural gas, and water is readily available and in close proximity to the Project Site.

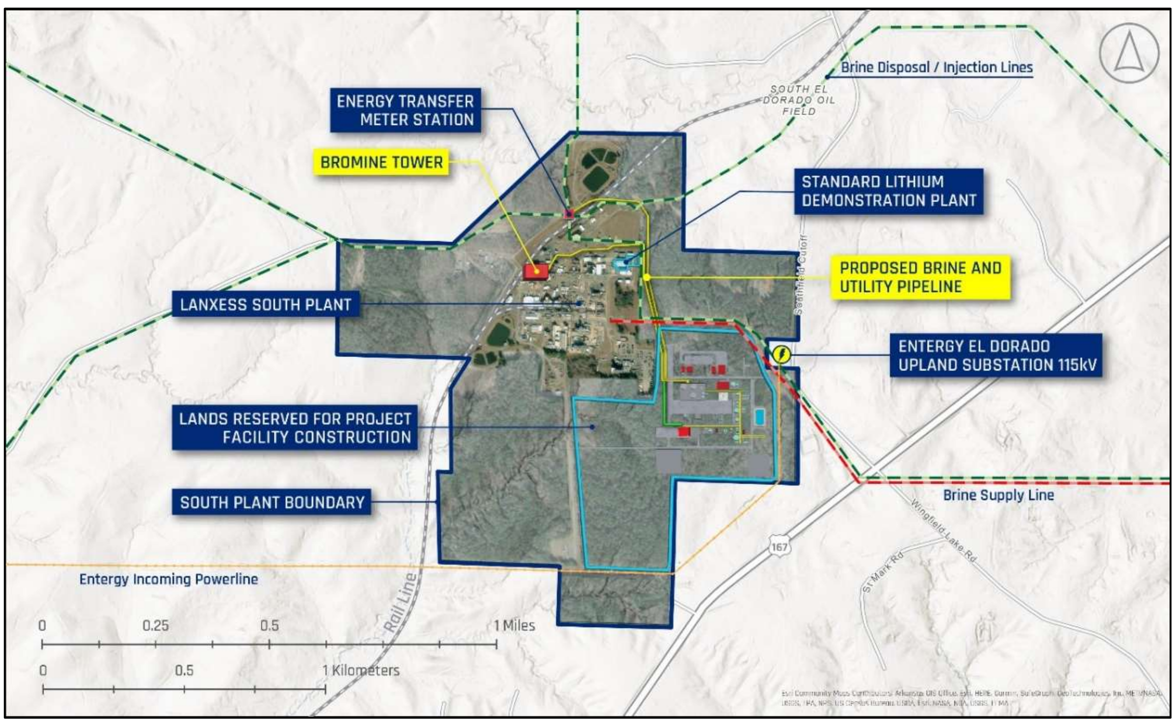


Figure 1-3. Proposed Project Location

Brine will be delivered to and from the Project Facility via two new fiberglass pipelines connecting the facility and the existing South Plant Tail Brine system. The processing plant includes facilities required for brine pre-treatment, direct lithium extraction, effluent brine handling, chemical softening, ion exchange, lithium chloride concentration, lithium carbonate production and product drying, milling, and packaging. The Project Facility also includes an administration building, hourly workers building, warehouse, maintenance shop, onsite laboratory, and guardhouse in support of the approximately 90 people anticipated to be required for its operation.

Natural gas will be delivered by Energy Transfer from their existing supply pipeline located north of the South Plant via a short dedicated interconnecting pipeline constructed and operated by the Project. A dedicated and independent power supply will be provided for the Project Facility by Entergy from their 115kV El Dorado Upland Substation which is located immediately to the east of the Project Facility. Two new Underground Injection Control Class I non-hazardous injection wells for disposal of any excess barren brine are also proposed to be constructed by the Project.

1.9 MARKETING

The demand for lithium is expected to continue to outpace supply for the foreseeable future even with the new supplies coming online due predominantly to the energy transition for lithium battery materials. For purposes of estimating project future cash flows a conservative price of $30,000/tonne was selected for use in economic evaluations over the lifetime of the project.

1.10 ENVIRONMENTAL PERMITTING

The Project is not subject to review under the National Environmental Policy Act (NEPA). Construction and operational emissions to air, surface waters, and subsurface waters are regulated by the federal and state agencies to protect the environment while allowing responsible development of the lithium resources. Table 1-4 lists the permits required by the Project Company. In addition, the existing LANXESS brine reinjection permit will be modified to include the Project Facility. The permit modification request will be initiated by LANXESS and supported by the Project.

Standard Lithium has initiated early consultation with permitting agencies for the construction and operation of the Project. A Baseline Environmental Site Assessment has been conducted as well as investigations of jurisdictional waters of the U. S., wildlife studies, and cultural resources of the Project.

Table 1-4. Project Permits

Agency	Permitted Activity
USACE	Placement of fill in waters of the U.S.
ADEE-DEQ	Air Permit for Commercial Facility
ADH	Fresh Water Supply for Potable Water
ADEE-DEQ	Construction Storm Water NPDES Permit for Facility Construction Site
ADEE-DEQ	Surface Discharge of Non-Brine Process Wastewater, Non-contact Cooling Water, Treated Sanitary Wastewater
ADEE-DEQ	Construction of Treatment System Associated with a NPDES Permit
ADEE-DEQ	Stormwater Discharges from a Categorical Industry
ADEE-DEQ	Construct/Operate Surface Facility for New Class I Nonhazardous Injection Wells
ADEE-DEQ	Construct/Operate New Class I Nonhazardous Injection Wells
ADEE-AOGC	Construct Drilling Pit for Class 1 Nonhazardous Injection Wells
ADEE-DEQ	Transfer Barren Brine to LANXESS No-Discharge Permitted Facility

1.11 CAPITAL AND OPERATING EXPENSES

The total capital cost (CAPEX), including contingency, to construct the Project is estimated at $365 million. Direct project costs represent $259 million and indirect Project Costs represent $56 million of the total cost. A contingency of $50 million is included, which equates to approximately 15% of direct and indirect costs.

The capital cost estimate is considered to have an accuracy range of -15% to +20%. All costs are expressed in 2023 US Dollars. No allowances are included for cost escalation.

The total estimated capital cost for the Project by area is summarized in Table 1-5.

Table 1-5. Phase 1A Capital Cost Summary

Area	Capital Cost ($M)
Brine Delivery (Tie-ins)	9.0
Brine Pretreatment	43.3
Direct Lithium Extraction	38.1
Concentration and Purification	53.3
Carbonation	53.4
Drying, Milling and Packaging	18.9
Effluent Brine Disposal	24.3
Reagent Systems	8.8
Utilities	51.1
Other (First Fills, Membranes, Commercial Fees)	14.7
Contingency	49.9
Total Capital Cost	364.9

Notes:

[1] Direct costs were estimated using either vendor-supplied quotes, and/or engineer estimated pricing (based on recent experience) for all major equipment.

[2] Indirect costs include all contractor costs (including engineering); indirect labor costs and Owner's Engineer costs.

[3] Any discrepancies in the totals are due to rounding effects.

Standard Lithium has undertaken efforts to effectively de-risk the construction process for the Project and ensure on-time delivery. This includes a Term Sheet with the nominated EPC contractor, Optimized Process Designs LLC, which sets out construction performance and schedule guarantees to ensure on-time construction, as well as guarantees related to the production of battery-quality lithium carbonate at the facility's design capacity. This Term Sheet is subject to agreement between the parties on pricing and definitive documentation.

The capital cost estimate is based on construction and commissioning of the facility in accordance with the Project contracting strategy and Project schedule as outlined in Figure 1-4. The Company expects to make a Final Investment Decision in the first half of 2024 which would result in first production of lithium carbonate in 2026.

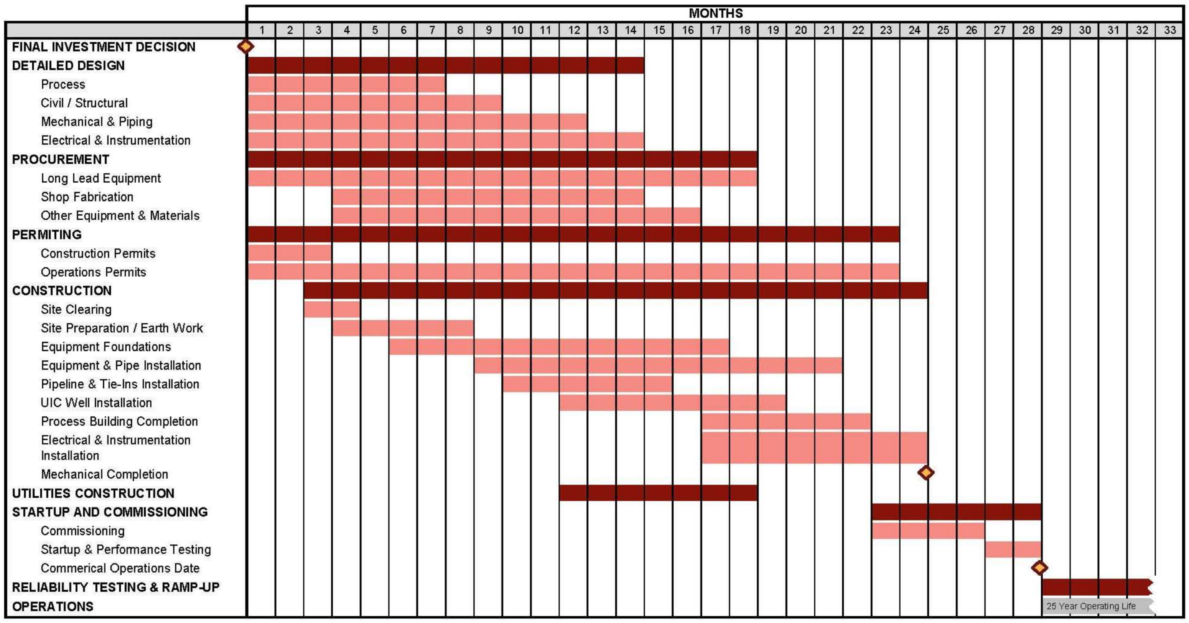


Figure 1-4. Project Schedule

The operating cost for the life of the Project is estimated to be $6,810/t of lithium carbonate. Labor, reagents, consumables, and energy account for over 70% of the operating costs. All-in operating cost, including sustaining capital expenditures is $7,390/t. A summary of the operating costs is included in Table 1-6.

Table 1-6. Phase 1A Operating Cost Summary

Category	Average Annual Cost ($/t) [1]
Electrical Power and Infrastructure	950
Reagents and Consumables	2,880
Maintenance and External Services [2]	610
Workforce [3]	1,930
Insurance	340
Miscellaneous Costs [4]	100
Total Operating Cost	6,810
Sustaining Capital Expenditures [5][6]	580
All-in Operating Cost	7,390

Notes:

[1] Operating costs are calculated based on average annual production of 5,400 tonnes of lithium carbonate.

[2] Includes contract maintenance, solids waste disposal, and external lab services.

[3] Approximately 89 full time equivalent positions.

[4] Includes general and administrative expenses.

[5] Does not include future brine lease-fees-in-lieu-of-royalties which are still to be determined and subject to regulatory approval (lease-fees-in-lieu-of-royalties have been determined for bromine and certain other minerals in the State of Arkansas but have not yet been determined for lithium extraction).

[6] Does not include brine fees which may be due to LANXESS as a result of finalization of the commercial arrangements between LANXESS and Company.

1.12 ECONOMIC ANALYSIS

The financial results are derived from inputs based on the annual production schedule summarized in Table 1-7. Sensitivity analysis on the unlevered economic results over a 25-year operating life are summarized in Table 1-7.

Table 1-7. Phase 1A Financial Results Summary

Category	Units	Value
Initial Annual Production of Li_2CO_3	tpa[1]	5,730[2]
Average Annual Production of Li_2CO_3	tpa	5,400
Plant Operating Life	years	25[3]
Total Capital Expenditures	$ millions	365[4, 5]
Average Annual Operating Cost	$/t	6,810
Average Annual All-in Operating cost	$/t	7,390[6, 7]
Selling Price	$/t	30,000[8]
Discount Rate	%	8
Net Present Value (NPV) Pre-Tax	$ millions	772
NPV After-Tax	$ millions	550[9]
Internal Rate of Return (IRR) Pre-Tax	%	29.5
IRR After -Tax	%	24.0

Notes:

[1] Tonnes (1,000 kg) per annum.

[2] Initial annual production figure represents Year 2 production, following a ramp-up period in Year 1.

[3] Plant design and financial modelling based on 25-year economic life. Proven and Probable Reserves support a 40-year operating life.

[4] Capital expenditures include 15% contingency.

[5] No inflation or escalation has been carried out for the economic modelling.

[6] Includes operating expenditures and sustaining capital.

[7] Brine lease-fees-in-lieu-of-royalties (to be approved by AOGC) have not been defined and are not currently included in the economic modelling.

[8] Selling price of battery-quality lithium carbonate based on a flatline price of $30,000/t over total project lifetime.

[9] Assumes a U.S. Federal tax rate of 21% and State of Arkansas Tax rate of 5.1%, as well as variable property taxes.

Sensitivity analysis on the unlevered economic results over a 25-year operating life are summarized in Table 1-8.

Table 1-8. Sensitivity Analysis Summary

Category	After-tax NPV ($millions)	After-Tax IRR (%)
Li_2CO_3 Price		
-20%	337	18.4
0%	550	24.0
+20%	762	29.3
Production		
-5%	502	22.8
0	550	24.0
+5%	597	25.3
Capital Costs		
+20%	491	20.4
0%	550	24.0
-20%	608	29.2
Operating Costs		
+20%	507	22.9
0%	550	24.0
-20%	592	25.2

1.13 QUALIFIED PERSON'S CONCLUSIONS

The Project has been independently evaluated, leading to the following conclusions and interpretations regarding the suitability of the proposed site and the viability of the Project. It is determined that a clear path is established to reach a positive Final Investment Decision subject to concluding remaining commercial agreements and obtaining the required financing.

/ The Proven and Probable Reserves confirm the viability of the Project over its 25 year economic life at an average annual production rate of 5,400 tonne per annum of lithium carbonate.

/ The Proven and Probable Reserves support an operating life of up to 40 years.

/ The development and testing completed at the Demonstration Plant provides a robust basis for the commercial design which is based on Direct Lithium Extraction technology.

/ Work to date completed at the Demonstration Plant illustrates that lithium can be economically extracted from the lithium rich brine produced from the Smackover Formation.

/ The Project Site secured is considered well suited for development and is situated near all required utilities.

/ Environmental studies have concluded the site is suitable for development with limited adverse environmental and social impacts, generally limited to the boundaries of the Project Site.

/ There is a clear pathway for the Project to obtain the state permits required for development.

- The economic analysis yielded positive results in a timeline for development and first production that is considered realistic based on timely funding and is typical of projects of similar magnitude within industry.
- Overall, the result of this Feasibility Study demonstrates that lithium can be economically extracted from the lithium rich brine within the Smackover Formation.

1.14 QUALIFIED PERSON'S RECOMMENDATIONS

The Qualified Persons involved in the Report make the following recommendations:

- Obtain and review any new log and core data collected in the West, Central, and South Brine Units which may become available in the future.
- Continue to monitor the LANXESS South Unit brine production performance.
- Continue test work at the Demonstration Plant.
- Continue to advance key permits and authorizations required for construction and operation of the Project.
- Address the responsibility for pre-existing environmental conditions in commercial agreements.
- Continue the process of establishing project-specific lithium royalties (lease-fees-in-lieu-of-royalties) with the AOGC.
- Evaluate and pursue additional federal and state incentive programs which may be available to improve overall Project economics.
- Given the sensitivity of the Project economics to the product price, consider offtake pricing mechanisms, to mitigate the commercial risk associated with short-term lithium price fluctuations.
- Finalize definitive commercial agreements with LANXESS and other parties which are required to support a positive Final Investment Decision.

2.0 INTRODUCTION

2.1 TERMS OF REFERENCE AND PURPOSE OF REPORT

This Technical Report (TR) was prepared by RESPEC Company, LLC (RESPEC) at the request of Standard Lithium Ltd. (Standard Lithium, or the Company), a *Canada Business Corporations Act* company, for a Definitive Feasibility Study (DFS) of the Commercial Lithium Extraction Plant Project (Phase 1A of the LANXESS Project, or the Project) and an update of the Mineral Resource, located in Arkansas, USA. Standard Lithium, trading under the symbol SLI on the TSX Venture Exchange, the New York Stock Exchange, and the Frankfurt Exchange, is headquartered at 1625-1075 West Georgia Street, Vancouver, British Columbia.

Phase 1A, Standard Lithium's first commercial lithium extraction plant, is proposed to be located at the LANXESS South Plant, approximately 13 kilometers [8 miles] southwest of the City of El Dorado in Union County, Arkansas. LANXESS Corporation, a US subsidiary of LANXESS AG, a specialty chemicals company, has exclusive brine extraction rights for 60,477 hectares [149,442 acres] which is contained within three brine production units, referred to as the South, Central, and West Brine Units. The development process for the Project, including development of definitive commercial agreements, equity participation and phasing are governed by a Memorandum of Understanding (MOU) between Standard Lithium and LANXESS.

This TR considers lithium brine at the Project that is present in the brines throughout the LANXESS South, Central, and West Brine Units. The Mineral Resources and Mineral Reserve estimates presented in this report have been prepared in accordance with the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) *CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines* (CIM, 2019) and *CIM Definition Standards for Mineral Resources and Mineral Reserves* (CIM, 2014), as referred to in National Instrument (NI) 43-101 and Form 43-101F, Standards of Disclosure for Mineral Projects and in force as of the effective date of this report. This is consistent with *CIM Best Practice Guidelines for Resource and Reserve Estimation for Lithium Brines* (CIM, 2012), in which it is stated that the CIM considers brine projects to be mineral projects, as defined in NI 43-101.

In this TR, the terms "Mineral Resource," "Inferred Mineral Resource," "Indicated Mineral Resource," "Measured Mineral Resource," "Proven Mineral Reserve," and "Probable Mineral Reserves" have the meanings ascribed to those terms by the CIM Definition Standards on Mineral Resources and Mineral Reserves adopted by CIM Council, as amended. Investors are cautioned that Mineral Resources cannot be classified as Mineral Reserves until further work is completed to upgrade the material's classification. Resources also cannot be reclassified until other economic and technical feasibility factors based upon such work have been resolved and can be demonstrated that the Resources may be legally and economically extracted and produced. As a result, investors should not assume that all or any part of the mineralized material reported in any of these categories referred to in the Resource Estimate and this TR will be converted into Mineral Reserves.

Throughout this TR, geological, technical, and lithium industry-specific terminology is commonly used. Table 2-1 provides a list of definitions for the most common terms and phrases.

Table 2-1. Glossary of Terms

Term	Definition
Assay	A test performed to determine a mineral sample's chemical content.
Brine Expansion Unit	Each separate composite area of land so designated by order of the AOGC as an expansion area adjacent to an existing brine production unit to produce brine or the reinjection of effluent.
Brine Production Unit	Each separate composite area of land so designated by order of the Arkansas Oil and Gas Commission (AOGC) to produce brine and the reinjection of effluent.
Bypass Brine	The output brine that has bypassed the LANXESS bromine facility.
Company	Standard Lithium Ltd. (Standard Lithium) and its subsidiaries.
Eluate	A liquid solution resulting from desorbing an absorbed material using a solvent.
Feed Brine	The input brine to the Project.
Final Investment Decision	A milestone activity to determine the Project will proceed with acquiring funding.
LANXESS Project	Suite of contemplated staged expansion projects relating to the LANXESS South, Central, and West Brine Production Units for lithium extraction.
Project	Commercial Lithium Extraction Plant Project at the LANXESS South Plant which is Phase 1A of the LANXESS Project.
Project Company	Standard Lithium Ltd. El Dorado South LLC, a wholly owned subsidiary of Standard Lithium.
Project Facility	The buildings and areas associated to the Commercial Lithium Extraction Plant Project under future Standard Lithium Ltd. control.
Project Site	Location at which the Commercial Lithium Extraction Plant Project is to occur.
Property	LANXESS South, Central and West Units.
Raffinate	The liquid which comes out of an extraction process involving two liquids.
Tail Brine	The output brine from the LANXESS bromine facility.

2.2 QUALIFIED PERSONS

Table 2-2 presents the Qualified Persons (QPs) for the Technical Report and their responsibilities.

Table 2-2. Qualified Persons and Responsibilities

Qualified Person	Company	Chapter(s)
Susan B. Patton, PE	RESPEC Company, LLC	Chapters 1–6, 19, 23–27
Randal M. Brush, PE	William M. Cobb & Associates, Inc.	Chapters 7–12, 14–16
Robert E. Williams, Jr., CPG	William M. Cobb & Associates, Inc.	Chapters 7–12, 14–16
Mike Rockandel, RM-SME	Mike Rockandel Consulting, LLC	Chapters 13, 17, 18, 21
Charles Daniel Campbell, PE	Alliance (formerly GBMc & Associates)	Chapter 20
Frank Gay, PE	Hunt, Guillot & Associates, LLC	Chapter 22

Notes:
CPG, Certified Professional Geologist
PE, Professional Engineer
PG, Professional Geologist
RM-SME, Registered Member Society for Mining, Metallurgy and Exploration

2.3 PERSONAL INSPECTION OF PROPERTY BY QUALIFIED PERSONS

The following QPs personally inspected the Standard Lithium Project Site:

- Randal Brush, PE, and Robert E. Williams, Jr., PG, visited the Standard Lithium Project Site May 17 through 19, 2022, and participated in sampling 10 different operating brine supply wells at the LANXESS bromine Property. LANXESS personnel captured the samples, which were observed, recorded, labeled, and shipped to the laboratory for assay. Standard Lithium personnel were present and obtained additional samples. The sample results make up part of the lithium concentration data used in the analyses.
- Charles Daniel Campbell, PE, visited the Standard Lithium Project Site on November 8, 2022, where he performed a reconnaissance of the proposed site to examine surface topography including surface water run-on from the adjacent property and runoff pathways. He confirmed locations for permanent groundwater monitoring wells to be installed and the general conditions of the undeveloped site.
- Mike Rockandel, RM-SME, visited the Standard Lithium Project Site October 10 through 12, 2022, where he viewed the process tie-points, visited the Demonstration Plant for 1 day, and visited the laboratory to understand the analytical requirements. Mike held numerous discussions with plant personnel on operating issues and reviewed historical data.
- Susan Patton visited the Standard Lithium Demonstration Plant site on June 27, 2023. She viewed the Tail Brine input from LANXESS, toured the operating Demonstration Plant, laboratory, and the proposed location of the commercial plant.

2.4 SOURCES OF INFORMATION

This TR is based, in part, on internal company technical reports, maps, company letters, memoranda, public disclosure, and public information, as listed in the *NI 43-101 Technical Report Preliminary*

Economic Assessment of LANXESS Smackover Project (Worley, 2019). Information brought forward from previous reports has been reviewed and verified as accurate by the QPs.

The sub-consultants presented in Table 2-3 were contracted to complete specific technical studies/analyses for input into the DFS Report.

Table 2-3. Contributor Sub-Consultants

Sub-Consultants	Area Contribution
Alliance (formerly GBMc & Associates)	Permitting and Site Conditions
Hunt, Guillot & Associates	FEED
M3 Engineering	FEED
Optimized Process Design	FEED
RHI-Group	FEED Cost Estimating
Terra Dynamics	UIC Permitting

FEED = front-end engineering design
UIC = Underground Injection Control

2.5 CURRENCY, ABBREVIATIONS, AND UNITS OF MEASURES

Unless otherwise stated, metric units and the United States dollar (USD) are used in this TR. Abbreviations, units of measure, and minerals referenced herein are defined in Tables 2-4, 2-5, and 2-6, respectively.

Table 2-4. Abbreviations and Acronyms

Term	Definition	Term	Definition
AACE	Association for the Advancement of Cost Engineering	ML	Mother Liquor
ADEE-AOGC	Arkansas Oil and Gas Commission	MOU	Memorandum of Understanding
ADEE-DEQ	Arkansas Department of Energy & Environment Division of Environmental Quality	MRMR	Mineral Resource Mineral Reserve
ADH	Arkansas Department of Health	NAAQS	National Ambient Air Quality Standards
AHPP	Arkansas Historic Preservation Program	NEPA	National Environmental Policy Act
AIME	The American Institute of Mining, Metallurgy and Petroleum Engineers	NFPA	National Fire Protection Association
AIPG	American Institute of Professional Geologists	NI	National Instrument
API	American Petroleum Institute	NPDES	National Pollutant Discharge Elimination System
ASL	Above Sea Level	NPV	Net Present Value
BBLS	Barrels	NYSE	New York Stock Exchange
BOE	Basis of Estimate	OARO	Osmotically Assisted Reverse Osmosis
BSW	Brine Supply Well	OAT	One Factor at a Time
BV	Bed Volumes	OLI	Systems In. Process Software
BWRO	Brackish Water Reverse Osmosis	OPD	Optimized Process Designs, LLC
CAA	Clean Air Act	OPEX	Operating Cost
CAPEX	Capital Cost	ORP	Oxidation-Reduction Potential
CCR	Central Control Room	PAH	Polycyclic Aromatic Hydrocarbon
CCTV	Closed Circuit Television	PCS	Process Control System
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	PDC	Power Distribution Center
CIM	Canadian Institute of Mining, Metallurgy and Petroleum	PE	Professional Engineer
CIP	Clean In-Place	PEA	Preliminary Economic Assessment
CIT	Corporate Income Tax	PG	Professional Geologist
CPG	Certified Professional Geologist	PMC	Project Management Consulting
CWA	Clean Water Act	PSI	Pounds per Square Inch
DBSP	Design Basis Scoping Paper	PSIG	Pounds per Square Inch Guage
DCF	Discounted Cashflow	PTZ	Pan-Tilt-Zoom
DFS	Definitive Feasibility Study	PVC	Polyvinyl Chloride
DLE	Direct Lithium Extraction	QA/QC	Quality Assurance Quality Control
DTB	Draft Tube Baffled	QP	Qualified Person
DXC	Dangxiongcuo	RCRA	The Resource Conservation and Recovery Act
EA	Environmental Assessment	RESPEC	RESPEC Company, LLC

EDC	Dichloroethane	RIO	Remote Input/Output
EPA	Environmental Protection Agency	RM-SME	Registered Member of the Society of Mining, Metallurgy and Exploration
EPC	Engineering, Procurement and Construction	RO	Reverse Osmosis
ESA	Environmental Site Assessment	SARA	Superfund Amendment and Reauthorization Act
EV	Electric vehicle	SARL	Site Access, License and Reservation Agreement
FEED	Front End Engineering Design	SBS	Sodium Bisulfite
FID	Final Investment Decision	SCFM	Standard Cubic Feet per Minute
GHG	Greenhouse Gas	SDWA	Safe Drinking Water Act
GLCC	Great Lakes Chemical Corporation	SLL	Standard Lithium Limited
GLO	General Land Office	SP	Spontaneous Potential
GPM	Gallons per Minute	SVOC	Semi Volatile Organic compounds
GR	Gamma Ray	SWPPP	Stormwater Pollution Prevention Plan
GWH	Gigawatt Hour	SWRO	Sea Water Reverse Osmosis
HMI	Human Machine Interface	TDS	Total Dissolved Solids
HWY	Highway	TM	Trademark
IPaC	Information for Planning and Consulting	TR	Technical Report
IRR	Internal Rate of Return	TSXV	Toronto Venture Exchange
ISBL	Inside Battery Limits	UF	Ultrafiltration
IT	Internet Technology	UIC	Underground Injection Control
JV	Joint Venture	USACE	U.S. Army Corps of Engineers
KES	Koch Engineered Systems	USD	United States Dollar
KTS	Koch Technology Solutions	USFWS	United States Fish and Wildlife Service
LAS	Log ASCII Standard	USGS	United States Geological Survey
LCE	Lithium Carbonate Equivalent	UST	Underground Storage Tanks
LiSTR	Lithium Stirred Tank Reactors	UTM	Universal transverse Mercator
LLC	Limited Liability Company	UV	Ultraviolet
LSS	Lithium Selective Sorption	VOC	Volatile Organic Compounds
MCC	Motor Control Center	WCA	William M. Cobb & Associates
MIRE	Maiden Inferred Resource Estimate	XRD	X-Ray Diffraction

Table 2-5. Units of Measure

Term	Definition
°C	degrees Celsius
g/L	grams per liter
L	liter
m	meters
mg	milligram
mg/L	milligrams per liter
mg/L	milligrams per liter
US BBLS	United States barrels
US$	United States dollar
wt%	percentage by weight
µm	microns

Table 2-6. Minerals

Term	Chemical Formula
Boron	B
Bromine	Br_2
Calcium	Ca
Calcium Chloride	$CaCl_2$
Chlorine	Cl_2
Hydrogen Sulfide	H_2S
Lithium	Li
Lithium Carbonate	Li_2CO_3
Magnesium	Mg
Potassium	K
Rubidium	Rb
Silica	Si
Sodium	Na

3.0 RELIANCE ON OTHER EXPERTS

3.1 MINERAL TENURE

The QP has reviewed the mineral tenure of LANXESS using the publicly available information on Units approved by the AOGC: South Plant Brine Unit, BU 1-1995, March 28, 1995; South Expansion Brine Unit 086-1-2016-11 November 28, 2016; Central Plant Brine Unit BU 2-1995 August 22, 1995; Central Expansion Brine Unit 095-2022-12 January 5, 2023; West Plant Brine Unit BU 3-1995 November 28, 1995 and the West Expansion Brine Unit-H 048-2-2015-04 May 14, 2015. The Authors have not independently verified the legal status or ownership of the mineral title, and underlying property agreements of LANXESS. The QP reviewed the terms of the amended and restated MOU with LANXESS dated February 23, 2022 concerning the rights of Standard Lithium to access the LANXESS brines and the conditions of the access in the Site Access Reservation and License Agreement dated November 15, 2022. The QP has relied on Standard Lithium for minerals rights definition in section 4.0.

3.2 MARKET PRICING

Standard Lithium obtained a third-party marketing study (The Lithium Market A summary of the market for lithium chemicals with a battery quality carbonate price forecast to 2036, Global Lithium LLC, June 5, 2023) to establish the lithium carbonate price. The Authors have reviewed against publicly available pricing forecasts and deemed it applicable for reporting purposes and have thus relied on the information contained in the market study to establish the product pricing for use in the economic analysis (section 22).

RESPEC

4.0 PROPERTY DESCRIPTION AND LOCATION

4.1 PROPERTY DESCRIPTION AND LOCATION

The Property, which includes the LANXESS South, Central and West Brine Units, is located south of the City of El Dorado in Union County, Arkansas, USA, as presented in Figure 4-1. The southern and western edges of the Property border the state of Louisiana and Columbia County, respectively. The Property encompasses Townships 16-19 South, and Ranges 14-18, West of the 5th Meridian. The Property center is at UTM 520600 Easting, 3670000 Northing, Zone 15N, North American Datum of 1983.

LANXESS has the rights to extract brine from the South, Central, and West brine production units through the unitization by the Arkansas Oil and Gas Commission (AOGC). Standard Lithium's Memorandum of Understanding in place with LANXESS sets out the process for the establishment of definitive commercial agreements between the parties, which once in place, will grant Standard Lithium certain rights related to the extraction of lithium. (See Section 4.4 below).

Figure 4-2 provides an overview of the Property, including the location of the bromine processing facilities in the South, Central, and West Units. The land package, which is shown in Figure 4-2, consists of 60,477 hectares (149,442 acres) that cover more than 608 square kilometers (km^2). Table 4-1 provides a description of the LANXESS Unitized land holdings.

Each Unit (South, Central, and West) has its own brine supply wells, pipeline network, and bromine-processing (separation) infrastructure. The facilities and their locations, which are wholly owned and operated by LANXESS, are as follows:

- South Unit (South Plant): 324 Southfield Cutoff, El Dorado, Arkansas 71730
- Central Unit (Central Plant): 2226 Haynesville Highway (HWY 15S), El Dorado, Arkansas 71731
- West Unit (West Plant): 5821 Shuler Road, Magnolia, Arkansas 71731

Table 4-1. Description of LANXESS Unitized Land Holdings for Brine Production

Unit	AOGC Order Reference	Date	Hectares	Acres
South Plant Brine Unit	BU 1-1995	March 28, 1995	12,495	30,877
South Expansion Brine Unit	086-1-2016-11	November 28, 2016	2,963	7,321
Central Brine Unit	BU 2-1995	August 22, 1995	17,391	42,974
Central Expansion Brine Unit	095-2022-12	January 5, 2023	2,655	6,560
West Brine Unit	BU 3-1995	November 28, 1995	24,424	60,354
West Expansion Brine Unit-H	048-2-2015-04	May 14, 2015	549	1,356

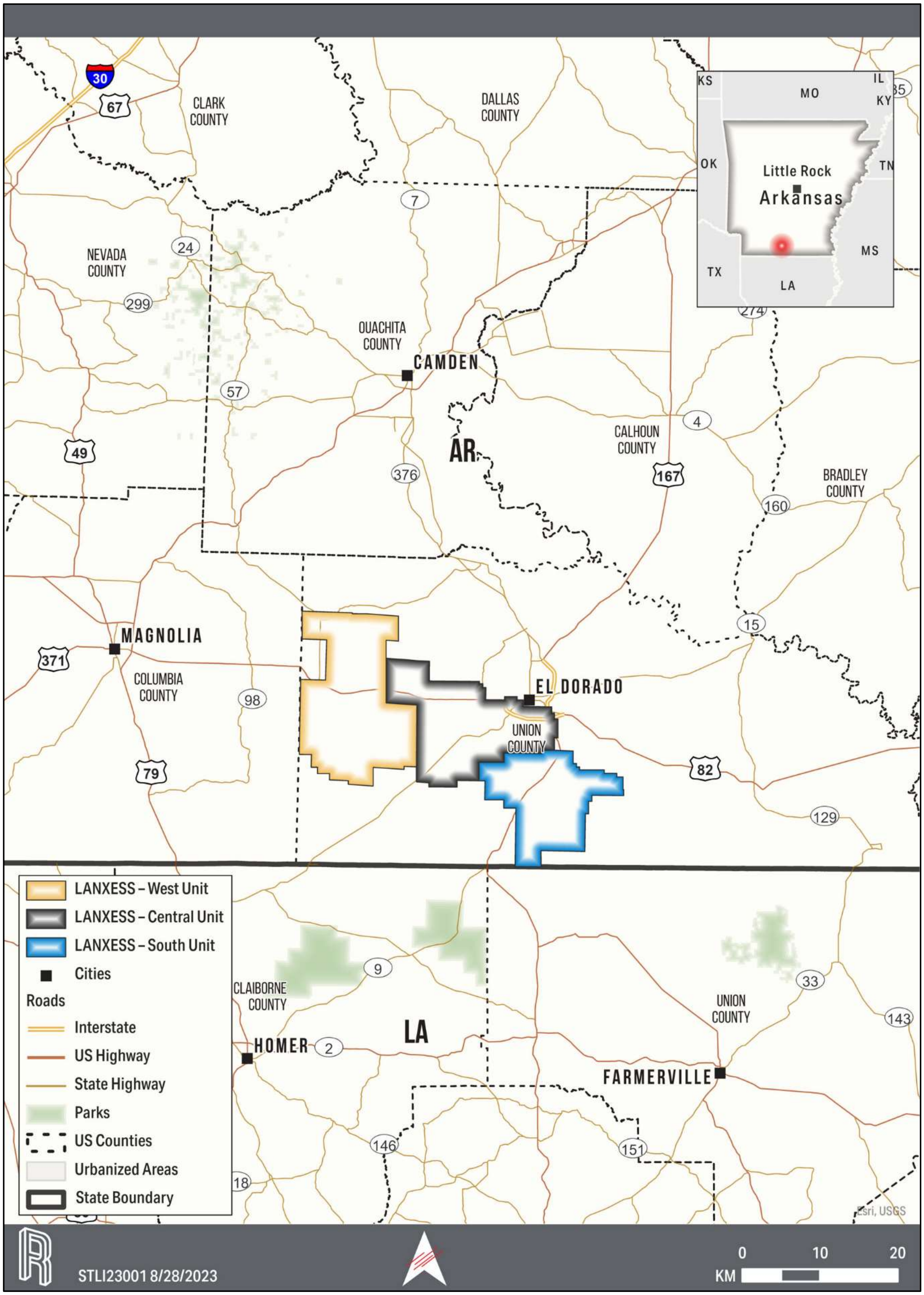


Figure 4-1. Overall Property Location Map

4.2 SURFACE AND MINERAL RIGHTS

4.2.1 MINERAL RIGHTS

Per Arkansas Code Title 15, Natural Resources and Economic Development § 15-56-301 minerals "include oil, gas, asphalt, coal, iron, zinc, lead, cinnabar, bauxite, and salt water whose naturally dissolved components or solutes are used as a source of raw materials for bromine and other products derived there from in bromine production." The mineral interest owner has the inherent right to develop the minerals and the right to lease the minerals to others for development. The development, production and royalties are regulated by the Arkansas Brine Conservation Act § 15-76-301(Arkansas, 2023).

Payments made to the Lessor for brine production are governed by statute in Arkansas. For brine used to produce bromine, the statutory rate is currently $66.93 per net mineral acre per year. For substances extracted from brine other than the bromine, the Arkansas Oil and Gas Commission is responsible for determining 'fair and equitable' compensation. The Arkansas Oil and Gas Commission has not yet determined what constitutes 'fair and equitable' compensation for brine used to produce lithium.

In many instances the surface estate has been severed from the mineral estate. The owner of the mineral estate, as the dominant estate, has the right to make reasonable use of the surface in order to extract minerals. In most cases brine leases include the right to use the surface to produce brine.

4.2.2 SURFACE RIGHTS

The proposed site (Project Site) for the Project is located approximately 13 km [8 miles] south of El Dorado, Arkansas in Union County, immediately east of the existing South Plant bromine extraction facility owned and operated by LANXESS. The location of the proposed Project Site is shown in Figure 4-2.

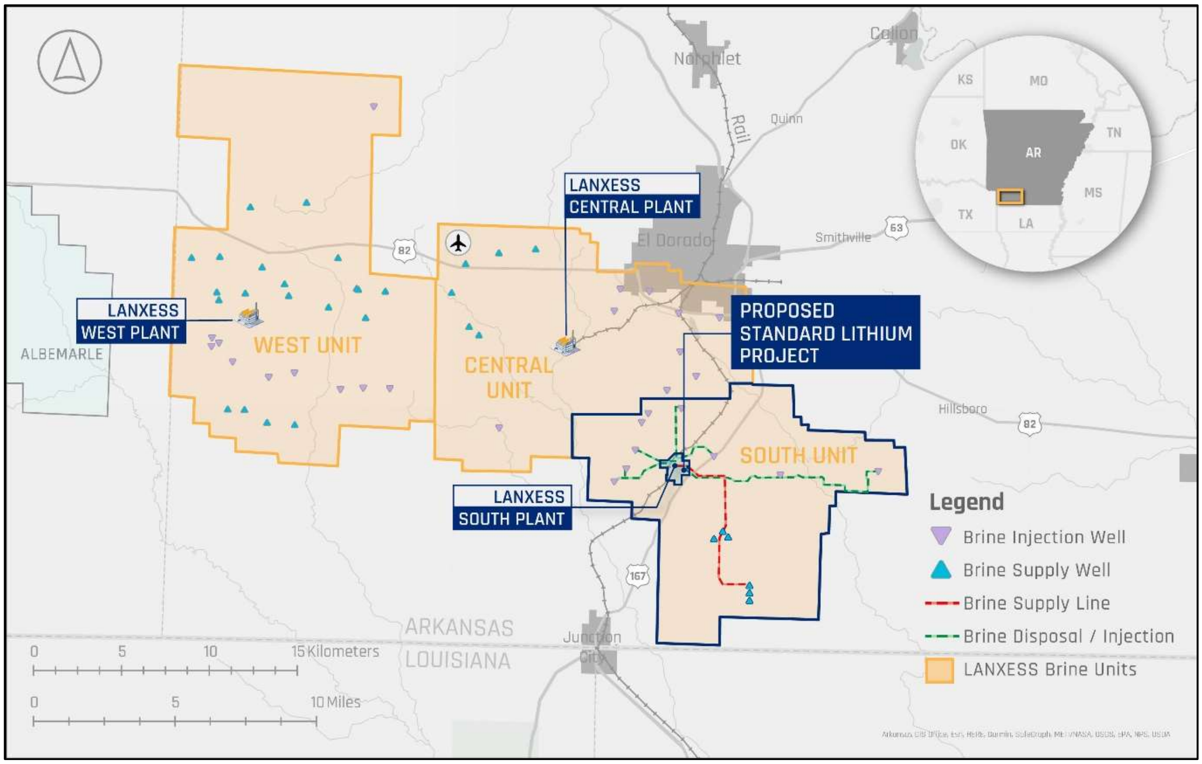


Figure 4-2. Property Location showing LANXESS Plant Locations within Units

The Project Facility is proposed to be constructed on leased property which is owned by LANXESS Corporation, immediately to the East of the existing South Plant bromine extraction facility. The Project Company has entered into commercial agreements with LANXESS which reserves up to 39 hectares (96 acres) for the development of the Project and future phases of development at the site, which phases are subject to the completion of future feasibility studies. Refer to Section 4.4 for an overview of the Standard Lithium – LANXESS Agreements including the Site Access, Reservation and License Agreement.

Certain agreements with LANXESS contemplate future additional production of lithium chemicals across LANXESS's facilities; the Project as described herein does not include any expansions or additional lithium plants.

Figure 4-3 outlines the land reserved for development by Standard Lithium, a portion of which is proposed to be leased for construction of the Project Facility.

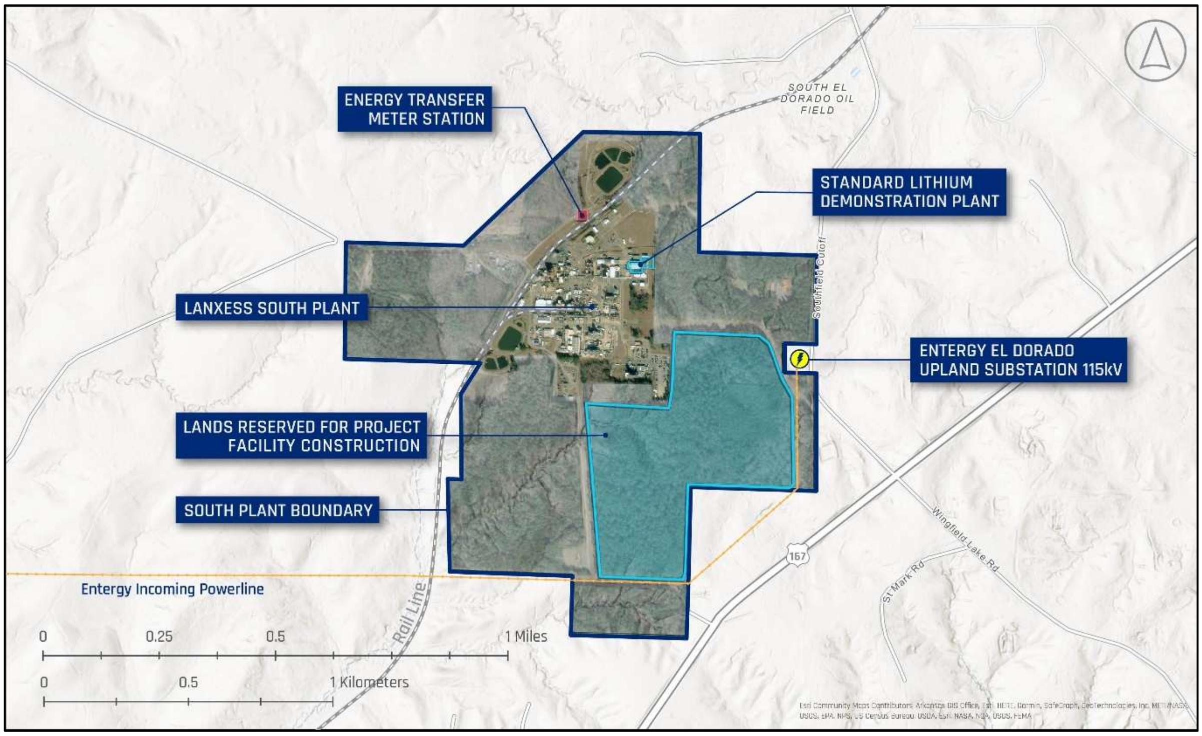


Figure 4-3. Land Reserved for Project Facility Construction

Road access to the Project Facility is contemplated to be via Southfield Cutoff. The nearest major intersection is 1 km southeast of the facility at the junction of Highway 63 and Southfield Cutoff. Refer to Section 5 for a description of accessibility, climate, local resources, infrastructure, and physiography.

4.3 PAYMENTS TO LESSORS

The AOGC, in accordance with Arkansas law to avoid waste and maximize recovery of Mineral Resources, establishes drilling units that ensure all mineral owners potentially impacted by a producing well receive proper payment.

The AOGC must approve the lease payment rate for any 'additional substance' profitably extracted from brine produced by an operator of a brine unit. The extraction of lithium from Tail Brine produced in South Arkansas is an additional substance triggering the fee analysis. Standard Lithium and LANXESS have a joint application before the AOGC which sets out a proposed royalty structure (also at times referred to as 'Lease-fees-in-lieu-of-royalties') as fair and equitable compensation to mineral owners for the commercial extraction of lithium from the South Brine Unit.

On October 10, 2018, the AOGC granted an Order approving the deployment of the Demonstration Plant to test the commercial viability of the extraction of lithium from brine processed at the South Unit processing plant operated LANXESS and Arkansas Lithium Corporation (a wholly owned subsidiary of Standard Lithium). The Order took effect November 19, 2018 (AOGC, 2018a). The Demonstration Plant started operation in May of 2020. By Order No. 58-2023-08 the AOGC granted an additional extension to operate the Demonstration Plant through December 5, 2023 and Standard Lithium has an application before the AOGC for a further extension of operations. Standard Lithium asserts the successful testing and production of lithium products at the Demonstration Plant illustrates, subject to execution of lithium purchase agreement with a suitable Offtake counterparty, that lithium can be profitably extracted from brine.

4.4 OVERVIEW OF THE STANDARD LITHIUM – LANXESS AGREEMENTS

4.4.1 AMENDED AND RESTATED MEMORANDUM OF UNDERSTANDING

Standard Lithium entered into an Amended and Restated Memorandum of Understanding ("MOU") on February 23, 2022, (Standard, 2022) with LANXESS. The MOU replaces the LANXESS MOU and LANXESS Joint Venture (JV) Term Sheet, which previously set out the basis on which the parties had agreed to cooperate in a phased process towards developing commercial opportunities related to the production, marketing, and sale of battery-quality lithium products.

Specifically, the MOU sets out the process for the establishment of definitive commercial agreements between the parties, which once in place, will grant Standard Lithium the rights required for development of the Project and govern the relationship throughout the life of the Project. Under the MOU, LANXESS is obliged to support development of the Project.

The Project is currently wholly owned by Standard Lithium's wholly owned subsidiary project company ("Project Company"). With completion of this DFS, pursuant to the MOU, LANXESS will be given the option to acquire an equity interest in the Project Company of up to 49% and not less than 30%, at a price equal to a ratable share of Standard Lithium's aggregate investment in the Project Company.

If LANXESS acquires an equity interest in the Project Company, the parties will share the costs of financing construction of the Project, on a ratable basis. The Project Company is expected to directly acquire the required debt financing for the Project and this process remains independent of the LANXESS equity election process.

If LANXESS does not acquire an equity interest in the Project Company, Standard Lithium will continue to own 100% and may elicit bids from other interested parties to acquire an interest of up to 50% in the Project Company.

Note that Standard Lithium retains 100% ownership of its South West Arkansas Project, including certain other sites in Arkansas, its Project Sites in East Texas, and all of the proprietary extraction technologies, relevant intellectual property and know-how owned or licensed by Standard Lithium.

Under the MOU, LANXESS has the right to acquire some, or all of the lithium carbonate offtake produced at the Project.

The MOU also sets out the definitive commercial agreements between the parties which are currently contemplated to be completed prior to, or concurrent with, the Final Investment Decision for the Project, which include:

- Brine Agreement which will set out the terms and conditions for the supply and return of brine for the Project.

- Lithium Purchase (Offtake) Agreement which sets out the terms and conditions for the purchase of Lithium Carbonate by LANXESS from the Project, if any.
- Ground Lease Agreement for the lands required to construct the Project adjacent to the South Plant, including additional right of ways and easements on the broader LANXESS property.
- Site Services Agreement which sets out the services to be provided by LANXESS to support the Project.

Select key terms and conditions required to be included in these definitive commercial agreements are further set out in the MOU and the Site Access, Reservation and License Agreement as outlined below.

4.4.2 SITE ACCESS, RESERVATION AND LICENSE AGREEMENT

The Site Access, Reservation and License Agreement ("SARL"), executed in November 2022 between LANXESS, Standard Lithium and the Project Company, provides for access to the LANXESS properties during the term of the SARL for the purposes of developing the Project, reserves up to 96 acres for the development of the Project and any future phases of development and sets out key terms and conditions to be included in the definitive commercial agreements between the parties.

A principal purpose of the SARL is to facilitate access by the Project Company to complete surveying, sampling and other intrusive investigations on the LANXESS properties to support Project development. The permitted activities include:

- ground surveying and location of existing facilities;
- conducting geotechnical field investigations, including drilling and test-pitting;
- installation of groundwater monitoring wells;
- establishing baseline environmental conditions, including sampling of surface water, soils, vegetation and ground water; and,
- location of underground utilities.

Under the SARL, the Project Company has the exclusive right to develop the Project on undeveloped land owned by LANXESS that is immediately east of the existing South Plant bromine extraction facility (refer to Figure 4-3), subject to execution of the definitive Ground Lease Agreement which is contemplated to become effective upon a successful FID.

The Project Company is expected to lease approximately 20 hectares (50 acres) of the reserved lands pursuant to the Ground Lease Agreement, leaving the balance available for future phases of development. The reservation of the real property for future development is anticipated to be addressed through a separate option agreement, which will supersede the SARL, and a separate future ground lease agreement.

In order to allow the Project to proceed with confidence, the SARL also establishes key terms to be incorporated into the definitive commercial agreements between LANXESS and the Project Company, with highlights as summarized below.

Term of Agreements

- Definitive commercial agreements, including the Brine Agreement, Ground Lease Agreement and Site Services Agreement, will each have an initial term of 25 years, which aligns with the Project economic life.
- The Project Company will have the right to extend the term of the commercial agreements up to 40 years, with notice, in 5 year increments.

Brine Agreement

- LANXESS commits to supply the Project with a guaranteed minimum quantity of brine over the 25 year operating life of the Project in accordance with the development plan established for the South Brine Unit.
- Establishment of the brine supply and discharge infrastructure to be constructed by the Project Company and that infrastructure to be constructed by LANXESS as currently set out in the SARL, as well as a commitment to construct such infrastructure by an agreed upon milestone schedule.
- Conditions for brine supply and disposal including, quality parameters for both Feed Brine and the lithium-depleted effluent brine as well as minimum and maximum flow conditions and metering requirements. Metering will be the responsibility of the Project Company.
- Responsibility of each party to maintain permits necessary to perform their respective obligations under the brine agreement, including supply and disposal of brine.

Ground Lease

- Right to lease the real property required for the Project including a right to purchase the leased real property if LANXESS desires to sell, with the right to lease additional real property for future development of the Project pursuant to a separate option agreement ;
- Permitted use of the leased property includes construction and operation of the commercial lithium extraction plant as well as research and development work;
- Grant of permanent and temporary access rights, rights-of-way, licenses, easements required for construction, operation and maintenance of the Project and any future phases of development including rights required for infrastructure, utilities, site services, laydown, parking, pipelines and powerlines;
- Decommissioning obligations by the Project Company; and,
- Responsibility of each party for any current and future environmental liabilities.

Site Services Agreement

- Provision of power and utilities for the Project infrastructure located outside the primary leased property within the LANXESS facility; and,
- Provision of chlorinated water for the Project.

4.5 ENVIRONMENTAL LIABILITIES AND PERMITTING

Potential environmental liabilities associated with construction of the Project Facility include discovery of improperly abandoned oil/gas wells, permanent closure/abandonment of existing LANXESS ground water monitoring wells within the construction area, and potential off-site transport of sediments because of improper or inadequate erosion control measures.

LANXESS is responsible for environmental liabilities incurred by Standard Lithium arising from pre-existing environmental conditions (to the extent not exacerbated by Standard Lithium) during the investigative activities covered under the SARL. It is currently contemplated, subject to finalization of the Ground Lease Agreement, that environmental liabilities which arise from pre-existing environmental conditions (to the extent not exacerbated by Standard Lithium), will remain the responsibility of LANXESS as lessor.

Based on the permitting evaluations completed to date, the Project is not subject to review under the National Environmental Policy Act (NEPA). Construction and operational emissions to air, surface waters, and subsurface waters are regulated by the federal and state agencies to protect the environment while allowing responsible development of the lithium resources.

Standard Lithium has initiated early consultation with permitting agencies for the construction and operation of the Project. A Baseline Environmental Site Assessment has been conducted as well as investigations of jurisdictional waters of the U. S., cultural resource assessment, and wildlife studies for the Project. New permits expected to be required for the Project are summarized in Table 4-2.

Table 4-2. Expected Permits for the Project

Agency	Permitted Activity
ADEE-DEQ	Air Permit for Commercial Facility
ADH	Fresh Water Supply for Potable Water
ADEE-DEQ	Construction Storm Water NPDES Permit for Facility Construction Site
ADEE-DEQ	Surface Discharge of Non-Brine Process Wastewater, Non-contact Cooling Water, Treated Sanitary Wastewater
ADEE-DEQ	Construction of Treatment System Associated with a NPDES Permit
ADEE-DEQ	Stormwater Discharges from a Categorical Industry
ADEE-DEQ	Construct/Operate Surface Facility for New Class I Nonhazardous Injection Wells
ADEE-DEQ	Construct/Operate Class I Nonhazardous Injection Wells
ADEE-AOGC	Construct Drilling Pit for Class 1 Nonhazardous Injection Wells
ADEE-DEQ	Transfer Barren Brine to LANXESS No-Discharge Permitted Facility
USACE	Placement of fill in waters of the U.S.

4.6 SIGNIFICANT ENCUMBRANCES OR RISKS TO PERFORM WORK ON PROPERTY

As with any development project, there exists potential risks and uncertainties. There are no known significant encumbrances on the property. Standard Lithium will attempt to reduce risk/uncertainty through effective project management, utilization of technical experts, community engagement, and development of contingency plans. These risks to perform work on the property include but are not limited to the following:

- Obtaining all the necessary licenses and permits on acceptable terms, in a timely manner.
- Completing remaining commercial agreements with LANXESS on acceptable terms, in a timely manner.
- Operational variances within the LANXESS plant that adversely impact the quality of the Tail Brine beyond those brine conditions that have already been tested in the Demonstration Plant.
- Changes in laws and their implementation, impacting activities on the properties.
- Activities on adjacent properties having an impact on the Project.

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE, AND PHYSIOGRAPHY

5.1 ACCESSIBILITY

The Property consists of the LANXESS South, Central and West Units and is situated in Union County in southern Arkansas. Union County is the largest county in the State of Arkansas (2,730 km^2) and borders the State of Louisiana. The LANXESS Central Unit is located directly adjacent to and southwest of the City of El Dorado, Arkansas, as shown in Figure 5-1. El Dorado is the County Seat of Union County and has a population of slightly more than 18,000. It is considered the population, cultural, and business center of the regional area. LANXESS' South and West Units are located approximately 13 km [8 miles] and 35 km [22 miles] south and west of El Dorado, respectively. The LANXESS Property can be readily accessed via plane, rail, and an extensive road network.

5.1.1 AIRPORT ACCESS

National airports are regionally located in Little Rock, Arkansas (approximately 2.5 hours north of the Property by car) and Shreveport, Louisiana (1.5 hours southwest of the Property by car).

5.1.2 RAIL ACCESS

Products are shipped to and from the El Dorado predominantly by truck and rail; rail lines dissect the Central and South Units with direct access to both the LANXESS South and Central Plants. Railroad companies and rail lines within Union County include Camden & Southern, Union Pacific, Louisiana & North West, and El Dorado & Wesson railroads/railways.

5.1.3 ROAD ACCESS

The following primary U.S. Highways are in the region:

- South Unit (South Plant): U.S. Highway 7 and Highway 167
- Central Unit (Central Plant): U.S. Highway 15, Highway 82, and Highway 335
- West Unit (West Plant): U.S. Highway 82, Highway 57, Highway 160, and Highway 172

The secondary, major, Township, and well-pad access roads provide an integrated network that allows year-round access to almost every part of the Property and El Dorado has an extensive all-season secondary road network (see Figure 5-1).

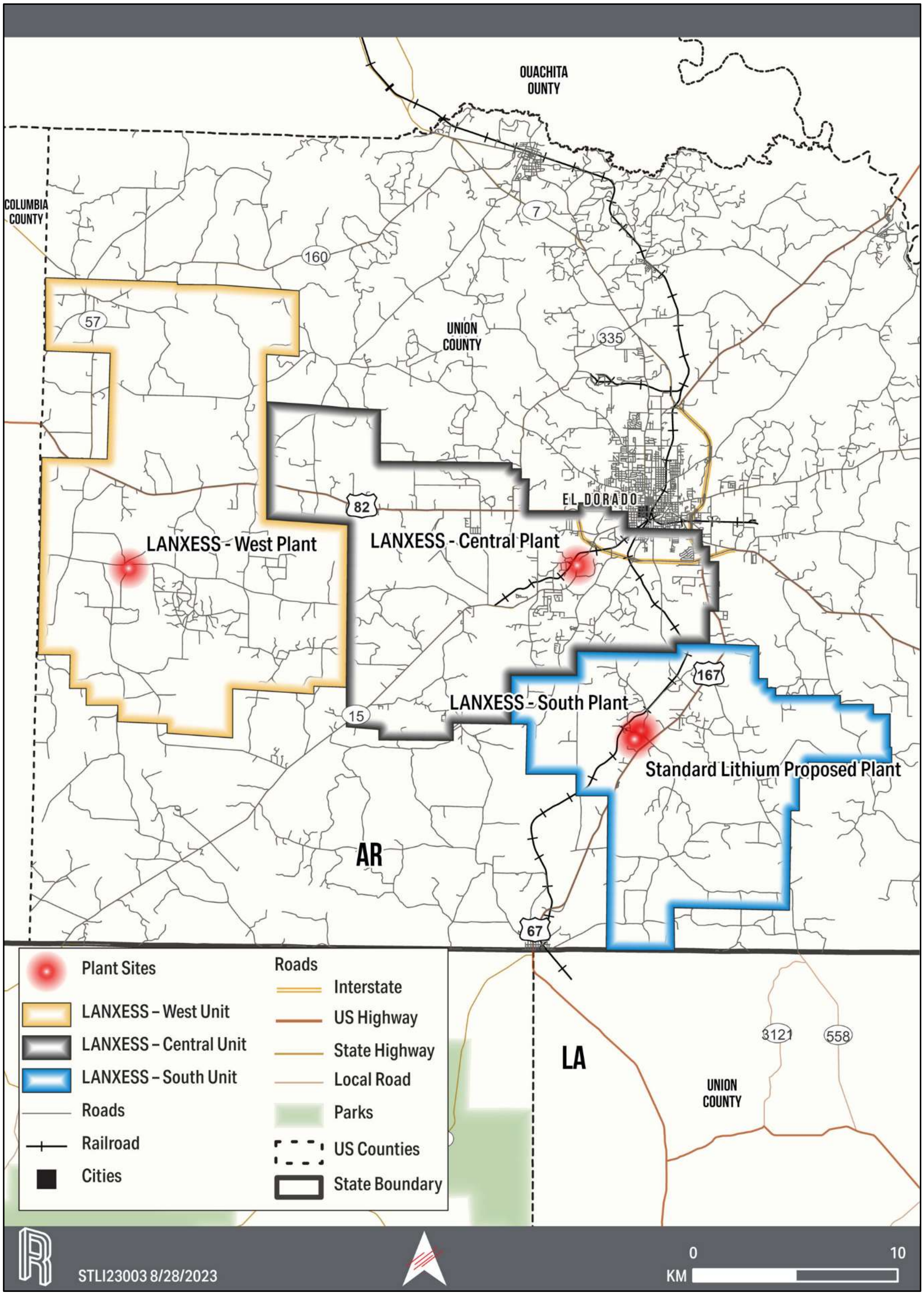


Figure 5-1. LANXESS Project Access Routes

5.2 CLIMATE

The Project area's climate is generally humid. The average annual temperature and total precipitation at El Dorado for 2022 (recorded at El Dorado Goodwin Field in Arkansas) is 17.61°C and 128.0 centimeters, respectively (Figure 5-2). Annual rainfall is evenly distributed throughout the year. The wettest month of the year is August, with a total rainfall of 19.1 centimeters (Weather.gov, 2023).

The warmest month of the year is July, with an average maximum temperature of 34.9°C , while the coldest month of the year is January with an average minimum temperature of -0.4°C.

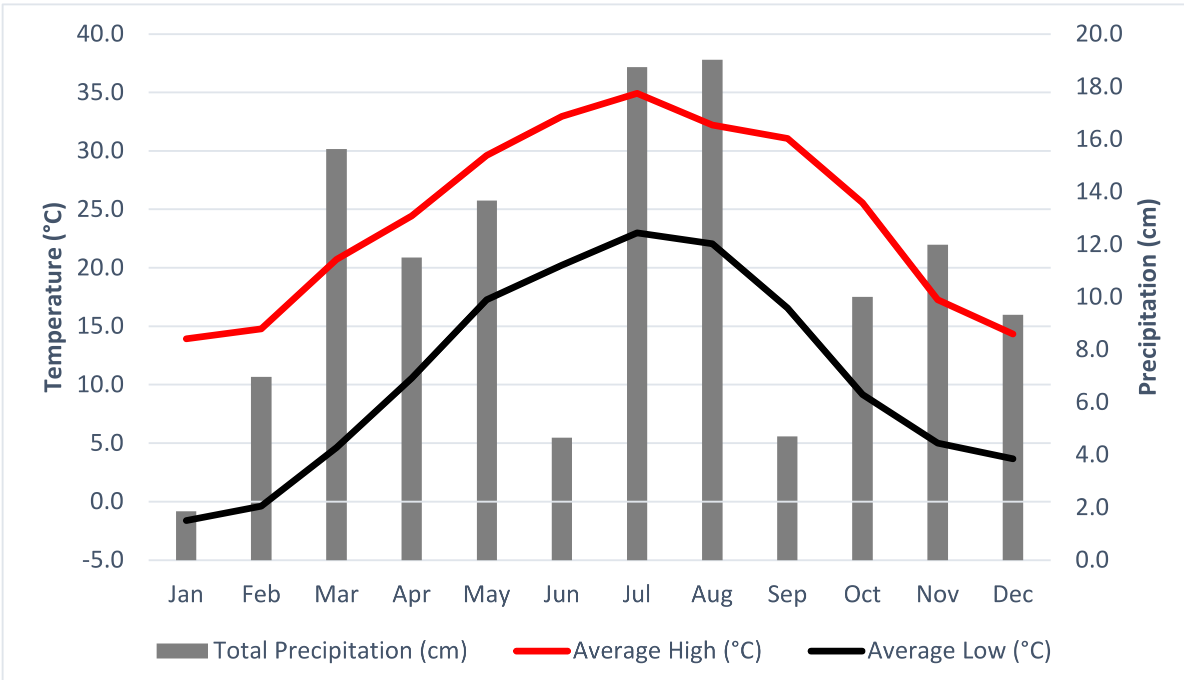


Figure 5-2. Average Temperature and Total Precipitation at El Dorado, Arkansas, for 2022 (Weather.gov, 2023)

5.3 LOCAL RESOURCES AND INFRASTRUCTURE

The greater than 60 years of brine production in the area has built a robust infrastructure and resource center to support the production from the Property.

5.3.1 LOCAL LABOR

In the El Dorado area, the largest manufacturers include Delek US – El Dorado Refinery, LANXESS, Pro Ampac, LSB Industries, and Milbank Manufacturing Co. Production of elemental bromine in Arkansas has a long history in the area including LANXESS and Albemarle. The work force supporting these industries has significant knowledge in brine technology, chemical engineering, and production.

5.3.2 TRANSPORT

There are multiple trucking and logistics companies operating in the area.

RESPEC

5.3.3 WATER

The South Plant is fed by wells from the Sparta Aquifer and the intent of the new Project Facility is to have water supplied from the Sparta Aquifer as well.

5.3.4 POWER

The local electric power is provided by Entergy Arkansas, with its nearest generating facility , a 1,800-megawatt combined cycle gas plant, located approximately 12 km northeast of El Dorado.

5.3.5 NATURAL GAS

Energy Transfer for the gas transportation services currently supply the South Plant and the intent of the new Project Facility is to have gas tied in to the same metering station.

5.3.6 SUPPORTING SERVICES

The area has a significant number of businesses that service all aspects of the brine, oil, and gas industries.

5.4 PHYSIOGRAPHY

Union County covers a total area of 2,730 km^2, of which 98.5 percent (2,690 km^2) consists of land and 1.5 percent (41 km^2) of water. The West Gulf Coastal Plain covers the southeastern and south-central portions of the state along the border of Louisiana. El Dorado, which lies within the West Gulf Coastal Plain, has an elevation of 102 meters (m) above sea level (asl).

The area surrounding the Property is characterized by pine forests and farmlands. The Felsenthal National Wildlife Refuge, the world's largest green tree reservoir, is located approximately 45 km east of the City of El Dorado. The Property does not infringe on the Wildlife Refuge.

5.5 SUMMARY

Southern Arkansas, Union County, the City of El Dorado, and the Property all have well developed infrastructure and an experienced workforce available for the brine exploration, production, and processing in the region. The Property can be accessed year-round.

6.0 HISTORY

Despite there having been many years of bromine production, the exploration and Mineral Resource estimates for lithium have only been occurring since 2018.

6.1 HISTORY OF THE LANXESS PROPERTY

LANXESS Corporation, a subsidiary of LANXESS AG, a specialty chemical company, has exclusive brine extraction rights over the Property. LANXESS was founded on September 22, 2004, via the spin-off of the chemicals division and parts of the polymers business from Bayer Aktiengesellschaft, which was founded in 1863.

The core business of LANXESS is the manufacturing of chemical intermediates, additives, specialty chemicals, and plastics. LANXESS has a specialty in bromine extraction from the Smackover Formation where the bromine is either sold as a product or used as a raw material within the other plants.

The following is an abbreviated history of the Property:

- Great Lakes Chemical Corporation was founded in Michigan in 1936 to extract bromine from underground saltwater brine deposits.
- Great Lakes Chemical Corporation was acquired by McClanahan Oil in 1948 and the name changed to Great Lakes Oil and Chemical Company.
- The company ended hydrocarbon production in 1957 and focused on the production of bromine-based chemicals in Arkansas. Around this time, the company assumed its original name of Great Lakes Chemical Corporation (GLCC).
- The acquisition of the bromine operations of Northwest Industries operations near El Dorado, AR is noted as the early stages of the Property bromine assets.
- In 2005, Great Lakes Chemical Corporation merged with Crompton to become Chemtura. Great Lakes Chemical Corporation remained in existence as a wholly owned subsidiary of Chemtura to own and operate all the brine production facilities in Union County.
- In 2016, LANXESS acquired Chemtura.
- In 2020, GLCC merged into its corporate parent LANXESS Corporation. As a result of this internal merger LANXESS is the owner and operator operations of the El Dorado facilities listed above.
- All infrastructure on the Property is owned by LANXESS. Three bromine plants, West, Central and South Units, are in operation and produce bromine in the El Dorado region.

The South Plant was the first bromine plant and was originally developed by Michigan/Chemical/Murphy Oil in 1957. The West Plant is the smallest of the three LANXESS El Dorado plants. The Central Plant was expanded in the 1970's to produce flame retardants and oil field completion fluids.

LANXESS has conducted exploration on the property as an ongoing part of their operations and production planning. That exploration, while focused on bromine, also included brine analyses with lithium analytical results. LANXESS has also collected pre- and post-bromine processing brine samples.

The historical brine samples by LANXESS that were analyzed for lithium as presented by Worley (Worley, 2019) are shown in Table 6-1. The average value of this lithium data is higher than that of the datasets presented by Moldovanyi and Walter (Moldovanyi, 1992) and the USGS National Produced Waters Geochemical Database (Blondes, 2016) of 141 to 150 mg/L Li.

Table 6-1. Summary of Historical Brine Analyses (Worley 2019)

Unit	Sample Source Point	Number of Analyses	Minimum Li (mg/L)	Maximum Li (mg/L)	Average Li (mg/L)
South	All wells	25	177.0	547.0	349.9
	Post-bromine tail	3	206.0	356.0	274.7
Central	All wells	15	72.0	262.0	157.7
	Post-bromine tail	7	69.8	272.0	119.6
West	All wells	100	32.0	588.0	239.3
	Post-bromine feed	1	80.0	1,800.0	180.0
	Post-bromine tail	6	79.6	229.0	123.9
	All Analyses	157	32.0	588.0	239.7

Moldovanyi and Walter conducted a regional brine chemical study of brine samples from 87 producing wells from Smackover Formation reservoirs in southwest Arkansas, east Texas, and northern Louisiana. Worley concluded the regional distribution of elevated Smackover Formation Li-brine exhibited the following:

- Boron (B) and alkali metal Li, potassium (K), rubidium (Rb) concentrations in Smackover Formation waters exhibit coherent geochemical relations across the southwest Arkansas shelf.
- In general, the concentration of B, Li, K, and Rb is greater and more heterogeneous in hydrogen sulfide (H_2S)-rich brine than in H_2S-free brine.
- Regional concentration gradients in H_2S, B, Li, K, and Rb suggest fluids enriched in these elements may have migrated into the Smackover Formation reservoirs from large-scale circulation of deep-seated waters along segments of the South Arkansas and Louisiana State Line graben fault system (Moldovanyi and Walter, 1992).

Nineteen brine analyses within the boundaries of the Property are reported in the Moldovanyi and Walter (1992) dataset. Li-brine values reported range from 47 mg/L Li to 191 mg/L Li, with an average of 144 mg/L Li.

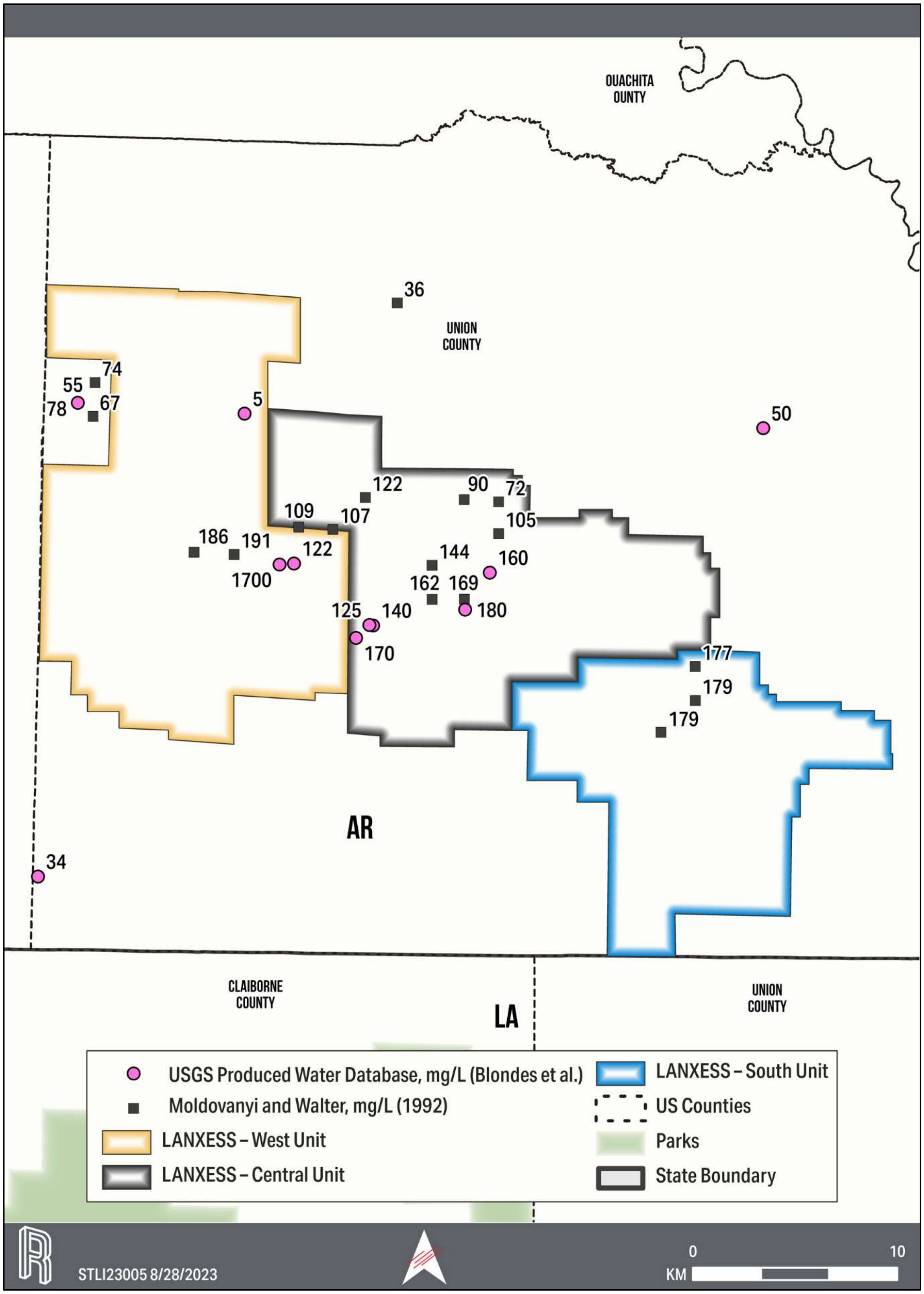


Figure 6-1. Smackover Formation Lithium Brine Values Derived within, and Adjacent to, the LANXESS Property (Blondes, et al. 2018)

The USGS National Produced Waters Geochemical Database contains an additional seven brine analyses not included in the dataset published by Moldovanyi and Walter (1992). Of the seven analyses, five sample locations report between 122 mg/L and 180 mg/L Li. These data are unreferenced in the USGS database. Two outlier analytical results yield 5 mg/L and 1,700 mg/L Li, representing the lowest and highest Li-brine values in the Southern Arkansas historical Li-brine data, respectively. These outlier values are viewed with some skepticism.

Standard Lithium conducted a sampling program to verify the lithium content of the Smackover Formation brine underlying the Property. Historical datasets show the Smackover Formation at the Property has average values of 141 to 150 mg/L Li.

6.2 HISTORICAL MINERAL RESOURCE ESTIMATES

Historical Mineral Resource estimates have been completed by APEX Geoscience, Ltd. (2018) and Worley (2019). APEX (2018) reported a maiden Inferred resource of 580,000 tonnes of elemental Li (Table 6-2). The total LCE for the main resource is 3,086,000. Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability. There is no guarantee that all or any part of the Mineral Resource will be converted into a Mineral Reserve.

Table 6-2. 2018 Inferred Mineral Resource (Eccles et al. 2018).

Reporting Parameter	South Unit	Central Unit	West Unit	Total Resource
Aquifer volume (km^3)	5,828	8,289	16,310	30,427
Brine Volume (km^3)	0.689	0.995	1.835	3.515
Average lithium concentration (mg/L)	164.9	164.9	164.9	164.9
Average Porosity (%)	11.8	12.0	11.2	11.6
Total elemental Li resource (tonnes)	114,000	164,000	303,000	580,000
Total LCE (tonnes)	605,000	873,000	1,610,000	3,086,000

Notes:

[1] Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability. There is no guarantee that all or any part of the Mineral Resource will be converted into a Mineral Reserve. The estimate of Mineral Resources may be materially affected by geology, environment, permitting, legal, title, taxation, socio-political, marketing or other relevant issues.

[2] The weights are reported in metric tonnes (1,000 kg or 2,204.6 lbs)

[3] Numbers may not add up due to rounding of the resource values percentages (rounded to the nearest 1,000 unit).

[4] In a 'confined' aquifer (as reported herein), porosity is a proxy for specific yield; especially given the number of effective porosity measurements evaluated in this report and their positive correlation with Log ASCII Standard (LAS) log total porosity.

[5] The 'Total' volume and weights are estimated at volume-weighted average porosities of the block-model (i.e. calculated by using the porosity of the brine units and their respective unit areas). It is assumed that all pore space is occupied by brine.

[6] The LANXESS estimation was completed and reported using a cutoff of 50 mg/L Li.

[7] In order to describe the resource in terms of industry standard, a conversion factor of 5.323 is used to convert elemental Li to Li2CO3, or Lithium Carbonate Equivalent (LCE).

Worley (2019) reclassified the inferred Mineral Resource through the demonstration of potential economics in a PEA (Table 6-3) based on additional sampling and test work by Standard Lithium including:

- Smackover Formation brine sampling program and an assessment of the lithium concentration in the Smackover Formation brine over time
- Disclosure of Li extraction technological information based on Standard Lithium's bench-scale and mini-pilot-plant laboratory processing test work
- An update on the Demonstration Plant with some discussion as to the scalability of the technology toward potential commercial production

Table 6-3. Indicated Mineral Resource (Dworzanowski et al. 2019).

Reporting Parameter	South Unit	Central Unit	West Unit	Total Resource
Aquifer volume (km^3)	5,828	8,289	16,310	30,427
Brine Volume (km^3)	0.689	0.995	1.835	3.515
Average lithium concentration (mg/L)	168	168	168	168
Average Porosity (%)	11.8	12.0	11.2	11.6
Total elemental Li resource (tonnes)	116,000	167,000	308,000	590,000
Total LCE (tonnes)	615,000	889,000	1,639,000	3,140,000

Notes:

[1] Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability. There is no guarantee that all or any part of the Mineral Resource will be converted into a Mineral Reserve. The estimate of Mineral Resources may be materially affected by geology, environment, permitting, legal, title, taxation, socio-political, marketing or other relevant issues.

[2] The weights are reported in tonnes (1,000 kg).

[3] Numbers may not add up due to rounding of the resource values percentages (rounded to the nearest 1,000 unit).

[4] In a 'confined' aquifer (as reported herein), porosity is a proxy for specific yield; especially given the number of effective porosity measurements evaluated in this report and their positive correlation with Log ASCII Standard (LAS) log total porosity.

[5] The 'Total' volume and weights are estimated at volume-weighted average porosities of the block-model (i.e. calculated by using the porosity of the brine units and their respective unit areas). It is assumed that all pore space is occupied by brine.

[6] The LANXESS estimation was completed and reported using a cutoff of 100 mg/L Li.

[7] To describe the resource in terms of industry standard, a conversion factor of 5.323 is used to convert elemental Li to lithium carbonate, or Lithium Carbonate Equivalent (LCE).

The resource variation is attributed to the increase in the average lithium concentration used to calculate the resource estimate from 165 mg/L Li to 168 mg/L Li. The increase in the average concentration is from the analytical results of 90 brine analyses versus 45 analyses in (Eccles et al, 2018). The doubling of analytical data increased the confidence level of the information used to calculate the Indicated LANXESS Li-Brine Resource Estimate.

6.3 PRODUCTION FROM THE PROPERTY

No lithium has been commercially produced from the Property. A small quantity of lithium has been extracted from the LANXESS South Plant Tail Brine in the Demonstration Plant for testing and development purposes.

7.0 GEOLOGICAL SETTING AND MINERALIZATION

QP Brush has reviewed in detail the prior geological setting and mineralization evaluations of the Project, including the "Amended Geological Introduction and Maiden Inferred Resource Estimate For Standard Lithium's LANXESS Smackover Lithium-Brine Property In Arkansas, United States", effective date 19 November 2018 (MIRE)(Eccles, D.R. et al. 2018), and the "Preliminary Economic Assessment of LANXESS Smackover Project", dated 1 August 2019 (PEA) (Dworzanowski, et al. 2019), and will note where their descriptions, of the geological setting and mineralization are adopted by this report. In particular, the extensive descriptions of the geologic setting and Property history are accurate and are adopted here without repetition.

The Smackover Formation is Upper Jurassic in age and was named after the Smackover Field, Union County, Arkansas, which first produced oil in 1922 (Schneider1924). The Smackover Formation extends from the panhandle of Florida through Alabama, Mississippi, Louisiana, and Arkansas to Texas, Figure 7-1 (Budd et al. 1981). The Smackover Formation's productive characteristics have been extensively characterized by the drilling of over 1,000 wells in approximately 600 former and producing oil and gas fields, with approximately 150 of those fields in Arkansas, Figure 7-2.

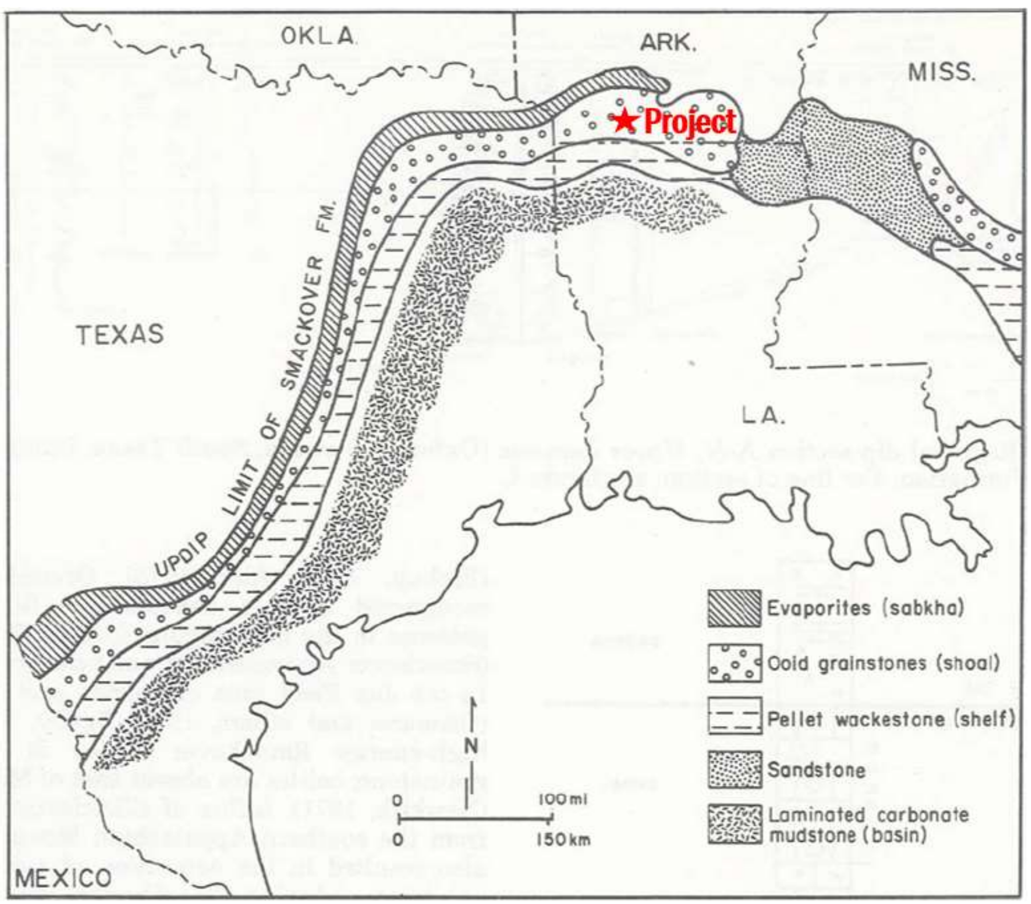


Figure 7-1. Facies Map of the Smackover Formation, Northern Gulf Coast Basin (Budd et al. 1981)

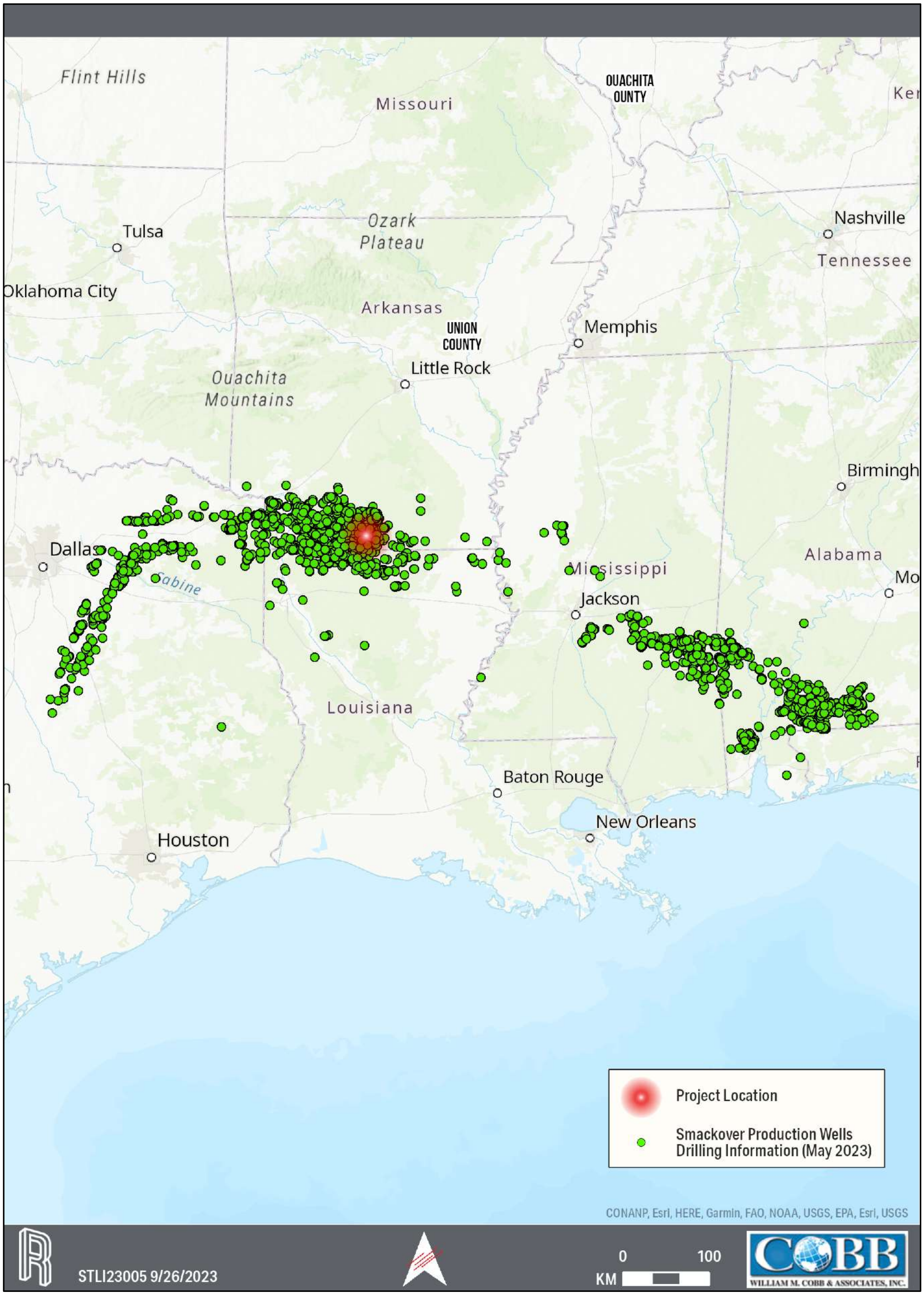


Figure 7-2. Smackover Production Oil and Gas Wells Drilling Information as of May 2023 (Enverus,2023)

The portion of the Smackover generally known to contain significant bromine and lithium is found between the Jurassic Gulf Coast basin-bounding faults to the north-northwest of the Property and the "State Line" fault system to the south-southeast near the Arkansas-Louisiana border, Figure 7-3 (Budd et al. 1981). Although some minor faulting within the Property has been inferred in public literature, no faulting effects have been observed in the subsurface fluid movements associated with the Property operations.

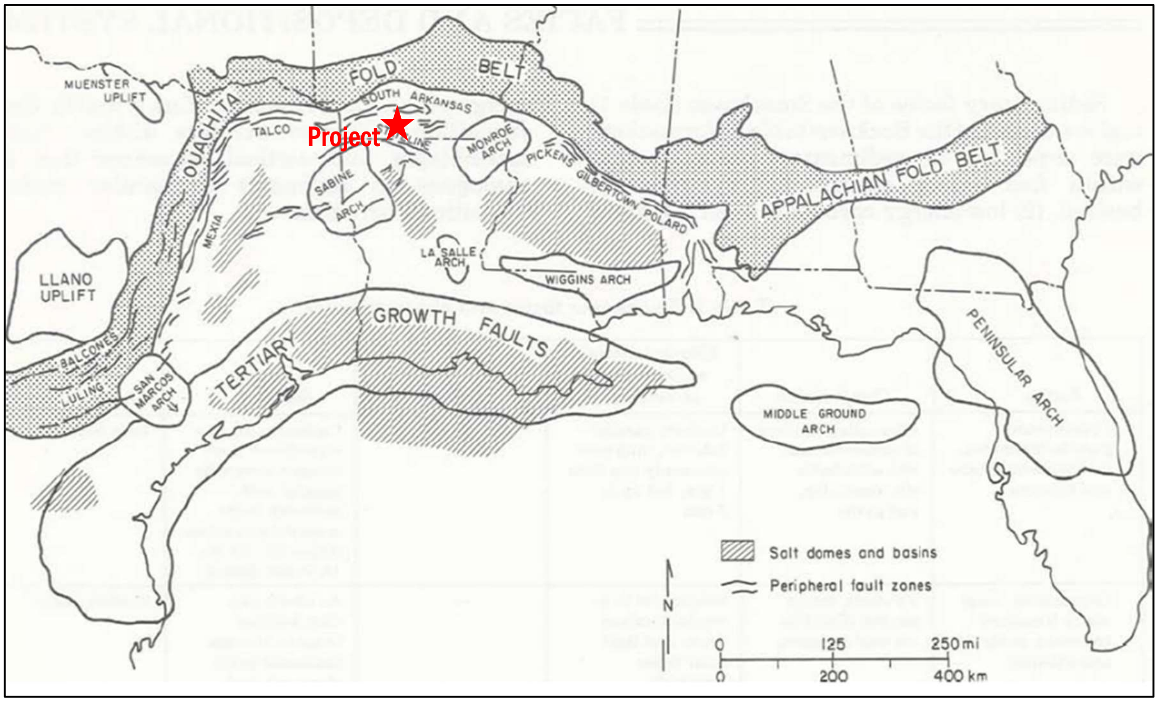


Figure 7-3. Structural Framework, Northern Gulf Coast (Budd D.A. et al. 1981).

The focus of this resource and reserves assessment is the LANXESS Project Area's Smackover Formation in southern Arkansas. The LANXESS Property (Figure 7-4) is approximately 41 kilometers (km) east to west and 31.4 km north to south. The lithium bearing Smackover reservoir is continuous across the Property and extends beyond the property discussed in this TR. The lithium concentration within the Smackover Formation brines varies throughout the Property and generally increases from north-northeast to south-southwest.

The structure of the Smackover in the Property area generally dips from north-northeast to south-southwest, with a small structural high in southern portions of the West and Central Units (Figure 7-5) and varies in depth from approximately 1,920 meters subsea to approximately 2,621 meters subsea. Unlike the production of oil and gas, the reservoir structure is not by itself an important factor in brine production, because the similar densities of injected and produced brines minimizes the influence of gravity on fluid flow in the reservoir.

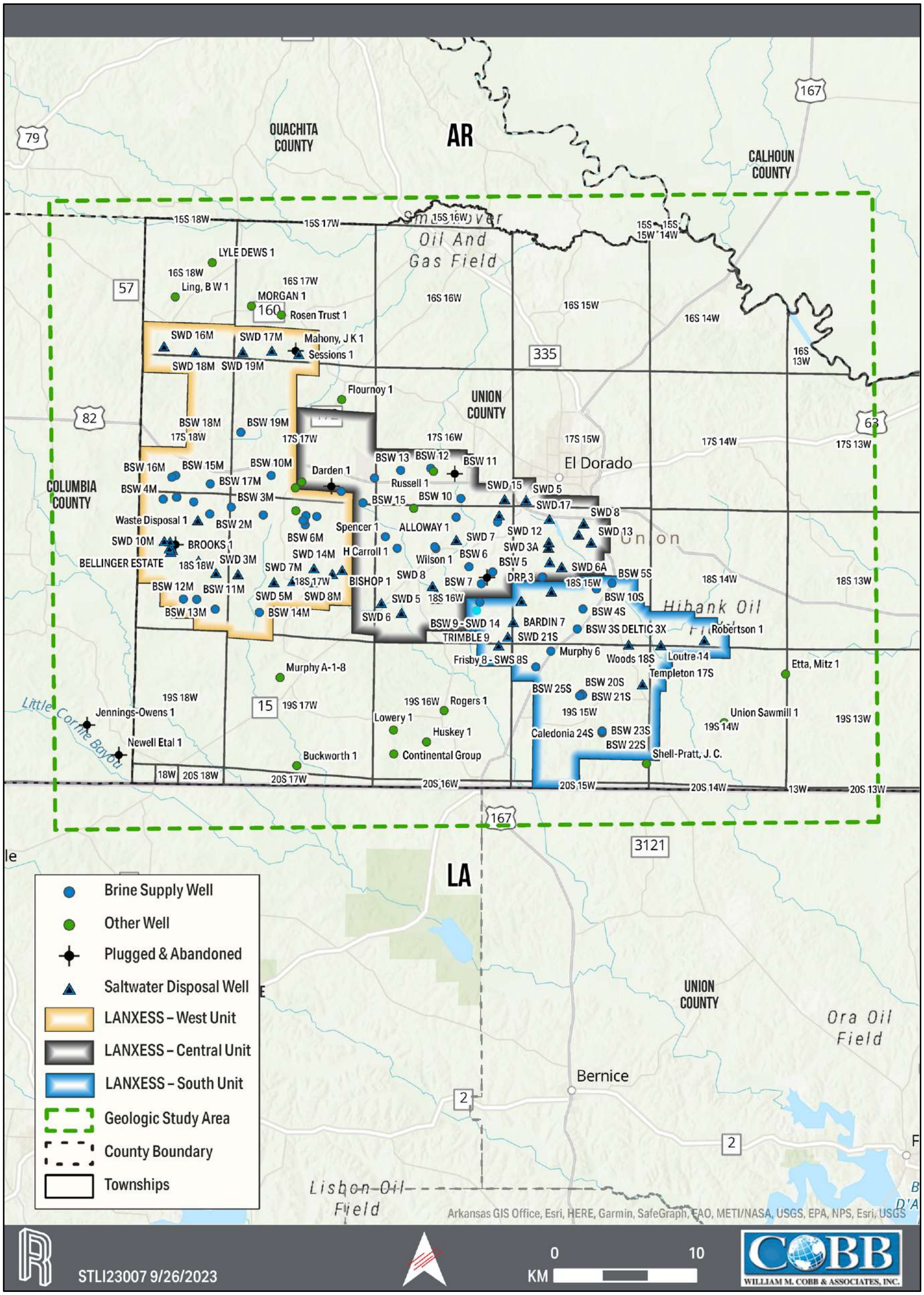


Figure 7-4. LANXESS Project Area Map

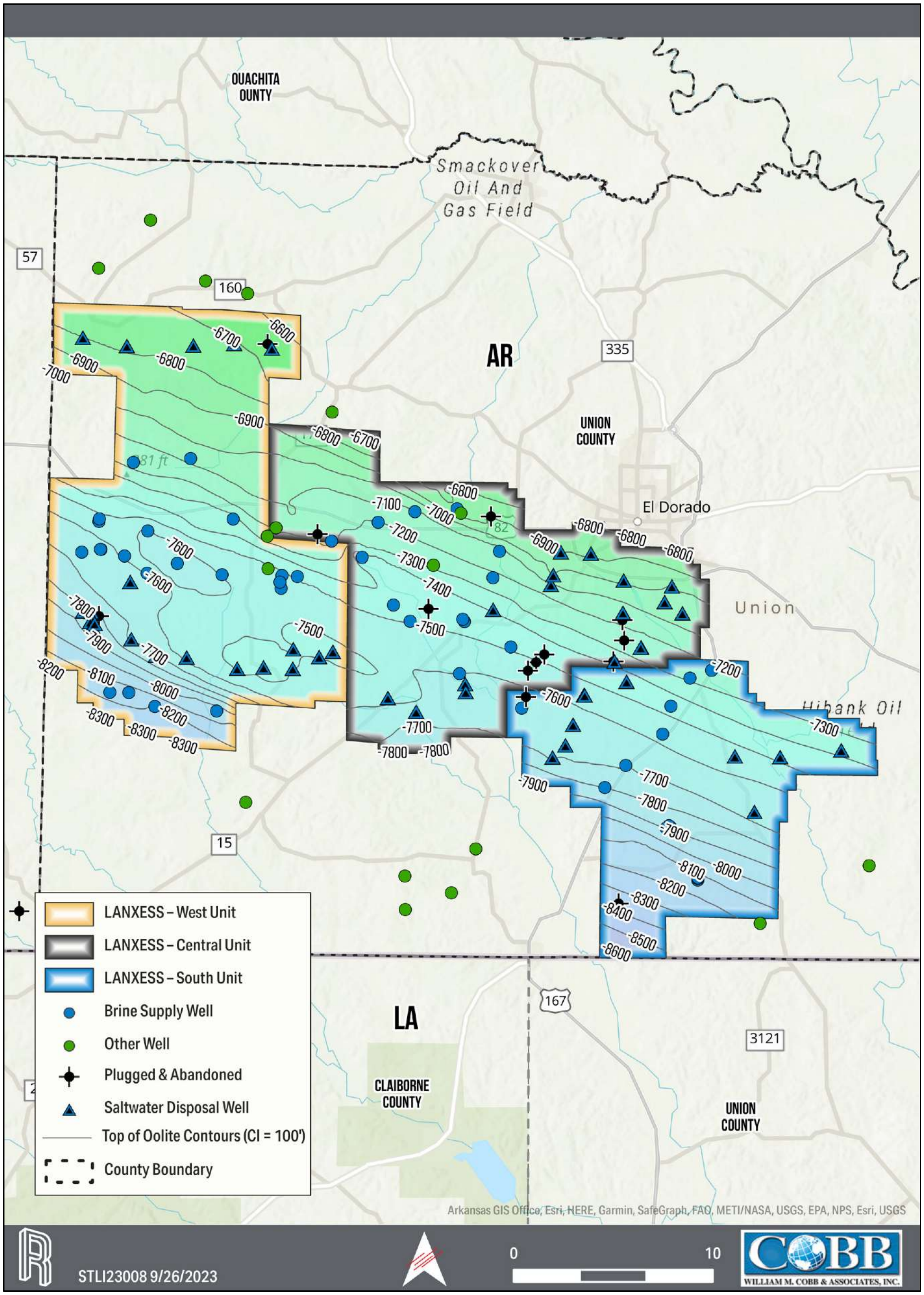


Figure 7-5. Smackover Structure Map

As shown in Figure 7-6 of the MIRE (Eccles et al. 2018), the Smackover Formation in southern Arkansas is commonly subdivided into two intervals, Upper and Lower. The Upper Smackover Interval, which is the development target for this project, has been subdivided in southern Arkansas into the Reynolds Member Oolite, a predominantly oolitic limestone, and the Middle Smackover. The Lower Smackover Interval, also known as the Brown Dense, is composed of dark, dense limestone with argillaceous bands (Imlay 1940). The entire Smackover Formation has been dolomitized to varying degrees.

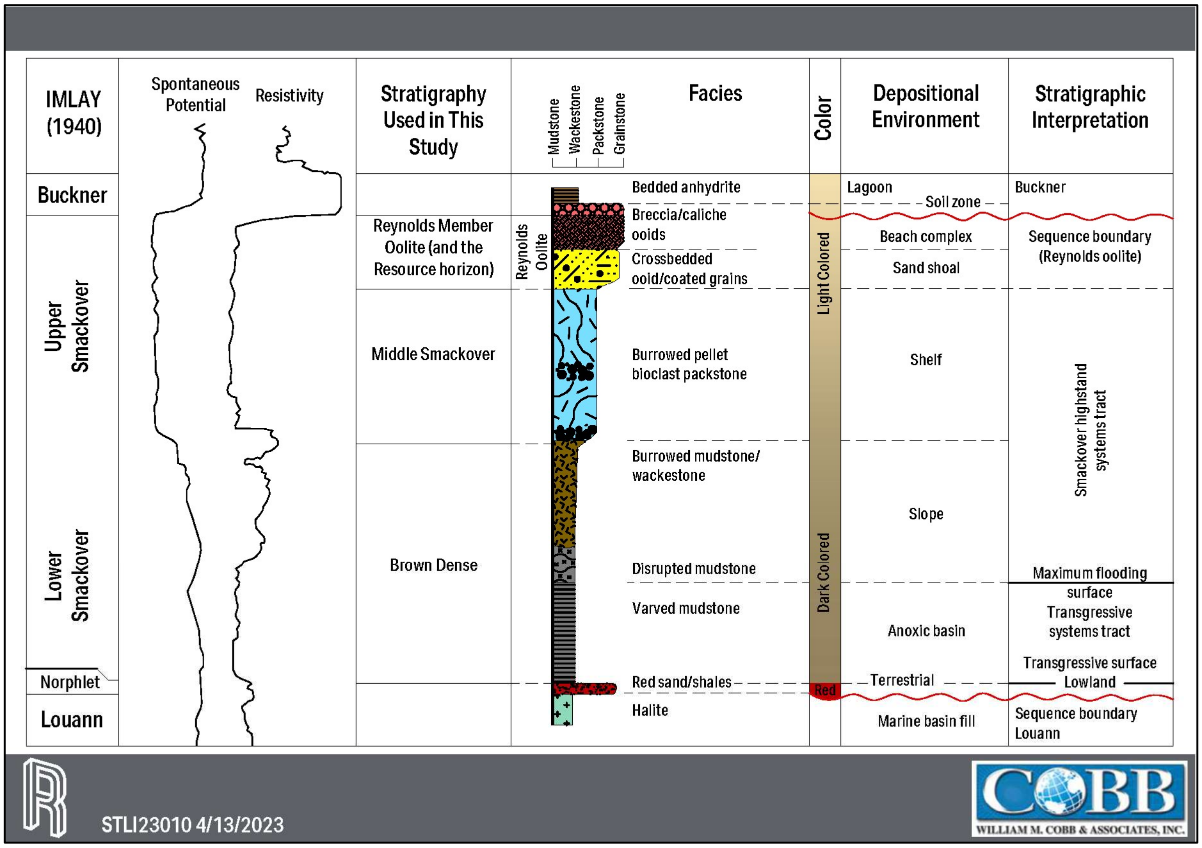


Figure 7-6. Smackover Stratigraphic Column (after Eccles et al. 2018)

The lithium brine-bearing Upper Smackover Interval is overlain by the Buckner Formation, which in Arkansas is dominated by red shale in the upper part and anhydrite in the lower part above the Smackover carbonates, and, as a result of its low permeability, acts as a geologic seal which traps oil and gas. The dense, low-permeability carbonate of the Lower Smackover interval is underlain by the clastic section of the Norphlet Formation. The Norphlet Formation is comprised of red and gray clays with varying amounts of intercalated sands and occasional gravels. The relationship between the Smackover Formation, the Buckner Formation, and the Norphlet Formation as shown in a north-south cross-section, Figure 7-7.

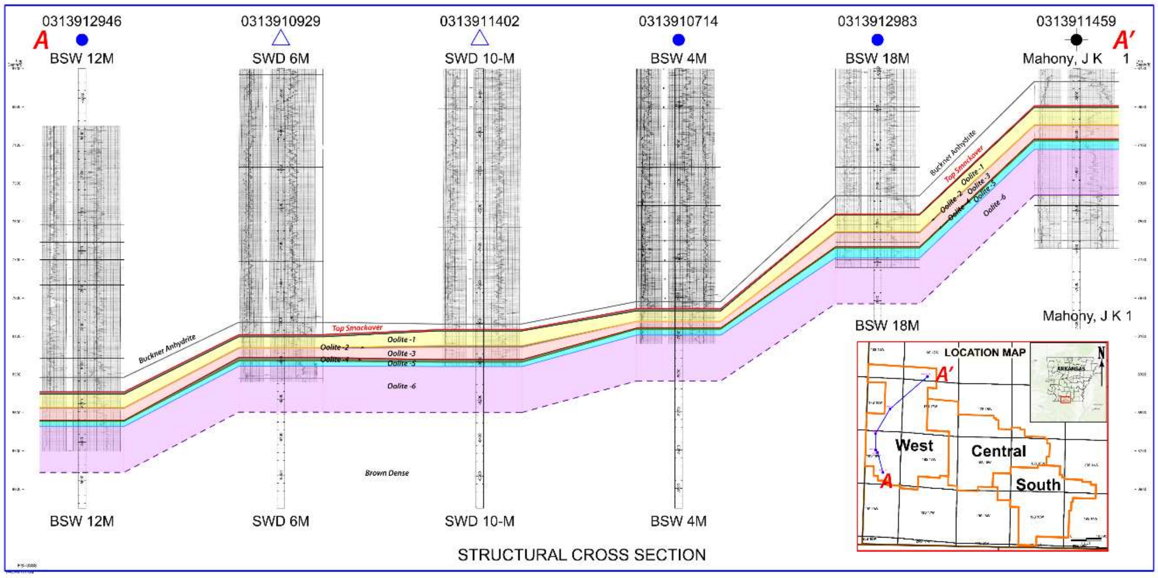


Figure 7-7. North-South Cross Section with Geologic Model Oolite 1-6 Zones

Also shown on Figure 7-7, and as described in more detail in Section 14, Cobb & Associates has subdivided the Upper Smackover Interval into six zones based on geologic characteristics and lateral correlations. These six zones are referred to as oolite zones. Zones two and four are low-permeability zones and were key correlation intervals used to define the six zones. The available well data was evaluated to determine the reservoir's structure, porosity, gross zone thickness, net pay thickness (that portion of the gross zone thickness expected to be productive because it exceeded a minimum porosity value) and net pay thickness to gross zone thickness ratio (equal to the fraction of the oolite zone at a given location that was estimated to be productive) for each oolite zone at each well location. Some wells did not drill deeply enough to penetrate all oolite zones, so only penetrated oolite zones with data were used in the mapping effort at those locations.

8.0 DEPOSIT TYPE

The Property lithium deposit is in the form of a lithium-bearing brine contained within the porosity of the Smackover Formation within the LANXESS unitized boundaries. The volume of in-place lithium is proportional to the product of the brine-saturated pore volume in the Property and the lithium concentration, both of which are known with reasonable accuracy, based on extensive drilling, logging, coring, and sampling data obtained throughout the Property. A refinement of this TR in comparison to the MIRE (Eccles et al. 2018) and PEA (Dworzanowski et al. 2019) reports is the inclusion of the varying lithium concentration in the Property, which changes both in location and with time. The balance of information in this section has been brought forward from the previously issued PEA (Dworzanowski et al. 2019).

> *Lithium is a silver-grey alkali metal that commonly occurs with other alkali metals (sodium, potassium, rubidium, cesium). Lithium's atomic number is 3 and it has an atomic weight of 6.94, making it the lightest metal and the least dense of all elements that are not gases at 20°C (the density of lithium in solid form at 20°C is 534 kg/m^3). Lithium has excellent electrical conductivity (i.e. a low electrical resistivity of 9.5 mΩ·cm), making it an ideal component for battery manufacturing, where lithium ions move from the negative electrode to the positive electrode during discharge and back when charging. Lithium imparts high mechanical strength and thermal shock resistance in ceramics and glass.*
>
> *The average crustal abundance of lithium is approximate 17-20 parts per million (ppm), with higher abundances in igneous (28-30 ppm) and sedimentary (53-60 ppm) rocks (Evans 2014; Kunasz 2006). Note: 1 mg/L Li is equivalent to 1 ppm (at a fluid density of 1 g/cm3) and 0.0001%. Lithium does not occur in elemental form in nature because of its reactivity. There are over 100 minerals that contain lithium, but only a few of these are currently economic to extract.*
>
> *Lithium can be described, priced and quoted as lithium content (Li), lithium oxide (Li_2O; 0.464 Li content; conversion is Li x 2.153), lithium carbonate (Li_2CO_3; 0.188 Li content) and lithium carbonate equivalent (LCE; conversion is Li x 5.323). Resource estimates and production quantities of lithium are most commonly expressed as LCE.*
>
> *Lithium is extracted from two main categories of deposits: mineral and brine. With respect to mineral deposits, lithium is currently only extracted commercially from pegmatite deposits. Pegmatite lithium deposits are found globally and account for half of the lithium produced today (Benson et al. 2017). Spodumene is the most abundant Li-bearing mineral found in economic deposits.*
>
> *Brine deposits include unconfined (i.e. continental) and confined (i.e. geothermal and subsurface aquifer) brine deposits. Continental brine occurs in endorheic basins, where inflowing surface and groundwater is moderately enriched in lithium. All producing lithium brine operations are unconfined, or partially confined, continental deposits.*

Several first-order characteristics of this type of brine deposit are: (1) arid climate; (2) closed basin containing a playa or salar; (3) tectonically driven subsidence; (4) associated igneous or geothermal activity; (5) suitable lithium source-rocks; (6) one or more adequate aquifers; and (7) sufficient time to concentrate a brine (Bradley et al. 2006).

Economic continental brine deposits typically occur in areas where high solar evaporation results in beneficiating the Li-brine to higher levels of lithium. Geothermal and/or volcanic associations are the favoured mechanisms for introducing lithium into continental basins, because lithium-rich brines often exist in areas of volcanic activity (e.g. Imperial Valley, California; Reykjanes Field, Iceland; Taupo Volcanic Zone, New Zealand). Typical grades are 0.04-0.15 mg/L Li.

Selected continental brine deposit examples include: Salar de Uyuni in Bolivia (Bradley et al. 2017); Salar de Atacama in Chile (Garrett 2004); Salar de Hombre Muerto in Argentina (Tahil 2007); Salar del Rincon and the Salar del Olaroz in Argentina (Pavlovic and Fowler 2004; Houston and Gunn 2011); and the Zhabuye Salt Lake in the Tibetan Plateau, the DXC Salt Lake and the Qaidam Basin in China (Shengsong 1986; Zheng et al. 2007). The only active lithium mine in North America is in Silver Peak, Nevada, where lithium brine extraction started in 1966. The lithium occurs in an infilled playa sequence that covers an area of 72 km2 within a closed drainage basin of 1,342 km2 (Munk et al. 2011). Average lithium content at the initiation of production was 360 ppm in 1966, declining to 230 ppm in 2008 (Garrett 2004). The mine currently produces 3,500 tonnes of LCE per year, with the capability to produce 6,000 tonnes of LCE per year.

Deep aquifer Li-brine is frequently pumped as a waste product of hydrocarbon production from confined aquifers at depths of up to 4,000 m. Lithium enrichment of deep saline brine is known to occur worldwide in sedimentary basins of various age, including: the Cambrian Siberian Platform, Russia (Shouakar-Stash et al. 2007); Devonian Michigan Basin (Wilson and Long 1993); Mississippian–Pennsylvanian reservoirs of the Illinois Basin (Stueber et al. 1993); Pennsylvanian Paradox Basin, Utah (Garrett 2004); Triassic strata of the Paris Basin, France (Fontes and Matray 1993); and Jurassic Smackover strata from the Gulf Coast, Arkansas and Texas (Moldovanyi and Walter 1992).

If the aquifer contains elevated concentrations of lithium, deep, confined aquifers associated with mature (or dwindling or dormant) oil and gas fields can be converted to brine producing aquifers. A perfect example of this is bromine production from the Smackover Formation in southern Arkansas. At the LANXESS Property, LANXESS's predecessors ceased hydrocarbon production in favour of bromine production in 1957 and this production has continued for over 50-years. Accordingly, these deep-seated aquifer brine deposits present enormous opportunity.

The source of lithium in hypersaline brine aquifers, including the Smackover Formation, remains subject to debate. Theories relevant to the Smackover Formation include, but are not limited to, the following:

- *Smackover Li-brine could be a result of the continental drainage of lithium-enriched solutions into the sea, where the lithium stems from Triassic age volcanic rocks in the Gulf coast (Collins 1976). Continental water from springs or other hydrothermal fluids along fault systems could have leached lithium from Triassic aged volcanic rocks. These lithium-enriched fluids then drained into the Smackover Sea and the water was then concentrated by evaporation.*
- *In the Smackover brine, radiogenic Strontium -87/Strontium -86 are significantly higher than Late Jurassic seawater, suggesting significant strontium contribution from detrital sources, such as the Bossier Formation, which overlies and/or interfingers with the upper Smackover Formation, or suggesting they were acquired during brine migration (Stueber et al. 1984).*
- *Lithium was mobilized from the Alleghenian-sourced volcaniclastics (including plutonic rocks) and then concentrated in the underlying Norphlet Formation. These fluids could have originated in the Louann Salt and migrated upward through faults or from shallower circulation through the alluvial and wadi facies of the Norphlet (from Chuchla, unpublished, via Daitch 2018).*
- *The association between B, Li, K, and Rb, coupled with a general lack of clastic sediments in the upper Smackover Formation in southwest Arkansas, suggest that the Smackover Formation brines are mixing with deeper-seated waters that may have been geochemically modified by siliciclastic diagenesis at higher temperature (Walter et al. 1990)*
- *Regional trends between H_2S) and B, Li, K and Rb support the association of a higher temperature, deeper-seated fluid end member; these fluids may have migrated into upper Smackover reservoirs via major fault systems, the South Arkansas fault system and the Louisiana State Line graben, and their associated fractures (Moldovanyi and Walter 1992).*

With respect to resource modelling of confined aquifer Li-brine deposits, important criteria include defining the boundaries of the subsurface aquifer; brine chemistry; and understanding of the hydrology of the brine. The reader is referred to the CIM Best Practice Guidelines for Resource and Reserve Estimation for Lithium Brine (2012). While the guidelines define issues specific to unconfined continental brine deposits (i.e. salars), they do provide general direction for reporting on confined deep aquifer deposits.

9.0 EXPLORATION

The exploration program to quantify the Property brine lithium accumulation has focused on quantifying two key parameters: the distribution of porosity in the Smackover Formation (which determines the volume of brine) and the initial distribution of lithium concentration within the Smackover Formation. The initial total quantity of lithium in the Property is fully described by the combination of the formation's structure and pore volume, as estimated through the geologic characterization of the porosity and thickness of the Smackover Formation, as described in Section 14, with the mapped lithium concentration for the Smackover Formation, as estimated from the results of the Standard Lithium sampling program described here.

9.1 GEOLOGIC DATA SAMPLING METHODS, QUALITY, AND EXTENT

The Smackover Formation geologic data used in this analysis was obtained by LANXESS and its predecessors as they developed the Property for bromine recovery. Three categories of geologic data were obtained for the Property: well logs that provided structural data, well logs that provided porosity data, and cores that provided porosity and permeability data. Figure 9-1 identifies the locations where these data were collected. The structural data was obtained from 89 wells with log data in the Smackover Formation, while the porosity data originated in two forms: the porosity logs (density porosity, sonic porosity, and neutron porosity logs) obtained from 68 wells, and the core samples obtained from 27 wells. The logs and cores were gathered using industry-standard procedures by contractors experienced in their respective specialties.

All available wireline well log data from the 89 wells was used to establish correlations for structural control and to define gross interval thickness for each Smackover zone. Available well log data included spontaneous potential (SP), gamma ray (GR), resistivity (EL, ISFL, DIL, etc.), MicroLog, and various porosity curves when available (acoustic, neutron, and density). The number of wells with wireline log data available for structural and thickness determination exceeded the number of wells with porosity data from cores and porosity logs and was used to constrain net reservoir thickness and to relate porosity to the established zone correlations. The primary source of porosity data, the density porosity logs, were calibrated using the core porosity values, supplemented with the sonic porosity and neutron porosity well logs, eliminating any significant systematic error or bias in the resulting porosity value estimates. The resulting geologic model formed the basis for the geologic description of the brine-containing reservoir and the reservoir simulation model.

9.2 LITHIUM CONCENTRATION DATA SAMPLING METHODS, QUALITY, AND EXTENT

The lithium concentration data used in this TR resulted from brine samples collected by Standard Lithium from 2017 through May 2022 and analyzed by Western Environmental Testing Laboratory (WetLab), 1084 Lamoille Highway, Elko, Nevada 89801. The well concentration data were used to develop a map of the initial distribution of lithium throughout the Property area which formed the basis for the computer simulation model-based estimates for Project lithium production. In addition, the brine samples collected at the inlet of each of the processing facilities were used to quantify the inlet lithium concentrations at the three bromine processing facilities for comparison to the simulation model's initial predicted values.

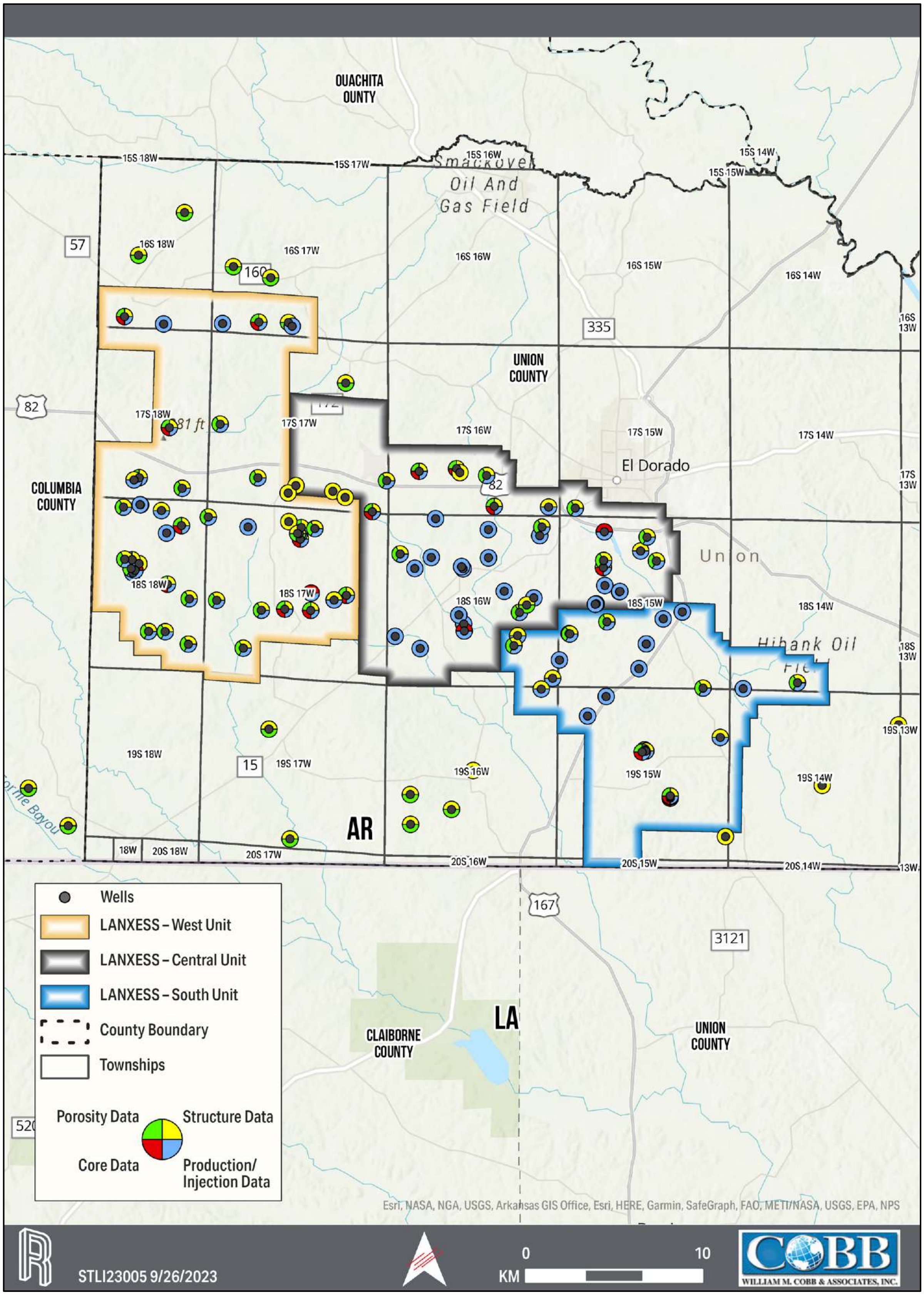


Figure 9-1. Well Data Source

Standard Lithium's 2017 (inlet brine samples only), 2018, and 2019 sampling programs on the Property and the resulting lithium concentration data are described in detail in sections 9.1 and 9.3 of the MIRE (Eccles, et al. 2018), and in section 9 of the PEA (Dworzanowski et al. 2019). The author has reviewed those reports and agrees that the sampling programs were appropriate, appear to have been executed correctly, and have provided reasonable estimates of the brine sample lithium compositions. The WCA QPs Brush and Williams participated in Standard Lithium's May 2022 brine sampling program using the sampling procedures described in Section 11. These results are incorporated with the 2017-2019 sampling data.

In total, there were six well sampling events from June 2018 to May 2022, where 22 to 37 samples were collected in each event, with a total of 162 samples analyzed. Table 9-1 lists the sample assay values averaged by well and Figure 9-2 is a map showing the locations of the sampled wells. The three right-hand columns on Table 9-1 relate to removing the impact of injected brine on measured lithium concentration.

9.3 EXPLORATION RESULTS AND INTERPRETATION

The extensive data collection programs for both porosity (Figure 9-1) and lithium concentration (Table 9-1) address the two key factors determining the volume and quality of the lithium resource for the Property, and the amount of lithium available for recovery in the South Unit by the Project. In the QP's Brush and Williams' opinion the Property has an exceptional quantity, quality, and coverage of the key data, thanks to the decades of data gathering associated with its development as a bromine recovery project and an extensive lithium sampling program.

Correctable bias exists in these recently measured lithium concentration values with respect to the initial (pre-bromine-development) concentration values because the recent values are affected to varying degrees by the presence of re-injected brine that has a lithium concentration different from the original lithium concentration at a specific well's location. This effect was removed by accounting for the fraction of injected brine present in the samples, thereby providing the data needed to initialize the simulation model with the initial, pre-development lithium concentrations. This permitted the model to correctly evaluate the movement of lithium throughout the Property history.

The estimated original lithium concentrations are presented in the right-hand column of Table 9-1. These estimated values were used to create a map of estimated initial lithium concentrations throughout the Property, Figure 9-3. That map was then used as the initial lithium concentration data for the computer simulation of the Property from the date of first production and injection of brine. As demonstrated by Table 9-1, the large number of samples gathered over a broad area of the Property results in a high-quality data set suitable for estimating the initial distribution of lithium concentration throughout the Property.

Table 9-1. Average of Supply Well Lithium Concentration Data

		Brine Sampling			Estimated Initial Deposit		
Well	Unit	Number of Samples	Average Lithium Concentration (mg/L)	Percent Standard Deviation in Samples	Estimated Fraction of Injected Brine in Samples	Estimated Average Injected Brine Lithium Concentration (mg/L)	Estimated Original Lithium Concentration (mg/L)
BSW 13	Central	7	114	8.2%	0.27	135	106
BSW 14	Central	9	97	9.1%	0.09	135	93
BSW 15	Central	7	158	21.2%	0.24	135	165
BSW Car1N	Central	7	195	10.2%	0.18	135	208
BSW Spen N	Central	7	187	10.1%	0.38	135	219
BSW 10S[1]	South	3	192	0.6%	0.77	200	164
BSW 20S	South	7	213	7.1%	0.55	200	230
BSW 21S	South	6	238	6.9%	0.14	200	244
BSW 22S	South	3	279	14.6%	0.05	200	283
BSW 23S	South	4	256	9.4%	0.03	200	258
BSW 24S	South	2	233	20.6%	0.46	200	261
BSW 25S	South	2	250	2.0%	0.05	200	252
BSW 4S[1]	South	4	200	8.3%	0.46	200	200
BSW 5S[1]	South	3	176	3.5%	0.48	200	154
BSW 10M	West	9	114	9.2%	0.18	165	102
BSW 12M	West	7	256	6.7%	0.15	165	272
BSW 13M	West	8	304	9.3%	0.16	165	331
BSW 14M	West	7	255	11.4%	0.25	165	285
BSW 15M	West	5	147	22.2%	0.10	165	145
BSW 16M	West	5	171	9.7%	0.14	165	172
BSW 17M	West	6	159	14.6%	0.14	165	158
BSW 18M	West	6	82	5.2%	0.13	165	70
BSW 19M	West	6	58	10.8%	0.15	165	38
BSW 1M	West	8	183	7.2%	0.44	165	196
BSW 5M	West	5	183	7.3%	0.37	165	194
BSW 6M	West	3	194	3.0%	0.30	165	207
BSW 7M	West	6	184	4.1%	0.54	165	206
BSW A8M	West	5	205	11.2%	0.14	165	211
BSW JK2	West	5	185	4.5%	0.59	165	215
Average		5.6		9.2%			

Notes:

[1] Well no longer in service.

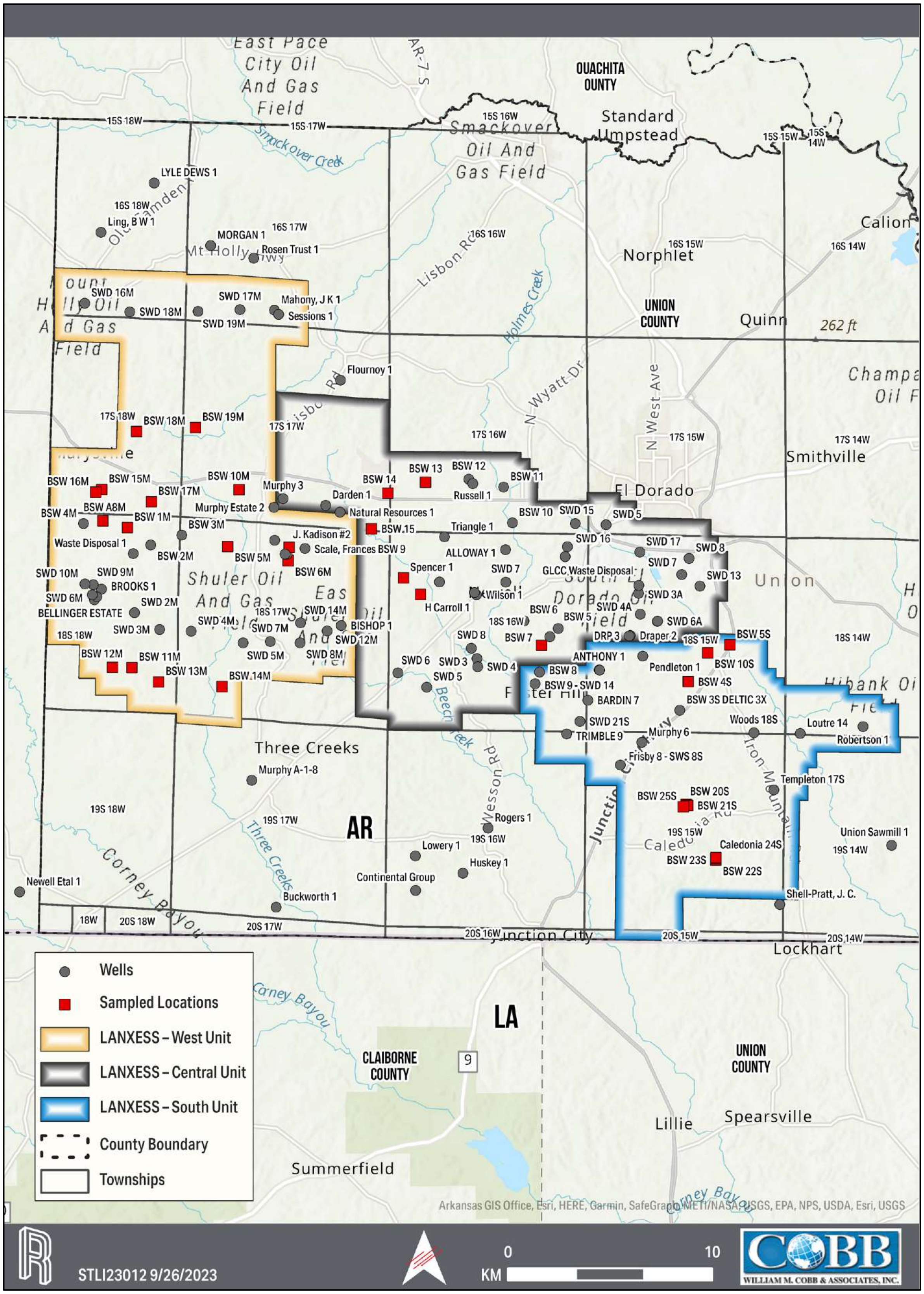


Figure 9-2. Standard Lithium Sample Locations

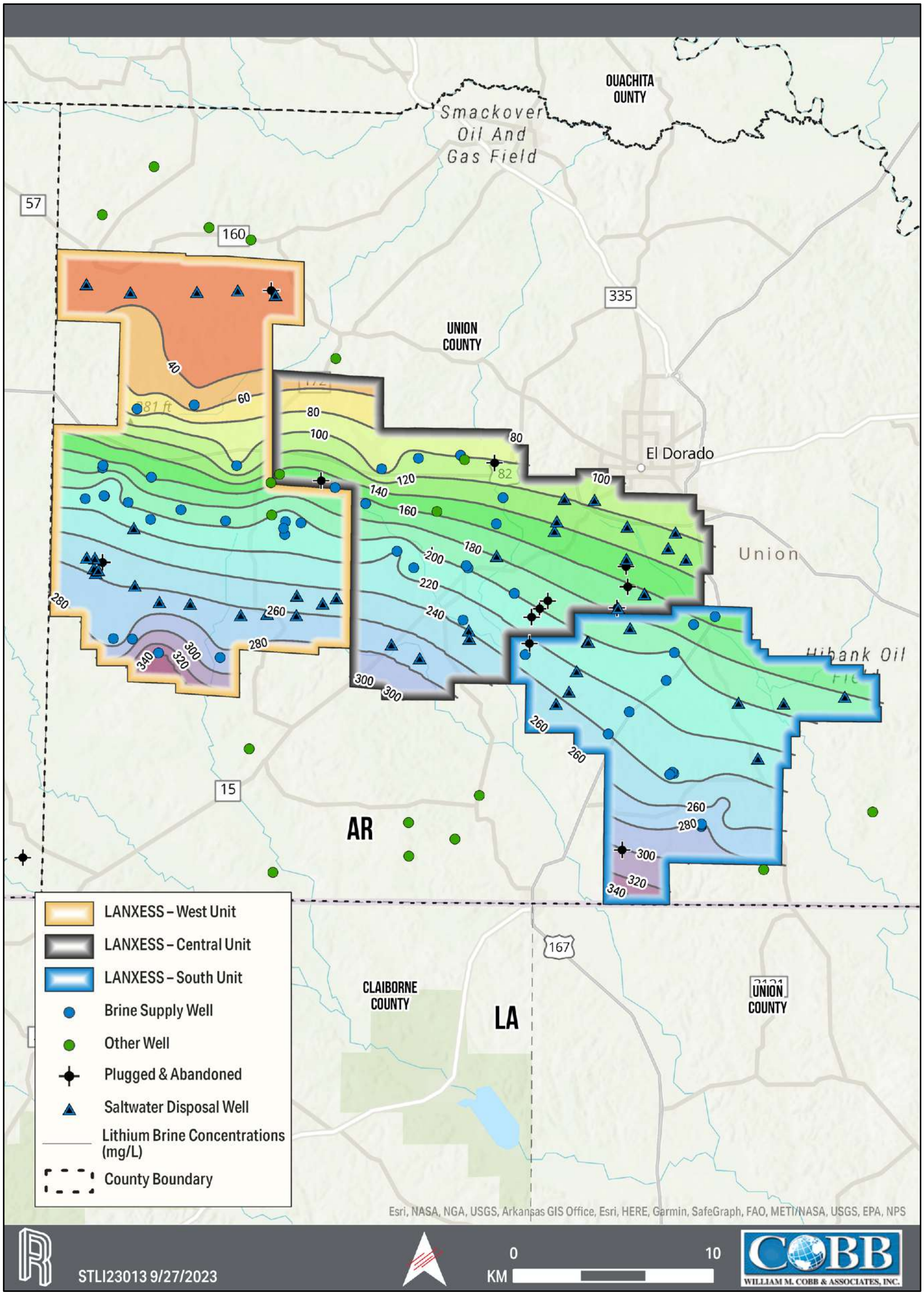


Figure 9-3. Estimated Initial Lithium Concentration

10.0 DRILLING

The geologic model as described in Section 14 is based on the well logs and core data obtained from 85 wells drilled in the Geologic Study Area (Figure 7-1) that penetrated at least the top of the Smackover Formation. No new exploration wells were drilled as part of this estimate. These wells were drilled either by LANXESS and its predecessor companies to assess and access the bromine-bearing brine, or by other operators exploring the area for hydrocarbons. There are 89 wells with logs of various types providing structural control, with 68 wells providing log porosity data and 27 wells providing core porosity data. The majority of the wells have associated injection and withdrawal data. Table 10-1 summarizes the locations and data provided by all wells in the geologic study area.

Table 10-1. Well Data

API Number	Well Name	Year Drilled	Latitude	Longitude	Structure Data	Porosity Data	Core Data	Production or Injection Data
0313904787	Alloway 1	1966	33.1864500	-92.7435200				YES
0313910088	Anthony 1	1947	33.1333295	-92.6945771				YES
0313983123	Arkansas Chemicals 6	1968	33.1723900	-92.7782200				YES
0313910415	Bardin 7	1972	33.1198800	-92.7005500				YES
0313911278	Bellinger Estate	1980	33.1647342	-92.9595850				YES
0313912191	Bishop 1	1961	33.1531830	-92.8298900	YES	YES	YES	YES
0313911279	Brooks 1	1980	33.1693362	-92.9558853	YES			
0313910820	BSW 10	1977	33.1983093	-92.7399135	YES	YES	YES	YES
0313912920	BSW 10M	1993	33.2131270	-92.8835200	YES	YES		YES
0313910475	BSW 10S	1973	33.1406949	-92.6374519				YES
0313911063	BSW 11	1978	33.2141222	-92.7444945	YES	YES		YES
0313911522	BSW 11M	1994	33.1346777	-92.9398784	YES	YES		YES
0313912745	BSW 12	1987	33.2176181	-92.7627527	YES	YES	YES	YES
0313912946	BSW 12M	1995	33.1348063	-92.9500576	YES	YES		YES
0313912779	BSW 13	1988	33.2163149	-92.7854856	YES	YES	YES	YES
0313912948	BSW 13M	1995	33.1283211	-92.9258458	YES	YES		YES
0313912924	BSW 14	1994	33.2115435	-92.8053158	YES	YES		YES
0313912949	BSW 14M	1995	33.1262500	-92.8925400	YES	YES		YES
0313912985	BSW 15	1998	33.1957500	-92.8139800	YES	YES	YES	YES
0313912970	BSW 15M	1996	33.2132500	-92.9556600	YES	YES	YES	YES
0313912971	BSW 16M	1996	33.2121000	-92.9558800	YES			YES
0313912965	BSW 17M	1996	33.2078053	-92.9295332	YES	YES		YES
0313912983	BSW 18M	1998	33.2388500	-92.9373000	YES	YES	YES	YES
0313913041	BSW 19M	2005	33.2405837	-92.9064449	YES	YES		YES
0313910558	BSW 1M	1975	33.1964325	-92.9421636	YES			YES
0313910552	BSW 20S	1974	33.0738200	-92.6490700	YES			YES
0313912968	BSW 21S	1996	33.0732500	-92.6482900	YES			YES
0313913549	BSW 22S	1996	33.0491314	-92.6336003	YES	YES	YES	YES
0313913558	BSW 23S	2018	33.0498160	-92.6335556	YES	YES	YES	YES
0313913560	BSW 25S	2018	33.0727400	-92.6505300	YES	YES	YES	YES

API Number	Well Name	Year Drilled	Latitude	Longitude	Structure Data	Porosity Data	Core Data	Production or Injection Data
0313910577	BSW 2M	1974	33.1887170	-92.9300000	YES	YES	YES	YES
0313910616	BSW 3M	1975	33.1931071	-92.9136646	YES	YES		YES
0313910117	BSW 3S DELTIC 3X	1969	33.1153266	-92.6522708				YES
0313910714	BSW 4M	1976	33.1981672	-92.9652242	YES	YES		YES
0313910248	BSW 4S	1970	33.1279821	-92.6477757				YES
0313910099	BSW 5	1969	33.1516340	-92.7159650				YES
0313971205	BSW 5M	1977	33.1880308	-92.8895329				YES
0313910411	BSW 5S	1972	33.1441965	-92.6258082				YES
0313970114	BSW 6	1970	33.1550500	-92.7339700				YES
0313911211	BSW 6M	1979	33.1818300	-92.8577400	YES	YES	YES	YES
0313910177	BSW 7	1970	33.1442544	-92.7247228	YES	YES		YES
0313972061	BSW 7M	1977	33.1846430	-92.8583700				YES
0313910184	BSW 8	1970	33.1323599	-92.7258727	YES			YES
0313911179	BSW 8M	1979	33.1993803	-92.9548591				YES
0313910498	BSW 9 – SWD 14	1979	33.1272655	-92.7281765	YES	YES		YES
0313913034	BSW A8M	2004	33.1994360	-92.9551300				YES
0313903426	BSW_WIL2N	1963	33.1676505	-92.7598252				YES
0313912880	Buckworth 1	1991	33.0287550	-92.8643200	YES	YES		
0313913562	Caledonia 24S	2018	33.0502432	-92.6335473	YES	YES	YES	YES
0313911374	Continental Group	1981	33.0361020	-92.7911300	YES	YES		
0313912660	Darden 1	2004	33.2062028	-92.8380019	YES			
0313910089	Draper 2	1969	33.1484896	-92.6781299				YES
0313913539	DRP 3	2017	33.1483300	-92.6786250				YES
0313911523	Etta, Mitz 1	1981	33.0860520	-92.4948500	YES	YES		
0313911269	Flournoy 1	1980	33.2615000	-92.8300600	YES	YES		
0313910473	Frisby 8 – SWS 8S	1973	33.0912255	-92.6835493				YES
0313912624	GLCC Waste Disposal	1973	33.1833202	-92.7122686				YES
0313910076	H Carroll 1	1969	33.1668170	-92.7882400				YES
0313913017	Huskey 1	2002	33.0436970	-92.7662900	YES	YES		
0313912864	J. Kadison #2	1991	33.1876481	-92.8572285	YES	YES	YES	YES
0302710233	Jennings -Owens 1	1974	33.0547476	-93.0229414	YES	YES		
0313911491	Jerry Estate 1	1981	33.1967050	-92.5013200	YES	YES		
0313904794	Kadison, Joy 1	1966	33.1907270	-92.8647700	YES			
0313910555	King, B W 1	1974	33.3268740	-92.9559800	YES	YES		
0313913545	LANXESS 1	2017	33.0385880	-92.6762690	YES	YES	YES	
0313910541	Loutre 14	1974	33.1048891	-92.5890446				YES
0313913014	Lowery 1	2002	33.0513214	-92.7912450	YES	YES		
0313910831	LYLE DEWS 1	1976	33.3486300	-92.9279800	YES	YES		
0313911459	Mahony, J K 1	1981	33.2924350	-92.8647900	YES	YES		
0313910776	McCorkle 1	1976	33.1480600	-92.7203300	YES	YES		
0313910815	MORGAN 1	1976	33.3210030	-92.8982900	YES	YES		
0313912751	Murphy 3	1988	33.2091400	-92.8604000	YES			
0313910461	Murphy 6	1973	33.1011990	-92.6722196				YES
0313911004	Murphy A-1-8	1978	33.0848524	-92.8769567	YES	YES		

API Number	Well Name	Year Drilled	Latitude	Longitude	Structure Data	Porosity Data	Core Data	Production or Injection Data
0313912661	Murphy Estate 2	1986	33.2053450	-92.8651400	YES			
0313912662	Natural Resources 1	1986	33.2030870	-92.8304700	YES			
0302710779	Newell Etal 1	1980	33.0355461	-92.9988495	YES	YES		
0313912423	Pendleton 1	1984	33.1393000	-92.6716400	YES	YES		YES
0313972061	Reeves BSW 7M 1	1977	33.1846470	-92.8583700	YES	YES		
0313912867	Robertson 1	1991	33.1078500	-92.5561100	YES	YES		YES
0313912905	Rogers 1	1993	33.0635450	-92.7530700	YES			
0313910921	Rosen Trust 1	1983	33.3153460	-92.8756400	YES	YES		
0313911387	Russell 1	1980	33.2156140	-92.7606900	YES			
0313912789	Scales, Frances BSW 9	1989	33.1871214	-92.8489570	YES	YES		YES
0313913401	Sessions 1	1926	33.2905500	-92.8625260				YES
0313904383	Shell-Pratt, J. C.	1948	33.0294040	-92.6001400	YES			
0313912177	Spencer 1	1983	33.1741300	-92.7971500	YES	YES		YES
0313911402	SWD 10M	1980	33.1716357	-92.9644587	YES	YES		YES
0313911397	SWD 12	1980	33.1705550	-92.6735000	YES	YES		YES
0313912790	SWD 12M	1989	33.1508013	-92.8373076	YES			YES
0313912781	SWD 13	1988	33.1702080	-92.6414200	YES	YES		YES
0313912921	SWD 14M	1993	33.1543553	-92.8512415			YES	YES
0313912912	SWD 15	1993	33.1979180	-92.7068415	YES			YES
0313912919	SWD 16	1993	33.1877020	-92.7109900	YES	YES		YES
0313912940	SWD 16M	1995	33.2955500	-92.9645800	YES	YES	YES	YES
0313912925	SWD 17	1994	33.1851655	-92.6730410				YES
0313912942	SWD 17M	1995	33.2926369	-92.8828778	YES	YES	YES	YES
0313912943	SWD 18M	1995	33.2917600	-92.9408100			YES	YES
0313912947	SWD 19M	1995	33.2919511	-92.9049207			YES	YES
0313910559	SWD 1M	1994	33.1660420	-92.9582750			YES	YES
0313912939	SWD 21S	1995	33.1105533	-92.7046875	YES			YES
0313913592	SWD 22S	2019	33.1331525	-92.6942309	YES	YES		YES
0313910578	SWD 2M	1975	33.1589583	-92.9385476	YES	YES	YES	YES
0313904790	SWD 3	1966	33.1384300	-92.7586200				YES
0313911226	SWD 3A	1980	33.1670700	-92.6737200	YES	YES	YES	YES
0313910803	SWD 3M	1976	33.1515200	-92.9253300	YES	YES		YES
0313904791	SWD 4	1967	33.1348054	-92.7583276			YES	YES
0313912800	SWD 4A	1989	33.1578570	-92.6728418				YES
0313910671	SWD 4M	1975	33.1506974	-92.9087054	YES	YES		YES
0313910035	SWD 5	1969	33.1259100	-92.7851000				YES
0313910452	SWD 5	1973	33.1973080	-92.6906360	YES	YES		YES
0313910863	SWD 5M	2008	33.1456000	-92.8814800	YES	YES		YES
0313910487	SWD 6	1973	33.1547052	-92.6639400	YES	YES		YES
0313912713	SWD 6	1987	33.1321730	-92.8002839				YES
0313912933	SWD 6A	1994	33.1547740	-92.6637200				YES
0313910929	SWD 6M	1977	33.1669120	-92.9606200	YES	YES		YES
0313910525	SWD 7	1974	33.1753119	-92.6509982	YES			YES
0313912749	SWD 7	1988	33.1721080	-92.7434840				YES

API Number	Well Name	Year Drilled	Latitude	Longitude	Structure Data	Porosity Data	Core Data	Production or Injection Data
0313911122	SWD 7M	1979	33.1461423	-92.8672778	YES	YES	YES	YES
0313910530	SWD 8	1974	33.1824023	-92.6470486	YES	YES		YES
0313983124	SWD 8	2008	33.1430100	-92.7615900				YES
0313911129	SWD 8M	1979	33.1455100	-92.8515300	YES	YES	YES	YES
0313911232	SWD 9M	1980	33.1713417	-92.9600731	YES	YES	YES	YES
0313910561	Templeton 17S	1974	33.0800500	-92.6030400	YES			YES
0313903415	Triangle 1	1961	33.1921132	-92.7755764				YES
0313910466	Trimble 9	1973	33.1050570	-92.7116400	YES			YES
0313904360	Union Sawmill 1	1939	33.0553630	-92.5413060	YES			
0313912817	Waste Disposal Well	1989	33.1849300	-92.9390700				YES
0313983122	Wilson 1	1982	33.1666017	-92.7588750				YES
0313912929	Woods 18S	1994	33.1052858	-92.6134203	YES	YES		YES

11.0 SAMPLE PREPARATION, ANALYSES, AND SECURITY

Standard Lithium's Property sampling programs and the analyses performed prior to 2022 are described in detail in the MIRE (Eccles et al. 2018) and PEA (Dworzanowski et al. 2019). QP Brush has reviewed those reports and agrees with those reports' conclusions that the sampling programs they described were appropriate, appear to have been executed correctly and securely, and provided samples that were used to prepare reasonable brine lithium composition estimates.

QPs Brush and Williams participated in the May 2022 brine sampling program. The samples were collected in a consistent and secure manner, with a clear chain of custody from the sample collection point to the shipment to the laboratory and following the procedures summarized below.

11.1 SAMPLING PROCEDURES

Brine sampling undertaken to support resource definition and geochemical analysis was completed with a key focus on ensuring the integrity of the brine sample.

The LANXESS bromine plants and well/pipeline infrastructure were originally designed specifically for brine collection, processing and production of bromine from Smackover brine. Accordingly, as a brine-specific production-system, brine access points were available throughout the Property and were utilized for sampling.

Samples were collected at all operating brine supply wells and all bromine processing facilities at locations prior to and after bromine processing.

11.1.1 METHODOLOGY

Brine sampling programs were undertaken using a methodology as summarized below:

- Prepare and label new laboratory supplied containers including sample ID, date and time of sample collection and the sampler's initials. Sample containers required to support the required analytical suite:
  - Unpreserved Poly (density, pH, alkalinity, TDS, anions) – 1000 ml
  - Nitric acid (HNO_3) Preserved Poly (Metals) – 500 ml
  - Phosphoric acid (H_3PO_4) Preserved Amber Glass (TOC) – 250 ml
- Purge the sample point for a period of 5-10 seconds to ensure the spigot is cleared of any stagnant brine, oil, dirt or other contaminants.
- Following purging, fill the required sample containers to capacity, or near-capacity and immediately seal container.
- Re-check sample containers to verify that all sample label information is correct, and the sample container is properly sealed.
- Store samples in a cooler for transport to the analytical laboratory.

- Collect an additional 250 ml sample for additional field measurement using a Myron Ultrameter 6PIIFCE. Calibrate meter prior to use and record:
  - Electrical conductivity;
  - Resistivity;
  - TDS;
  - pH;
  - Oxidation Reduction Potential; and,
  - Temperature.
- Complete the sampling process by recording physical attributes of the brine samples and any comments that might be significant to the sampling site, the sample collection or the sample itself.

Field duplicate samples, standard sample blanks and synthetic brine standard samples were employed for quality assurance and quality control purposes as follows:

- Field duplicate samples, taken at the same time as the original sample, were collected for every 10 field samples collected and assigned random identification prior to laboratory delivery to confirm precision of the laboratory results.
- Standard sample blanks were inserted for every 10 field samples taken as an additional laboratory check. Sample blanks were comprised of deionized water, which contained no lithium.
- Synthetic brine solutions with 250 mg/L Li and a TDS of 250,000 mg/L were prepared by University of British Columbia. The synthetic brine samples were included in sample sets at a rate of 1 sample for every 20 laboratory samples to measure the accuracy of the laboratory.

Sample security protocols including chain of custody documentation, sealed delivery containers and delivery auditing were employed as part of the sampling program.

11.1.2 ANALYTICAL PROTOCOL

Analysis of brine samples collected was undertaken by independent laboratories covering an expanded lithium brine analytical suite prepared specifically for the Project and which included the following analytical work (following the associated ASTM, SM and EPA international and national method code):

- General chemistry: density, pH, temperature, carbonate, bicarbonate, total dissolved solids, total organic carbon (ASTM 1963, SM 4500-H+B, SM 2550B, SM 2320B, SM 2540C and SM 5310B).
- Anions by Ion Chromatography: chloride, sulfate, bromide, fluoride (EPA 300.0).
- Sample preparation: trace metal digestion (EPA 200.2).
- Trace metals by ICP-OES: Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Ga, Fe, Pb, Li, Mg, Mn, Mo, Ni, P, K, Sc, Se, Si, silica, Ag, Na, Sr, Sn, Ti, V and Zn (EPA 200.7).

12.0 DATA VERIFICATION

12.1 VERIFICATION OF LITHIUM CONCENTRATION DATA

QP Brush verified the lithium concentration data five different ways:

- Reviewed the choice of analytical laboratory
- Reviewed the overall scatter in each well's lithium concentration data
- Compared concentration results between samples taken by the author and those by Standard Lithium
- Compared concentration results between known standards and reported concentrations
- Compared the recent Wetlabs results to historic data.

In 2021, subsequent to the reviews of the analytical laboratories in the MIRE (Eccles et al. 2018) and PEA (Dworzanowski et al. 2019) which found WetLab to be acceptable as the primary analytical laboratory for the Project, Standard Lithium conducted an extensive comparison test of four laboratories known for brine analysis. This study's results indicate that WetLabs is the appropriate choice for the range of lithium concentrations encountered in this TR. QP Brush has reviewed the supporting documentation of that study and agrees with its conclusions. As a result, WetLabs-reported lithium concentration data is used throughout this TR.

The lithium data summary, Table 9-1, shows the number of samples for each well over all sampling events and the percent standard deviation for each well, ranging from 0.6 percent to 22.2 percent, with an average of 9.2 percent for all the wells. This captures the variation between sampling events and between samples within a given sampling event. The observed standard deviation values are an acceptable level of uncertainty for the lithium concentration values.

While not used in this report's lithium concentration analyses because of uncertainty in the testing methodologies, the available earlier lithium concentration data was reviewed and found to be consistent with the Wetlabs lithium concentration data. Figure 12-1 is a map of the average WetLab lithium concentration values from Table 9-1. Figure 12-2 adds the historical values from the USGS, LANXESS sampling in 1990, and other values presented in Moldovanyi and Walker, 1992. While there is the expected scatter in the data, the historical values are in close agreement with the WetLab values, aside from two clear errors in the historical data (the 5 mg/L and 1,700 mg/L data points). This exhibit confirms that the WetLab values reasonably represent the current distribution of lithium in the Property's sampled wells.

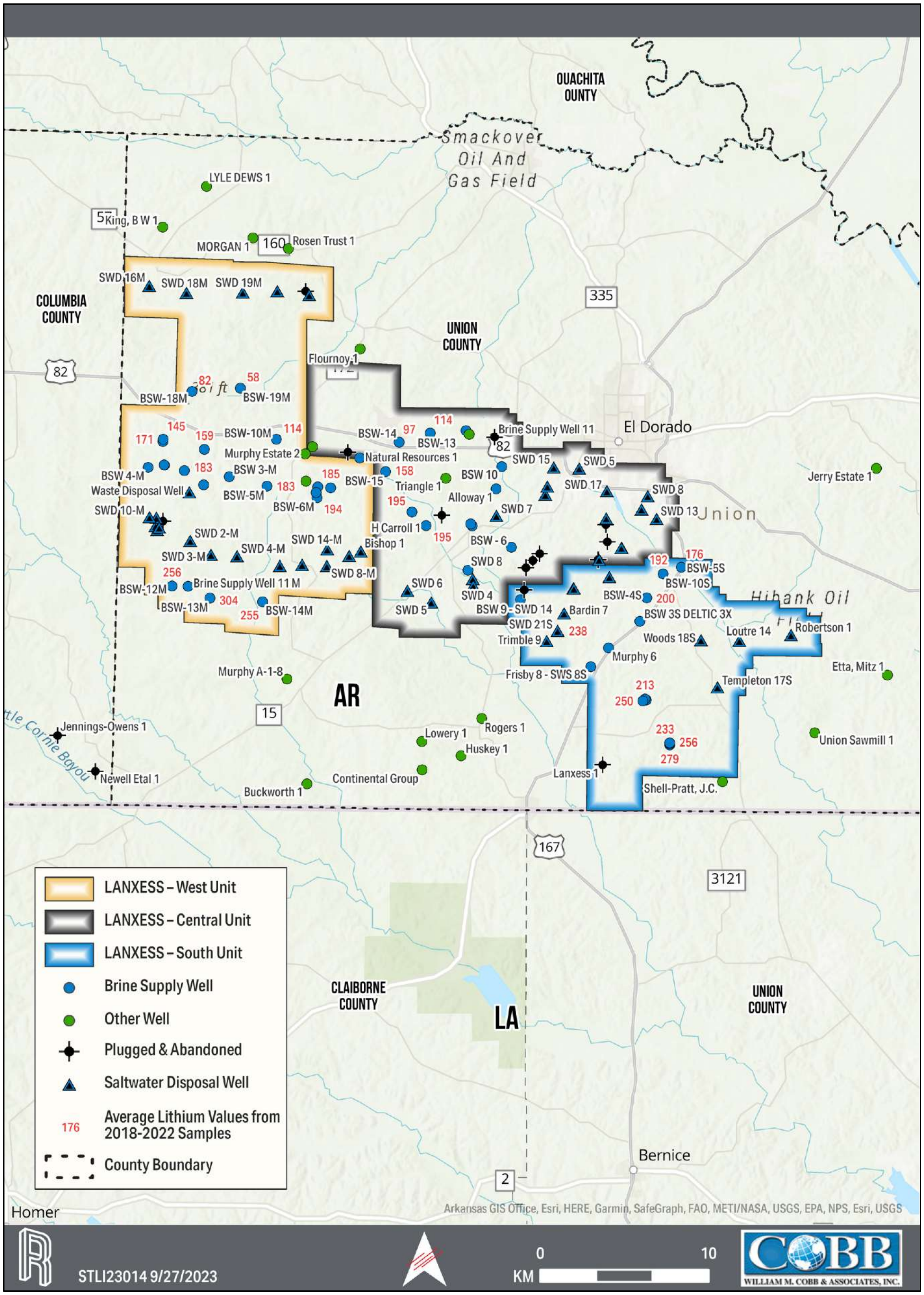


Figure 12-1. Recent Average Well Lithium Concentrations

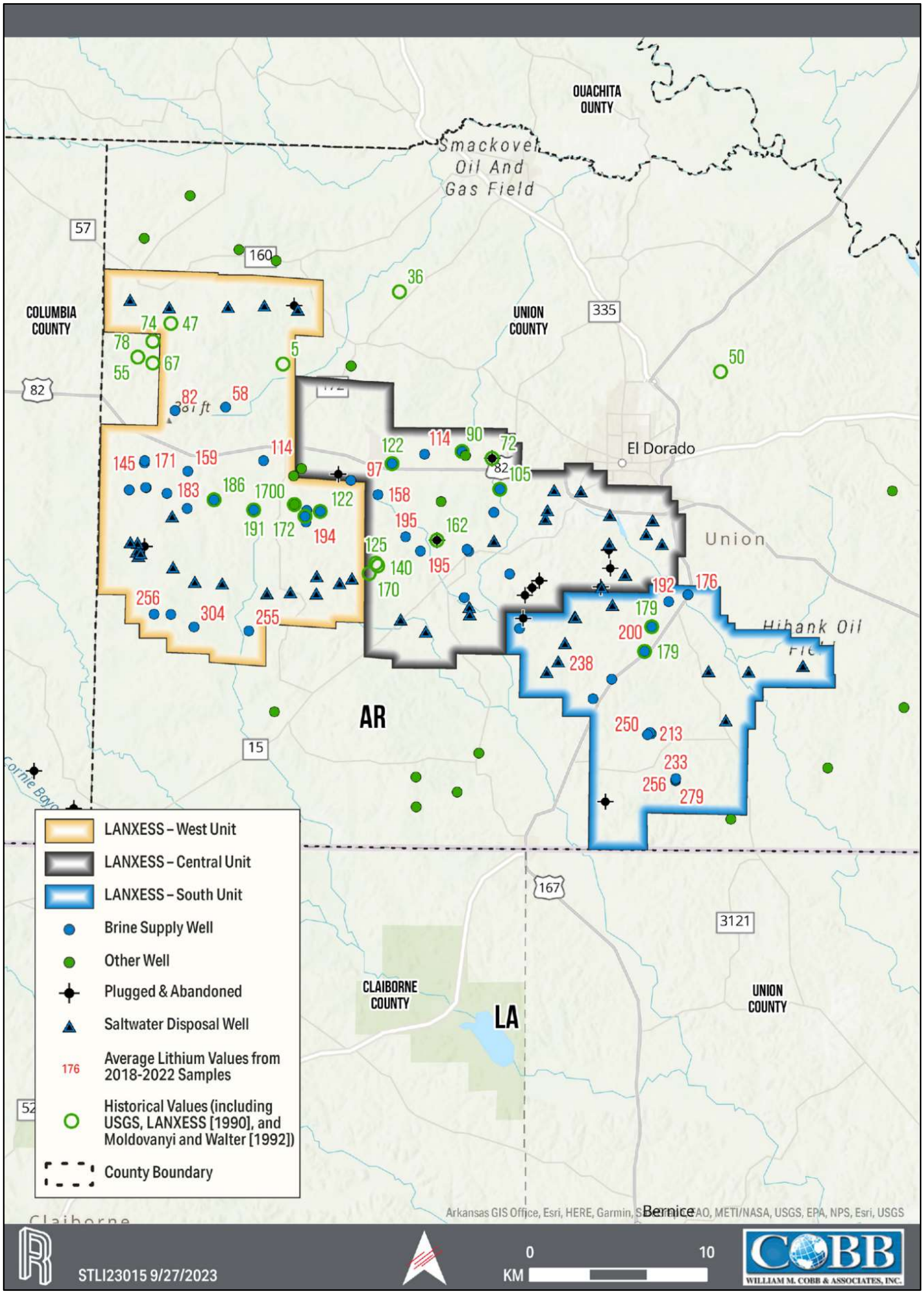


Figure 12-2. Historical and Recent Well Lithium Concentrations

Table 12-1 lists the comparison samples' lithium concentrations, the absolute percent variation of the WCA samples from the Standard Lithium samples, and the statistical characterization of the comparison. Figure 12-3 compares those two sets of lithium concentration results. For each data point an error bar representing a two standard deviation range of Absolute Percent Variation is shown. From this plot one can conclude that the Standard Lithium samples results were closely related to the results for the WCA duplicate samples. In all but one case the error bar encounters the X = Y line. The best fit line to the cross plot of the two data sets indicates the WCA duplicate samples average 7.2 percent higher than the Standard Lithium samples.

To evaluate the accuracy of the laboratory two types of calibration samples were sent for analysis, interspersed with the well test samples. Three samples (two Standard Lithium, one WCA) of deionized water with no lithium were found to contain less than 2.0 mg/L of lithium (the minimum measurement sensitivity of the laboratory). A total of 17 samples (16 Standard Lithium, one WCA) of synthetic brine with 250 mg/L of lithium were found to contain, on average, 280 mg/L of lithium. This average value is within 0.8 standard deviation (37 mg/L) of the calibration sample lithium concentration. Both sets of comparisons demonstrate the accuracy and repeatability of the laboratory results.

Based on these three different analyses, QP Brush concludes that the preparation, security, and analysis of May 2022 sampling program, as well as the prior sampling programs, were appropriate, with no significant issues identified, resulting in lithium concentration values that are valid for the purposes of this report.

Table 12-1. Sample Concentration Comparison

Well	Standard Lithium Sample mg/L Li	WCA Sample mg/L Li	Absolute % Variation
BSW 14	101	111	9.4%
BSW 13	121	123	1.6%
BSW Spencer	192	224	15.4%
BSW 15	199	200	0.5%
BSW 24S	199	267	29.2%
BSW 20S	220	224	1.8%
BSW Carrol	224	223	0.4%
BSW 21S	240	238	0.8%
BSW 22S	264	325	20.7%
BSW 23S	285	267	6.5%
		Minimum	0.4%
		Maximum	29.2%
		Mean	8.6%
		Standard Deviation	9.5%
		Best Fit Slope	1.072
		Best Fit R^2	0.986

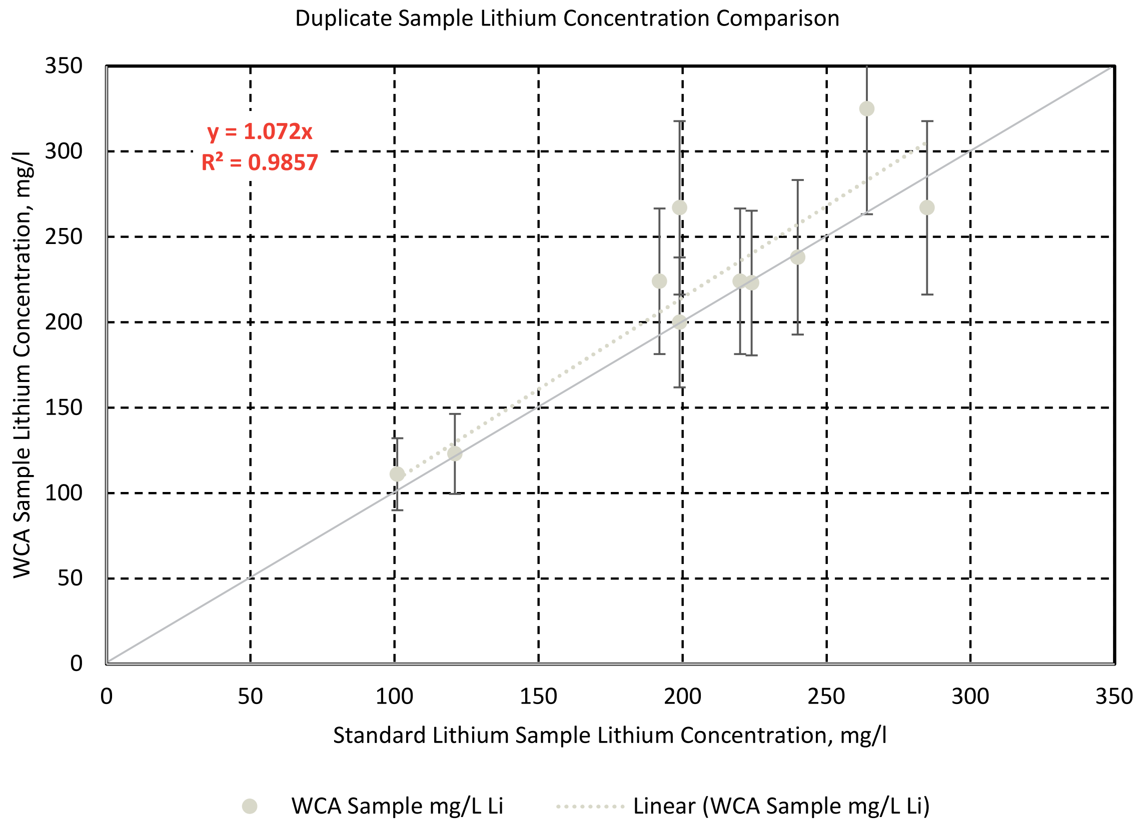


Figure 12-3. Duplicate Sample Comparison

12.2 VERIFICATION OF WELL LOGS AND CORE DATA

The well log and core data used to create the geologic model meets the standard of reliability required by this report. This data was taken by independent vendors in a manner meeting industry standards, consistent with the identical data collection procedures used in dozens of projects evaluated by QPs Brush and Williams over the last 30+ years. Importantly, this data was obtained for a purpose unrelated to the estimation of lithium resources and reserves. Therefore, it was not subject to any biases related to that estimation process.

12.3 VERIFICATION OF PRODUCTION AND INJECTION DATA

The brine production and injection rates used to history match the reservoir simulation model are the product of LANXESS' Property operations and are used as the basis of their daily operations. LANXESS has made every effort over the years to provide accurate data, recognizing that the quality of the bromine process evaluations depends directly on the quality of the data provided by LANXESS. The brine production and injection rates used in the reservoir simulation model forecasts are the result of discussions with LANXESS and represent their best current estimates for rates associated with future operations.

12.4 QUALIFIED PERSON'S OPINION

Each well's production or injection data has been reviewed as part of the history matching process, and the data was found suitable for this evaluation. The lithium concentration, well log, core, production, and injection data used in the preparation of this TR meets the highest standards for the evaluation of the brine deposit. Any limitations present in the data are the unavoidable limitations present in all field measurements. LANXESS and its predecessor companies have exerted industry-standard efforts in gathering high-quality data on the Property. The Property's data gathering program has been thorough over its history, and this history of high-quality data gathering results directly in a high-quality database for use in this evaluation of the Property's lithium deposit.

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 INTRODUCTION

Standard Lithium has developed a process flowsheet to selectively extract lithium from Smackover Formation brine and produce battery-quality lithium carbonate. Smackover brine used for lithium extraction by the Project will originate from the LANXESS Tail Brine system delivered from the existing South Brine Unit supply well network and South Plant bromine extraction operation. The Project will pre-treat the brine received from LANXESS to condition the brine prior to the lithium extraction process. The mineral processing and hydrometallurgical flowsheet for the Project consists of seven process areas, three of which areas are included in LANXESS' existing operations:

1. **Brine Production –** Brine from the Smackover Formation is produced from multiple existing brine supply wells, separated from associated sour gas and crude oil through three-phase separators at the wellheads, and then delivered via pipeline to the LANXESS South Plant.

2. **Bromine Extraction and Tail and Bypass Brine Pre-treatment –** Brine received from the field at the LANXESS South Plant is treated to remove most of the dissolved H_2S in the brine by vacuum degassing. The degassed brine is fed into a bromine tower where it is reacted with elemental chlorine (Cl_2), converting bromides in the brine to elemental bromine (Br_2). Bromine extracted from the brine is recovered from the top of the bromine tower and (bromide-barren) Tail Brine discharges from the bottom of the bromine tower. Before the Tail Brine is delivered to Standard Lithium for lithium extraction, it is first pre-treated with sodium bisulfite ($NaHSO_3$) to reduce the free chlorine and free bromine from the brine and then is partially neutralized with anhydrous ammonia. If the bromine tower is not operating for any reason, to avoid shutting down brine production wells, degassed brine bypasses the bromine tower and is discharged directly into the Tail Brine system downstream of sodium bisulfite dosing. Bypass Brine is partially neutralized, similar to Tail Brine. The pre-treated Tail Brine and Bypass Brine is then pumped to the Standard Lithium Plant.

3. **Feed Brine Pre-Treatment for Lithium Extraction –** Brine received from the LANXESS South Plant is neutralized, chemically adjusted to increase the ORP (oxidation-reduction potential), and then is filtered to remove suspended solids that could interfere with the downstream Direct Lithium Extraction (DLE) process.

4. **Direct Lithium Extraction (DLE) Process) –** A proprietary Direct Lithium Extraction (DLE) process is used for extraction of lithium from the pre-treated brine, producing a relatively pure lithium chloride (LiCl) solution that is low in contaminants.

5. **Purification and Concentration of the LiCl Solution –** Further purification and concentration of the LiCl solution produced by the DLE process uses chemical softening and impurity removal processes that are industry standard processes for water and wastewater treatment, including BWRO (Brackish Water Reverse Osmosis), lime soda softening, ion exchange for removal of calcium (Ca), magnesium (Mg), and boron (B), and OARO (Osmotically-Assisted Reverse Osmosis).

6. **Battery-Quality Lithium Carbonate Production –** Purified LiCl solution is converted to battery-quality lithium carbonate in an industry-proven process that includes reacting the LiCl with sodium carbonate (Na_2CO_3), producing crude lithium carbonate, conversion to lithium bicarbonate, ion exchange, secondary crystallization to produce pure lithium carbonate, and finally drying, milling, and packaging of the final product.

7. **Effluent Brine Return to LANXESS for Reinjection –** The final process is the return of the lithium-depleted, barren brine from the DLE process and other Project effluents back to LANXESS for reinjection into the Smackover Formation, and disposal of any excess effluent brine volume into two Underground Injection Control (UIC) wells.

With respect to the above identified process areas 1, 2 and 7, the Project relies on the existing brine infrastructure of the LANXESS South Plant for the supply of lithium-rich brine and disposal of most of the Project's effluent brine. Testing programs associated with these process areas focused primarily on the characterization of the quality of Feed Brine to be processed by the Project.

With respect to process areas 3, 4 and 5, Standard Lithium has been continuously running a pre-commercial Demonstration Plant at the LANXESS South Plant since May 2020. This operation has produced significant data on the performance of the various unit processes for pre-treatment of brine from the South Plant and operation of the DLE technology on this brine. The Demonstration Plant has produced significant quantities of purified and concentrated LiCl solution and has converted portions into battery-quality lithium carbonate, on site and at vendor facilities.

With respect to process area 6, Standard Lithium is relying on commercially proven lithium carbonate conversion technologies from globally recognized vendors. These vendors have supported the Project with specific bench-scale testing at their laboratory facilities using LiCl solution produced at the Demonstration Plant to validate vendor guarantees related to commercial-scale production of battery-quality lithium carbonate in the Project.

The intent of this Section is to provide an overview of the specific lithium-brine mineral processing test work completed to support the characterization of the brine resource (i.e., brine quality) as well as support the development of commercial processes for the Project and confirm the associated process performance.

13.1 PROCESS OVERVIEW

Standard Lithium plans to use a demonstrated proprietary DLE technology (discussed further in Section 13.5.1) to extract lithium from the pre-treated, lithium-bearing, Smackover brine, supplied as tail and Bypass Brine from the LANXESS South Plant. The DLE process selected for the Project produces a slightly concentrated and significantly more pure brine than the received Feed Brine. The LiCl solution produced by the DLE process is purified and concentrated, then converted to battery-quality lithium carbonate using an industry-proven lithium carbonate process. The lithium extraction technology described in this study has been operated on a 24hr / 7 day per week basis at Standard Lithium's Demonstration Plant since October 2022. The brine pre-treatment and DLE technology, while still being optimized, has been sufficiently tested and validated for commercial use for the Project.

Figure 13-1 provides a simplified schematic illustrating the main process steps proposed for the Project using Feed Brine from the LANXESS South Plant.

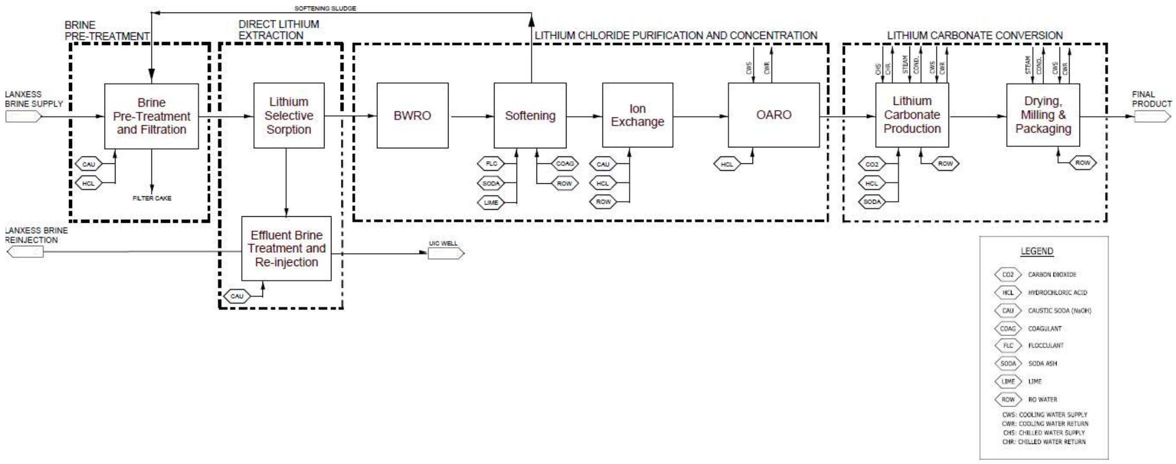


Figure 13-1. Project Process Block Flow Diagram

It is the opinion of the author preparing this section, that the discussion includes an objective level of reasonableness and demonstrates competence and due care in the execution of the metallurgical test work and lithium-brine recovery process steps.

13.2 HISTORICAL TESTING

All testing discussed below was performed for or by Standard Lithium as part of the current development program either to support the Project or the broader developments contemplated by Standard Lithium in the Smackover Formation.

13.3 DEMONSTRATION PLANT TESTING

Considering the factors outlined in Section 13.1.1, alternative methods to those commercially proven in lithium recovery from salar-based brines are required to continuously extract and purify lithium from the Smackover brines. Standard Lithium has been assessing and testing technologies with a specific focus on direct lithium extraction which to date is somewhat unproven at a commercial scale. The process evaluation conducted at the Demonstration Plant over 3 years of operation included extensive testing of two separate DLE technologies:

1. LiSTR (Lithium Stirred Tank Reactor), a proprietary DLE technology developed, owned and patented by Standard Lithium, which directly extracts lithium from high total dissolved solids (TDS) brines using a high-loading-capacity, lithium-selective, solid sorbent based on lithium titanate, in a continuous stirred tank reactor configuration. (Testing of this DLE process occurred from May 2020 through to October 2022); and
2. LSS (Lithium Selective Sorption, a component of the broader Li-PRO™ technology), a Koch Technology Solutions owned (KTS), proprietary, DLE technology. The LSS technology uses a fixed bed of commercially available alumina-based resin. This technology has been co-developed under a Joint Development Agreement between Standard Lithium and Koch Technology Solutions. (Testing of this DLE process has commenced in October 2022 and is ongoing as of the publishing date of this report).

RESPEC

13.1.1 DEMONSTRATION PLANT

The Standard Lithium LiSTR Demonstration Plant, was designed and constructed in Ontario, Canada in 2019 by Zeton Inc. The Demonstration Plant was designed to continuously process a slipstream of the lithium-containing Tail Brine produced by the LANXESS South Plant bromine facility with a focus on developing and confirming the operation of an integrated DLE flowsheet to allow the design of a future commercial production facility. The two DLE processes that have been operated in the Demonstration Plant have been adjusted and optimized over time to allow integration into the full commercial plant flowsheet. At the Demonstration Plant, the lithium-barren brine from the DLE processes, various other process effluents, and all of the LiCl solution not used for test production of lithium carbonate are continuously transferred back to the LANXESS brine disposal system; no lithium products were produced for sale at this test facility.

The Demonstration Plant as shown in Figure 13-2, which consisted of 18 modules, was dismantled and transported from Canada to its current location at the LANXESS South Plant bromine facility in Union County, Arkansas (south of the Town of El Dorado). It was erected within the existing fence line of the South Plant on a one acre site leased from LANXESS. The site was levelled, foundations were poured, and all process, utility and power connections were installed to ready the Demonstration Plant for operation in late 2019. The plant was installed/connected and enclosed in a tensile fabric building in late 2019 and underwent commissioning in early 2020. Commissioning was partially delayed by the COVID-19 pandemic and associated lockdowns. The Demonstration Plant commenced operations in May 2020.

Figure 13-2. Standard Lithium Demonstration Plant

The Demonstration Plant initially comprised of brine pre-treatment, LiSTR DLE process tanks and equipment, and purification equipment for removal of calcium, magnesium and silica. Process modifications to address scalability for commercialization were made in December 2020 and an osmotically assisted reverse osmosis (OARO) unit was installed at the plant in August 2021 (membrane concentration of the purified LiCl product operation had, until that point, been completed off-site as an occasional batch process).

Modifications were implemented in September and October 2022 to install a fixed bed column and support equipment to prove out the second DLE process (LSS). Several subsequent modifications have been made at the Demonstration Plant for continuing optimization of this process, including addition of a second LSS column in March 2023.

The Demonstration Plant has a dedicated team of approximately 30 engineers, chemists, operators, and maintenance staff who run and maintain the plant on a 24 hour per day, 7 day per week basis. The plant has operated continuously since it was started, apart from shutdowns for maintenance, process improvements, and supply outages caused by interruptions to the LANXESS brine supply. The plant includes a dedicated analytical laboratory equipped to complete all on-site process control assays. The plant's high level of process instrumentation and extensive program of sampling and analysis have generated large amounts of data. The data collection underpins the assessment in this report.

The Demonstration Plant has processed two different brines from the LANXESS South Plant: Tail Brine (brine that has been through the bromine extraction process) and Bypass Brine (brine that has been degassed to remove hydrogen sulfide but has not been through the bromine extraction process). Representative analyses of the Demonstration Plant brine solutions are provided in Table 13-1. There have been several periods when Bypass Brine with >4,000 mg/L of bromide has been supplied to the DLE processes and the rest of the Demonstration Plant's purification and concentration processes.

Brine pre-treatment performed by LANXESS utilizes a reducing chemical, sodium bisulfite ($NaHSO_3$), to reduce free bromine and chlorine to low levels by converting them to their respective bromides and chlorides. It has been observed that neither of the two DLE processes operated in the Demonstration Plant (LiSTR and LSS) were impacted by dissolved bromide concentrations in the brine. It was found that the bromides behave similarly to chlorides and are largely rejected with the lithium-barren brine and do not pass through into the LiCl product stream in any significant amounts.

As of the end of Q2 2023, the Demonstration Plant has processed approximately 55,500 m^3 (approximately 14,700,000 US gallons) of brine from the LANXESS South Plant.

The purified and concentrated LiCl product solution from the Demonstration Plant along with brine from various stages of the Demonstration Plant flowsheet have been supplied to equipment vendors for testing in support of equipment design and process guarantees. The purified and concentrated LiCl product solution from the Demonstration Plant has also been converted to battery-quality lithium carbonate both on site at the Demonstration Plant and offsite by vendor testing laboratories.

The Demonstration Plant operation period when the LiSTR DLE process was operated between May 2020 and October 2022 provided useful information to further the overall process development. This included, but was not limited to:

- Development of analytical techniques to evaluate process operational performance,
- Understanding the variability and characteristics of the Tail Brine received from LANXESS,
- Evaluation of potential materials of construction through plant operation and submerged metallurgical coupon testing,
- Demonstration of membrane ultra-filtration (UF) system operation,
- Demonstration of multi-media filtration,
- Demonstration of Osmotically Assisted Reverse Osmosis (OARO),
- Operation of calcium, magnesium, and boron removal by ion exchange,
- Preparation of samples for three lithium carbonate crystallization campaigns conducted in the laboratories of two vendors of lithium carbonate systems.

Since October 2022, test work at the Demonstration Plant is on-going using the LSS DLE technology. The LSS testing program is expected to continue to optimize the operation and product quality.

Operations within the Demonstration Plant can be systematically varied, and as such, the effect of changing operating parameters on performance metrics such as degree of lithium recovery from the incoming brine, rejection of impurities, reagent usage and water balance have all been studied in a controlled manner. As with any industrial process, there are many competing factors, and the optimal operation has been proven to be a trade-off between the various inputs. For reference, representative LiCl analyses generated by the two flowsheets tested in the Demonstration Plant are provided in Table 13-1, though these can be modified by varying the processes in the Demonstration Plant.

A test program is in progress at SGS (Société Générale de Surveillance) laboratory using brine and LSS eluate supplied from the Demonstration Plant which is exploring brine pretreatment (prior to LSS) and post treatment of the LSS Eluate. Specifically, this includes lime—soda softening which will precipitate calcium, magnesium, strontium, and silica followed by ion exchange to reduce the above impurities to levels near 1 mg/L.

Table 13-1. Representative Analyses of Brine and LiCl Products.

Table 13-1. Demonstration Plant LiCl Analysis

Element	Brine Feed to Demonstration Plant from LANXESS[1] (mg/L)	Raw LiCl from LiSTR DLE[2,3] (mg/L)	Raw LiCl from LSS DLE[2,4] (mg/L)	Polished LiCl from Demonstration Plant[2,5] (mg/L)
Lithium (Li)	237	1427	301	4917
Sodium (Na)	61136	2217	817	28896
Calcium (Ca)	31793	3423	620	0.5
Magnesium (Mg)	2682	169	56	0
Potassium (K)	2385	N/A	30	672
Strontium (Sr)	1932	N/A	35	0
Boron (B)	189	N/A	37	0
Silicon (Si)	10	26	4	0

Notes:

[1] Demonstration Plant brine supply composition is average sample data collected in the Demonstration Plant from 4th May to 30th June 2023 to reflect the period when Sr was regularly measured.

[2] All LiCl compositional data is based on data collected during normal operation of the Demonstration Pant. The results from the on-site laboratory have been regularly validated by independent testing by WetLabs, NV, over the period of May 2020 through to June 2023.

[3] The data from LiSTR is based on compositional averages of approximately 6,000 hours of operation from March 2021 through to November 2021. During this period, B, K and Sr were not measured, but data from Wetlabs samples indicates typical values of 100, 67, and 221 respectively. Following November 2021, a sorbent development and optimization program was initiated to assess the performance of bespoke sorbents and target specific operating parameters and long-term continuous operation was discontinued in support of shorter duration testing.

[4] The LSS data is based on compositional averages of a 1,200-hour period of continuous operation in Q2 2023.

[5] The LiCl Product from the Demonstration Plant is based on the average of bulk samples. The samples were produced in the Demonstration Plant by LSS DLE with subsequent IX processes for removal of bivalent cation and boron followed by OARO for concentration suitable for vendor testing of downstream processes.

13.1.2 TAIL BRINE MEASUREMENT SKID

A measurement and sampling skid was designed and built by Standard Lithium to enable the Tail Brine discharged directly from the LANXESS bromine tower to be measured continuously, and for samples of the Tail Brine to be more easily collected for laboratory analysis. A photograph of the Tail Brine measurement and sampling skid is shown in Figure 13-3, below. Direct measurements taken by the field instrumentation on the skid were recorded in the Demonstration Plant data archive. These measurements included: Tail Brine temperature, specific gravity, pH, ORP and turbidity.

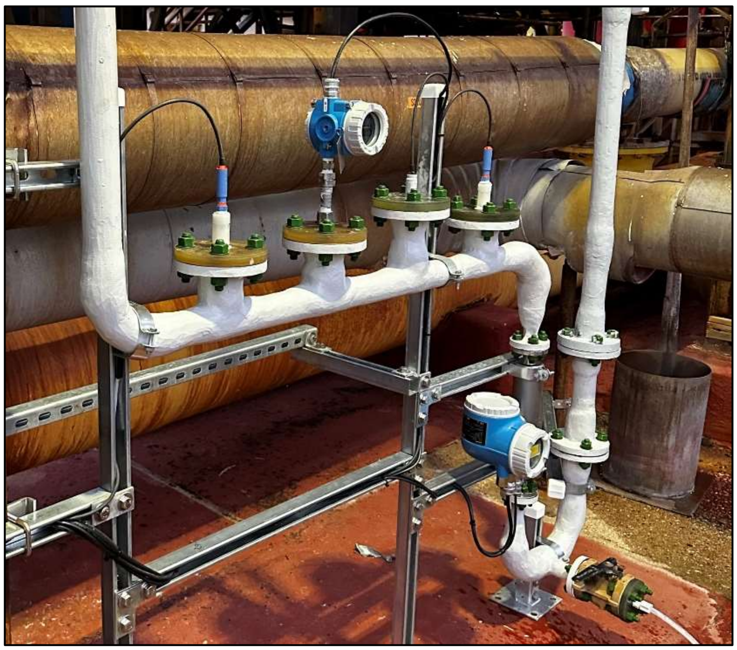


Figure 13-3. Tail Brine Measurement Skid at the LANXESS Bromine Tower

13.1.3 BRINE PRE-TREATMENT TESTING

As part of operating the pre-commercial Demonstration Plant facility, a variety of brine pre-treatment processes, including those proposed for inclusion in the commercial operation, have been demonstrated at the facility. These included:

- pH and chemical adjustment and control using reagents for preventing and encouraging solids precipitation and associated silica, iron, aluminum, and other metals removal,
- Temperature adjustments for protection of downstream equipment
- Different solid-liquid separation equipment:
  - Conventional fabric cartridge filters
  - Bag filters
  - Multi-media filters
  - Pressurized ultrafiltration membrane filters
  - Submerged ultrafiltration membrane filters
  - Profiled metal plate filters

   - Conventional and lamella clarifiers, with and without coagulant and flocculant dosing
- Alumina sorbent for removing silica from the brine,
- Media filters for hydrocarbons removal
   - Walnut shell media filters
   - Activated carbon for hydrocarbons removal,

Note that many of the pre-treatment technologies tested have subsequently been discarded as likely unsuitable or unnecessary for commercialization.

13.2 BRINE PRE-TREATMENT AT LANXESS

Tail Brine will be chemically reduced by the addition of sodium bisulfite (SBS) and Tail Brine or Bypass Brine will be neutralized with anhydrous ammonia at the LANXESS South Plant in a set of four new mixed reaction tanks prior to the brine being pumped to Standard Lithium. SBS is added to reduce free bromine and chlorine to bromide and chloride. Currently Standard Lithium is examining the use of chemical addition to stabilize the Tail Brine. This may not be necessary once the new buffer tanks are installed by LANXESS, allowing improved control over the brine quality.

13.3 BRINE PH CONTROL

Control of the incoming Tail and Bypass Brine pH is important for effective brine pre-treatment. The precipitate (sludge) formed during LiCl chemical softening will be recycled to the brine pretreatment area utilizing the brine acidity to dissolve the softening sludge which is primarily calcium carbonate and magnesium hydroxide. The Tail Brine from the bromine tower will typically be in the range of pH 0.5 to 0.7 and it will be partially neutralized by LANXESS to between approximately pH 1 and 5.5.

In October 2022, Standard Lithium performed Feed Brine neutralization tests using softening sludge produced by treating the LSS eluate with sodium carbonate. Lime was not used and therefore the precipitate was substantially calcium carbonate (96.5%) with no magnesium hydroxide. The quantity of sludge required to neutralize the Tail Brine from pH 0.55 to 4.0 was measured to be 1.5 g/l (as $CaCO_3$) and is shown in the following diagram. The tests performed demonstrate that softening sludge can effectively neutralize Feed Brine.

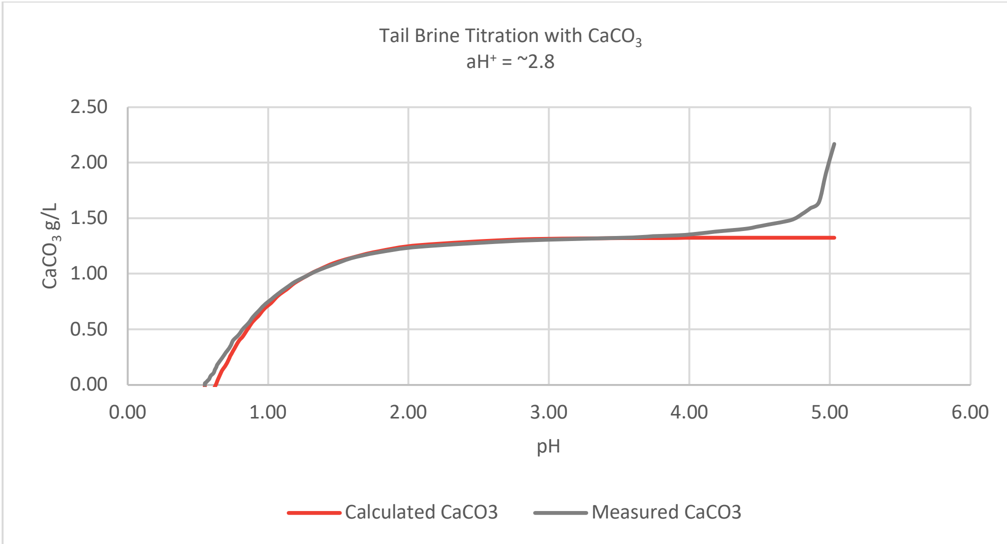


Figure 13-4. Sludge Dissolution for Tail Brine pH Adjustment

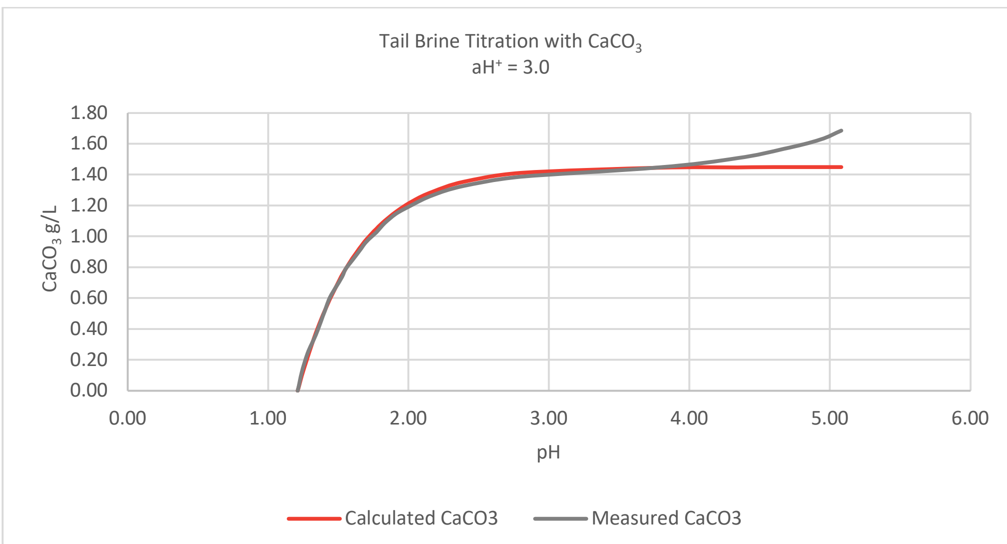


Figure 13-5. Sludge Dissolution for Brine pH Control

13.4 BRINE FILTRATION

The brine pretreatment includes membrane filtration to deliver a solids free liquid stream to LSS. A pilot system using Koch Separation System's (KSS) Puron MP Filters has been in continuous service at the Standard Lithium Demonstration Plant since March 2022. The membrane has a pore size near 0.01 mm and is expected to remove all particles > 1 micron. There have been very few operational problems.

13.5 KEY FINDINGS FROM BRINE PRE-TREATMENT TEST WORK

Key findings and outcomes from the Demonstration Plant pre-treatment testing work are:

- Pre-treatment of the incoming Tail and Bypass Brine is necessary to remove residual hydrogen sulfide, suspended solids, and other contaminants which may result from brine extraction and bromine processing.
- Real brines processed on a continuous basis are significantly more complex than synthetic brines based on the same underlying chloride matrix. Continuous, long-term (greater than two years) field testing of equipment is crucial in ensuring sufficient design inputs to support reliable scale-up.
- The Demonstration Plant has effectively pre-treated, neutralized, and filtered the Feed Brine to be suitable for DLE testing.

13.5.1 DLE TESTING AT THE DEMONSTRATION PLANT

The Demonstration Plant has tested two different DLE processes, LiSTR and LSS, as described below.

13.5.1.1 LISTR DLE TESTING

The LiSTR DLE technology is a proprietary process designed, patented, and owned by Standard Lithium. It uses a high-loading-capacity lithium titanate-based sorbent (meta-titanic acid in its active form) for selective extraction of lithium from the brine stream using a slurry of the sorbent in stirred-tank reactors and a conventional Counter Current Decantation (CCD) circuit. The LiSTR technology was initially developed in 2017 and went through two main scale-ups (each approximately a 100× scale-up) during 2018 and 2019, resulting in operation in the Demonstration Plant in May 2020.

LiSTR was originally commissioned and operated using a commercially available sorbent from China. Since testing in the Demonstration Plant, Standard Lithium has maintained a continued, dedicated sorbent development program over the past 3 years with the aim to develop sorbents with improved parameters for lithium loading capacity, separation efficiency and physical/chemical robustness.

The pre-commercial operation of the LiSTR process in the Demonstration Plant has proven high selectivity for lithium, high recovery of lithium from the brine, and long-term reliability.

13.5.1.2 KEY FINDINGS FROM LISTR DLE TEST WORK

- Continuous and accurate pH control in the loading and stripping reactors is critical to good performance and sorbent stability.
- Loading efficiency (lithium extraction efficiency) is a direct function of sorbent capacity and mass flux vs brine flow in the loading reactors – this is a variable that can be controlled. Lithium extraction during loading can exceed 90% when a two-stage counter-current loading configuration is used (the maximum sustained extraction efficiency was in excess of 95%).
- Contaminant (Ca, Mg, and Na) rejection efficiencies for most contaminants are consistently observed within the Demonstration Plant to be over 98%.
- Submerged membranes can be used effectively in the loading reactors to remove barren (lithium-free) brine, but their utility is limited at very high solids concentrations in the sorption slurries.

- The stripping performance of the sorbent is sensitive to temperature and pH and long-term operation under stable conditions is required to optimize the process performance.
- Industry-standard counter current decantation (CCD) circuits can be used to wash the sorbent in either the loaded or stripped (reactivated) state.
- Bulk properties and settling characteristics of the sorbent are key for effective solid-liquid separation and sorbent recovery for recycle.
- Bulk quantities of suitable sorbent have been produced by independent third parties with pilot scale equipment to demonstrate that sorbent can be produced at a commercial scale in North America.
- LiSTR requires continuous addition of acid/base during loading and stripping and as a result, is more sensitive to reagent pricing than LSS.

13.5.1.3 LSS DLE TESTING

The Lithium Selective Sorption (LSS) DLE is a Koch Technology Solutions LLC (KTS) proprietary technology for which Standard Lithium has a Joint Development Agreement and Smackover regional exclusivity agreement in place (for a period of time). This process uses a fixed bed adsorption with a lithium-selective solid resin, based on aluminum hydroxide copolymer, a resin material with elution by fresh water rather than an acid strip as used in LiSTR process. The core of the technology was originally developed by a consultant to Standard Lithium and purchased by KTS. The synergies associated with the relationship between Standard Lithium, various Koch Industries businesses and the process inventor led to an opportunity to operate and develop this process in parallel to LiSTR in the Demonstration Plant.

The LSS DLE process has been in operation at the Demonstration Plant since October 2022 and extensive work has been undertaken to prove scale-up and reliable operation. The LSS columns have been operated more than 6,000 cycles at the time of this technical report. Process refinement is on-going at the Demonstration Plant and is aiming to optimize the process operation steps to determine the best balance for lithium recovery, impurity rejection, water usage and lithium concentration that can be achieved.

To date, LSS has shown significant promise in reducing reagent use, reducing excess water addition, and simplifying the DLE process with lower equipment costs. The LSS process has the additional benefit that independent third-party process guarantees can be provided, and, as a result, has been recommended as the core technology for Standard Lithium's Commercial Lithium Extraction Plant Project.

The average recovery of lithium and rejection of impurities for the current LSS column configuration and operating profile recorded between July 2023 and August 2023 is presented in Table 13-2 below. This process will continue to be developed and optimized in parallel with the project execution.

Table 13-2. LSS Process Parameters

	Dilution	Recovery/ Rejection (%)				
	%	Li	Ca	Na	Mg	B
Goal	<6	>95	>99.0	>99.0	>98.5	>90
Average	4.7	95.6	99.7	99.9	99.3	95.0
St. Dev	0.0	2.7	0.2	0.1	0.3	2.5
Max	4.7	100.0	100.0	100.0	100.0	100.0
Min	4.7	90.3	99.1	99.7	98.3	83.6

13.5.1.4 KEY FINDINGS FROM LSS DLE TEST WORK

- Lithium extraction efficiencies of greater than 95% have been observed in the Demonstration Plant, which is consistent with the expected performance of the LSS technology provided by KTS; Similarly, contaminant (Ca, Mg, Na, and K) rejection efficiencies are consistently observed at over 99%, while boron rejection is typically over 90%.
- The key benefits of the LSS process over LiSTR are reduced excess water use (contributing to lower dilution of the effluent brine) which allows better control and maintenance of the Smackover Formation pressure and the elimination of hydrochloric acid and sodium hydroxide in the elution/regeneration steps.
- The fixed bed resin can be sensitive to high solids in the feed so proper brine feed quality control is critical.
- LSS operation has shown that optimization of operating step volumes during loading, displacement, and elution can provide high lithium recovery, concentration, and impurity rejection while minimizing raffinate (lithium-barren brine) dilution.
- The commercially available resin tested in the Demonstration Plant has performed well. Refer to the LSS performance data shown in Table 13-2. The KTS-Standard Lithium development team believe that better performance can be achieved in terms of selectivity of lithium and rejection of impurities. In support of this, continued optimization is on-going in the Demonstration Plant including testing of alternate resins.
- Both DLE processes operated at the Demonstration Plant showed high selectivity for lithium extraction from the Smackover Formation brine to produce a LiCl solution in which the ratio of lithium to other components has been increased materially from <0.005:1 (i.e., 237 mg/L Lithium relative to the combined impurities at approximately 95,000 mg/L Na/Ca/Mg) to closer to a 0.2:1 (301mg/L lithium relative to approximately 1,500 mg/L). In addition, both lithium extraction processes are not measurably affected by the presence or absence of bromide in the incoming brine.
- The proven performance of LSS in the Demonstration Plant, the reduced excess water use, and the absence of reagent use validates the selection of LSS as the DLE for the Project.

13.6 DEMONSTRATION PLANT LICL SOLUTION PURIFICATION AND CONCENTRATION

Downstream of the DLE processes, the LiCl solution is processed by various technologies to remove unwanted impurities (e.g., calcium, magnesium, boron and silica) and to concentrate the purified solution by reverse osmosis processes, including brackish water reverse osmosis (BWRO) and osmotically assisted reverse osmosis (OARO); the latter is sometimes referred to as counter-flow reverse osmosis. The Demonstration Plant has demonstrated the ability to produce LiCl solutions suitable as feedstock for battery-quality lithium carbonate production.

Standard Lithium had multiple lab-scale tests conducted of various technologies and for purification of the brines and concentration of the LiCl product from the DLE processes, including ion exchange, nanofiltration, ultrafiltration, high pressure reverse osmosis, and osmotically assisted reverse osmosis prior to selecting technology for installation in the Demonstration Plant.

The following sections describe the test work completed on the LiCl solution purification and concentration processes.

13.7 LICL SOLUTION CONCENTRATION BY REVERSE OSMOSIS

13.7.1 BRACKISH WATER REVERSE OSMOSIS (BWRO)

Eluate from the LSS process (LiCl product solution) will be concentrated using brackish water reverse osmosis (BWRO). The goal is to concentrate the LiCl and recover water (permeate) for recycle to the process, primarily to use for LSS elution.

A BWRO system was installed in the Demonstration Plant in January 2023. The BWRO system was tested to concentrate the LiCl solution from LSS separate from the main Demonstration Plant process. All components in the LSS eluate product (LiCl solution) are concentrated during BWRO.

13.7.2 OSMOTICALLY ASSISTED REVERSE OSMOSIS (OARO)

Following the removal of calcium, magnesium, and boron the purified LiCl solution is concentrated using Osmotically assisted Reverse Osmosis (OARO). OARO differs from BWRO in that recirculation of effluent to the permeate side allows concentration to TDS levels as high as 180,000 mg/L compared to 60,000 mg/L in the BWRO. The permeate has higher impurities and must be recycled to BWRO for improved impurity rejection.

An OARO system was installed in the Demonstration Plant in August 2021 to enable a concentrated high purity LiCl solution to be produced for testing lithium carbonate production at vendor laboratories and for use in testing Standard Lithium's proprietary SiFT battery-quality lithium carbonate process installed at the Demonstration Plant. The OARO system was operated at the Demonstration Plant, on a batch basis for producing concentrated high purity LiCl solution. The OARO system has demonstrated the ability to concentrate the LiCl solution to greater than 10,000 mg/L Li, which is in excess of what is required for battery-quality lithium carbonate production processes contemplated for the Project.

Table 13-3 below shows two examples of the OARO concentrate that were produced using LSS eluate (LiCl) as the feed solution (post IX polishing). Trial 1 was completed in July 2023 and Trial 2 was completed in August 2023.

Table 13-3. OARO Examples

	Trial 1		Trial 2	
	Average LiCl Feed Composition	Composite Concentrate after OARO	Average LiCl Feed Composition	Composite Concentrate after OARO
Lithium (Li)	434	10,986	416	12,577
Sodium (Na)	694	14,488	162	6,559
Calcium (Ca)	2	3	11	181
Magnesium (Mg)	0	0.6	16	115
Potassium (K)	12	878	9	187
Boron (B)	20	150	19	159
Silica (Si)	2	42	7	45

Figure 13-6. Osmotically Assisted Reverse Osmosis System at the Demonstration Plant

13.8 CALCIUM AND MAGNESIUM REMOVAL PROCESSES

13.8.1 SODA LIME SOFTENING TESTING

Soda lime softening is included in the commercial LiCl solution purification process flow sheet for removing calcium and magnesium to reduce the reagent costs associated with the calcium and magnesium ion exchange process. The soda ash (sodium carbonate) and lime (calcium hydroxide) chemicals used in the softening process are significantly less expensive than the hydrochloric acid and sodium hydroxide required for the calcium and magnesium ion exchange resin regeneration. In addition, the softening sludge produced from the softening process can be used for neutralizing the tail and Bypass Brine received from LANXESS, reducing the amount of anhydrous ammonia required for this pre-treatment.

A small softening train including a flash mixing tank, a softening reaction tank, a clarifier with rake, and systems for dosing both coagulant and flocculant was constructed at the Demonstration Plant in March 2023 and used to treat the eluate from the LSS process.

It has been demonstrated that Ca and Mg removal approaching 100% is achievable. However, this is not an efficient operating mode as it requires an excess of chemical reagent addition. Additional laboratory testing is ongoing at SGS in Lakefield, Ontario to independently confirm the results and to develop design and operating parameters to support the commercial facility. The recent results from SGS are presented below. This test work was performed by adjusting the pH to 10.5 with hydrated lime and then adding soda ash at 100 and 110% stoichiometric dosage. The simple dosing with soda ash (even without lime) reliably reduced the calcium concentration in the eluate to below 5 mg/L. Dosing with lime and soda ash reliably reduced the magnesium concentration in the eluate to below 5 mg/L. No coagulant or flocculant was needed to produce a relatively clear supernatant from the softening clarifier.

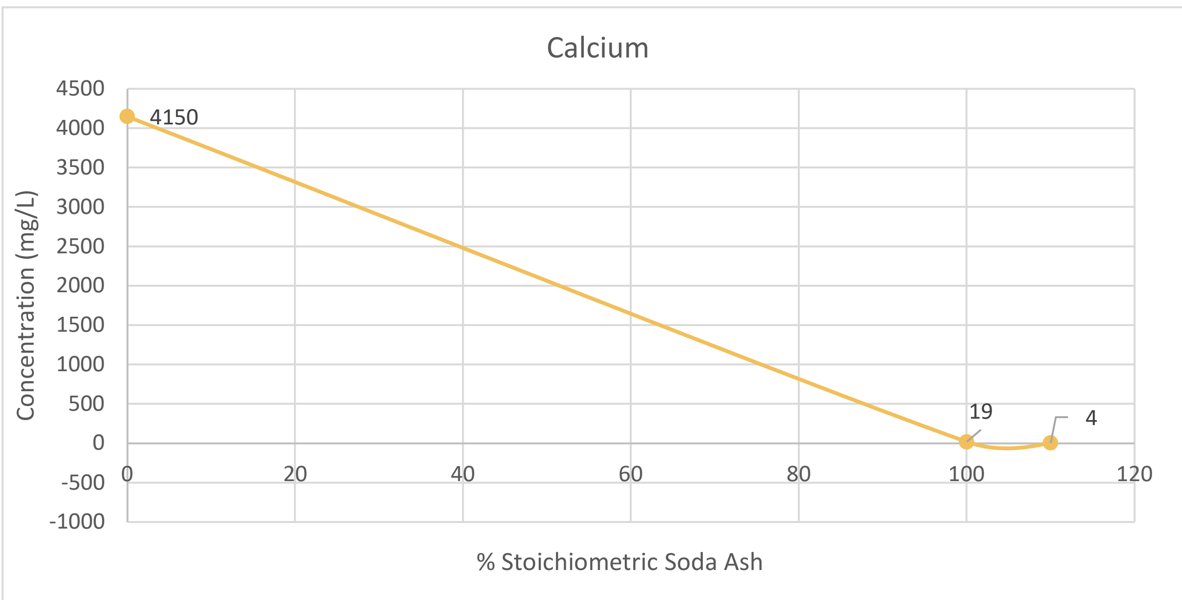
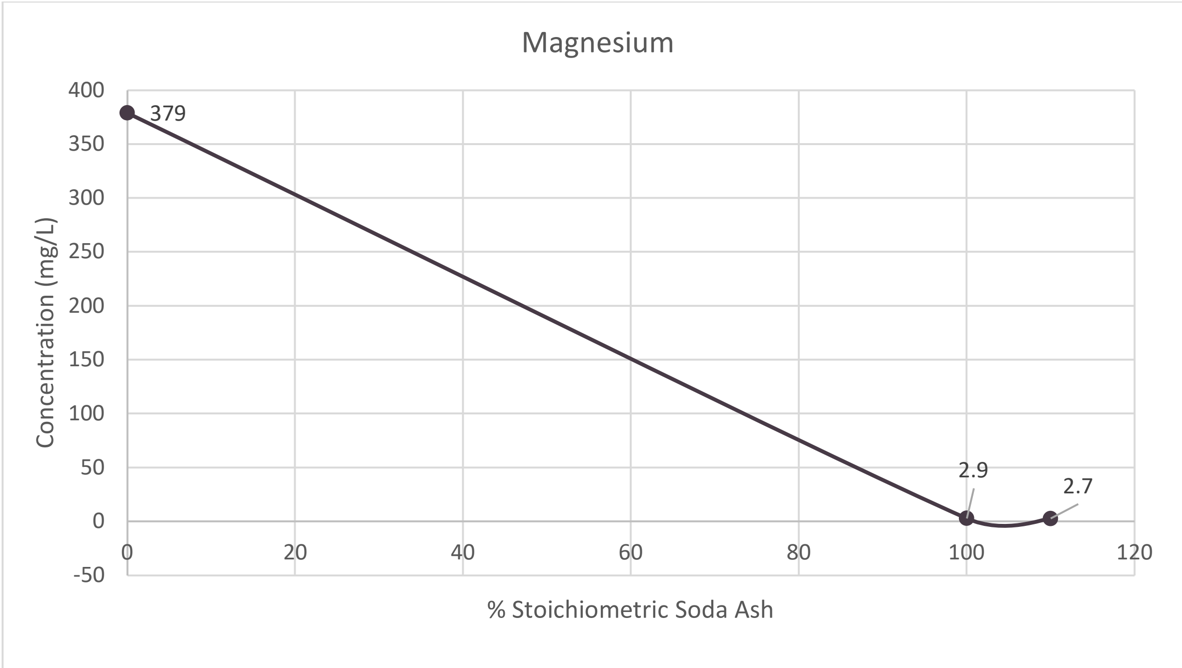


Figure 13-7. Calcium Removal with Soda Ash



Note:

[1] pH increased to 10.5 with hydrated lime prior to soda ash addition.

Figure 13-8. Magnesium Removal with Soda Ash

13.8.2 CALCIUM AND MAGNESIUM ION EXCHANGE

This is conventional technology which has been demonstrated by Standard Lithium and its vendors. The ion exchange resin being proposed are commercially available and are routinely used in large scale wastewater treatment for hardness removal, as seen in Figure 13-9.

Figure 13-9. Calcium and Magnesium Ion Exchange System at the Demonstration Plant

13.9 BORON REMOVAL ION EXCHANGE

This technology has been demonstrated by Standard Lithium and its vendors. The ion exchange resin being proposed is commercially available and is routinely used in industry for boron removal.

13.10 KEY FINDINGS FROM LICL PURIFICATION AND CONCENTRATION TEST WORK

Key findings and outcomes from the Demonstration Plant testing are:

- The Demonstration Plant has produced polished LiCl product and has demonstrated:
  - LiCl solution with Li concentration greater than 10,000 mg/L.
  - Rejection of calcium, boron and magnesium to less than 1 mg/l which meets rejection targets for the commercial process.

- The LSS eluate (raw LiCl solution) from DLE can be efficiently purified by commercially available ion exchange (IX) resins.
- Traditional soda lime chemical softening has also been proven to work reliably down to very low levels of both calcium and magnesium to less than 5 mg/L. For commercial operations, softening should be used only to reduce the calcium and magnesium to 30-100 mg/L before using calcium and magnesium IX.
- Boron has been shown to be easily removed from the concentrated LiCl solution by Standard Lithium and third party work using OEM industry standard IX technology (< 1 mg/L).
- The final LiCl concentrate is suitable for conversion to lithium carbonate.

13.11 ADDITIONAL LICL PURIFICATION AND CONCENTRATION TESTING

A number of additional processes have been tested extensively in the Demonstration Plant to evaluate the best fit technology for the Project. All of the technologies have commercial precedent and have been shown to work at the Demonstration Plant. The key technologies that have been evaluated include:

- Chemical softening using carbon dioxide instead of sodium carbonate to minimize introduction of additional impurities.
- Silica removal by pH adjustment.
- Silica removal using a proprietary IX approach.
- Silica removal by activated alumina.

The outcomes of testing and the learnings from the Demonstration Plant operations, have facilitated the refinement of the process design for the Project to allow for the selection of the appropriate process unit operations to support a robust integrated flowsheet for the commercial facility.

13.12 LITHIUM CARBONATE CRYSTALLIZATION

One lithium carbonate system vendor performed two laboratory testing campaigns to demonstrate their ability to produce battery quality lithium carbonate from the Standard Lithium LiSTR LiCl product. The first proof of concept campaign performed in February 2021 successfully produced 1 kg of battery quality crystal lithium carbonate. The second campaign performed in October 2021 produced 3 kg of battery quality lithium carbonate and further clarified the commercial design parameters. A third program at a second lithium carbonate vendor laboratory was completed in June 2023 using LSS LiCl product. It produced 12kg of battery quality crystal lithium carbonate.

13.12.1 FIRST PRODUCTION OF LITHIUM CARBONATE

In October 2021, the first lithium carbonate system vendor received 250 L of LiCl product solution produced by the LiSTR DLE process. The analysis of the LiCl is shown in Table 13-4, below.

Table 13-4 - LiCl Product Used for Lithium Carbonate Conversion – Trial 1

Cation/Anion	Units	Concentration
Sodium (Na)	ppm	11800
Calcium (Ca)	ppm	1344
Magnesium (Mg)	ppm	245
Potassium (K)	ppm	266
Lithium (Li)	ppm	2628
Strontium (Sr)	ppm	250
Boron (B)	ppm	106
Chloride (Cl)	ppm	35300
Silicon (Si)	ppm	81
Sulfate (SO_4)	ppm	90
Barium (Ba)	ppm	14
TDS	ppm	52124
SG		1.05

The following describes the processes that the vendor used for purifying the LiCl solution for production of battery-quality lithium carbonate:

- The LiCl solution was initially processed by caustic and soda ash softening to remove the bulk of the calcium, and magnesium. Softening reduced calcium to 97 ppm and magnesium to 2 ppm, which is consistent with the expected commercial values.
- The vendor then used a 4% stoichiometric excess of sodium carbonate and maintained pH at 11.5 with caustic soda.
- Calcium IX was then used to reduce calcium and magnesium to a combined level of <1ppm ($CaCO_3$ equivalent).
- Boron Ion Exchange reduced Boron from 106 ppm to < 1ppm.

The ion exchange test work was performed to generate brine suitable for lithium carbonate production. The goal was not to optimize reagents, water use or column design parameters but simply to produce solution for the crystallization work. The columns were not operated to breakthrough or exhaustion. Following purification, the brine was evaporatively concentrated to increase the lithium concentration and simultaneously crystallize sodium chloride. The crystallization of sodium chloride is not included in the current standard lithium carbonate flowsheet. Instead, concentrated brine from the OARO process will be delivered to the Lithium Carbonate Plant.

Lithium carbonate was produced in a two-stage process. In the 1st stage, lithium chloride was reacted with 25% sodium carbonate solution to crystallize crude lithium carbonate. The sodium carbonate used in the treatment was commercially available technical grade which contained about 100 ppm equivalent calcium and magnesium. The calcium and magnesium almost quantitatively reported to the 1st stage crystals. The crystals were coarse 200-300 microns in size and were mainly agglomerated. Washing could only remove a portion of the impurities.

The crude 1st stage crystals were repulped in water and then carbonated to produce soluble lithium bicarbonate. Following filtration, the lithium bicarbonate solution was filtered, and then subjected to Ion Exchange to reduce the brine to < 1ppm calcium equivalent.

The lithium bicarbonate was thermally decomposed to release carbon dioxide and crystallize purified lithium carbonate. The carbon dioxide that is released would be recycled in the commercial plant. The 2nd stage or purified crystals were mainly singular crystals, 200-300 μm in length with an aspect ratio (length to width) of approximately 10. The photograph of the 2nd stage crystals shown in Figure 13-10, below, were de-watered, washed, analyzed, and confirmed to meet battery quality specification. See Table 13-5, below, comparing typical battery quality lithium carbonate specifications with laboratory-produced lithium carbonate made from Standard Lithium LiCl product solution. The vendor produced approximately 1 kg of battery quality lithium carbonate crystals during their laboratory testing.

Table 13-5 –Lithium Carbonate Product – Trial 1

Element	Analysis Method	Typical Specification[1]	Units	Standard Lithium Li_2CO_3 Sample Produced
Sodium (Na)	AA	<500	ppm	13
Potassium (K)	AA	<10	ppm	<10
Calcium (Ca)	AA	<100	ppm	<10
Magnesium (Mg)	AA	<60	ppm	<10
Iron (Fe)	ICP	<10	ppm	<1
Manganese (Mn)	ICP	--	ppm	<1
Copper (Cu)	ICP	<10	ppm	<1
Nickel (Ni)	ICP	<10	ppm	<1
Zinc (Zn)	ICP	<10	ppm	<1
Sulfate (SO4)	ICP	<300	ppm	<30
Boron (B)	ICP	<10	ppm	<1
Aluminum (Al)	ICP	<10	ppm	<3
Lead (Pb)	ICP	<10	ppm	<1
Chromium (Cr)	ICP	<10	ppm	<1
Chloride (Cl)	Titration	<100	ppm	<50

Notes:
[1] Typical specification listed is based on industry standards for reference only.

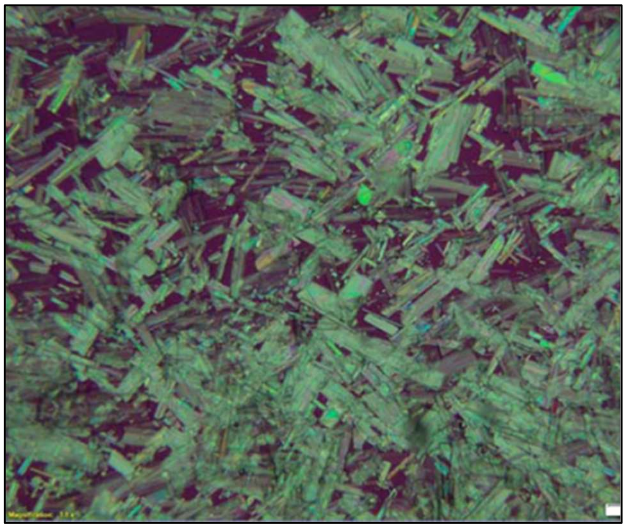


Figure 13-10. Photo of 2nd Stage Lithium Carbonate Crystals

13.12.2 SECOND PRODUCTION OF LITHIUM CARBONATE

In October 2021, the first lithium carbonate system vendor received 350 L of LiCl solution produced by the LiSTR process after RO concentration and Strong Acid Cation IX to remove calcium, and magnesium. The analysis of the brine is shown in Table 13-6 below.

Table 13-6 - LiCl Product Used for Lithium Carbonate Conversion – Trial 2

Cation/Anion	Units	Concentration
Sodium (Na)	ppm	18800
Calcium (Ca)	ppm	<1
Magnesium (Mg)	ppm	<1
Potassium (K)	ppm	122
Lithium (Li)	ppm	5500
Strontium (Sr)	ppm	<1
Boron (B)	ppm	292
Chloride (Cl)	ppm	58600
Silicon (Si)	ppm	48
Sulfate (SO_4)	ppm	30
Barium (Ba)	ppm	<1
TDS	ppm	83400
SG	-	1.05

Boron IX reduced boron in the LiCl solution from 292 ppm to < 1ppm. The ion exchange test work was performed to generate a LiCl solution suitable for lithium carbonate production. Again, the goal was to produce solution for crystallization not to evaluate the purification processes.

Following purification, the LiCl solution was evaporatively concentrated to increase the lithium concentration and simultaneously crystallize out sodium chloride. The evaporation was performed continuously over a 14-day period using two 22-L bench scale evaporators. Lithium was concentrated to 24% by weight of lithium chloride. The crystallization of sodium chloride is not included in the current standard lithium carbonate flowsheet.

Lithium carbonate was produced in a two-stage process. The campaign was conducted over one week. In the 1st stage, lithium chloride was reacted with 30% sodium carbonate solution to crystallize crude lithium carbonate at 95°C. The sodium carbonate used in the treatment was commercially available technical grade which contained about 100 ppm equivalent calcium and magnesium. Most of the calcium and magnesium from the sodium carbonated ended up in the 1st stage crude lithium carbonate crystals.

The 1st stage crystals were coarse 200-300 µm and mainly agglomerated. See Figure 13-11, below. Washing could only remove a portion of the impurities.

The crude 1st stage crystals were repulped in water and then carbonated to produce soluble lithium bicarbonate. Following filtration, the lithium carbonate brine was filtered, and then again subjected to Ion Exchange to reduce the brine to < 1ppm calcium equivalent. The column flux rate was 15 BV/h. The lithium carbonate was thermally decomposed to release carbon dioxide, which would be recycled in the commercial plant, and purified lithium carbonate crystallized. The 2nd stage crystals were mainly singular, 200-300 microns in length, with an aspect ratio (length to width) of approximately 10. See Figure 13-12, below. The crystals picture in Figure 13-12, below, were de-watered, washed, analyzed, and confirmed to meet battery quality specification. Approximately 3 kg of battery quality crystals were produced during the laboratory testing campaign. Refer to Table 13-7 below for the lithium carbonate sample analysis produced.

Table 13-7 - Lithium Carbonate Product – Trial 2

Element	Analysis Method	Typical Specification	Units	Standard Lithium Li_2CO_3 Sample Produced
Sodium (Na)	AA	<500	ppm	<15
Potassium (K)	AA	<10	ppm	<10
Calcium (Ca)	AA	<100	ppm	<10
Magnesium (Mg)	AA	<60	ppm	<10
Iron (Fe)	ICP	<10	ppm	<1
Manganese (Mn)	ICP	--	ppm	<1
Copper (Cu)	ICP	<10	ppm	<1
Nickel (Ni)	ICP	<10	ppm	<1
Zinc (Zn)	ICP	<10	ppm	<1
Sulfate (SO_4)	ICP	<300	ppm	<100
Boron (B)	ICP	<10	ppm	<1
Aluminum (Al)	ICP	<10	ppm	<5
Lead (Pb)	ICP	<10	ppm	<1
Chromium (Cr)	ICP	<10	ppm	<1
Chloride (Cl)	Titration	<100	ppm	<100
Silicon (Si)	ICP	--	ppm	<12

Notes:
[1] Typical specification listed is based on industry standards for reference only.

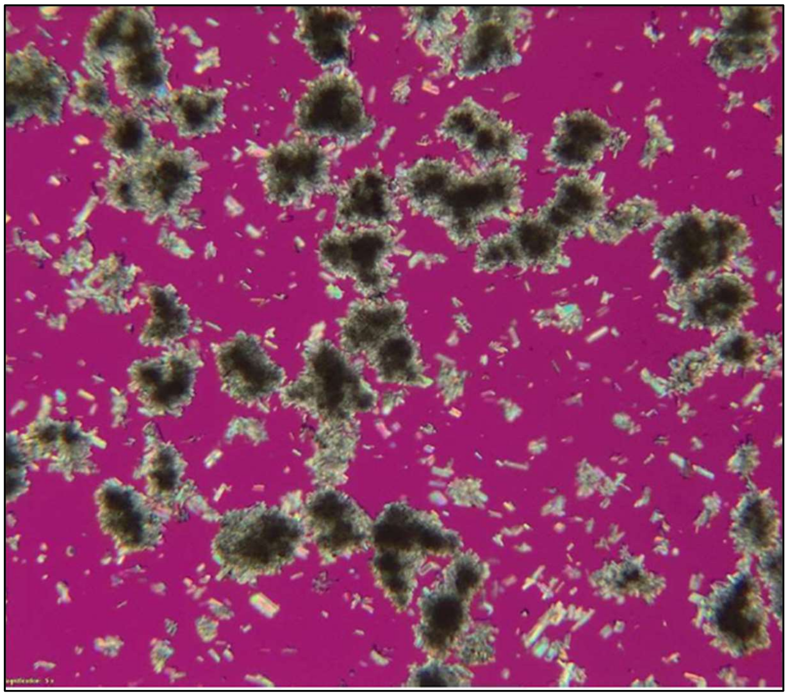


Figure 13-11. Photo of 1st Stage Lithium Carbonate Crystals

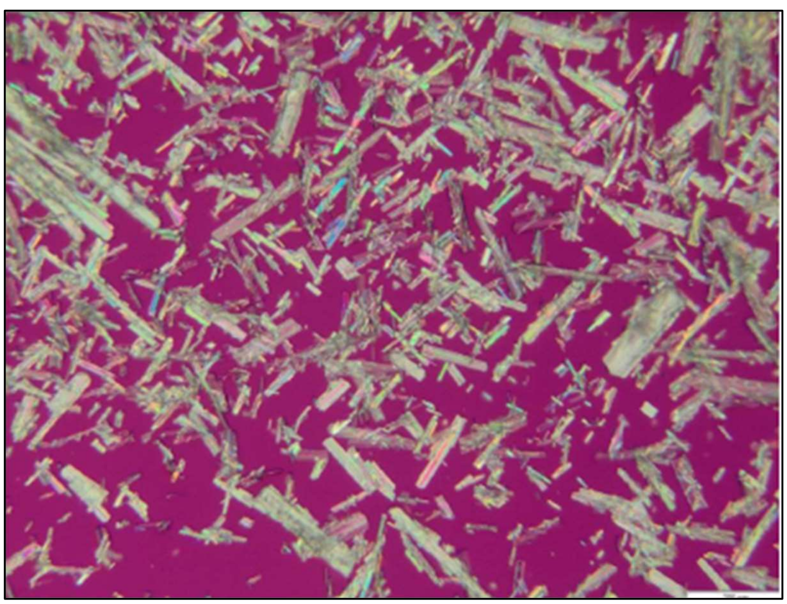


Figure 13-12. Photo of 2nd Stage Lithium Carbonate Crystals

13.12.3 THIRD PRODUCTION OF LITHIUM CARBONATE

In June 2023, a second lithium carbonate system vendor received 2800 L of LiCl solution produced by the LSS process and subsequently purified and concentrated in the Demonstration Plant. The LiCl eluate solution was treated to remove calcium and magnesium using strong acid cationic (SAC) IX followed by weak acid cationic (WAC) IX. The purified solution was next concentrated using OARO and then treated for boron removal using boron IX and finally treated one more time using WAC IX. The analysis of the brine is shown in Table 13-8 below.

Table 13-8. LiCl Product Used for Lithium Carbonate Conversion – Trial 3

Cation/Anion	Units	Concentration
Sodium (Na)	mg/L	52083
Calcium (Ca)	mg/L	2.6
Magnesium (Mg)	mg/L	1.4
Potassium (K)	mg/L	1260
Lithium (Li)	mg/L	7703
Boron (B)	mg/L	2.2
Chloride (Cl)	mg/L	119600
Silicon (SiO_2)	mg/L	21.4
Sulfate (SO_4)	mg/L	145
Ammonia (NH_3)	mg/L	15
Bromine (Br)	mg/L	304
TDS	mg/L	180000
SG		1.1

The test program simulated reactive crystallization of Li_2CO_3 through addition of soda ash to the OARO concentrated DLE eluate feed. The soda ash was provided by Standard Lithium to match the impurity profile expected during commercial operation. A thickening system was used to increase the slurry density in the crude crystallizer to match the commercial design. At periodic intervals, a centrifuge was used to separate the crude Li_2CO_3 crystals from the mother liquor (ML). The resulting Li_2CO_3 cake was then washed with mother liquor from the refined crystallizer to reduce impurities contained in the residual moisture on the crystal surface.

The dewatered and washed crude crystals were repulped in recycle ML from the refined crystallizer. Distillate was added to satisfy the material balance. CO_2 was then sparged through this solution to convert the suspended Li_2CO_3 crystals to soluble $LiHCO_3$. The resulting solution was filtered through a cloth filter and processed through a chelating ion exchange to remove multivalent cations.

The purified $LiHCO_3$ solution was then fed to the refined crystallizer, where thermal decomposition released CO_2 from the solution, leading to the precipitation of Li_2CO_3. A thickening system was used to increase the slurry density in the refined crystallizer to match the commercial design. At periodic intervals, a centrifuge was used to separate the refined Li_2CO_3 crystals from the mother liquor. The resulting Li_2CO_3 cake was then washed with distilled water to reduce impurities contained in the residual moisture on the crystal surface.

See Table 13-9 below comparing typical battery quality lithium carbonate specifications with laboratory-produced lithium carbonate made from Standard Lithium LiCl product solution. The vendor produced approximately 12 kg of battery quality lithium carbonate crystals during their pilot testing.

Table 13-9. Lithium Carbonate Product – Trial 3

Element	Analysis Method	Typical Specification	Units	Standard Lithium Li2CO3 Sample Produced
Sodium (Na)	ICP-OES	<500	ppm	<12
Potassium (K)	ICP-OES	<10	ppm	<0.3
Calcium (Ca)	ICP-OES	<100	ppm	<25
Magnesium (Mg)	ICP-OES	<60	ppm	<4
Iron (Fe)	ICP-OES	<10	ppm	<2
Manganese (Mn)	ICP-OES	--	ppm	<0.3
Copper (Cu)	ICP-OES	<10	ppm	<0.1
Nickel (Ni)	ICP-OES	<10	ppm	<0.3
Zinc (Zn)	ICP-OES	<10	ppm	<2
Sulfate (SO4)	ICP-OES	<300	ppm	<50
Boron (B)	ICP-OES	<10	ppm	<0.2
Aluminum (Al)	ICP-OES	<10	ppm	<2
Lead (Pb)	ICP-OES	<10	ppm	<0.3
Chromium (Cr)	ICP-OES	<10	ppm	<0.4
Chloride (Cl)	Pyrohydrolysis then IC	<100	ppm	<25
Silicon (Si)	ICP-OES	--	ppm	<10

13.12.4 KEY FINDINGS FROM LITHIUM CARBONATE CRYSTALLIZATION TEST WORK

- Pilot testing of the complete lithium carbonate crystallization process flowsheet including all unit operations has demonstrated commercial suitability
- Testing confirmed battery-quality lithium carbonate can be produced meeting the required impurity specifications for the Project using LiCl produced from the Demonstration Plant from the same brine which will be processed by the Project
- Produced representative refined crystals that were measured to be crystalline Li_2CO_3 with >99.98% purity excluding moisture as calculated by sum of impurities

13.13 PROCESS TESTING QA/QC

During the operation of the Demonstration Plant, routine daily chemical analysis is conducted in the internal laboratory using standard solution analysis instrumental techniques; principally, Inductively Coupled Plasma – Optical Emission Spectroscopy (ICP-OES). For more important determinations, duplicate samples are submitted to SGS Canada Inc. (SGS) for analysis using their standard ISO 9000 compliant protocols (principally ICP-OES), developed based on their experience working on numerous lithium projects. Additional brine and solid samples are also periodically sent to other third-party analytical laboratories (principally Wetlabs) in order to provide suitable independent verification of data generated by the Demonstration Plant.

Other instrumentation in the Demonstration Plant undergoes a rigorous maintenance schedule to ensure accurate collection of data from the plant.

13.14 PROCESS TECHNICAL RISKS AND MITIGATION MEASURES

Similar to all lithium brine processing projects (including those using 'conventional' evaporation ponds), there are risks that need to be addressed or resolved as the Project moves through the usual development stages:

- Effect of varying feed composition on lithium selectivity. The Demonstration Plant has been operated with the South Plant brine feed and as such little variation is expected. Extensive testing has been completed to characterize the brine. In addition, variations in Feed Brine will be commercially limited by commercial agreements which set out minimum brine quality requirements for the delivery of Feed Brine to the facility by LANXESS.
- Process Scalability. The pre-treatment technology used on the Tail Brine and Bypass Brine supplied from the LANXESS South Plant to prepare it for the LSS DLE process is industry standard technology. The LSS DLE process has now been operated continuously for approximately 12 months at a pre-commercial Demonstration Plant scale and has been developed to FEED (DFS) level in support of the Commercial Lithium Extraction Plant Project. It is believed that all operations comprising the DLE process can be reasonably scaled-up. Scale-up will occur by the addition of multiple standard size LSS columns operating in parallel. The same fluid velocities and step bed volumes will be maintained in the commercial design. Scale up from the Demonstration Plant to the Commercial Lithium Extraction Plant Project will be about 60:1. The purification, concentration, and crystallization unit operations of the flowsheet are all commercially demonstrated. Similarly, the lithium carbonate drying, micronizing, product handling, and packaging equipment are commercial processes, and are not deemed to be areas of risk.

13.15 CONCLUSIONS AND RECOMMENDATIONS

Standard Lithium has completed substantial test work at the Demonstration Plant and in external laboratories. Most aspects of the proposed flowsheet for the Project are commercially available industrial processes and have been demonstrated at substantial pre-commercial scale, or have been verified by pilot scale work on similar solutions. As such, the author feels that the test work completed supports the feasibility of the flowsheet proposed for the Project to use for commercial development, subject to the successful conclusion of additional on-going test work.

Recommendations are:

- Continue to operate and collect data from the existing Demonstration Plant.
- Continue to test alternative filtration technologies and optimize brine filtration by varying the media and incoming brine temperature, pH, and ORP to optimize capital and operating costs.
- Continue to optimize the LSS DLE to improve the quality of the Raw LiCl by elimination of impurities, including testing of alternative resins and adjustments to operating parameters to support future commercial operations.
- Undertake continuous brine neutralization using softening sludge for commercial process optimization.

14.0 MINERAL RESOURCES ESTIMATES

This section describes the preparation of the Lithium Resource brine estimate for the three Units that make up the Property obtained from the simulation model results. These estimates are based on the volume of porous rock as described in the geologic model and the estimated lithium concentrations present in the brines stored within the formation on the Property as of the effective date of August 18, 2023.

A portion of the resource estimates have been upgraded from the Indicated category, PEA (Worley 2019), to the Measured category based on the extensive geologic data and lithium concentration data, combined with consideration of the 65-year history of brine recovery from the Property. This information demonstrates the proven capability of the existing field operations to effectively displace and recover brine from this Smackover reservoir. This upgrading of the resource estimates is described in more detail in Section 14.4.

This resource estimate has been prepared is in accordance with the CIM Definition Standards for Mineral Resources and Mineral Reserves (CIM, 2014).

Mineral Resources are sub-divided, in order of increasing geological confidence, into inferred, indicated and measured categories. An Inferred Mineral Resource has a lower level of confidence than that applied to an Indicated Mineral Resource. An Indicated Mineral Resource has a higher level of confidence than an Inferred Mineral Resource but has a lower level of confidence than a Measured Mineral Resource.

*An **Inferred Mineral Resource** is that part of a Mineral Resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. Geological evidence is sufficient to imply but not verify geological and grade or quality continuity.*

*An **Indicated Mineral Resource** is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit.*

*A **Measured Mineral Resource** is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit.*

The estimation of resources and reserves in this report have been carried out in conformance with NI 43-101 and have been estimated using the CIM Definition Standards for Mineral Resources and Mineral Reserves, as amended and adopted (CIM, 2014), and CIM Best Practice Guidelines for Resource and Reserve Estimation for Lithium Brine (CIM, 2012).

The Best Practice Guidelines (CIM, 2012) have been adapted for the specific conditions present at this Property. Unlike a brine-bearing salar, the Property's brine accumulation exists in a well-defined porous geologic formation at depth, the Smackover. This brine accumulation is bounded vertically by impermeable formations and laterally by changes in lithium concentration to the north and formation geologic properties to the south. The Property area itself is determined by the West, Central, and South Unit property boundaries. Also unlike a salar, the brine recovery from the Smackover is the result of rich brine displacement by injected lean brine. This brine-on-brine displacement mechanism is efficient, with all of the lithium-bearing brine in a given reservoir volume contacted by the injected brine displaced. For this reason, the Guidelines' use of Specific Yield for estimating resources, which assumes some remaining content of lithium in the subject formation, has been replaced here with the Effective Porosity of the formation. The estimation of the fraction of the resources that will be recovered by the Project (the recovery factor, equal to the estimated reserves divided by the estimated resource for the Project area) is done using reservoir simulation. Simulation accounts for the key reservoir properties (lithium concentration, porosity, and permeability) and for the specific Project development activities, including time limits applied to those activities. The recovery factor is not pre-determined at the resource estimation step.

This approach to the estimation of both resources and reserves using a detailed geologic model as the basis for the reservoir simulation model fully captures all factors and mechanisms that affect the content and recovery of brine and the associated lithium from this porous underground formation.

14.1 GEOLOGIC MODEL DESCRIPTION

The geologic characteristics of the reservoir and its productivity have been proven by the 65-year development history of bromine extraction by LANXESS and its predecessors. All this data and historical production information provides the basis upon which to estimate the resource and plan this lithium extraction Project.

A geologic multi-zone model of the Property was constructed using Petra that serves the basis of the brine body simulation model. The geologic mapping covered the Property and the surrounding area [Geologic Study Area] (Figure 7-1). The following steps were carried out to construct the geologic multi-zone model:

1. The Smackover was divided into six zones called Oolites 1 through 6, based on their distinct geologic characteristics. These divisions are identified in the well type log, Figure 14-1.
2. The zone picks were made on each well log.
3. Each porosity well log was evaluated to determine each zone's gross thickness, net pay thickness (which represents the productive thickness of the zone considering a minimum porosity cutoff of nine percent), average porosity for that net pay interval, and the ratio of net pay thickness to gross thickness.
4. An example of this process is shown in Figure 14-2. The zone picks result in the gross pay values, the application of the nine percent porosity cutoff results in the net pay values, the ratio of those two values provides the net to gross ratio, and the average porosity over

each oolite zone's net pay intervals results in the average porosity of the net pay for that Oolite zone.

5. Each well's geologic data (location, top of Smackover depths picks, along with the by-zone gross thickness, net to gross ratio, and porosity data) were imported into Petra® Software.
6. A 500 ft by 500 ft (152.4 m by 152.4 m) grid was established, and the well geologic data was contoured using two Petra gridding options:
    a. The *Highly Connected Features* option utilizes a least-squares gridding algorithm that is well-suited to both structure maps and the smoothly changing petrophysical data present here. The "grid flexing" option, appropriate for this type of well-behaved data, was used to regularize the maps' contour lines.
    b. The *Directional Bias* option was used, with a direction of 120 degrees. This directional bias was applied to capture the regional direction of strike of the Smackover Formation, corresponding to the orientation of the oolite bars as they were deposited.
7. Following the gridding and contouring process, bounding limits were applied to the gross thickness, porosity, and net thickness to gross thickness ratio grids. The gross thickness and the porosity grids were constrained to between 95% of the minimum observed value and 105% of the maximum observed value to prevent the mapping algorithm from extrapolating to unreasonable values. Similarly, the net thickness to gross thickness ratio grids were limited between 0 and 1, corresponding to the physical limits of that ratio.
8. The resulting zone grids for structure, porosity, gross pay, and net pay were then exported from Petra and loaded into the simulation model.

Figure 9-1 depicts the locations of wells containing structure, porosity, or core data relevant to the description of one or more of the six zones. In addition to calibrating the porosity well log data, the core data was used to establish correlation equations between permeability and porosity data. A total of 2187 core samples were analyzed. These relationships were then used to estimate the permeability values of each model layer based on their respective porosity values. Figure 7-2 presents the structure map for the top of the Smackover Formation, and Figure 14-1 presents the total gross pay for the six zones resulting from the analysis described above.

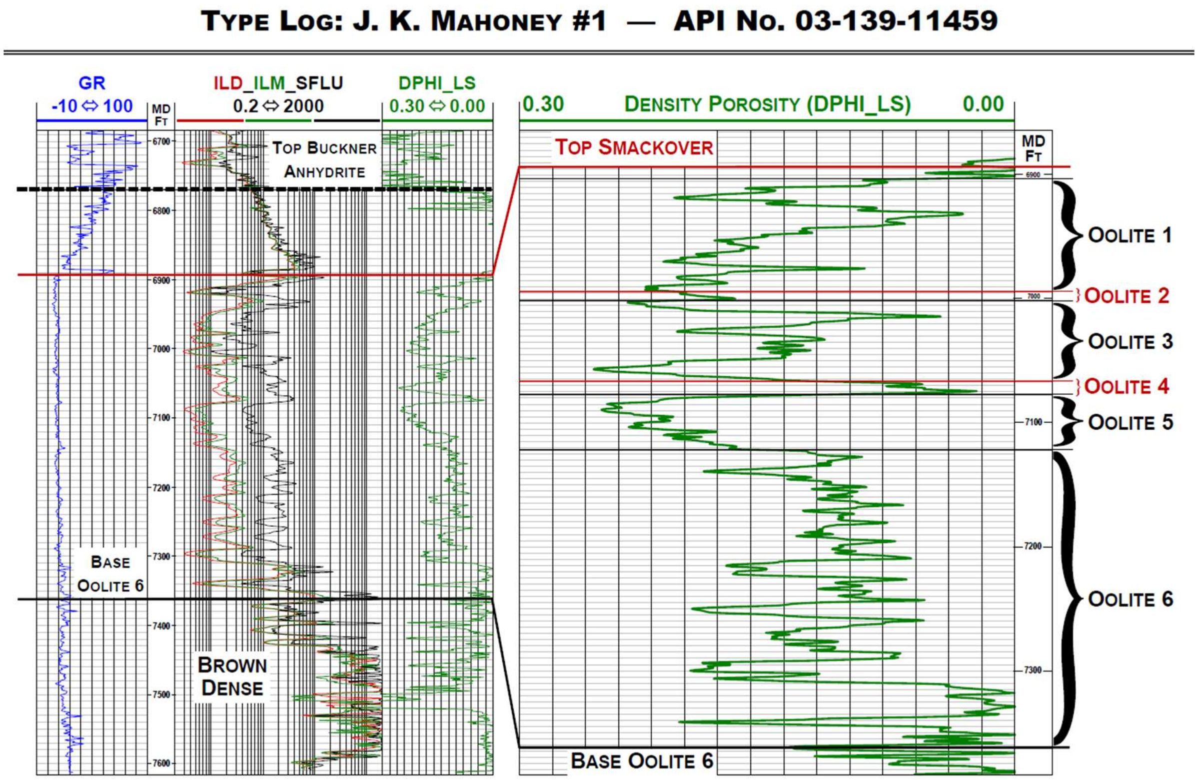


Figure 14-1. LANXESS Property Smackover Type Well

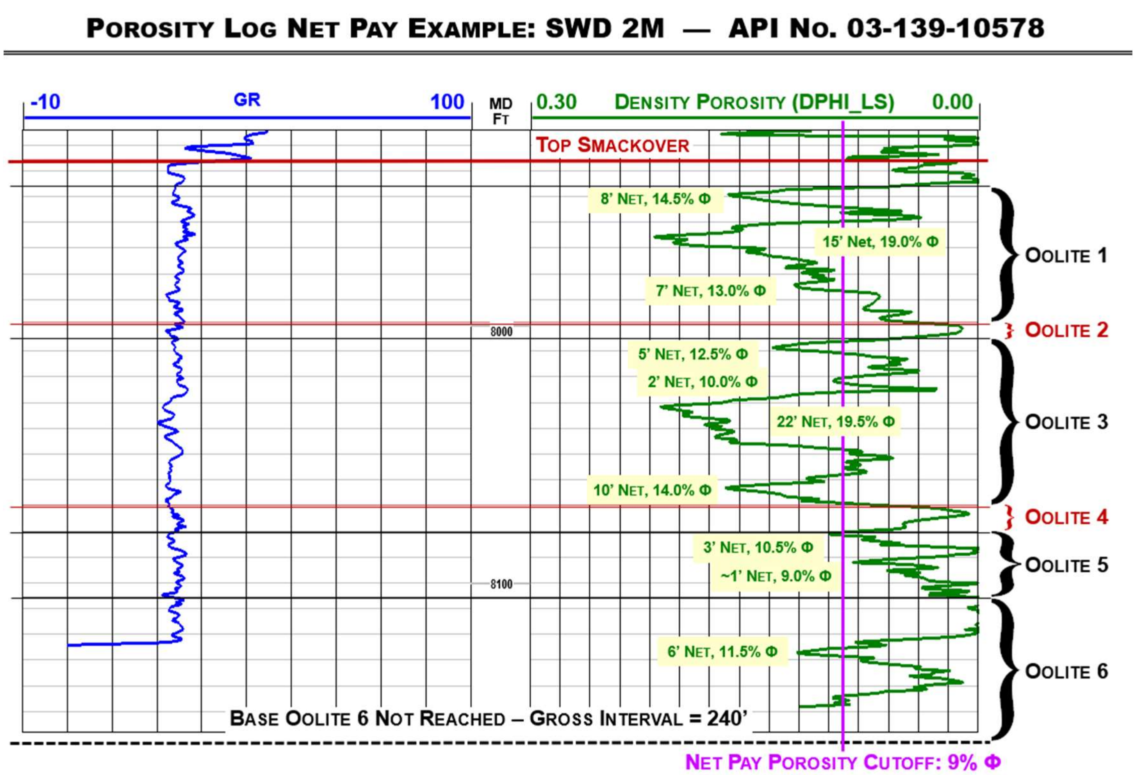


Figure 14-2. Porosity Log Net Pay Example

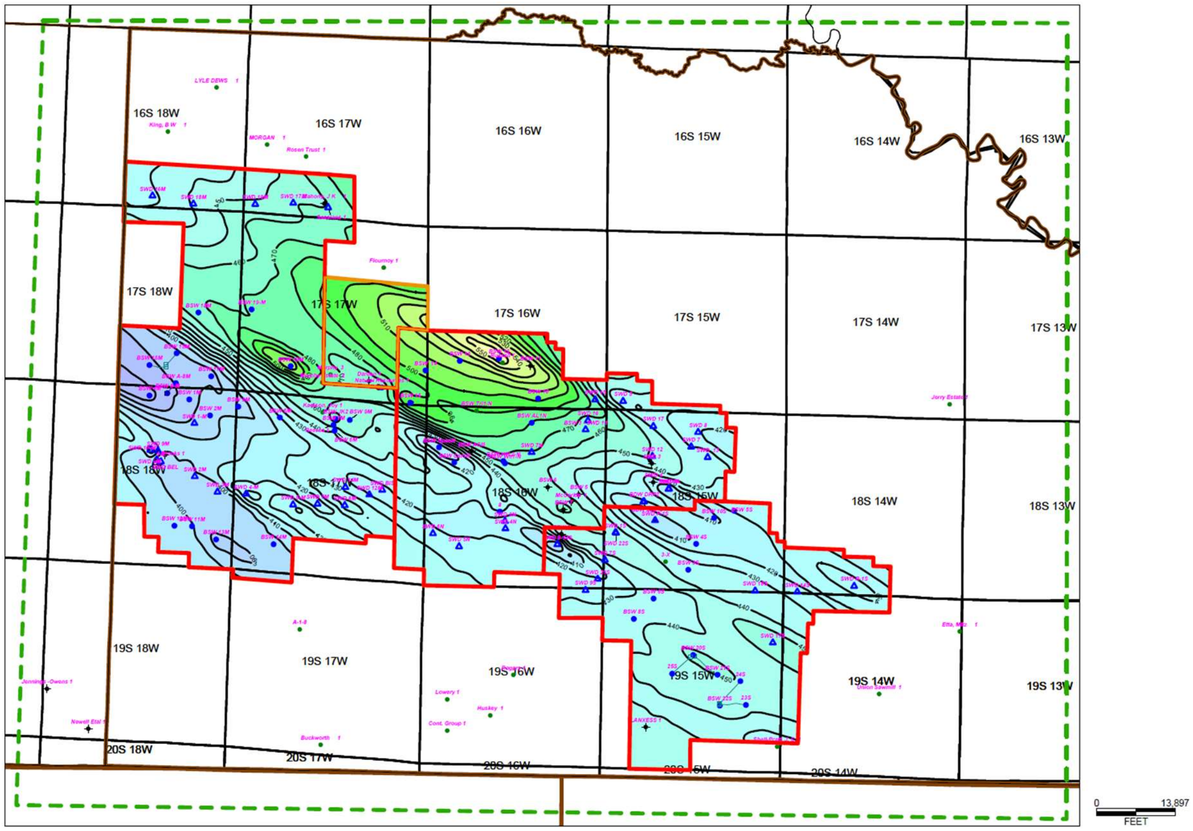


Figure 14-3. Total Gross Pay Map Zones 1-6

14.2 SIMULATION MODEL DESCRIPTION

A simulation model, based on the layered geologic description, was used to estimate the resources present in each of the three Units. Simulation was required to estimate the resources as of August 18, 2023, because the ongoing bromine recovery process, while not altering the overall lithium content of the Property, has moved the lithium location as a result of the production and injection of brine.

The Merlin finite-difference reservoir simulation model, an industry-standard simulation model created by Gemini Solutions, Inc., was used to model brine content, brine movement, bromine recovery, and lithium recovery. The Merlin model has the capability of tracking two types of water: water without tracer and water with tracer, in varying relative combinations. That capability was adapted to track the injected lean brine (with either bromine or lithium removed) and original rich brine (for either bromine or for lithium). The physical process being modeled, the displacement of rich brine by lean brine, is identical for both bromine and lithium brines.

The model grid is shown in Figure 14-4. The by-zone geologic model maps, gridded on a 152.4 m spacing, were loaded into the model and re-gridded to conform to the model's grid architecture. The model covers an area of approximately 48.3 km by 33.8 km. The grid dimensions are 120 cells in the east-west direction by 84 cells in the north-south direction, resulting in each 402.3 m by 402.3 m cell covering approximately 40 acres (16.2 hectares). There are 14 model layers, resulting in 141,120 model cells. Eight model layers were added to the six geologic zones by subdividing each of the four highly permeable geologic zones (oolites 1, 3, 5, and 6) into three layers. Based on the core permeability and porosity data, either a low, medium, or high permeability as a function of porosity equation was applied to that oolite zones' porosity data. This technique better captures the permeability heterogeneity present in the Smackover Formation and its impact on brine movement.

Model parameters including average horizontal permeability, gross rock volume, average net-to-gross ratio, net rock volume, average porosity, and brine volume, were quantified on a Unit-by-Unit basis. These values are presented in Table 14-1.

The model was calibrated by achieving a historical match between field and model injection and production well rates and production well bromine concentrations over the life of the bromine recovery project. This history-matched and calibrated model was then converted to track the movement and production of lithium-containing brine, including the reinjection of the brine stripped of lithium once the Project is implemented.

The model was initialized with the estimated initial lithium concentration map, Figure 9-3. The model then tracked the movement of lithium-bearing brine in the reservoir during the history of the Property. While no lithium was removed during this period, the produced brine, with its lithium concentration varying by location, was combined at each Unit's processing facility. As a result, each Units' injected lithium concentration was based on the volume-weighted average produced lithium concentration for that Unit. Therefore, during this period (up to the start of the Project), the total lithium content of each Unit did not change significantly, but the distribution of lithium within each Unit did change. These changes were tracked by the varying lithium concentrations in the model cells.

Following Project startup, the future recovery of lithium from the South Unit was modeled by specifying the injection and production rates, with the injected brine lithium concentration reflecting the removal of lithium from the process stream by the Project. This report's estimated lithium recovery values are based on the model's produced volumes and associated lithium concentrations, which were then subjected to the appropriate recovery factors, as described in Section 16.

The simulation model's ability to match the observed field performance (injection rates, production rates, bromine concentrations, and lithium concentrations) provides confidence in its forecasts for lithium production rates and the resulting Resource estimates. The model-simulated average produced lithium concentrations from the three Units, corresponding to each Unit's plant inlet lithium concentrations, were found to closely match the measured plant inlet lithium concentrations, as obtained by Standard lithium, as shown in Figure 14-5. This accuracy in matching the field rate and concentration data extends to the match of individual wells. Figure 14-5 depicts the matches achieved for the six South Unit wells that will be produced as part of the Project. In QP Brush's opinion this accurate history match confirms the suitability of the simulation model for use in estimating the lithium resources.

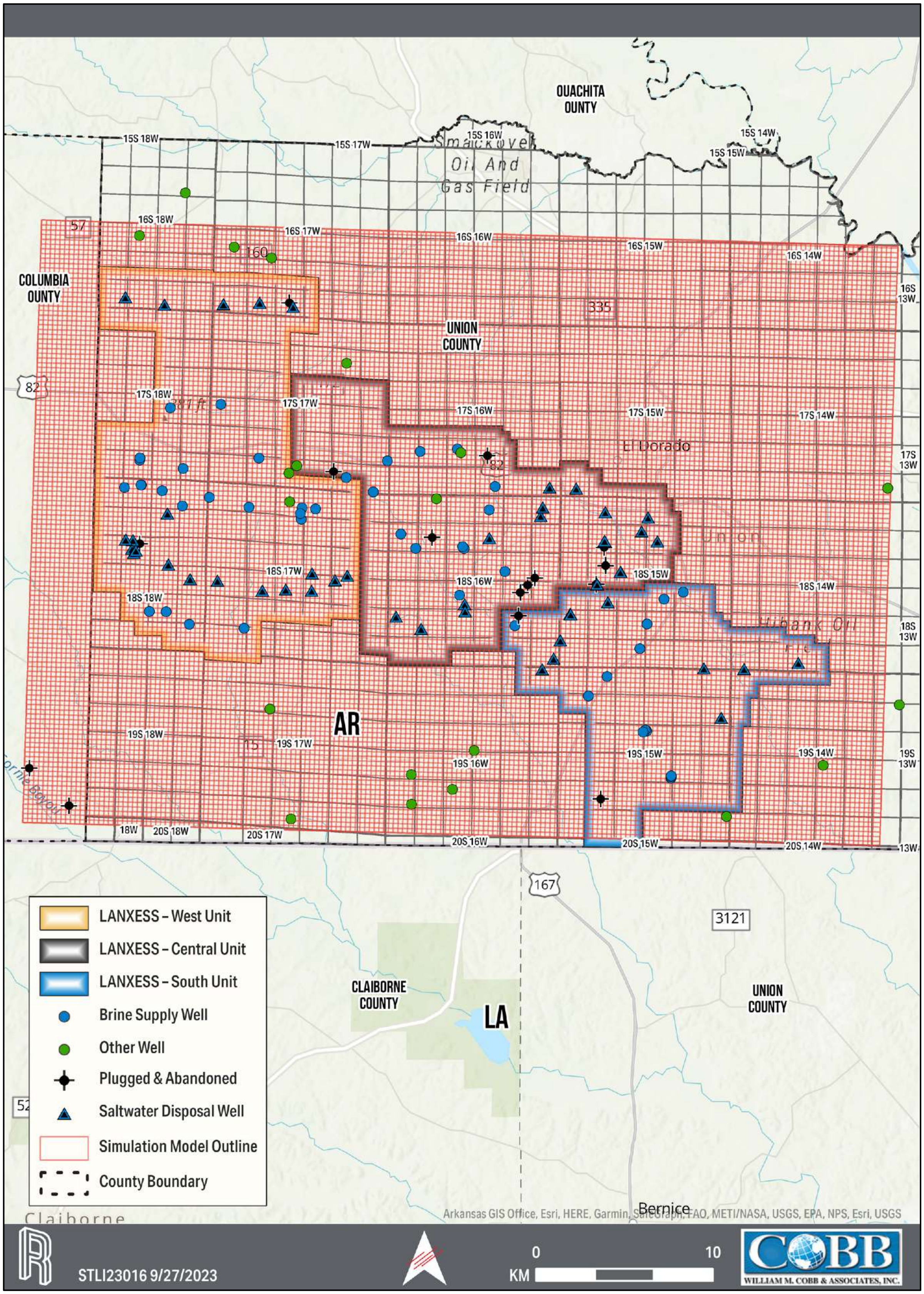
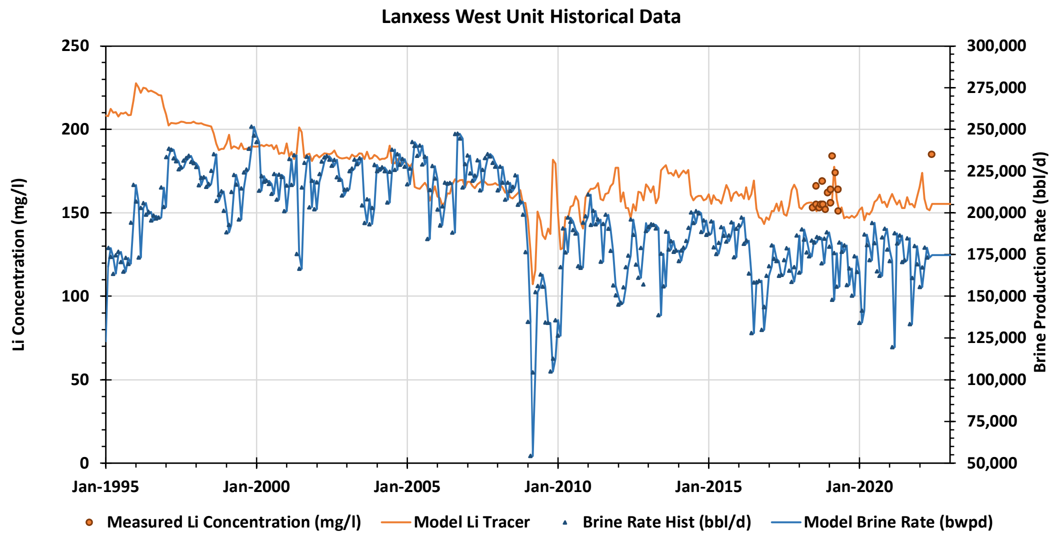
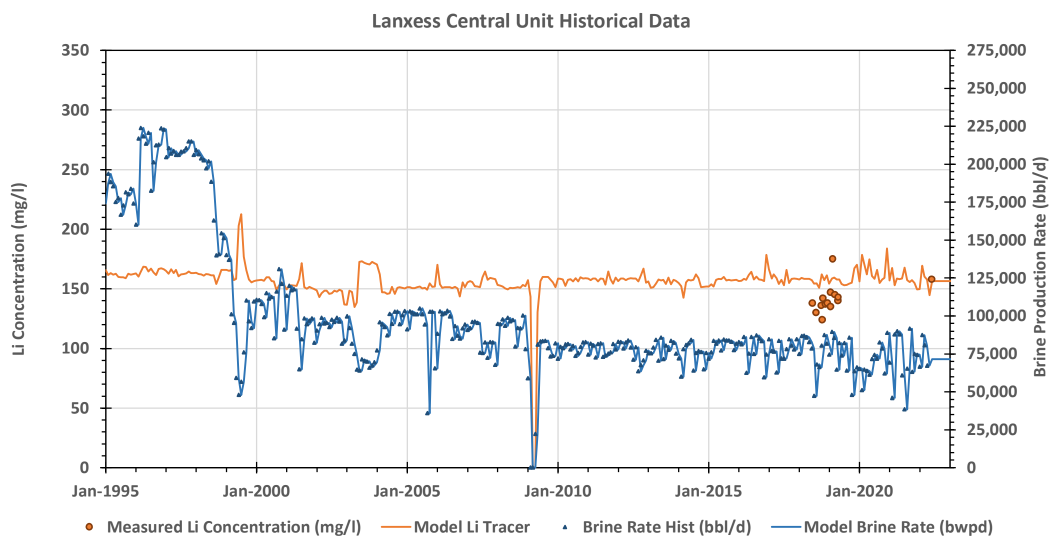


Figure 14-4. Simulation Model Grid Layout





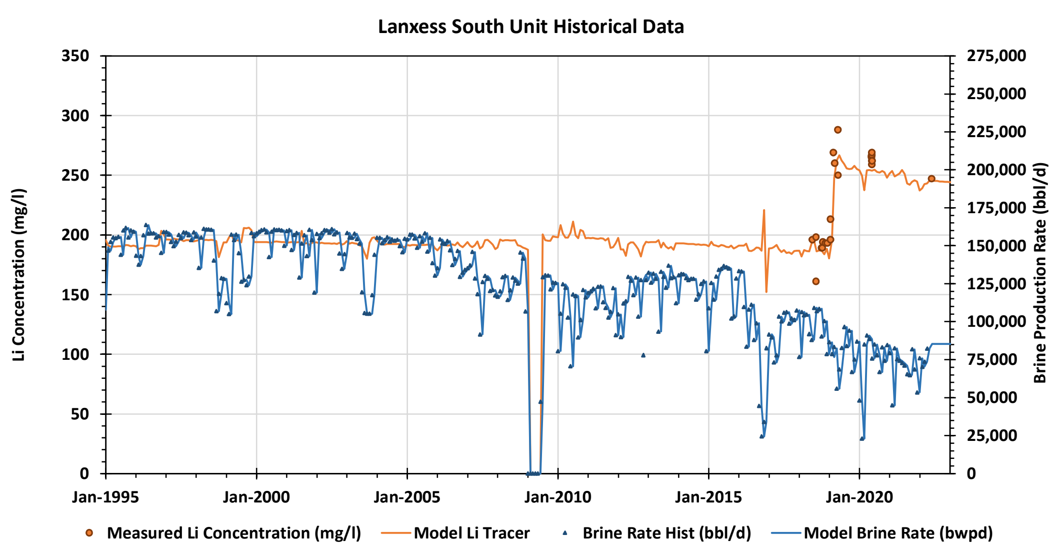
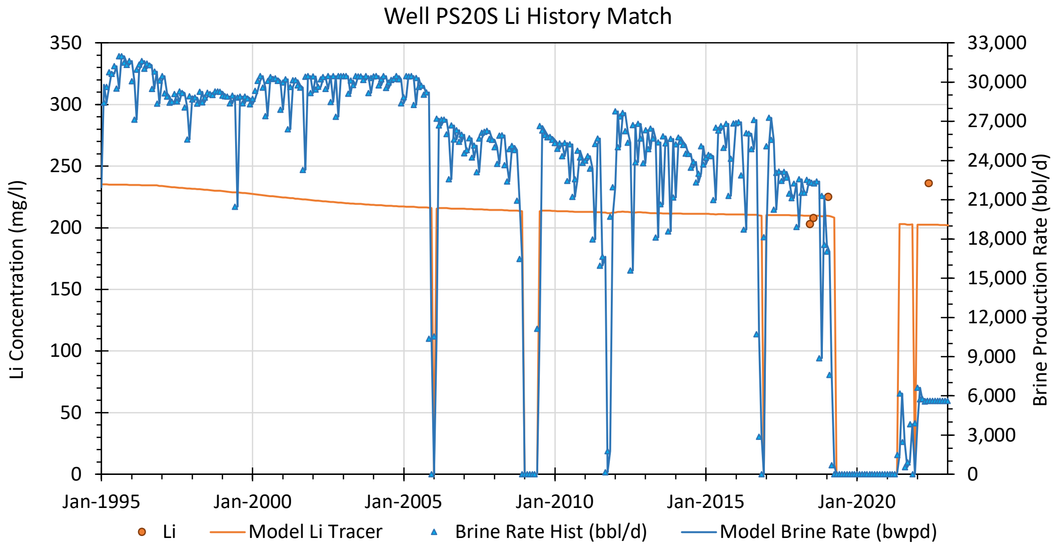
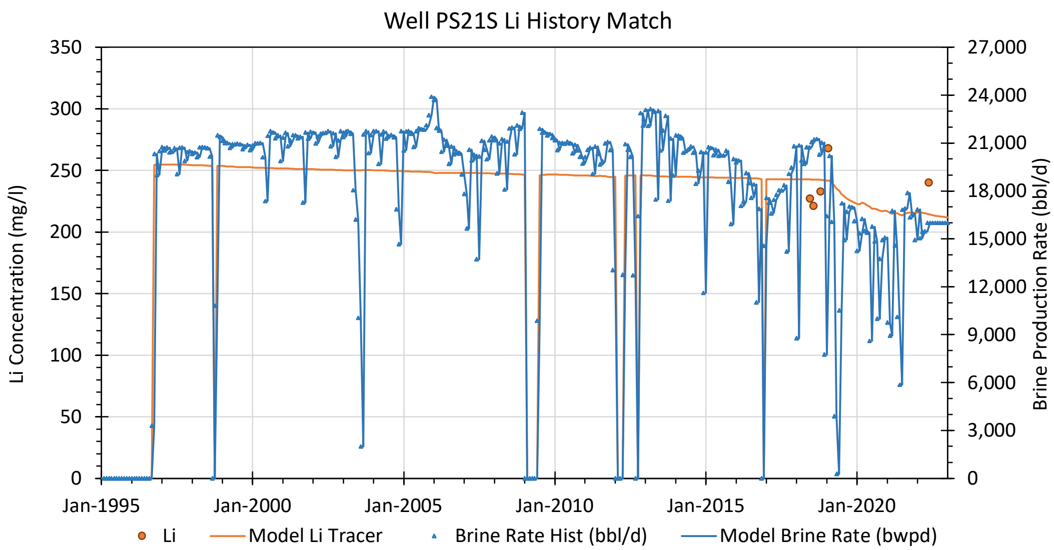


Figure 14-5. Simulation Model Match of Unit Produced Lithium Concentration Data


Well PS20S Li History Match
Li Concentration (mg/l)
Brine Production Rate (bbl/d)
350
300
250
200
150
100
50
0
33,000
30,000
27,000
24,000
21,000
18,000
15,000
12,000
9,000
6,000
3,000
0
Jan-1995
Jan-2000
Jan-2005
Jan-2010
Jan-2015
Jan-2020
Li
Model Li Tracer
Brine Rate Hist (bbl/d)
Model Brine Rate (bwpd)


Well PS21S Li History Match
Li Concentration (mg/l)
Brine Production Rate (bbl/d)
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300
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200
150
100
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27,000
24,000
21,000
18,000
15,000
12,000
9,000
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Jan-1995
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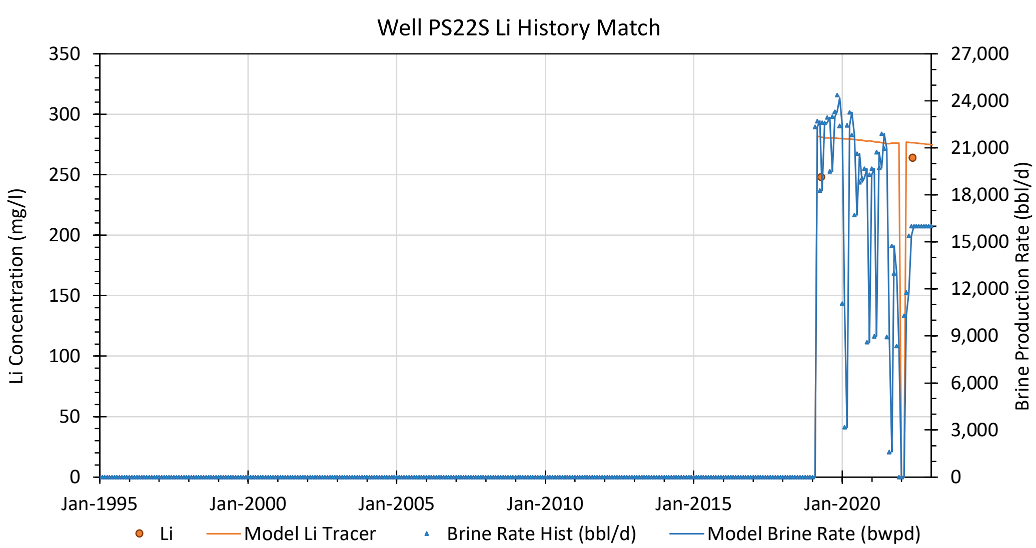
Jan-2015
Jan-2020
Li
Model Li Tracer
Brine Rate Hist (bbl/d)
Model Brine Rate (bwpd)


Well PS22S Li History Match
Li Concentration (mg/l)
Brine Production Rate (bbl/d)
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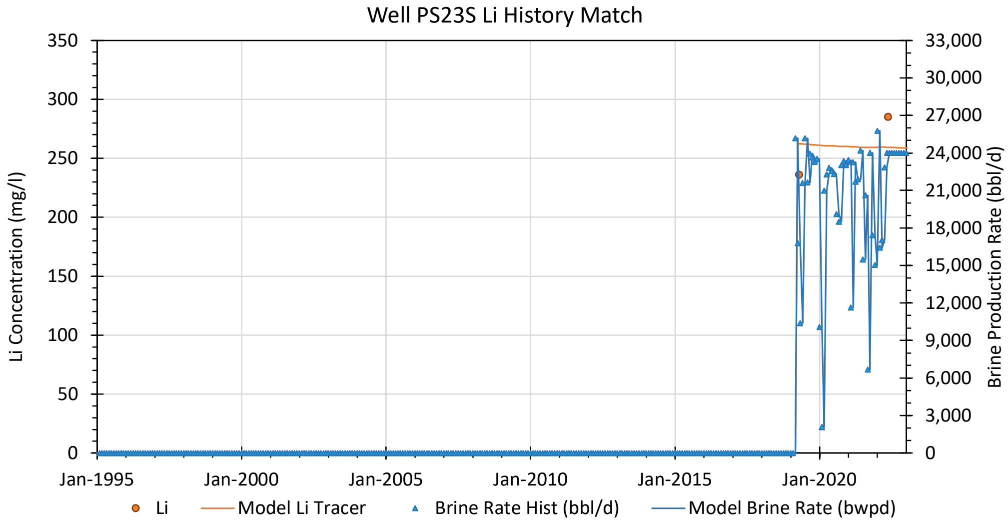
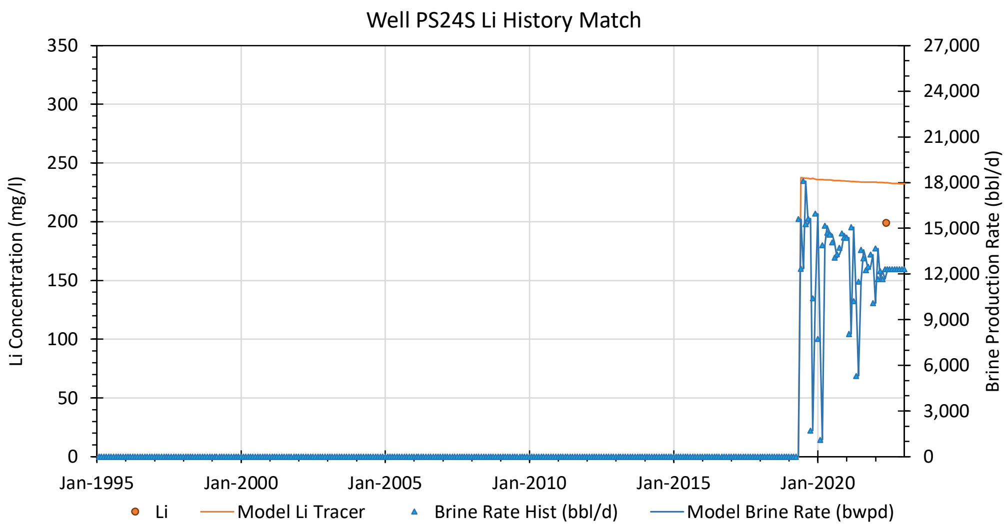
Li
Model Li Tracer
Brine Rate Hist (bbl/d)
Model Brine Rate (bwpd)





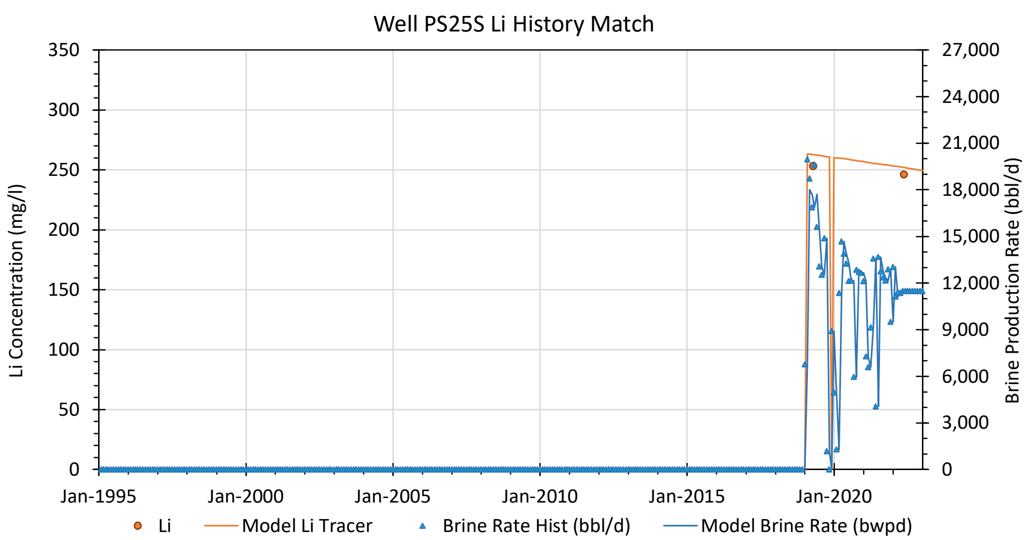


Figure 14-6. Simulation Model Match of South Unit Well Produced Lithium Concentration Data

14.3 LITHIUM RESOURCE ESTIMATE

To estimate the in-place lithium Resource effective August 18, 2023, the simulation model was used instead of the layered geologic model, because the bromine production activities over the Property history moved the lithium around within each Unit. The lithium content was calculated by multiplying the brine volume for each of the simulation model's cells by the lithium concentration on that date for that cell. The resulting values were then summed over each Unit. Any cell in more than one Unit was allocated between the Units, as were cells straddling the outer boundaries of the Units. The estimated properties for each Unit are listed in Table 14-1. The resulting estimated average lithium concentration and in-place estimated Lithium Mineral Resource value for each of the three Units as of August 18, 2023, are presented in Table 14-2.

Table 14-1. Estimated Unit Properties Resulting from Finite Difference Modeling

Estimate	Units	West Unit	Central Unit	Central Unit Expansion	South Unit	Total/Average
Average Horizontal Permeability	Md	85	91	91	88	88
Gross Rock Volume	10^6 m^3	32,800	24,000	3,900	20,800	81,500
Average Net to Gross Ratio	%	34.1	30.8	36.6	24.3	30.8
Net Rock Volume	10^6 m^3	11,200	7,400	1,400	5,100	25,100
Average Porosity	%	14.1	14.2	14.3	14.4	14.2

The resulting estimated average lithium concentration and in-place estimated Measured and Indicated Estimated Lithium Resource value for each of the three Units (including the Central Unit Expansion) as of August 18, 2023, are presented in Table 14-2. The Estimated Lithium Resources are presented in tonnes of elemental lithium. The 529,000 tonnes of total Measured plus Indicated elemental lithium resources corresponds to approximately 2,820,000 tonnes of LCE, using a conversion factor of 5.323.

Table 14-2. Statement of Resources In-Place by Unit effective date, August 18, 2023

	Units	South	West	Central	Central Expansion	Total
Gross Volume [1]	km^3	20.8	32.8	24	3.9	81.5
Net Volume [1]	km^3	5.1	11.2	7.4	1.4	25.1
Average Porosity [2]	%	14.4	14.1	14.2	14.3	14.2
Brine Volume [8]	km^3	0.73	1.58	1.05	0.2	3.56
Average Lithium Concentration	mg/L	204	122	164	78	148
Measured Resource	thousand tonnes	148	192	173	-	513
Indicated Resource	thousand tonnes	-	-	-	16	16
Measured LCE Resource [9]	thousand tonnes	788	1,022	921	-	2,731
Indicated LCE Resource [9]	thousand tonnes	-	-	-	85	85

Notes:

[1] Volumes are in-place.

[2] Cutoff of 9% porosity.

[3] The effective date of the resource estimate is August 18, 2023

[4] Mineral Resources are inclusive of Mineral Reserves.

[5] The Qualified Persons for the Mineral Resource Estimates is Randal M. Brush, PE and Robert E. Williams, Jr., PG, CPG.

[6] The Mineral Resource estimate follows 2014 CIM Definition Standards and the 2019 CIM MRMR Best Practice Guidelines.

[7] These Mineral Resources are not Mineral Reserves as they do not have demonstrated economic viability.

[8] Calculated brine volumes only include Measured and Indicated Mineral Resource volumes that when blended from the well field result in feed above the cut-off grade of 100 mg/L.

[9] Lithium Carbonate Equivalent ("LCE") is calculated using mass of LCE = 5.323 multiplied by mass of lithium metal.

[10] Results are presented in-situ. The number of tonnes was rounded to the nearest thousand. Any discrepancies in the totals are due to rounding effects.

[11] The Qualified Person is not aware of any known environmental, permitting, legal, title-related, taxation, socio-political or market issues, or any other relevant issue that could materially affect the potential development of Mineral Resources other than those discussed in the Mineral Resource Estimates.

14.4 QUALIFIED PERSON DISCUSSION

The simulation model was run to track changes in lithium concentrations over the entire Property history and was found to closely match the current produced lithium concentrations, indicating the model is well calibrated. Therefore, this simulation model is appropriate to use in modeling both the historic movement of lithium in the field and in estimating the future production of lithium from the Project's brine source wells.

The Indicated Resources associated with the three Units evaluated in the PEA (Worley, 2019) have been reclassified in this report as Measured Resources. This reclassification is based on the following observations:

- The multi-zone geologic description incorporates the available well log and core data and describes the variation in reservoir properties over each of the three Units. This data covers the entire vertical and horizontal extent of the reservoir within the Units that has been developed, and there is not a significant undeveloped target within the three Units.
- The Smackover has demonstrated sufficient permeability and thickness throughout the three Units to permit 55,600 to 87,400 m^3 per day (350,000 to 550,000 barrels per day) of production and matching injection of brine (total Property throughput) over the last 30 years.
- The reservoir simulation model based on that geologic description has been confirmed as reasonable by the match to Property production data achieved by the model, which has been history matched to 60+ years of bromine brine production and injection activities.
- The simulation model has also been confirmed as reasonable by the match of model-estimated lithium concentrations to recently collected plant inlet lithium concentration data.
- The lithium concentration data and the lean brine breakthrough data allow for the accurate mapping of the spatially varying original lithium concentration values, a significant increase in accuracy over the application of an average lithium concentration field wide. This map enables the modeling of the 60+ years of injection and production performance to estimate the current distribution of lithium within the three Units.
- The recognition of the high levels of geologic continuity between injection and production wells in those formations, as demonstrated by the 60+ years of bromine-rich brine displacement by lean processed brine. This lean brine breakthrough behavior is matched by the simulation model, which incorporates 100 percent continuity of the net pay in its geologic layers.
- In summary, all three Units have been fully developed over the last 60+ years for bromine production, providing geologic and engineering data to fully describe their lithium content. The addition of lithium recovery to the field takes full advantage of the information gathered by the existing bromine recovery project.

The lithium resources associated with the recently approved approximate 6,560-acre (2,654.7-hectare) expansion to the Central Unit (Arkansas Oil & Gas Commission Order Number 095-2022-12, January 5, 2023) have been classified as Indicated Resources, based on this area's location in close proximity to existing wells in the West Unit and Central Unit. As with the PEA (Worley 2019), there are no Inferred Resources.

A minimum lithium concentration cutoff of 100 mg/L was applied as part of the Indicated and Measured Resource estimation procedure. Because the ongoing bromine recovery process results in all of each Unit's lithium-bearing formation contributing to the produced brines from the brine source wells, the cutoff did not impact the resource estimation. The brine from these wells is mixed at each Unit's central plant. The option to selectively produce certain parts of the geologic formation does not exist because the wells produce from and inject into all the permeable parts of the formation, regardless of lithium concentration. As a result, all in-place brine subject to injection and production will be subject to the lithium recovery process. Therefore, the entirety of each Unit is part of that Unit's lithium resource, regardless of its current lithium concentration.

Geological evidence is derived from detailed and reliable exploration, sampling and testing and is sufficient to confirm geological and grade or quality continuity between points of observation. In this case, the geologic and physical characteristics of the lithium accumulation have been fully analyzed, and the resulting description is suitable for detailed Project planning. Any revisions to the geologic and physical descriptions prior to Project implementation would result from additional lithium sampling at the same locations as previously sampled, which could produce minor changes in the estimated lithium concentration map. As of the date of this report no additional wells are planned to be drilled in the West and Central Units.

In addition to the technical and economic advantages of implementing the Project at an ongoing brine recovery facility, the uncertainties associated with permitting, environmental, legal, title, and other social and political issues are expected to be greatly reduced or eliminated because the Project is supported by the Property's existing long-term bromine recovery operations.

15.0 MINERAL RESERVE ESTIMATES

15.1 INTRODUCTION

This Report presents the estimate of Probable and Proven Mineral Reserves, consistent with the CIM Definitions (CIM, 2014), which state:

- A **Mineral Reserve** is the economically mineable part of a Measured and/or Indicated Mineral Resource. It includes diluting materials and allowances for losses, which may occur when the material is mined or extracted and is defined by studies at Pre-Feasibility or Feasibility level as appropriate that include application of Modifying Factors. Such studies demonstrate that, at the time of reporting, extraction could reasonably be justified.
- A **Probable Mineral Reserve** is the economically mineable part of an Indicated, and in some circumstances, a Measured Mineral Resource. The confidence in the Modifying Factors applying to a Probable Mineral Reserve is lower than that applying to a Proven Mineral Reserve.
- A **Proven Mineral Reserve** is the economically mineable part of a Measured Mineral Resource. A Proven Mineral Reserve implies a high degree of confidence in the Modifying Factors.
- **Modifying Factors** are considerations used to convert Mineral Resources to Mineral Reserves. These include, but are not restricted to, mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social and governmental factors.

The Project consists of the addition of lithium recovery facilities to the ongoing bromine production at the South Unit, thereby producing a portion of the South Unit's Measured Mineral Resources described in Section 14. As an addition to the existing bromine recovery process, the Project is not subject to several of the uncertainties and economic costs associated with 'greenfield' projects; the production and injection facilities are already in place, are in operation, and benefit from the ongoing bromine production.

15.2 LITHIUM RESERVE ESTIMATE

The lithium Reserve estimates reported here were obtained using the simulation model described in Section 14. The lithium Mineral Reserves are that part of the Measured Mineral Resource for the South Unit effective August 18, 2023, that are estimated to be recovered by the Project over the 25-year forecast operating period, with project start-up of mid 2026. The basis for the forecast operating conditions is provided in Section 16.

Two cases of Feed Brine rates were evaluated to estimate the Project Reserves. The Proven Reserves case is based on LANXESS's minimum annual average South Unit Feed Brine rate expected over the 25-year Project production period of 4.96 x 10^6 m^3 per year. This minimum annual average production rate is based on the South Unit Development Plan as set out in the Site Access, License and Reservation Agreement (SARL) between Company and LANXESS. (Standard Lithium 2023). The Proven plus Probable Reserves case rate forecast is based on the average South Unit brine production expected over the 25-year Project production period of 5.21 x 10^6 m^3 per year. Both cases assume the same process efficiency and lithium recovery factors over that period, with the Probable Reserves equal to the difference between the two cases. The estimated Proven and Probable reserves are presented in Table 15-1.

The Project's Modifying Factors include the following, and are summarized in Table 15-2:

- **South Unit Feed Brine Rate:** The total volume of Feed Brine processed by the South Unit bromine plant which is available for processing by the Project.
- **System Availability:** The availability of the lithium extraction facility.
- **Lithium Recovery Efficiency:** The fraction of the lithium contained in the brine received by the Project that is recovered by the process; unrecovered lithium is injected back into the reservoir.
- **Lithium Carbonate Attrition:** The fraction of lithium lost in the production and handling of the lithium carbonate product, attributable to sampling, spillage, and other non-process related losses.

Additional validation for the Probable and Proven Reserve estimates presented in Table 15.1 results from the potential Project upside aspects, including:

- **Project Optimizations:** The Project operating conditions assumed in this analysis do not include potential optimizations, such as modifying the injection locations for the processed lean brine to reduce lean brine breakthrough at production wells, or the implementation of more-efficient or less-expensive lithium recovery technologies.
- **Project Expansion:** The reserve estimates are based on rates associated with current operations, and do not include any as-yet unplanned expansions to either processing facilities or Project area.
- **Increased Throughput:** It may be possible to operate the South Unit at a higher brine production rate through improved brine field production system availability.

While a 100 mg/L minimum producing lithium concentration cutoff was evaluated for the estimation of South Unit lithium Brine Reserves, it did not affect the results, The Feed Brine concentration exceeded the 100 mg/L cutoff value throughout the 25-year evaluation period. This cutoff was not applied to individual wells because the wells will be produced for bromine recovery, regardless of lithium content. Unless otherwise noted, Brine Reserves are referenced at the inlet to the lithium processing plant.

Table 15-1. Phase 1A Proven and Probable Reserves

	Units	Proven	Probable	Proven + Probable
Brine Reserves [4,8]	million m^3	124	84	209
Average Lithium Concentration [4,8]	mg/L	227	201	217
Lithium Metal [4,8]	thousand tonnes	28.2	17	45.2
LCE Reserves [4,9,10,12]	thousand tonnes	129	79	208

Notes:

[1] The effective date of the reserve estimate is August 18, 2023.
[2] Any discrepancies in the totals are due to rounding effects.
[3] The Qualified Person for the Mineral Reserve estimate is Randal M. Brush, PE.
[4] Reserves are exclusive to the South Brine Unit.
[5] The average lithium concentration is weighted per well simulated extraction rates.
[6] The Proven case assumes a 25-year operating life at 4.96 million m3/year of brine production at a cut-off of 100 mg/L.
[7] Proven plus Probable Reserves assume a 40-year operating life at 5.21 million m3/year of brine production at a cut-off of 100 mg/L.
[8] The Reserves reference point for the brine pumped, average lithium concentration, and lithium metal is the brine inlet to the Standard Lithium processing plant.
[9] The Reserves reference point for the LCE is the product output of the processing plant.
[10] Lithium Carbonate production values consider plant processing efficiency factors.
[11] The Mineral Reserve estimate follows 2014 CIM Definition Standards and the 2019 CIM MRMR Best Practice Guidelines.
[12] Lithium Carbonate Equivalent ("LCE") is calculated using mass of LCE = 5.323 multiplied by mass of lithium metal.
[13] The Qualified Person is not aware of any known environmental, permitting, legal, title-related, taxation, socio-political or marketing issues, or any other relevant issue, that could materially affect the potential development of Mineral Resources other than those discussed in the Mineral Resource Estimates.

Table 15-2. Phase 1A Modifying Factors

Modifying Factor	Units	Proven Reserves Case	Probable Reserves Case
South Unit Feed Brine Rate	million m^3/yr	4.96	5.21
Years 2 through 25 System Availability	Percent	94.0%	94.0%
Lithium Recovery Efficiency	Percent	93.1%	93.1%
Lithium Carbonate Attrition	Percent	0.5%	0.5%

Notes:

[1] Year 1 production is expected to be 75% of the facility capacity to account for the ramp-up period

15.3 DISCUSSION OF RESULTS

The lithium reserves estimate presented in this TR are supported in several ways:

- The successful brine injection and production activities associated with bromine recovery in south Arkansas and in the Property over the past 60 plus years provides compelling evidence regarding the brine content, the productivity, and the continuity of the Smackover Formation over large distances, essential elements to support of the lithium brine recovery Project described in this TR.
- The bromine extraction process in the South Unit is planned to occur with or without the implementation of the lithium recovery process. This greatly reduces uncertainties associated with the Project life and creates potential project upside regarding the extension of the project if the bromine production is enhanced in the future.
- The geological characteristics of the Property have already been fully delineated by the existing wells. Therefore, the estimated reservoir volumes associated with the Measured and Indicated Resources, and with the Proven and Probable Reserves have been fully delineated.
- The geological model was incorporated into the reservoir simulation model, which was matched to the full life of the bromine production history which aligned with the lithium sampling results.
- The simulation model, through its history match of field production, has confirmed the geological characteristics of the Property, demonstrating the reservoir to be productive, continuous, and to contain the estimated volume of brine.
- This single calibrated and matched simulation model, used as the basis both for the Measured and Indicated Resources and for the Proven and Probable Reserves ensures consistency between the reported mineral resource and reserves estimates.

For these reasons, the mineral reserve estimates reported here are considered to be reasonable, and in conformance with the requirements of NI 43-101.

16.0 MINING METHODS

Recovery of the lithium will use the existing LANXESS South Unit brine production facilities (brine supply wells, down-hole pumps, surface flowlines, bromine processing facilities, and connecting pipelines and disposal wells, as described in the PEA (Dworzanowski et al. 2019) to supply the Feed Brine from the LANXESS South Plant to the Project. Once the lithium is extracted from the brine, the processed brine will be re-injected into brine disposal wells, along with any brine not processed by the Project. This production and injection process from a deep brine reservoir is identical to that used in the adjacent Albemarle bromine project and incorporates the production and injection technology which has been proven by the petroleum industry in thousands of fields worldwide.

Examples of a typical brine source well (BSW) and salt water disposal (SWD) wells are given in Figures 16-1 and 16-2, and the configuration of the South Unit wells and the existing pipeline network is presented in Figure 16-3.

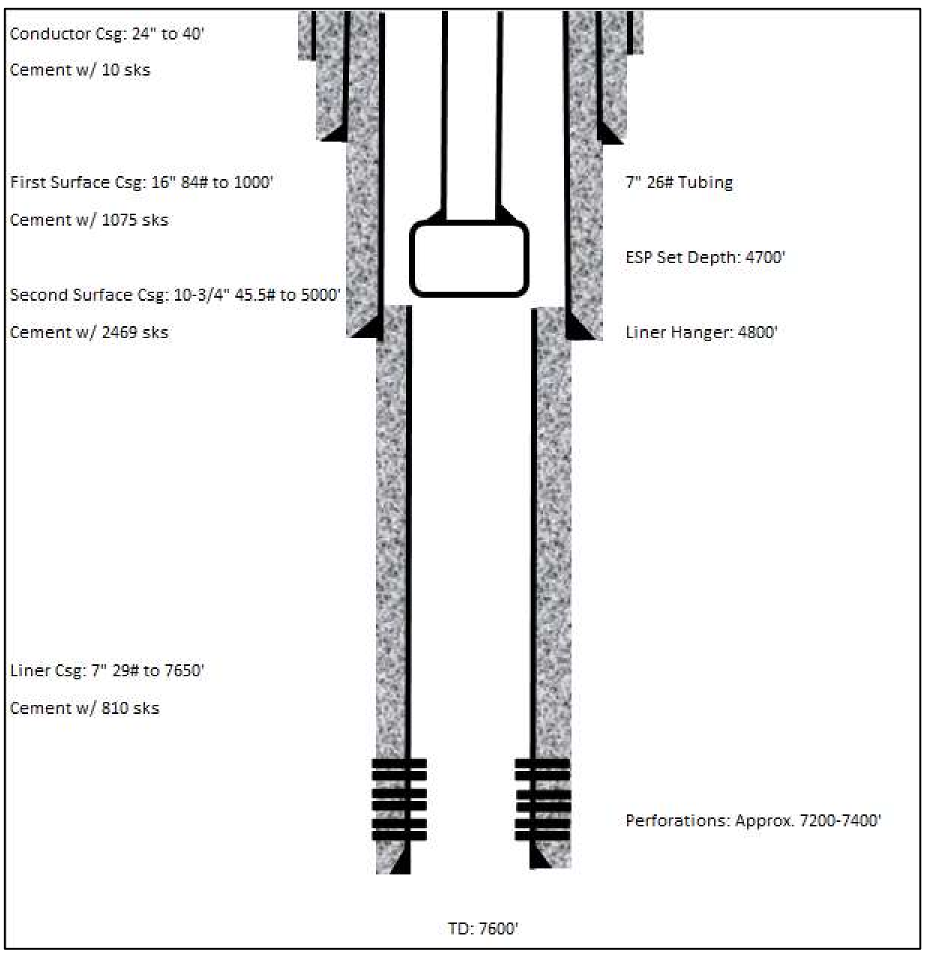


Figure 16-1. Typical Brine Source Well Diagram

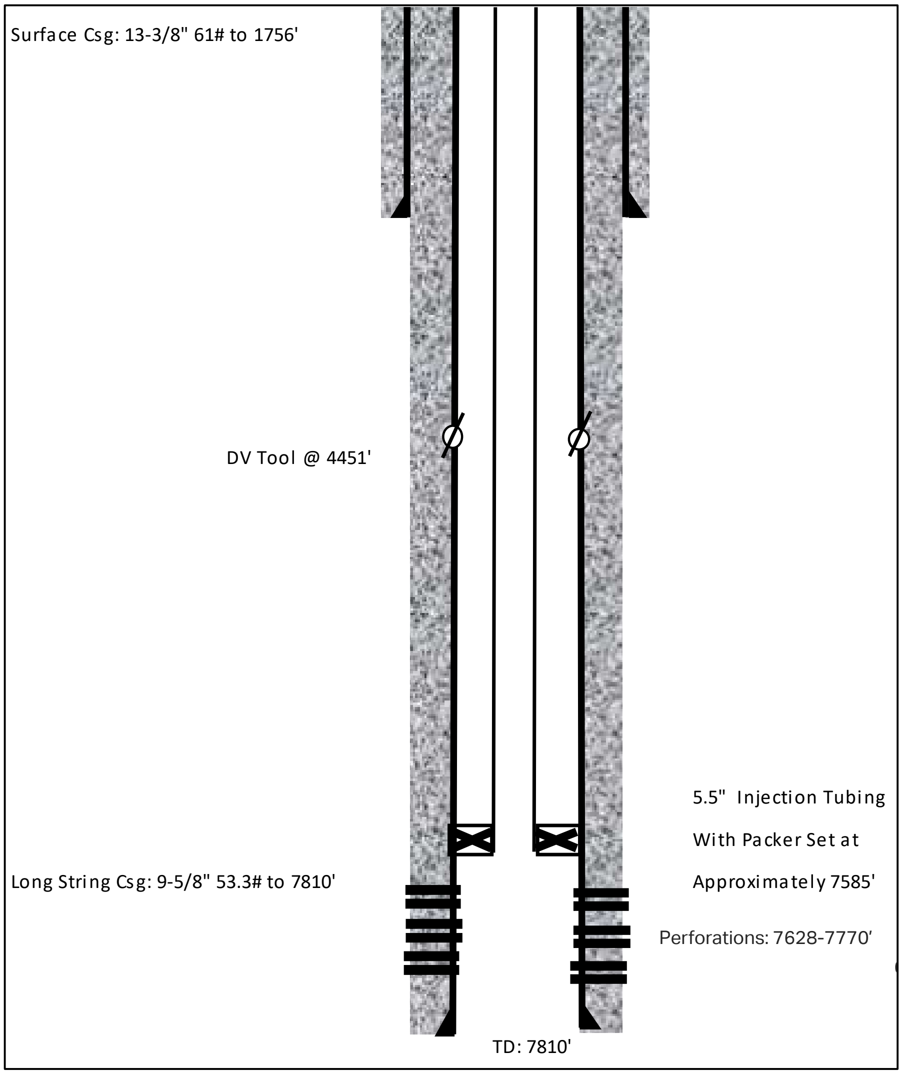


Figure 16-2. Typical Disposal Well Diagram

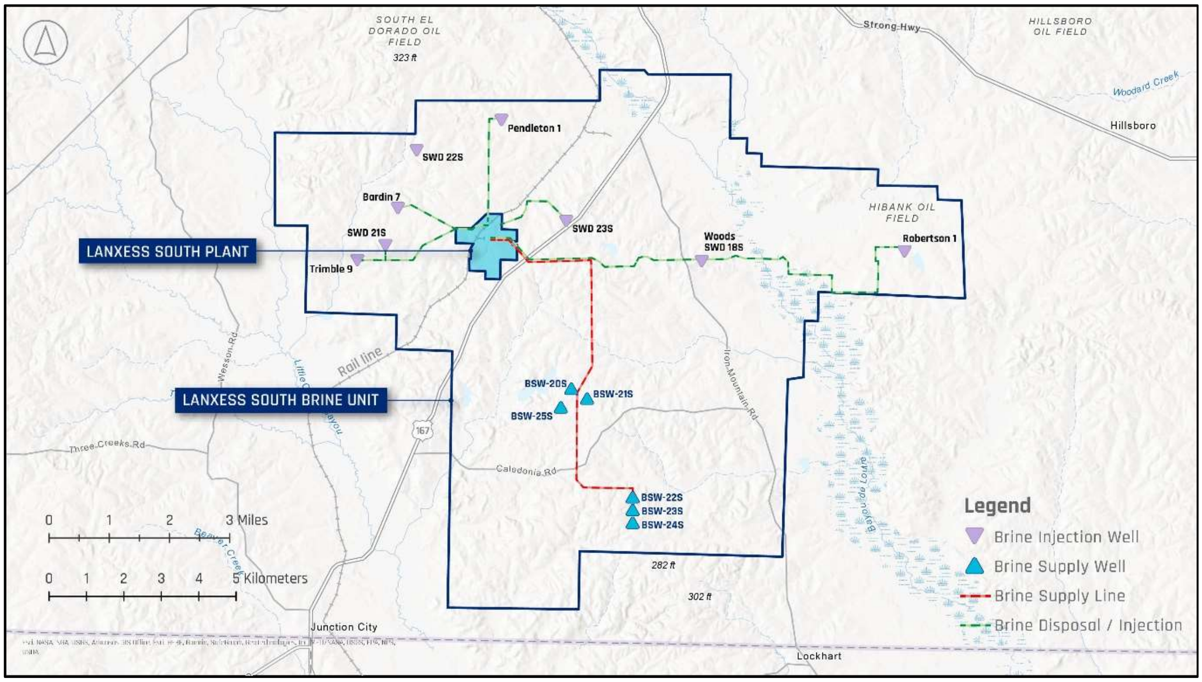


Figure 16-3. South Unit Well and Flow Line Configuration

The assumed Project injection and production rates are based on the existing well capacity and historic field operations, as LANXESS set out in the South Unit Development Plan, which sets out a high level, the contemplated production from the South Unit by LANXESS over the life of the Project. The extraction method is not expected to impose any significant changes on the existing bromine processing activities. Based on the current predicted life of the existing brine supply and disposal wells, no new wells are anticipated to be required during the initial 25-year operating life of the facility.

Proven Reserves case total brine rate and lithium concentration are plotted in Figure 16-4. The decrease in lithium concentration over the life of the Project results from the increasing production volume of injected lean brine that has been processed to remove the lithium, as expected in a brine displacement process.

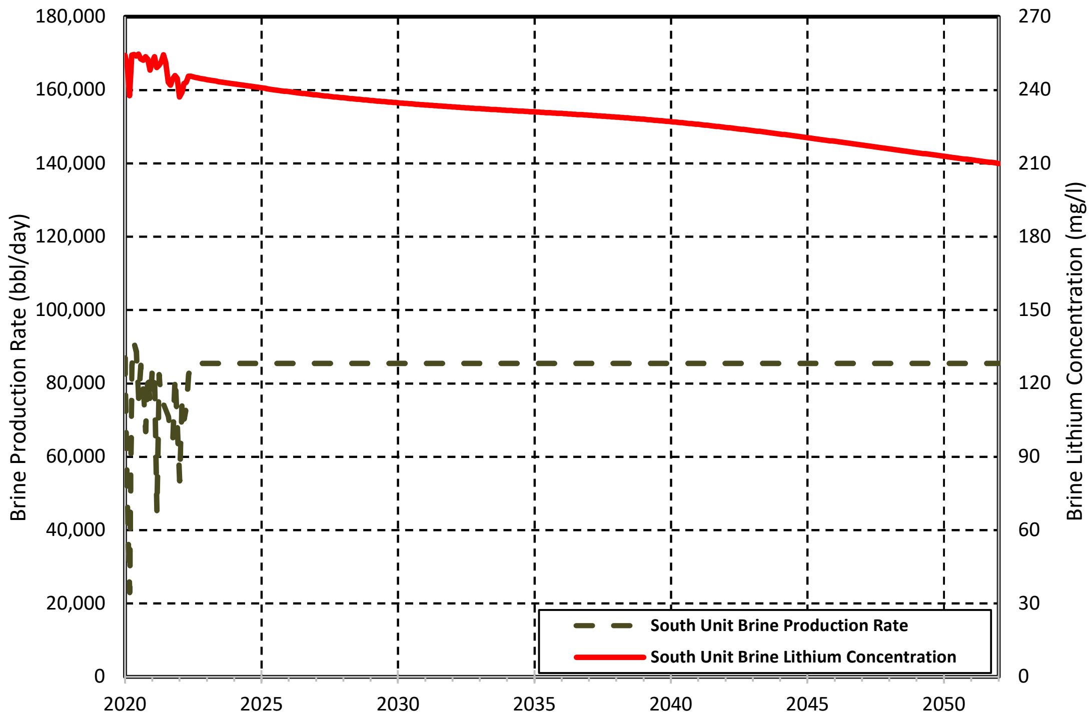


Figure 16-4. South Unit Production - Concentration Estimates

16.1 PRODUCTION PLAN

The Project contemplates production of battery-quality lithium carbonate averaging 5,400 tonnes per annum (tpa) over a 25-year operating life, producing 135,000 tonnes LCE from the LANXESS South Brine Unit.

The Project has the potential to operate over a 40-year life based on the Proven and Probable Reserves of 208,000 tonnes LCE. The TR makes very conservative assumptions that production of brine will occur from the existing wellfield, and that no additional wells are drilled in the future to supplement or add to the current brine flow, or to add additional brine from higher lithium content zones available in the production unit(s). See Figure 16-5 for the annual production plan.

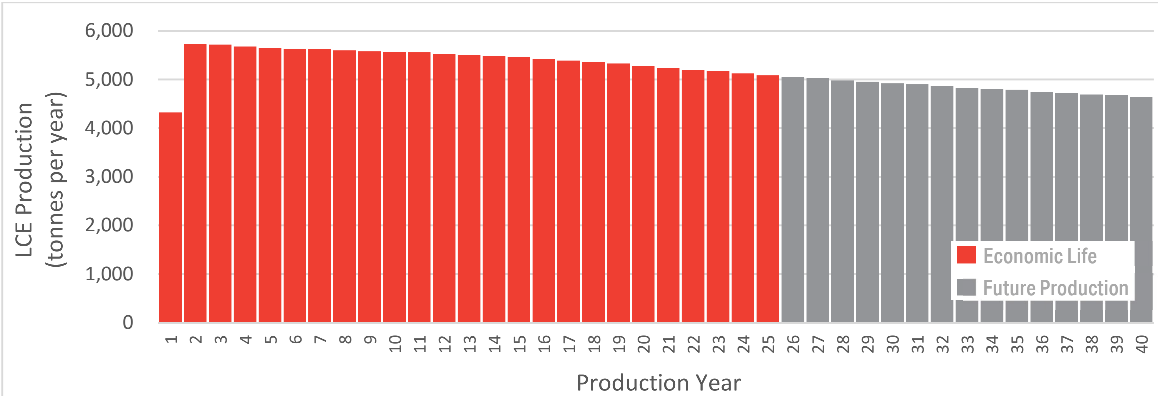


Figure 16-5. Project Production Plan

The LANXESS the South Unit Brine Resource and Proven Brine Reserves support the production of Lithium Carbonate well in excess of the initial 25-year economic life of the Project. The long-established history of brine production coupled with the proven experience of LANXESS in brine field operations, coupled with the fact that economic benefit will be obtained from both bromine and lithium extraction from the Project production, further supports planned future brine production from the South Unit.

Table 16-1. Planned South Unit Production by Year for First 25 Years of Production

Year No.	Year	Proven Reserves			Proven and Probable Reserves		
		Average Lithium Concentration	Lithium Processed by the Plant	Equivalent Lithium at Plant Outlet, 100% Purity	Average Lithium Concentration	Lithium Processed by the Plant	Equivalent Lithium at Plant Outlet, 100% Purity
		(mg/L)	(tonnes/year)	(tonnes/year)	(mg/L)	(tonnes/year)	(tonnes/year)
1	2026	239	888	780	239	932	864
2	2027	237	1,072	941	237	1,162	1,077
3	2028	236	1,070	939	236	1,160	1,074
4	2029	235	1,062	933	235	1,151	1,066
5	2030	234	1,058	929	234	1,147	1,062
6	2031	233	1,054	926	233	1,142	1,058
7	2032	233	1,053	925	232	1,142	1,058
8	2033	232	1,048	920	232	1,135	1,052
9	2034	231	1,045	917	231	1,132	1,048
10	2035	231	1,042	915	230	1,129	1,045
11	2036	230	1,042	915	230	1,128	1,045
12	2037	229	1,036	909	229	1,121	1,039
13	2038	229	1,032	906	228	1,117	1,035
14	2039	228	1,028	903	227	1,112	1,030
15	2040	227	1,027	902	226	1,109	1,028
16	2041	226	1,019	895	225	1,100	1,019
17	2042	224	1,014	890	223	1,093	1,013
18	2043	223	1,008	885	222	1,086	1,006
19	2044	222	1,005	882	220	1,081	1,002
20	2045	220	995	874	219	1,070	992
21	2046	219	989	868	217	1,063	984
22	2047	218	982	863	215	1,055	977
23	2048	216	979	859	214	1,050	973
24	2049	215	970	851	212	1,040	963
25	2050	213	963	846	211	1,032	956

17.0 RECOVERY METHODS

17.1 OVERVIEW

The Project Facility will be constructed adjacent to the existing LANXESS South Plant which currently receives, processes, and reinjects Smackover brine from the South Unit via a series of brine supply and reinjection wells as described in Section 16. The Project will receive brine downstream of the bromine processing facility, recover the lithium and return the lithium-depleted brine to LANXESS for reinjection into the Smackover Formation.

The Feed Brine received by the Project is pH adjusted, filtered and conditioned in a series of pre-treatment processes in preparation for the Direct Lithium Extraction (DLE) process. The DLE technology chosen for the Project is Lithium Selective Sorption (LSS), a Koch Technology Solutions LLC (KTS) proprietary technology, which extracts lithium ions from the brine to produce a raw lithium chloride solution that is low in contaminants. The lithium chloride is then purified through chemical softening and ion exchange, and concentrated using reverse osmosis to produce a polished lithium chloride solution.

The polished lithium chloride then enters a conventional, two-stage, lithium carbonate crystallization process to produce battery quality lithium carbonate. The lithium carbonate is dried, milled, and packaged to produce the finished product.

The lithium recovery method within the Project Facility consists of the following major process blocks:

- Brine Pre-Treatment;
- Direct Lithium Extraction;
- Concentration and Purification; and
- Lithium Carbonate Conversion.

The process block flow diagram included in Figure 17-1 provides an overview of the lithium recovery process proposed for Standard Lithium's Commercial Lithium Extraction Plant.

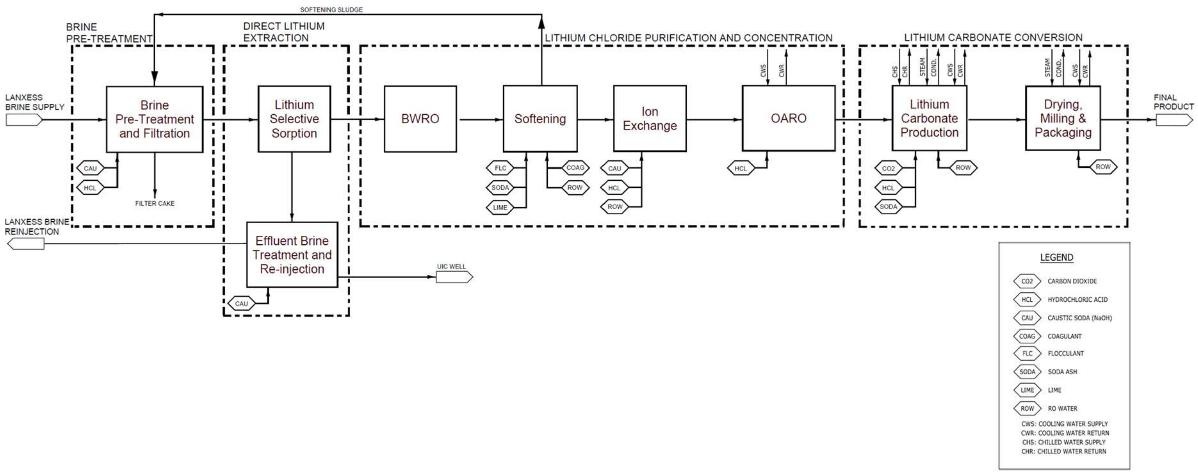


Figure 17-1. Project Process Block Flow Diagram

17.2 BRINE SUPPLY AND REINJECTION (LANXESS)

Under the terms of the commercial agreements, LANXESS is responsible for the supply and reinjection of brine which meets the process conditions set out in the commercial agreements. Figure 17-2 provides an overview of the brine supply and return process between the Project Facility and LANXESS South Plant.

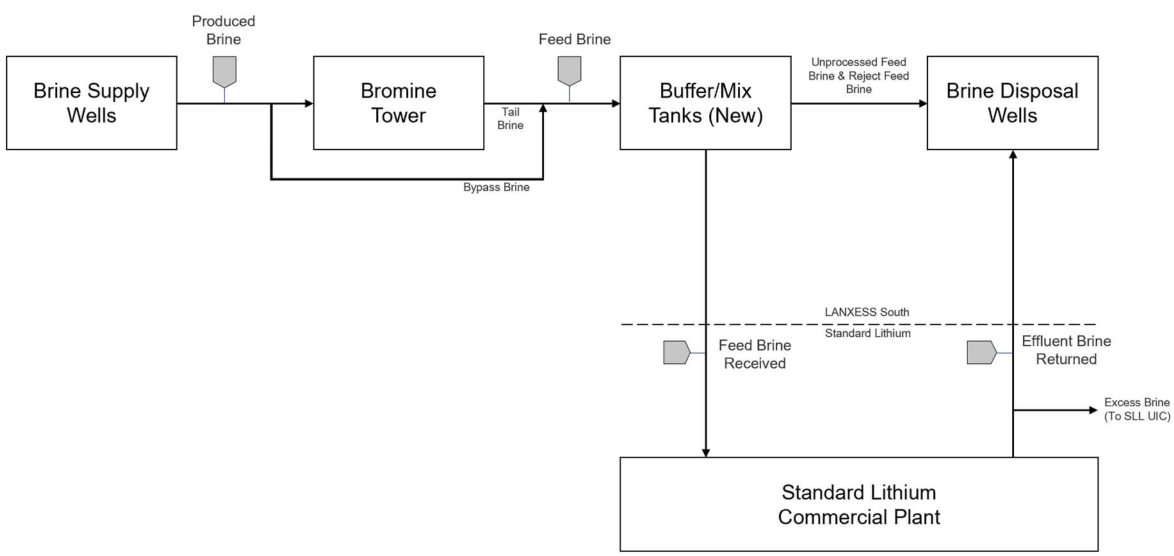


Figure 17-2. Standard Lithium and LANXESS Process Block Flow Diagram

17.2.1 BRINE SUPPLY

Smackover brine produced by LANXESS from the wells in the South Unit is treated and then gathered and delivered via pipeline to the South Plant for processing. Separation equipment at each well head is used to remove the bulk of any produced hydrocarbons and the sour gas (H_2S) from the brine stream prior to delivery to the South Plant. The sour gas collected is transported to the LANXESS Central Plant via pipeline and then delivered to the Delek Refinery for processing. Any produced hydrocarbons are locally collected and transported to the Delek Refinery for processing.

Once the brine is received at the South Plant, it first passes through a LANXESS vacuum degasser to remove residual sulfides entrained in the brine to less than 30 ppm ($^{wt}/_{wt}$) of H_2S, prior to the bromine extraction process. LANXESS may or may not extract bromine from the brine.

Brine which bypasses the bromine extraction facilities, referred to as Bypass Brine, requires pH adjustment using anhydrous ammonia (NH_3) prior to delivery to the Project Facility or reinjection into the formation. Bromine-depleted brine, referred to as Tail Brine, requires a further treatment by LANXESS using sodium bisulfite (SBS) to reduce any residual bromine and chlorine in the Tail Brine stream to bromides and chlorides.

The Project will be able to treat Feed Brine (Tail Brine or Bypass Brine) from LANXESS at a range of pH between 1 to 5.5. By receiving the brine at a lower pH, softening sludge produced by the Project Facility's downstream lithium chloride purification process can be used for coarse pH adjustment, which results in improved lithium recovery for the Project and an operating cost savings to LANXESS through reduced anhydrous ammonia consumption and to the Project through reduced reagent consumption.

17.2.2 BRINE REINJECTION

Following the lithium extraction process and any treatments required to meet reinjection specifications, the majority of the lithium-depleted brine and ancillary waste streams are consolidated and returned to LANXESS for reinjection into the Smackover Formation using the existing LANXESS reinjection well network. Any excess brine volumes are reinjected underground using the Project's Class 1 Non-Hazardous Underground Injection Control (UIC) wells as described in Section 18.

17.3 BRINE PRE-TREATMENT

The Project is designed to receive Feed Brine from the LANXESS South Plant at an operating rate of 680 m^3/hr [3,000 US gpm] with a 10% design factor. This is to ensure the project maximizes the volume of Feed Brine processed accounting for fluctuation in brine delivery rates from South Plant. The Feed Brine is typically hot, acidic, and highly saline. Besides lithium, the brine's primary constituents include sodium, potassium, magnesium, and calcium chlorides with minor quantities of boric acid.

The objective of Brine Pre-treatment is to neutralize, cool, and filter the Feed Brine in preparation for the Direct Lithium Extraction (DLE) process.

Feed Brine received from LANXESS is initially processed through two pH control tanks. Under normal operations, the first tank uses chemical softening sludge, primarily calcium carbonate and magnesium hydroxide produced in the downstream raw lithium chloride softening system, for coarse pH adjustment, specifically to raise the Feed Brine pH to approximately 4.0 - 4.5. The second tank uses caustic soda (sodium hydroxide solution) to further raise the brine pH to 5.5, the target pH for the DLE process. In the event there is insufficient softening sludge available, LANXESS will adjust the pH of the Feed Brine prior to delivery to the Project.

The Feed Brine temperature ranges between 60-90°C. To optimize the downstream process, two heat exchangers operating in parallel are used to moderate the brine temperature to 65°C primarily to protect the downstream membrane filtration system. The lithium-depleted brine produced downstream from the DLE process is used as coolant after passing through an evaporative cooling tower. The cooling tower is used to cool the lithium-depleted brine from 65°C to less than 40°C. The cooling tower also removes 35 m^3/hr of water from the brine by evaporation, which reduces the total volume of brine required to be reinjected into the Smackover Formation.

The pH and temperature adjusted Feed Brine is pumped through ultrafiltration (UF) membrane filters, for the removal of any fine suspended solids (over 0.04 µm). The UF membrane filters consist of five operating and one standby module. The membrane modules are removed from service one at a time to release the collected solids by air scouring and backwashing. Lithium-depleted brine is used for regular backwash of the membrane filters. The solids-laden backwash is transferred to the effluent brine tank. Clean-in-Place (CIP) of the UF membranes is periodically required. CIP uses a combination of cleaning agents including acids and detergents to remove any buildup of solids on the membrane.

17.4 DIRECT LITHIUM EXTRACTION

17.4.1 LITHIUM SELECTIVE SORPTION

The key unit process for the production of lithium chloride solution is the Direct Lithium Extraction process. Standard Lithium has selected the Lithium Selective Sorption (LSS) process as the DLE process for the Project. The selection is based on improved economics, the expected performance guarantees to be provided by KTS, and the DLE test work undertaken as described in Section 13.3.3.

The LSS equipment is a Koch Technology Solutions proprietary technology for which Standard Lithium have a Joint Development Agreement and Smackover Formation exclusivity agreement in place (for a period of time). The process will be a fixed bed, selective adsorption process that favors lithium chloride. Lithium-rich brine will be pumped through the fixed bed of sorbent, loading the sorbent with both lithium and chloride ions, and discharging a raffinate that is barren of lithium. The loading will be stopped at the point that lithium breakthrough occurs. After displacing remaining raffinate from the sorbent bed, the sorbent will be eluted with water, releasing the lithium and chloride, and producing an eluate that compared to Feed Brine is somewhat higher in lithium concentration and much lower in other undesirable ions such as sodium, potassium, calcium, magnesium and boron. The remaining eluate will then be displaced from the column to the feed tank and the cycle will be repeated.

After the LSS DLE process, the eluate or raw lithium chloride solution will recover approximately 95% lithium and will have rejected in excess of 98% of the major contaminants for sodium, calcium, magnesium, and potassium.

17.4.2 LITHIUM-DEPLETED BRINE PROCESSING

Lithium-depleted brine rejected from LSS passes through a brine cooling tower and heat exchangers described above in Brine Pre-treatment. Lithium-depleted brine is also reused as membrane filter backwash. All lithium-depleted brine and other process waste streams are ultimately consolidated, pH adjusted and then sent for reinjection either to the LANXESS brine reinjection network or to one of the Project's two dedicated UIC wells.

17.5 PURIFICATION AND CONCENTRATION

17.5.1 BRACKISH WATER REVERSE OSMOSIS

The raw lithium chloride from LSS is concentrated via conventional Brackish Water Reverse Osmosis (BWRO) to remove nearly 90 percent of the water. In this process lithium in the chloride solution is concentrated to 2,500 to 3,000 mg/L along with 99% of the solution impurities. The BWRO concentrate is the product that continues to the next step as lithium chloride. The BWRO permeate is reused throughout the process but mainly as eluant for the DLE process.

CIP of the BWRO membranes is periodically required. CIP uses a combination of cleaning agents including acids, detergents, anti-scalant, and bases to remove any buildup of solids on the membrane.

17.5.2 CHEMICAL SOFTENING

The objective of chemical softening is to reduce calcium and magnesium from the lithium chloride rich solution.

The lithium chloride from BWRO is chemically treated with soda ash (Na_2CO_3) and lime ($Ca(OH)_2$) to precipitate calcium carbonate and magnesium hydroxide. The lithium chloride is then separated from the precipitates through a clarifier.

The clarifier underflow is filtered and reslurried with Feed Brine to produce the softening sludge required in Brine Pre-treatment for pH adjustment.

The clarifier overflow following polishing by a multi-media filter continues to the next step as softened lithium chloride.

17.5.3 ION EXCHANGE

The purity requirements for battery-quality lithium carbonate require near complete removal of calcium, magnesium, and boron. To meet the lithium carbonate purity requirements, two ion exchange systems are used. The first removes calcium and magnesium and the second removes boron from the softened lithium chloride.

17.5.3.1 CALCIUM AND MAGNESIUM REMOVAL

The softened lithium chloride is treated to remove calcium and magnesium using a chelating resin through a continuous ion exchange system. The columns will alternate between loading and regeneration.

The softened lithium chloride passes through the ion exchange columns during loading, where calcium and magnesium are loaded onto the resin and stripped from the lithium chloride. The calcium and magnesium are then stripped from the resin during regeneration using a combination of water, acid, and base which is then directed to the effluent brine system.

17.5.3.2 ION EXCHANGE BORON REMOVAL

The boron ion exchange system receives lithium chloride after calcium and magnesium removal and uses boron-selective chelating resin.

The lithium chloride passes through the ion exchange columns during loading, boron is loaded onto the resin and stripped from the lithium chloride. The boron is then stripped from the resin during regeneration using a combination of water, acid, and base and then directed to the effluent brine system.

17.5.4 OSMOTICALLY-ASSISTED REVERSE OSMOSIS (OARO)

The lithium chloride, after calcium, magnesium and boron removal, is concentrated via an Osmotically Assisted Reverse Osmosis (OARO) treatment system until lithium concentrations reach approximately 8,000 – 10,000 mg/L. The OARO permeate is reused as RO water and the OARO concentrate or polished lithium chloride is advanced for lithium carbonate conversion. After RO the lithium chloride brine contains lithium chloride, sodium chloride and minor levels of other impurities,

Impurities, including silica, aluminum, manganese, and iron, must be controlled ahead of the OARO to avoid fouling or damaging the membranes, and are expected to be reduced to acceptable levels during chemical softening and ion exchange. CIP of the OARO membranes is periodically required. CIP uses a combination of cleaning agents including acids, detergents, anti-scalant, and bases to remove any buildup of solids on the membrane.

17.6 LITHIUM CARBONATE CONVERSION

17.6.1 LITHIUM CARBONATE CRYSTALLIZATION

The lithium carbonate crystallization system receives polished lithium chloride solution from OARO and produces lithium carbonate using a two-stage conventional crystallization process with a bicarbonate process and further ion exchange treatment.

Low solubility lithium carbonate is produced by reacting lithium chloride with a sodium carbonate solution. Crude lithium carbonate that forms from the reaction is recovered with the following process.

First, the lithium carbonate is crystallized in a draft tube baffled (DTB) first stage lithium carbonate crystallizer. The lithium carbonate slurry is combined with the baffle overflow liquor before being pumped to a peeler type first stage lithium carbonate centrifuge. The crystals are de-watered and washed using centrate from the second stage lithium carbonate centrifuges. The cake discharged from the centrifuge is then repulped with recycled centrate from the second stage lithium carbonate centrifuges and RO water.

The first stage lithium carbonate crystals produced from the first stage centrifuge are impure, containing unacceptable levels of calcium and magnesium contributed by the reaction with soda ash, and sodium and chloride from the lithium chloride feed.

The centrate from the first stage lithium carbonate is purged from the carbonation process to prevent a build-up of contaminants in the process. It is returned to the Feed Brine ahead of the LSS process as this carbonate purge stream has high lithium content.

The lithium carbonate slurry fed into the bicarbonate reactor is converted to soluble lithium bicarbonate by reaction with carbon dioxide under pressure. The lithium bicarbonate solution is then filtered and purified to remove calcium and magnesium in a fixed-bed ion exchange system.

The second stage lithium carbonate crystallizer is a DTB type crystallizer which is heated by sparged steam and operates at 95°C. At this temperature and atmospheric pressure, the lithium bicarbonate is converted to lithium carbonate with carbon dioxide evolving from the solution while the lithium carbonate crystallizes. The overhead vapor from the crystallizer is condensed with cooling water and the non-condensable carbon dioxide is recompressed and recycled to the lithium bicarbonate reactor. Lithium concentration in the mother liquor from the second stage crystallizer is about 3,000 mg/L. Lithium carbonate crystals at 15 wt.% slurry density are combined with the baffle overflow before being pumped to peeler-type second stage lithium carbonate centrifuges with hot treated water used to wash the lithium carbonate crystals in the centrifuge. The second stage centrate is used to repulp the first stage crude lithium carbonate and to wash the first stage centrifuge cake.

Crystals in the second stage centrifuge cake are battery-quality lithium carbonate. The washed, pure lithium carbonate second stage centrifuge cake is then dried in an indirect-steam-heated dryer.

17.6.2 DRYING, MILLING, AND PACKAGING

Following crystallization, the lithium carbonate will be dried in an indirect-steam heated dryer, cooled, micronized (crushed), and pneumatically conveyed for packaging. After sampling and laboratory analysis, the battery quality lithium carbonate is then loaded into 500 kg or 1,000 kg bulk bags, palletized, and ready for shipment.

17.7 ENERGY. WATER, AND PROCESS MATERIALS

17.7.1 ENERGY REQUIREMENTS

The electrical power required for the Project is estimated at 7.6 MWh during normal operation and will be supplied by the regional electric service provider Entergy. Entergy is currently completing a Facility Study to determine the specific upgrades required to the Entergy infrastructure for supplying this new connected load.

The natural gas required for the Project is estimated at 260 GJ per day to support boiler steam production and ancillary heating needs. The natural gas supply infrastructure will be provided by Energy Transfer and the natural gas will be purchased from a local supplier/marketer.

17.7.2 WATER SUPPLY

Raw water for process uses will be sourced from one of two new wells to be drilled and completed on the Project Site. Each well will have the capacity to supply up to 160 m^3/hr from the Sparta Aquifer. The plant raw water demand can be satisfied by either well. Water used for most lithium extraction processes and for boiler feedwater is first purified using reverse osmosis. Additional treatment is required to produce the high purity water used in the lithium carbonate washing circuit. Untreated well water and recycled storm water, when available, is used for fire protection, irrigation and general plant washdown.

Chlorinated well water for non-potable domestic uses will be sourced from either one of the new on-site wells and chlorinated, or chlorinated water will be purchased from LANXESS and delivered by pipeline from South Plant. Potable water for drinking water purposes will be locally purchased or produced on site from treated well water.

17.7.3 REAGENTS

The various lithium recovery and purification processes require hydrochloric acid (HCl) and caustic soda (NaOH) for pH adjustment and ion exchange resin regeneration, soda ash (Na_2CO_3) for softening and to precipitate lithium carbonate, and lime ($Ca(OH)_2$) for magnesium removal in softening. Estimated annual consumption of reagents are presented in table 17-1 below.

Table 17-1. Reagent Consumption

Description	Average Consumption per Year
32% Hydrochloric Acid (HCl)	6,200 tonnes
50% Caustic Soda (NaOH)	11,400 tonnes
Soda Ash (Na_2CO_3)	15,500 tonnes
Lime (($Ca(OH)_2$)	700 tonnes

Other reagents and additives to the process include:

- anti-scalant;
- carbon dioxide;
- citric acid;
- coagulant;
- flocculant; and
- surfactant.

These chemicals are used in the lithium carbonate circuit, CIP systems, boiler feedwater treatment, cooling tower chemicals, and other ancillary processes.

18.0 PROJECT INFRASTRUCTURE

18.1 INFRASTRUCTURE DESCRIPTION

The proposed Project Facility is strategically located on undeveloped lands adjacent to the existing LANXESS South Plant to allow interconnection with key elements of existing LANXESS South Plant infrastructure, specifically the brine handling system as generally shown on Figure 18-1. Supporting services including power, natural gas, and water is readily available at the Project Site.

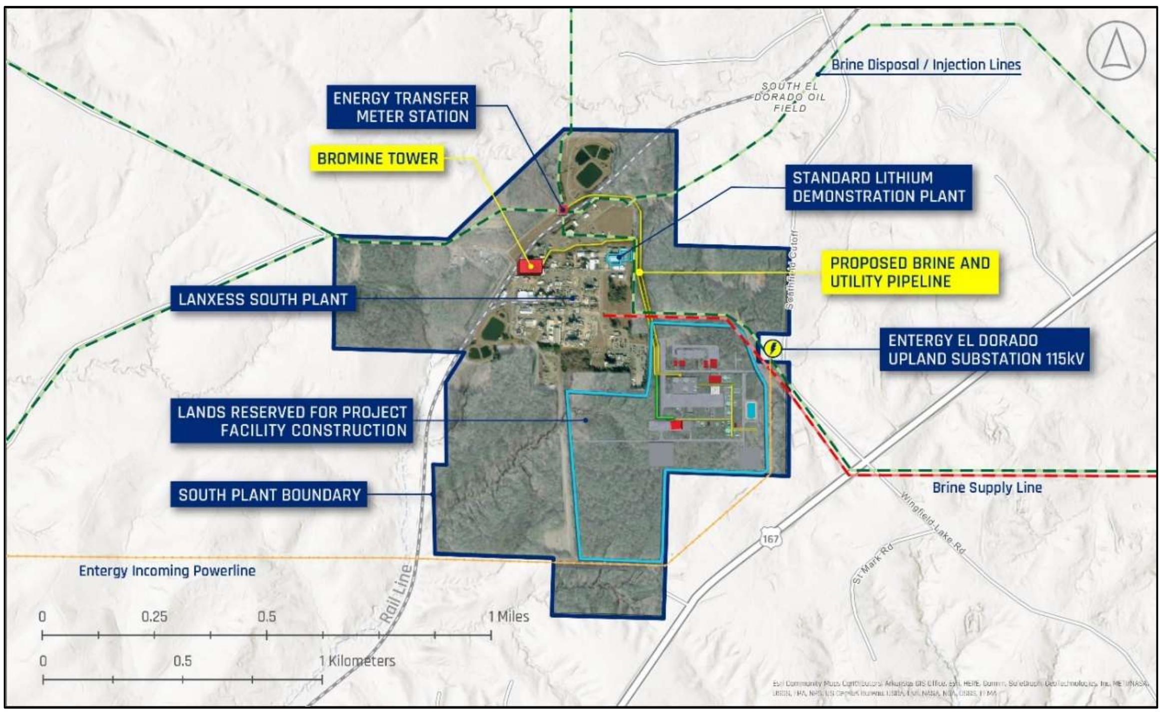


Figure 18-1. Proposed Project Facility Location

The infrastructure associated with the Project includes:

- Brine Supply and Return Pipelines;
- Processing Plant;
- Non-process Buildings; and
- Supporting Infrastructure.

Under the terms of the commercial agreements, LANXESS is responsible for construction of certain improvements (LANXESS Constructed Improvements) to the existing LANXESS Tail Brine system to facilitate the delivery of Feed Brine to the Project. This is further discussed in Section 18.6.

Figure 18-2 provides a general overview of the Project infrastructure.

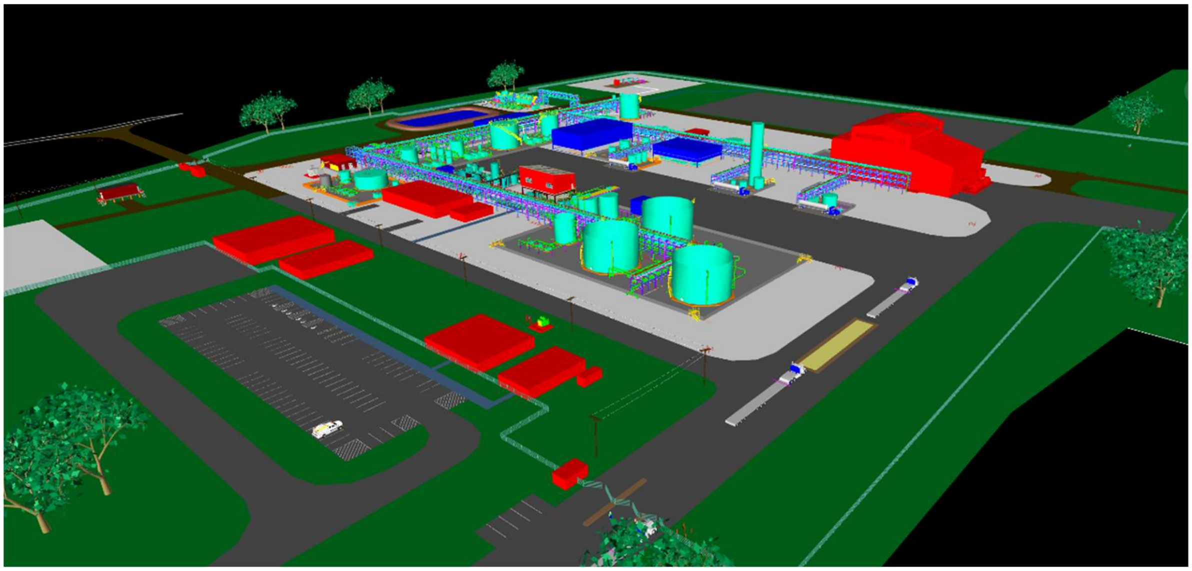


Figure 18-2. Project Site Overview

18.1.1 GEOTECHNICAL

A geotechnical field program and engineering study was completed in March 2023 to assess the suitability of the proposed Project Site for the proposed development. The field program included soil boring, test pitting and soil sampling to characterize ground conditions and confirm groundwater levels, with the objective of identifying any material ground risks, and to input into the design of the Project.

The field program confirmed the expected soil stratigraphy at the Project Site, determined to consist of highly variable layers of clay, silt, and sandy soils. Typically, the upper soils are more cohesive in content and become sandier with depth. The lower sand soils appear laminated and cross-bedded, with variable lenses of clay transitioning into in clayey sand soils. Groundwater was typically observed between a depth of 7m to 16m below the existing ground surface.

The study provided preliminary geotechnical recommendations for the earthworks, foundations, and pavements and to address seismic conditions. These recommendations are considered in the design of the Project Facility. Overall, the study concluded that the site is suitable for the proposed development and conventional foundation and construction techniques used in the area can be applied without the need for ground improvements.

18.2 BRINE SUPPLY AND RETURN

Brine will be delivered to and from the Project Facility via pipeline. Two operating and one standby centrifugal pumps with variable frequency drives located at the South Plant will be constructed to transfer Feed Brine to the Project Facility via a 1 km long, 300 mm (12 inch) fiberglass pipeline. A parallel 300 mm fiberglass pipeline will transfer Effluent Brine from the Project Facility back to the South Plant.

The pipelines will be surface run within the fence line of the South Plant and buried outside. A horizontal direction drill (HDD) will be used to route the supply and return pipelines to pass under the existing LANXESS pipelines, utilities and main South Plant access road. Figure 18-3 shows the pipeline routing.

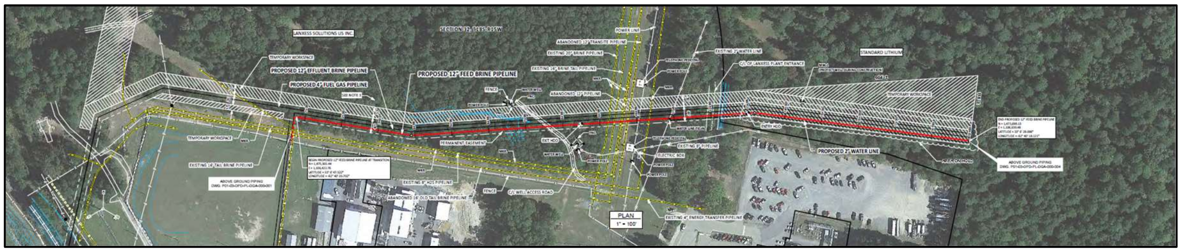


Figure 18-3. Brine Supply and Return Pipelines

Metering and sampling equipment will be installed by the Project on the brine supply and return pipelines to continuously monitor the volume and quality of brine received and discharged by the Project.

18.3 PROCESSING PLANT

The processing plant encompasses brine pre-treatment, lithium selective sorption, effluent brine, softening, ion exchange, lithium chloride concentration, and lithium carbonate production and drying, milling, and packaging. Figure 18-4 provides a layout of the Project Facility.

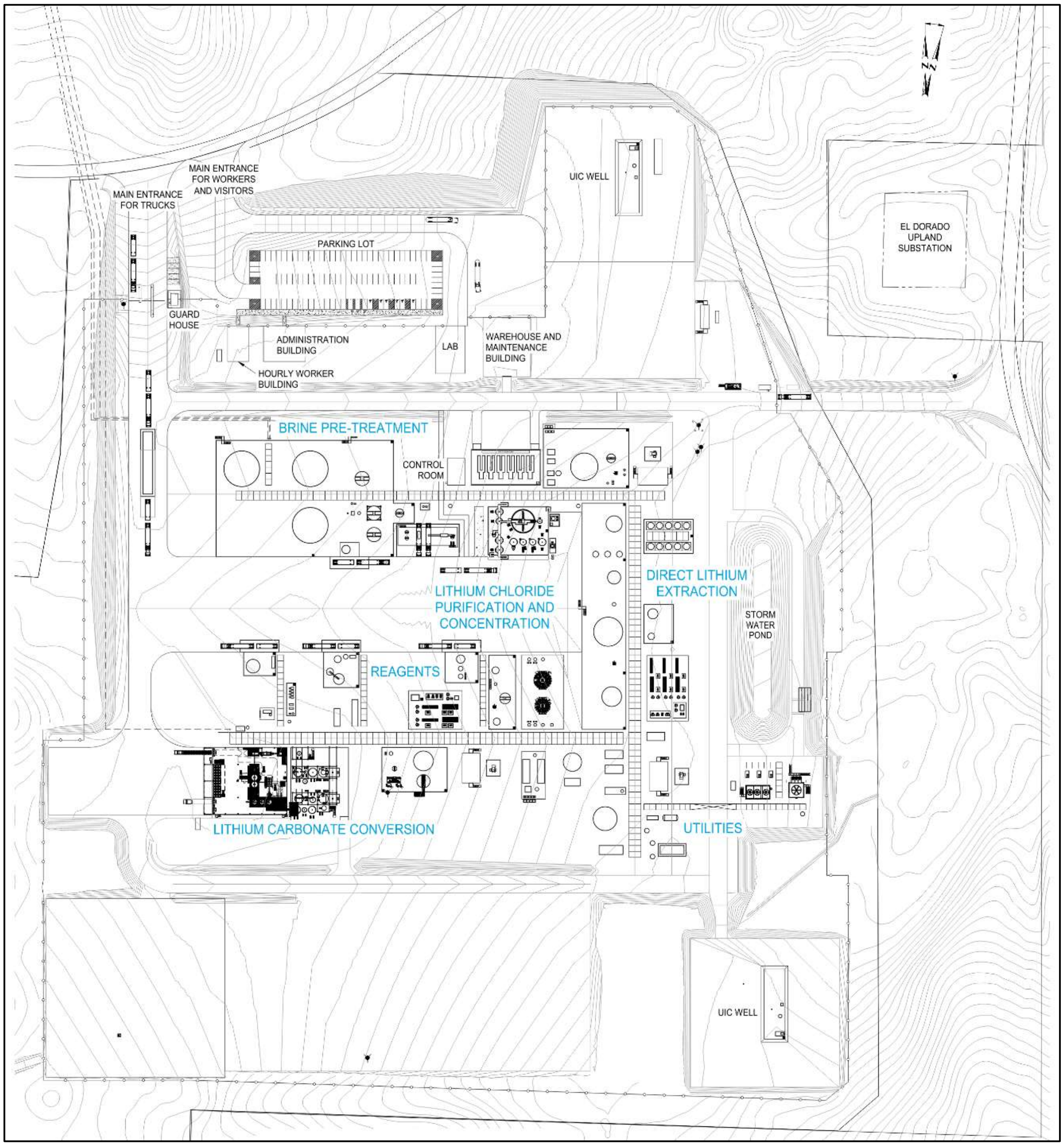


Figure 18-4. Project Facility Layout

18.3.1 BRINE PRE-TREATMENT

Feed Brine received from the brine supply pipeline must be chemically treated and conditioned prior to the direct lithium extraction process. Major equipment required to support Pre-Treatment includes:

- Softening recycle tank with agitator;
- Neutralization tank with agitator;
- Two Feed Brine storage tanks;
- A storage swing tank that can be used either to store Feed Brine or Effluent Brine;
- Two heat exchangers;

- UF membrane filter package; and
- Membrane backflush filter press.

The two Feed Brine storage tanks provide the ability to store up to eight (8) hours of brine production from LANXESS at the design capacity of 680 m^3/hr. This allows the Project to continue to receive brine from LANXESS in the event of a downstream process interruption, or to continue running the downstream process in the event of an upstream interruption. The brine storage swing tank provides additional operational flexibility for additional Feed Brine or Effluent Brine storage as may be required.

18.3.2 LITHIUM SELECTIVE SORPTION (LSS)

The LSS package is a proprietary technology for direct lithium extraction. It includes multiple trains of columns filled with resin to load and elute lithium from the brine. Provisions for the inspection and efficient replacement of resin will be included.

18.3.3 SOFTENING

The softening circuit removes calcium and magnesium from the lithium chloride and recycles the softening sludge to pre-treatment for Feed Brine neutralization. The major equipment required for softening includes:

- Flash tank with agitator;
- Reactor tanks with agitators;
- Clarifier;
- Media Polishing Filter;
- Softened Brine storage;
- Filter press;
- Softened Sludge repulp and recycle.

18.3.4 ION EXCHANGE

There will be two continuous ion exchange systems used to reduce impurities to acceptable levels for lithium carbonate production. The first system uses a chelating resin to target calcium and magnesium removal. The second system targets boron. A series of columns will be mounted on a rotating carousel. Each carousel is anticipated to include 30 columns.

18.3.5 LITHIUM CHLORIDE CONCENTRATION

There are two RO packages (BWRO and OARO) used to concentrate the lithium chloride to acceptable levels for lithium carbonate production. Both packages use cartridge filters, high pressure pumps, and RO membranes to increase concentration through desalination.

18.3.6 LITHIUM CARBONATE PRODUCTION

The lithium carbonate plant receives polished and concentrated lithium chloride to produce battery-quality lithium carbonate. The major equipment includes:

- Lithium chloride storage tank;

- First stage crystallizer;
- First stage centrifuge;
- Lithium bicarbonate reactor;
- Secondary calcium ion exchange system;
- Second stage crystallizer; and
- Second stage centrifuge.

The lithium chloride storage tank provides the ability to store up to 24 hours of lithium chloride to feed the lithium carbonate plant at the design capacity of approximately 30 m^3/hr. This allows the project to continue producing lithium chloride in the event of a downstream process interruption, or to continue producing lithium carbonate in the event of an upstream process interruption.

18.3.7 DRYING, MILLING, AND PACKAGING

Drying, milling, and packaging of the lithium carbonate product will take place in a secure building. The lithium carbonate is stored in three shift bins. The product is then conveyed to the bagging system which loads the product into 500 kg or 1,000 kg bulk bags ready for delivery by truck. The building includes space to store the equivalent of three days of production of finished bagged lithium carbonate.

18.3.8 EFFLUENT BRINE

Lithium-depleted brine received from LSS is collected, along with other effluent brine streams as is collectively conditioned to ensure quality requirement for discharge are met prior to return to the South Plant or reinjection into UIC wells. Major equipment required to support effluent brine handling includes:

- Neutralization tank;
- Brine cooling tower; and
- Effluent Brine storage tank.

The Effluent Brine storage tank provides the ability to store 4 hours of effluent brine at the design capacity of 680 m^3/hr. This allows the Project to continue to process brine in the event of a downstream process interruption at LANXESS. If additional storage is required, the swing tank from Brine Pre-Treatment can be used for Effluent Brine.

18.3.9 PROCESS CONTROL & INSTRUMENTATION SYSTEMS

The Project facility will have a Process Control System (PCS) within a prefabricated and equipped Central Control Room (CCR). It will be a single-story building located within the processing plant. The system will be equipped with an onsite radio and communication system to provide access to the internet and telephones. In addition, the control room building will have main operator consoles, conference area, restrooms, and small kitchen area.

Controls will be implemented using a Distributed Control System (DCS) with remote I/O (RIO) panels placed throughout the facility. Placement of the panels will be defined by I/O count in the area and location of vendor control panels to minimize communication runs. Vendor PLC control panels will be integrated into the DCS controller. DCS area controllers will remain inside the area Power Distribution Centers (PDC) buildings.

The main operator interface will be via operator consoles in the new CCR. The operator consoles will show the graphic displays depicting the process units. Vendor control panels will be integrated into the DCS controller. The control system will employ redundant processors to provide a high level of reliability and uptime.

Control room design will have a separate and secure data/server room which will house the control system servers, HMI servers, data historian, cyber-security, firewall, and other network equipment.

18.4 NON-PROCESS BUILDINGS

Non-process buildings include an administration building, hourly workers building, warehouse, maintenance shop, onsite laboratory, and guardhouse.

The administration and hourly workers buildings will be constructed to accommodate the approximately 90 people anticipated to be required to support operations. The administration building will include offices, a conference room, break room, and restroom facilities. The hourly workers building will include male and female locker rooms, restrooms, and a break room designed for 40 people. The number of staff and visitor parking stalls to be provided is 100 and will include EV changing facilities. The administration building will be accessible to guests and visitors from outside the process facilities.

A combined maintenance shop and warehouse facility will also be constructed in the non-process building area. It will be a well-ventilated (non-climate controlled) steel clad building with concrete flooring. The maintenance shop will include a tool crib, welding area, shop area and three climate-controlled offices. The warehouse will include a receiving dock for deliveries with direct access from outside of the process plant, one climate-controlled office, and parts storage including conditioned storage areas.

An on-site laboratory is provided to support the production of battery quality lithium carbonate as well as real-time assessment of process production conditions to ensure reliable continuous operation of the facility. The laboratory will be a modular facility that will be constructed next to the warehouse and shops.

A guard house will be provided at the plant entrance to control point entry and exit to the process facilities. The guard house will be a permanent stick built or pre-engineered modular facility. It will include workstations, a briefing room, restroom(s), and IT room.

To address the risk of extreme weather, specifically tornadoes, severe weather shelters will be incorporated into facility structures, such as the control room, or addressed using stand-alone pre-engineered structures designed to FEMA standards to protect on-site personnel.

18.5 SUPPORT SERVICES

18.5.1 TRANSPORTATION

The Project is based on the transportation of all products, byproducts, reagents, materials, and equipment by truck to and from the Project Facility.

18.5.2 REAGENTS

The primary reagents required for the operation of the Project Facility received by truck will be stored locally on site in permanent storage systems with sufficient inventory for reliable operation of the Project Facility.

Hydrochloric acid will be stored in a common tank and distributed to local day tanks to support the various unity operations. Caustic soda will be stored in a single tank and diluted with RO water for use. Soda ash will be delivered in bulk and stored dry in a storage bin. Citric Acid for membrane CIP will be bulk delivered and stored in a tank. Lime will be received in bulk bags.

18.5.3 UTILITIES

18.5.3.1 NATURAL GAS

The supply of natural gas to the facility will be provided by Energy Transfer. There is an existing 150 mm [6 inch] pipeline nearby with sufficient capacity to serve the Project. The pipeline tie-in will be located to the north of the South Plant. Energy Transfer will construct a metering station at the tie-in location. From the meter station, a 100 mm [4 inch] natural gas pipeline approximately 1 km long, running parallel to the brine supply and return lines, will be installed by the Project to deliver gas to the Project facility. Similar to the brine pipelines, HDD will be used to allow the supply and return pipelines to pass under the existing LANXESS pipelines, utilities, and main South Plant access road as well as to pass under the existing the right-of-way for the Ouachita Railroad on the north side of the South Plant.

18.5.3.2 ELECTRICAL POWER

A dedicated and independent power supply will be provided for the Project Facility by Entergy, the current provider of electrical power the LANXESS South Plant, from Entergy's 115kV El Dorado Upland Substation which is located immediately to the east of the Project Facility. The existing 13.8 kV distribution bus in the Entergy substation will be extended, and two new feeder bays and breakers will be installed by Entergy. Entergy will provide a metering pole at the boundary of the substation which will the electrical tie-in point for the Project. 13.8kV overhead lines will be installed by the Project between the Project Lease Area and Meter Pole tie-in location. The 13.8kV overhead lines will tie into the power distribution center (PDC) feeding the process facilities as well as supply power to pole mounted utility transformers feeding the non-process buildings. From the 13.8kV PDC, underground distribution will feed three local motor control center (MCC) buildings located strategically around the process plant. The MCC buildings will house the required switchgear, motor control centers and lighting panels. MCC's will be smart type and the communication to the control system will be via ethernet over fiber optic cable.

18.5.3.3 WATER SUPPLY

Two new water wells will be installed and operated by the Project, one at the northeast corner and one on the southwest corner of the Project Facility. Each well, capable of supplying up to 160 m^3/hr of water, will be used to support process water requirements, fire protection, or chlorinated on site for other domestic uses. A process water tank will provide buffer storage for the facility prior to distribution.

A 50 mm [2 inch] potable water line from the South Plant will provide an alternative source of chlorinated water for the Project Facility. The chlorinated water line from the South Plant will follow the same general routing as the brine and natural gas pipelines from South Plant and provide water at a rate of up to 11 m^3/hour [50 US gpm]. Chlorinated water will be used for potable water needs including safety showers, eye wash stations, faucets, toilets, and showers.

A Reserve Osmosis (RO) package will be installed to supply RO water for boiler feed, seal water, CIP systems, reagent dilution, and for other process uses. An additional water chiller will provide chilled process water to support the production of lithium carbonate.

18.5.3.4 STEAM & CONDENSATE

A natural gas fired boiler will be installed to supply low pressure steam for processing and other ancillary heating requirements. A condensate return system will be included to recycle condensate to the boiler.

18.5.3.5 COMPRESSED AIR

A centralized compressed air system is provided to support both process air and instrument air requirements.

18.5.3.6 SEWAGE TREATMENT

A small vendor supplied packaged wastewater treatment plant will be installed for treatment of domestic sewage prior to surface discharge.

18.5.4 FIRE PROTECTION

A fire protection system will be provided including fire detection in buildings and a fire water distribution piping and hydrant network. As there is no municipal fire water system in the Project Facility, fire water will be stored locally on site to support the plant fire water system. Local fire water pumps will be provided and installed in accordance with National Fire Protection Association (NFPA) requirements.

18.5.5 STORMWATER MANAGEMENT

The collection and disposal of stormwater on site will be managed in accordance with a comprehensive stormwater management plan which addresses both construction and operation of the Project Facility. Surface water will generally be directed via ditches and culverts, utilizing natural grade on the site, towards a sedimentation pond (which removes suspended solids) to be constructed along the east side of the site. Where process containment areas are constructed, stormwater collected within the containment areas will first be tested prior to discharge and once deemed safe for discharge, directed to the site sedimentation pond. The sedimentation pond will discharge to the east of the site, into the existing drainage which currently receives surface runoff for the undisturbed site.

18.5.6 UIC DISPOSAL WELLS

To support management of reservoir pressures in the Smackover Formation and minimize surface waste streams, the Project has committed to the safe disposing of any excess effluent brine and other process wastewater streams into the Hosston Formation using two redundant Class I Non-Hazardous UIC wells. Each well will be permitted to dispose of up to 70 m^3/hr of brine or wastewater on an individual basis or up to a maximum of 100 m^3/hr on a combined basis.

18.5.7 SECURITY

A perimeter fence will enclose the Project Facility with a minimum setback from the property boundary, providing a visual barrier into the facility. CCTV monitoring systems will be installed throughout the facility and monitored by site security personnel on a 24-hour, 7-days-per-week basis.

Truck and vehicle access to process areas of the facility will generally be restricted to essential activities and controlled by security personnel at the main gate house. The secondary construction access gate, provided for construction and future maintenance activities, will be located on the east side of the facility and will be either locally or remotely monitored.

Visitor access will be provided through the administration building. Deliveries will be received directly at the Warehouse from outside the process plant to limit non-essential personnel and vehicles inside the process plant.

Secondary security restrictions and access control within the process facility will be provided to protect personnel and visitors and restrict unnecessary access to critical process areas.

18.5.8 TELECOMMUNICATIONS

The plant telecommunications system consists of a private high speed fiber optic internet service, a cloud-based PBX phone system, a plant wireless system, VHF/UHF radios, a business LAN/WAN, and a process control LAN.

18.5.8.1 MAIN INTERNET SERVICE

A private high speed fiber optic internet service is provided and continually monitored by the local internet provider to ensure high availability of internet service to support cloud-based business and process applications. Critical business and process applications are hosted from local servers within the plant.

18.5.8.2 CLOUD BASED PBX PHONE SYSTEM

The PBX phone system is proposed to be hosted in the cloud by a local telephone company.

18.5.8.3 PLANT WIRELESS SYSTEM

A plant wireless system is provided for a cohesive wireless communication platform across the physical and functional areas of the plant operations, enabling the wireless network to support diverse applications such as connected worker and industrial internet of things (IIoT).

18.5.8.4 VHF/UHF RADIO SYSTEM

Handheld VHF/UHF radios are provided to plant operations and maintenance personnel as the main source of communications for managing day-to-day activities. The control room will be provided with a VHF/UHF base station with an antenna to provide good radio coverage over the entire plant.

18.5.8.5 BUSINESS LAN/WAN

The business network consists of the hardware and software infrastructure that connects the plant's business computers, servers, and other devices, providing employees with a connection to shared resources and access to internal and external applications.

The LAN infrastructure supports the connection to the plant's local applications such as the card access system, the phone system, and the CCTV cameras. The cloud infrastructure supports the connection to cloud hosted applications, such as the Corporate ERP, lab information system, and maintenance management systems.

The main internet service terminates in the business server room located in the administration building. The server room incorporates redundant servers to host local business applications. On a power supply, hard drive or CPU failure, the redundant servers allow the business systems to run uninterrupted on the backup server. On a plant power outage, the server room UPSs provide power to the redundant servers and other critical networking equipment for a period of time, to allow for the operation and controlled shutdown of the systems. The business applications run in virtualized containers on the server to allow for easier administration and upgrades of the software. Daily backups of the business applications are automatically stored offsite in cloud storage. A disaster recovery procedure ensures quick recovery of the business systems in the event of a catastrophic failure.

The business network will be distributed throughout the plant via remote network cabinets installed in other buildings and in the field. Each network cabinet will house managed network switches used to connect business end devices such as desktop computers, printers, CCTV cameras, desktop phones, wireless ethernet access points, card access readers, and truck scale operator panels. The managed network switches use virtual Lans (VLANs) to separate the business network traffic to allow the traffic to be optimized based on the application.

The enterprise network security is designed and implemented using best practice standard ISO/IEC 27001 Information Security, Cybersecurity and Privacy Protection.

18.5.8.6 PROCESS CONTROL LAN

The process control LAN consists of the hardware and software system used to control and monitor the process equipment running within the plant. The process control LAN provides the communication link between control equipment such as DCS controllers, remote IO junction boxes, motor starters, VFDs, process analyzers, operator consoles, data historians, and alarm management systems.

For security of process control equipment, the process LAN is physically isolated from the business LAN. The process control LAN is designed and implemented using best practice standards ISA/IEC62443 Security for Industrial Automation and ISA95 Enterprise Control System Integration.

18.6 LANXESS CONSTRUCTED IMPROVEMENTS

The purpose of the LANXESS constructed improvements is to support the supply and disposal of Feed Brine to and from the Standard Lithium facility. The scope and schedule for LANXESS Constructed Improvements is addressed in the SARL Agreement and will be further defined in the definitive Brine Agreement between LANXESS and the Project Company.

It is currently proposed that LANXESS will construct four (4) new buffering and mixing tanks downstream of their bromine tower Tail Brine surge tank to facilitate improved chemical conditioning of the Feed Brine to ensure the brine meets the required quality conditions prior to delivery to the Project. These agitated tanks will have the ability to receive both bromine-depleted brine, which has been processed through the LANXESS bromine tower, and bromine-rich brine, which bypasses the bromine extraction facility. The Project is designed to extract lithium from both bromine-depleted or bromine-rich Feed Brine. The Project will construct the pipelines and pumps from the outlet flange of the new LANXESS constructed tanks required to deliver the Feed Brine to the Project Facility.

Following lithium extraction, the Project will pump the lithium-depleted brine back to the bromine processing area where it will be discharged into a new LANXESS-constructed effluent brine tank to facilitate gravity discharge into the existing LANXESS Tail Brine and disposal system for reinjection back into the Smackover Formation. The Project will be responsible for delivering the lithium-depleted brine to the inlet flange of the new LANXESS constructed effluent brine tank.

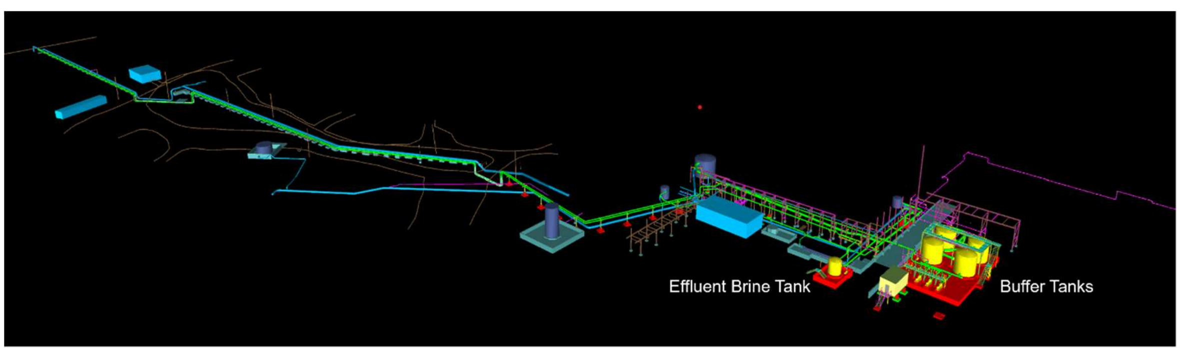


Figure 18-5. Project Brine Pipeline Network

19.0 MARKET STUDIES AND CONTRACTS

19.1 THE LITHIUM MARKET

The lithium market is in a period of transformation because of the supply and demand response from a global demand in 2010 of less than 100k metric tons (Mt) of lithium carbonate equivalents (LCEs) to a demand in 2020 of more than 300k Mt LCE. Battery-related use accounts for approximately 60 percent of the market, driven in part by the growing demand for electric transportation, predominantly electric vehicles (EVs).

By 2030, demand may exceed 3,000k Mt with more than 90 percent of use related to lithium-ion batteries in electric transportation and energy storage. Considering the time it takes for greenfield lithium projects to be developed and come into production, the demand will likely outstrip supply for the remainder of the decade.

The consulting company McKinsey & Company forecasts lithium-ion battery cell demand to grow from 700 gigawatt hours (GWH) in 2022 to 4,700 GWH in 2030, as shown in Figure 19-1. Each terawatt hour (1,000 GWH) requires a minimum of 800k Mt of LCE.

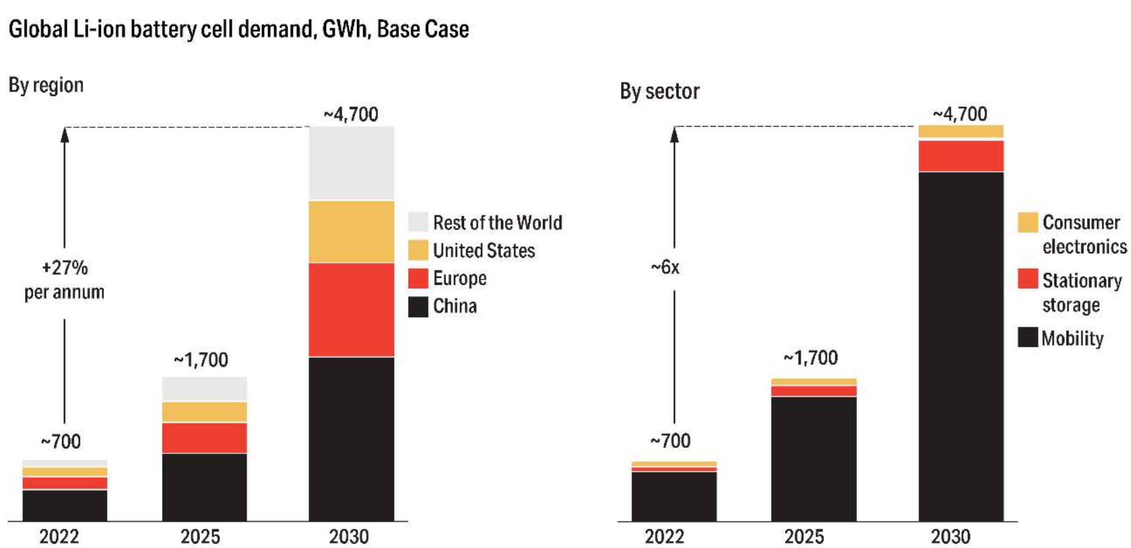


Figure 19-1. Global Lithium-Ion Battery Cell Demand, GWh, Base (after McKinsey & Company 2023).

The world's largest lithium producer, Albemarle, forecasts a similar demand pattern for LCE growth shown in Figure 19-2. The lithium use aligns well with the forecast in Figure 19-1.

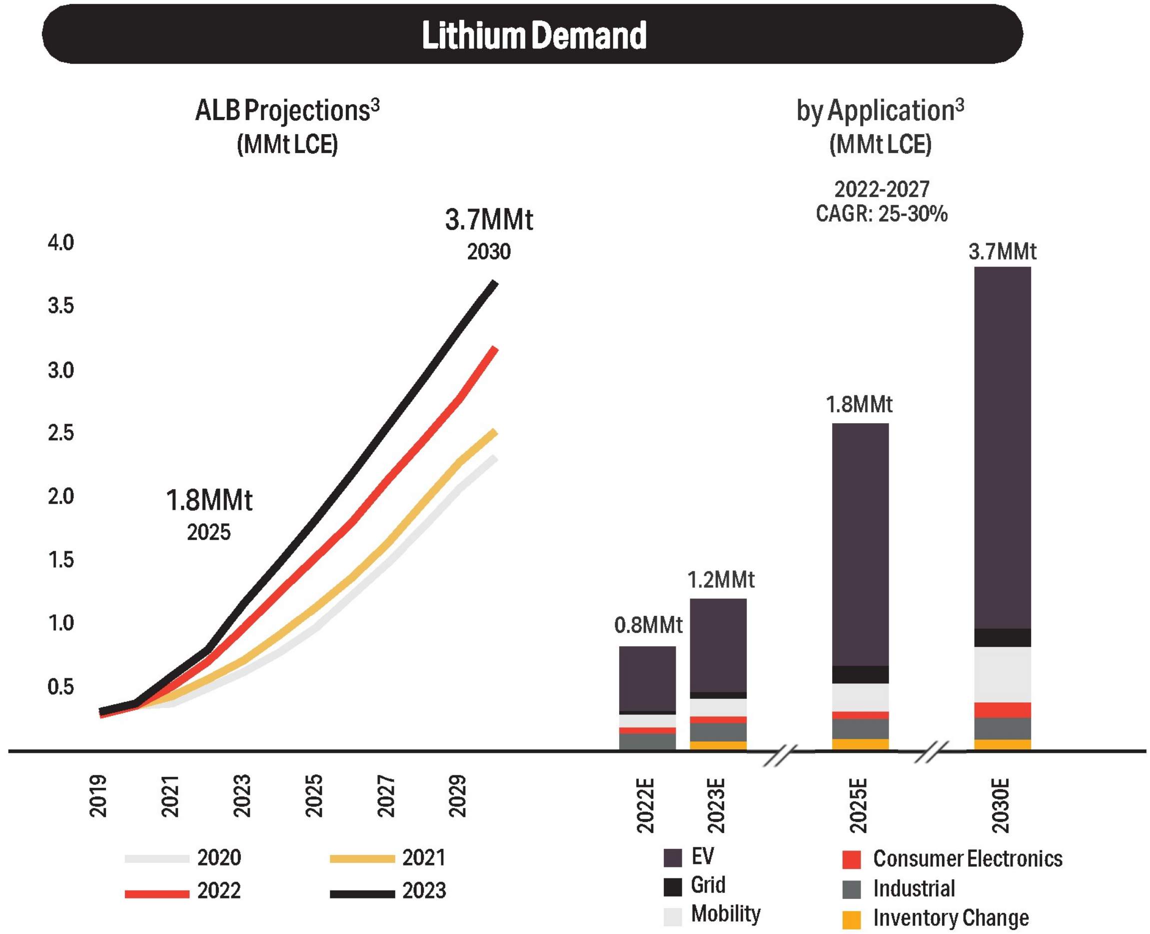


Figure 19-2. Forecasted Lithium Demand (Albemarle, 2023)

Asia is expected to remain the largest market for lithium chemicals for the remainder of the decade. China currently has 70 percent of lithium-ion battery cell production capacity and will remain the largest single market for EVs into the next decade. Korea and Japan are also significant battery producers.

North America is expected to become the second-largest market for lithium chemicals by the end of the decade. U.S. legislation has taken several steps to support growth of the domestic electric vehicle (EV) market and a North American battery supply chain.

The American Jobs Plan proposed $174 billion of investments to support development of the U.S. EV market by doing the following:

- Providing tax credits for EVs worth up to $7,500 for a new EV and $3,750 for a used EV
- Expanding access to charging stations with a goal of installing 500,000 new EV chargers by 2030
- Setting an ambitious goal of 50 percent of U.S. automobile sales being EVs by 2030

The European Union is supporting the growth of lithium-ion batteries through their "Green Deal" with a stated objective of making Europe the first carbon neutral continent by 2050.

Lithium-ion batteries are anticipated to play a central role in the global energy transition. Ensuring adequate supply of lithium chemicals to support the growth of batter demand is becoming a global concern. The Project is well positioned to support the growth in demand for lithium chemicals in North America and other world markets.

19.2 LITHIUM SUPPLY AND DEMAND

The supply of lithium chemicals is expected to remain constrained for this decade and perhaps longer with demand outpacing supply. Lithium for use in batteries remains a specialty chemical rather than a commodity because of the raw material specifications required for EV batteries.

Advisory firm Global Lithium LLC's supply and demand forecast is shown in Figure 19-3. It is more conservative than demand shown in Figure 19-2, predicting a 2030 demand of approximately 3,000k Mt LCE versus Albemarle's forecast of 3,700k Mt. Although the supply line appears in relative balance with demand in some years, consumers may have difficulty sourcing qualified product in adequate volumes maintaining upward price pressure.

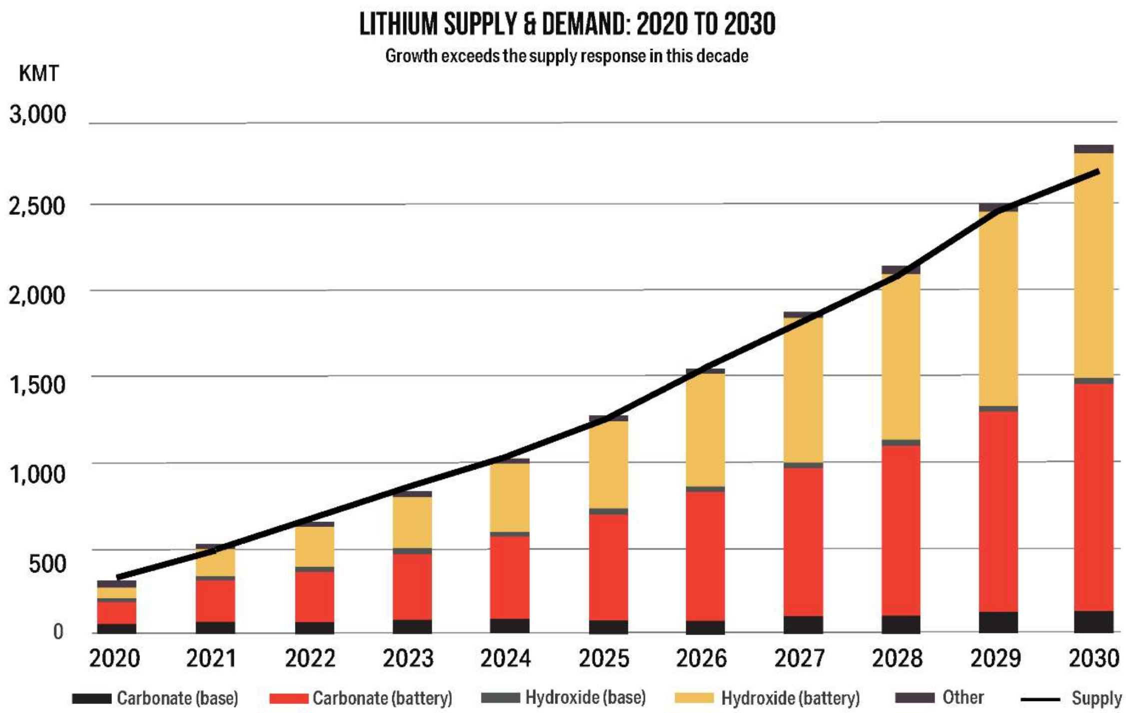


Figure 19-3. Lithium Supply and Demand Forecast (McKinsey & Company, 2023)

The two fastest growing lithium chemicals sectors are expected to be battery quality lithium hydroxide (lithium hydroxide monohydrate) and lithium carbonate. Types of resources that provide a source of lithium include hard rock (spodumene), brines and clay deposits. Lithium chemical supply from recycling is not anticipated to be a significant source at this time.

Lithium hydroxide is primarily used in longer range EV batteries requiring high nickel content while lithium carbonate is favored in lower capacity, less expensive EV batteries, electric buses, and energy storage systems. Figure 19-3 shows a relatively even balance of lithium carbonate and lithium hydroxide demand by 2030.

Lithium carbonate produced from brine sources is almost universally lower cost than the output from hard rock assets, giving brine-based sources a competitive advantage if market conditions move to an oversupply situation.

Currently, Western Australia is the largest global source of lithium supplying more than 40 percent of the total in 2022, mostly in the form of spodumene concentrate converted in China to lithium chemicals. Over the next several years, Australia is expected to convert significant volumes of their spodumene into lithium chemicals, causing China to seek feedstock elsewhere.

Chile is the second largest lithium producer, supplying approximately 30 percent of LCEs globally in 2022. China is the largest producer of lithium chemicals globally, sourced from imported feedstock.

19.3 LITHIUM CARBONATE PRICE

Since 2021, the price of lithium has shown volatility from lows of $10,000 USD/tonne to a peak of $70,000 USD/tonne. The global average price from 2016 to early 2023 by month is shown in Figure 19-4. Several hard rock mines in Western Australia came online in 2018 and 2019, leading to a temporary oversupply situation and causing the price to fall below $5,000 USD/tonne. In late 2020, EV growth in China and Europe shifted the market back to a shortage situation.

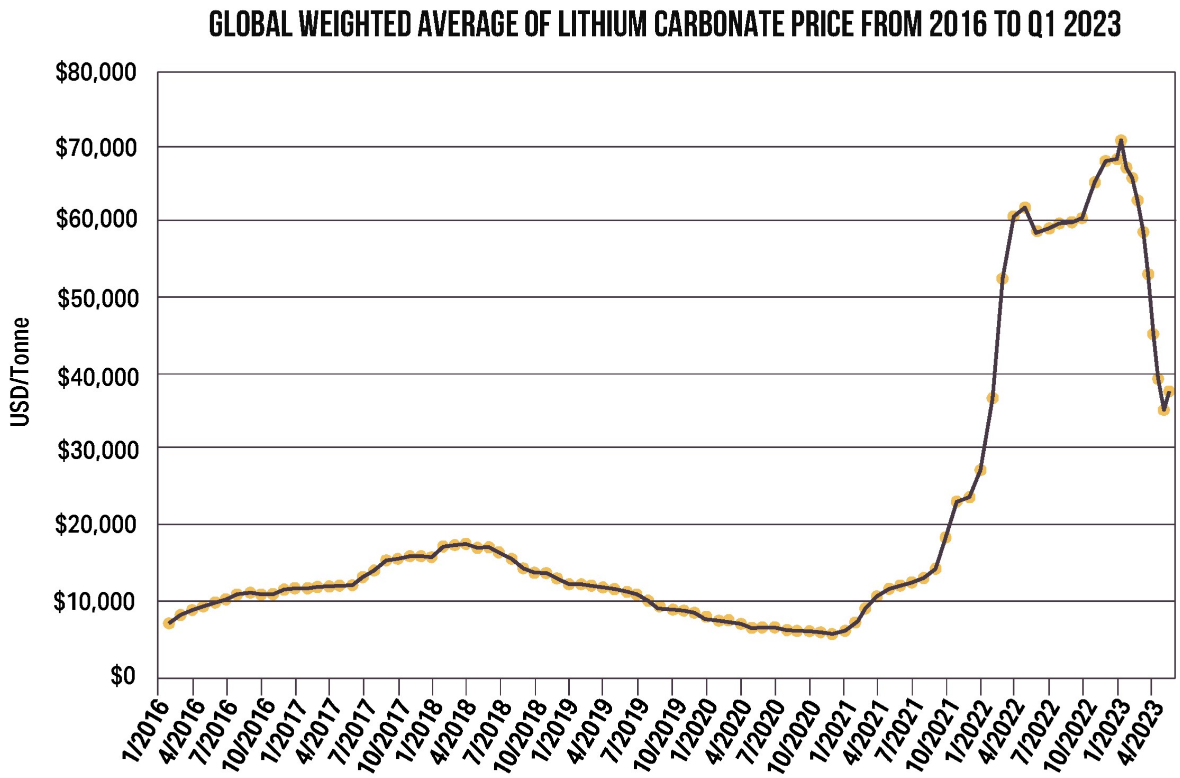
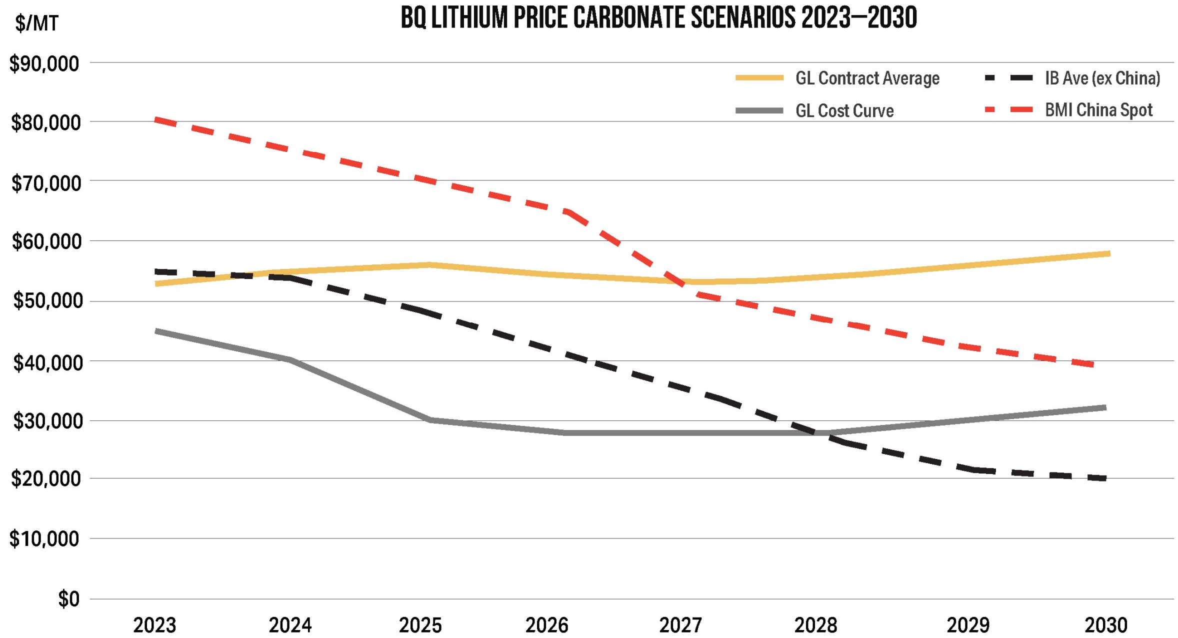


Figure 19-4. Global Weighted Average Lithium Carbonate Price From 2016 to Q1 2023 (source, https://tradingeconomics.com/commodity/lithium)

Global Lithium LLC estimates that average large-contract pricing will remain between $50,000 and $60,000 USD/tonne through 2030 based on the assumption that demand will exceed battery quality supply until at least the early 2030s. The price forecast in Figure 19-5 shows multiple price scenarios, including an average of the price forecasts of three major investment banks, the projection of China spot price by Benchmark Mineral Intelligence, with pricing considerations in an oversupply situation and the price if the high-cost facility production was curtailed.

For purposes of estimating new project future cash flows, Global Lithium LLC recommended a conservative approach using the forecast high end of the cost curve. Although Global Lithium LLC forecasts global pricing well above the grey line in Figure 19-5, using a conservative price is recommended in case of unforeseen market circumstances. From 2031 to 2036, Global Lithium recommended using a price of $30,000 USD/tonne for economic evaluations.



Notes:
[1] Contract Average is the ex-China average price per Global Lithium LLC estimates
[2] Cost Curve reflects the China hard rock converter cost
[3] IB Average is the ex-China price average from three major investment banks
[4] China spot price

Figure 19-5. Battery Quality Lithium Price Carbonate Scenarios 2023-2030

19.4 LANXESS MEMORANDUM OF UNDERSTANDING AND OFFTAKE OPTION

Under the terms of an Amended and Restated MOU, dated February 23, 2022, between Standard Lithium and LANXESS Corporation, LANXESS was given the right to purchase and take from the Project up to 100% of the product.

In the event LANXESS desires to exercise this right, the parties are obligated to reasonably and in good faith negotiate the terms and conditions a definitive offtake agreement and use commercially reasonable efforts to cause the execution and delivery of such agreement by a date set forth in the MOU.

In the event LANXESS participates as an equity investor in the Project and is entitled to customary dividend, distribution or similar rights, the price under such offtake agreement for the market price less a handling fee. In the event that LANXESS does not participate as an equity investor in the Project or shall not enjoy customary dividend, distribution or similar rights, the price under such offtake agreement is established at the market price minus a discount up to 20%.

20.0 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

20.1 ENVIRONMENTAL REGULATORY SETTING

The Project Facility is situated in southern Union County, Arkansas, adjacent to developed chemical manufacturing facilities operated by LANXESS and The Chemours Company. The site is in a rural unincorporated area of Union County and not subject to local planning or zoning restrictions or any local permitting authority.

The environmental regulatory programs applicable to the Project Facility are administered by the U.S. Army Corps of Engineers (USACE), the Arkansas Department of Energy & Environment, and the Arkansas Department of Health (ADH). Those agencies have been delegated authority from the U.S. Environmental Protection Agency (EPA) for permits and approvals required for operation of the Project.

The Project Facility relies on the existing brine supply and disposal infrastructure associated with the LANXESS South Plant. After extraction of lithium from the brine, the majority of the lithium depleted brine will be returned to LANXESS for reinjection into the Smackover using the existing network of brine disposal pipelines and injection wells. Any excess volumes of lithium depleted brine will be managed and disposed of by Standard Lithium through two new injection wells to be permitted and constructed specifically for the Project.

No amendment to the existing LANXESS brine supply and disposal permits issued by the ADEE-AOGC are anticipated as a result of the Project. An amendment to the existing LANXESS ADEE-DEQ No Discharge Permit associated with the existing brine disposal surface infrastructure is required. Amendment of permits issued to LANXESS remains the responsibility of LANXESS as the permit holder. Excess brine, byproducts, wastes, and emissions not transferred to LANXESS will be addressed through permits issued directly for the Project as described below.

20.2 PERMITS AND AUTHORITIES

The Project has been evaluated to determine the specific permits necessary to construct and operate the facility and supporting infrastructure. Based on the evaluations completed to date, the Project is not subject to review under the National Environmental Policy Act (NEPA). Construction and operational emissions to air, surface waters, and subsurface waters are regulated by the federal and state agencies to protect the environment while allowing responsible development of the lithium resources.

Standard Lithium has initiated early consultation with permitting agencies for the construction and operation of the Project. A Baseline Environmental Site Assessment has been conducted as well as investigations of jurisdictional waters of the U. S., wildlife studies, and cultural resources of the Project, as discussed in Sections 20.6, 20.7 and 20.8, respectively.

20.2.1 FEDERAL

Federal agency permitting required for the Project is limited to authorization from the USACE Vicksburg District for placement of dredged or fill material into waters of the U.S., including wetlands. Section 404 permits refer to that division of the Clean Water Act (CWA) to protect wetlands and jurisdictional waters of the U.S.

The area of development associated with the Project Facility has been assessed to identify jurisdictional waters of the U.S. The area designated for development will impact jurisdictional waters and a Nationwide Permit (NWP-39) will be required for construction of the Project Facility.

20.2.2 STATE OF ARKANSAS

The EPA has delegated responsibility for most of the regulatory programs under its jurisdiction to the Arkansas Department of Energy & Environment, Division of Environmental Quality (ADEE-DEQ) including programs under the CWA; Clean Air Act (CAA); Resource Conservation and Recovery Act (RCRA); Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); Underground Injection Control (UIC); and the Superfund Amendments and Reauthorization Act (SARA). Additionally, the Arkansas Department of Energy & Environment, Oil and Gas Commission (ADEE-AOGC) is the permitting authority for construction of drilling fluid temporary holding basins associated with drilling of the UIC injection well permits.

The ADEE-DEQ has primacy in issuing relevant environmental permits for the construction and operation of the proposed lithium extraction facility. Ancillary activities to support the manufacturing operations, specifically development of a non-transient non-community public water supply is authorized by a permit issued by the ADH. The list of identified permits necessary and the respective issuing agency is provided in Table 20-1.

20.3 CONSTRUCTION AND/OR OPERATION PERMITS

New permits required to accommodate the Project Facility are provided in Table 20-1. A brief discussion of each approval required for construction and/or operation is provided below.

Table 20-1. Permits for Project

Agency	Permitted Activity	Expected Permit Issuance Time
USACE	Placement of fill in waters of the U.S.	6 months
ADEE-DEQ	Air Permit for Commercial Facility	9 months
ADH	Fresh Water Supply for Potable Water	9 months
ADEE-DEQ	Construction Storm Water NPDES Permit for Facility Construction Site	1 month
ADEE-DEQ	Surface Discharge of Non-Brine Process Wastewater, Non-contact Cooling Water, Treated Sanitary Wastewater	12 months
ADEE-DEQ	Construction of Treatment System Associated with a NPDES Permit	12 months
ADEE-DEQ	Stormwater Discharges from a Categorical Industry	1 month
ADEE-DEQ	Construct/Operate Surface Facility for New Class I Nonhazardous Injection Wells	9 months
ADEE-DEQ	Construct/Operate New Class I Nonhazardous Injection Wells	12 months
ADEE-AOGC	Construct Drilling Pit for Class 1 Nonhazardous Injection Wells	1 month
ADEE-DEQ	Transfer Barren Brine to LANXESS No-Discharge Permitted Facility	9 months

20.3.1 CWA SECTION 404 – NATIONWIDE PERMIT 39

Section 404 of the Clean Water Act established a statutory mechanism for control of dredged or fill material into waters of the U. S., including wetlands. The USACE has final administrative authority to determine the status of land surface as jurisdictional waters. Currently, certain land characteristics are scientifically used as indicators of waters through a process known as a Jurisdictional Determination (JD). Private entities commonly prepare and submit JD reports to the USACE to expedite their decision-making process and in some cases, the USACE will conduct a site survey to confirm the private JD or absent a private submittal, to provide the basis for the agency's permitting decision. Construction of the Project Facility includes placement of fill in an area and diversion of a small creek that a field investigations deemed to be waters of the U. S. Thus, Standard Lithium will be required to obtain a Section 404 permit for the proposed activity.

USACE authorizes impacts to WOTUS through nationwide or individual Section 404 permits. Nationwide permits are structured for specific activities and minimal impacts and do not require lengthy agency review. The Project Facility will be subject to NWP 39 – Commercial and Institutional Developments.

Nationwide permits mandate compensatory mitigation for impacts to waters of the U.S. Mitigation is commonly satisfied through purchase of wetlands credits from a USACE-recognized mitigation bank. Once the Section 404 permitting process is initiated, the USACE will determine the degree of compensatory mitigation (if any) and institute a review of threatened/endangered species and cultural resources that may be impacted by the Project Facility.

20.3.2 MINOR SOURCE AIR PERMIT

The ADEE-DEQ, Office of Air Quality, issues new permits for proposed facilities after reviewing and evaluating permit applications for administrative and technical completeness and ensuring that each application meets regulatory adequacy, as required by Title V of the CAA. It is a legally enforceable document designed to improve compliance by clarifying what facilities (sources) must do to control air pollution. ADEE-DEQ has primacy for the issuance of permits and regulation of air emissions sources in Arkansas.

A single permit will be issued by ADEE-DEQ for construction and operation of the facility. The permit must be in place prior to initiating construction, including preparation of foundations for any air emission source.

Emissions estimates for the Project Facility have been developed using engineering calculations and preliminary equipment specifications. Based on the emissions estimates, the operation will be required to obtain a Minor Source permit, and an application for the new facility must be reviewed and approved by the ADEE-DEQ. The permit application will include a review of the applicability of federal rules for specific sources. The ADEE-DEQ has authority to issue a permit with federally enforceable conditions and limitations. The permit conditions and limitations will be developed by ADEE-DEQ to prevent deterioration of ambient air quality and to comply with State and National Ambient Air Quality Standards or with other applicable regulations.

20.3.3 PUBLIC WATER SUPPLY

The ADH issues approvals for Public Water Systems serving non-municipal potable water. The Project will require fresh water sources to support the lithium extraction process and provide potable for personnel use. There is no municipal water system in the vicinity of the project. Currently, the adjacent LANXESS South Plant has fresh water extracted from an underground source (Sparta Aquifer) approximately 275 m (900 feet) to 500 m (1,640 feet) but does not have sufficient excess capacity to support the Project.

Standard Lithium expects to drill and construct two Sparta Aquifer fresh water supply wells. Fresh water produced by the wells will be disinfected, stored, and distributed following ADH rules. Following submission of engineering design and construction plans and specifications that meet ADH standards, the ADH will issue a Noncommunity Public Water System permit for the non-transient, non-municipal water system supplying potable water to the Project Facility.

20.3.4 NPDES CONSTRUCTION STORMWATER DISCHARGE

The ADEE-DEQ, Office of Water Quality has been delegated authority by the EPA for administration of the NPDES permit program in accordance with the federal CWA.

The ADEE-DEQ, Office of Water Quality has issued a general permit for discharges of stormwater runoff from construction (earthmoving) activities. General permits are developed for multiple facilities that have similar activities and limitations. The objective of permit ARR150000 is to eliminate or reduce the transport of sediments and construction-related contaminants from earthmoving and construction activities that disturb 1 acre or more area. As the Project Facility development will exceed 5 acres, a

Stormwater Pollution Prevention Plan (SWPPP) specific to the construction site must be prepared and submitted to ADEE-DEQ along with a Notice of Intent for coverage under the general NPDES permit. The SWPPP includes management practices and physical controls to minimize sediment/contaminant transport off the construction area as a result of precipitation events. Once authorized, the permit is in effect until the disturbed area is stabilized after construction is completed. The current permit ARR150000 was effective November 1, 2021, and expires October 31, 2026.

20.3.5 NPDES NON-BRINE PROCESS WATER DISCHARGE

The ADEE-DEQ, Office of Water Quality regulates discharges of non-brine process-related effluents from industrial operations and sanitary or domestic wastewater through the NPDES permit program. Process effluent includes any water that, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate byproduct, finished product, byproduct, or waste product. An individual NPDES permit will be required for non-brine effluents from the Project Facility that are discharged to surface waters. Tail-brine is prohibited from discharge to surface waters and must be disposed subsurface in UIC Class I or V injection wells.

An individual NPDES permit application includes information on the processes generating the effluent, treatment (if any) of the effluent before its discharge, an actual or predicted pollutant characterization of the effluent, and a schematic diagram depicting the mass flow of water through the facility before its discharge. Administrative information on the Project Facility will be included and the application must be signed by a Responsible Official. Individual NPDES permits are issued with 5-year expirations and must be renewed 180 days before the expiration date.

20.3.6 STATE CONSTRUCTION PERMIT FOR WASTEWATER TREATMENT

The ADEE-DEQ, Office of Water Quality requires a Construction Permit for industrial treatment and collection facilities that discharge treated effluent to a surface water as permitted by an individual NPDES permit. A Construction Permit will be necessary for the Project Facility. The Construction Permit is a state-only permit and is required to ensure that treatment systems proposed comply with the applicable provisions of the "Recommended Standards for Wastewater Facilities" by the Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, commonly known as "The 10 States Standards." The Construction Permit is an add on to the individual NPDES permit application submitted by an Arkansas Professional Engineer and is in effect until the treatment system is completed and operational. Construction in accordance with the issued permit must be certified by an Arkansas Professional Engineer at the completion of construction.

20.3.7 NPDES STORMWATER DISCHARGES FROM CATEGORICAL INDUSTRY

Stormwater runoff discharges from certain industrial categories are regulated by the ADEE-DEQ Office of Water Quality in the NPDES program using a multi-sector general permit. The Project Facility will require the general stormwater permit for operation and is included in Sector J3: Mineral Mining and Dressing, Chemical and Fertilizer Mineral Mining. Standard Lithium will submit a Notice of Intent to ADEE-DEQ to request coverage under the industrial general stormwater permit.

The industrial general permit ARR000000 for stormwater runoff discharges from industrial sites has requirements similar to the general permit for construction stormwater discharges (ARR150000) that emphasize pollution prevention and best management practices. A SWPPP must also be prepared specific to the operational site. Discharges of storm runoff from the area of industrial activity must be sampled, analyzed, and reported to ADEE-DEQ annually. ADEE-DEQ has established benchmark values for pH and Total Suspended Solids (TSS) in stormwater discharges from industrial Sector J3. The benchmark for pH is a range from 6.0 S.U. to 9.0 S.U. and for TSS is 100 mg/l, The benchmark concentrations are established to alert facilities and the ADEE-DEQ of potential exposure to industrial materials or processes, and to provide the facility opportunity to implement new or amend existing management practices to reduce the parameter of concern.

20.3.8 STATE NO-DISCHARGE PERMIT

The ADEE-DEQ regulates waste disposal systems that do not discharge to surface waters through a "No-Discharge Water Permit". The State No-Discharge Permit (ADEQ NDSP) is required for the storage tanks and ancillary equipment associated with disposal of effluent brine in the two proposed Class I injection disposal wells. The intent of the ADEQ NDSP is to allow ADEE-DEQ the opportunity to review and approve the waste handling process and equipment with regard to good engineering practices to prevent unauthorized discharges to surface waters. The ADEQ NDSP application must be prepared and submitted by an Arkansas Professional Engineer.

20.3.9 UNDERGROUND INJECTION CONTROL PERMIT

The Project will use two distinct paths for management of lithium-depleted (barren) brine from the lithium extraction process. The majority of the brine will be returned to the LANXESS South Plant for injection in the existing Class V wells and the remainder (excess over volume) will be injected into two new Class I Non-hazardous wells owned and operated by Standard Lithium. For the brine returned to LANXESS, refer to Section 20.4.

The ADEE-AOGC issues Class V Permits for brine injection wells. Disposal of barren brine processed through the Project Facility using the existing LANXESS brine disposal well network does not require modification of the existing ADEE-AOGC permits held by LANXESS as the injectate is still considered "spent brine" and the lithium-depleted brine remains consistent with fluids permitted for injection into the Class V wells. Class V well authorizations do not expire until a well is permanently plugged and abandoned.

Class I wells are used to inject non-hazardous waste into deep, confined rock formations. The Class I well target depths for the two new Hosston Formation wells in this project range from 1,151 m (3,775 feet) to 1,646 m (5,400 feet) below ground level elevation. Class I wells are strictly regulated under the Resource Conservation and Recovery Act (RCRA), and the Safe Drinking Water Act (SDWA). The Project is preparing and will submit an application for the two required UIC Class I wells. Class I permits are issued with 10-year terms and applications for renewal must be submitted before the expiration date.

20.3.10 RESOURCE CONSERVATION AND RECOVERY ACT SUBTITLE C TREATMENT, STORAGE, AND DISPOSAL PERMIT

A RCRA Hazardous Waste Permit is required of any facility that performs treatment, storage (greater than 90 days), or disposal of waste meeting the criteria to be classified as hazardous. The Project Facility will not conduct any of the activities requiring a RCRA permit authorization. Process wastes generated by the facility are not expected to meet the hazardous classification. Small quantities of universal wastes (e.g., batteries, pesticides, mercury-containing equipment, lamps, electronics, and aerosol cans) may be generated by the operation and maintenance of the site. Title 40 Code of Federal Regulations, Part 273 provides an alternative set of management standards for universal wastes in lieu of regulation as hazardous waste.

20.4 PERMIT MODIFICATIONS

New permits required to accommodate the Project Facility are listed in Table 20-1. An existing State No-Discharge Permit issued to LANXESS for surface equipment associated with disposal of barren brine must be modified to include the Project Facility. Information regarding the permit is noted in Table 20-2.

Table 20-2. Permits for LANXESS South Plant to be Modified

Permit, Application, or Reference Number	Activity	Construction or Operation	Agency	Permit/Plan
ADEQ PERMIT 5048-WR-2	Transfer Barren Brine to LXS for Smackover Injection	Operation	ADEE-DEQ	Modify LXS State No-Discharge Permit 5048-WR-2

Permit 5048-WR-2 is a State No-Discharge Permit issued by ADEE-DEQ to LANXESS for operation of the brine disposal system (tanks, equipment, pipelines) associated with the UIC Class V injection well network. The narrative description and flow schematic diagram of the permit must be revised to include brine diverted to and returned from the Project Facility. The permit modification request will be initiated by LANXESS and supported by the Project.

20.5 ENVIRONMENTAL LIABILITIES

The construction of the Project Facility has the potential to cause conditions which may create minor environmental liabilities through the discovery of improperly abandoned oil/gas wells, permanent closure/abandonment of existing LANXESS ground water monitoring wells within the construction area, and potential off-site transport of sediments because of improper or inadequate erosion control measures.

The Project Facility is included in a portion of the historical El Dorado South oil/gas field, which was discovered in 1922. The El Dorado South field is mostly depleted with a few “stripper” wells operated by independent producers remaining. An August 1957 historical field map of El Dorado South used by the ADEE-AOGC to indicate the location of producing and abandoned wells shows three possible abandoned well locations within the Project Facility boundary. ADEE-AOGC plugging and abandonment records for the period from 1922 to 1957 were researched but unsuccessful in identifying any documents regarding drilling, operation, or abandonment of the three wells. A field investigation of the mapped well locations did not indicate the presence of historical oil production or of any wellbores, and it is presumed the wells, if actually constructed within the boundary of the construction areas, were plugged and abandoned properly. If evidence of wellbores is discovered during construction, the ADEE-AOGC will be notified and further investigation conducted as to the plugging status of the well. The potential liability for improperly abandoned wells remains with the original permit holder. The ADEE-AOGC has a fund for plugging improperly abandoned wells for which ownership cannot be established.

Any well discovered on the subject property would be eligible for public funding of the closure action, if required.

Monitoring wells owned and operated by LANXESS South are located within the proposed construction area of the project. If required, the wells will be plugged and abandoned in accordance with accepted groundwater protection measures; where possible existing wells will be maintained to allow for ongoing groundwater monitoring by LANXESS.

Earth disturbance during the construction of the facility will require preparation of a SWPPP in accordance with ADEE-DEQ NPDES Permit ARR150000 requirements discussed in Section 20.3.3. The SWPPP and other permit conditions are established to prevent transport of sediments off site during construction.

Any additional environmental liabilities discovered during the course of construction or operation, and which are determined through investigation to be a result of pre-existing conditions, will remain the responsibility of LANXESS as lessor of the Project properties, the permit holder in the case of abandoned wells.

20.6 ENVIRONMENTAL BASELINE STUDIES

A Baseline Environmental Site Assessment (ESA) was conducted from November 2022 to March 2023 on property proposed to be leased from LANXESS for the construction of the Project Facility. The assessment was conducted to determine if historical activities and processes on the property or adjacent properties have impacted surface and subsurface soil and water quality, and to document the pre-construction conditions of the site prior to alterations associated with the Project Facility. Field investigation activities included collecting representative samples of subsurface groundwater and soil, surface stormwater and soil, and vegetation for chemical analysis. The investigation was based upon the best judgment of the environmental professional in consideration of the proximity of chemical manufacturing operations and historical oil/gas production in the area. The data collection was completed in accordance with standard operating procedure for quality assurance/quality control (QA/QC) consistent with EPA guidance.

20.6.1 SUBSURFACE – GROUNDWATER

The adjacent LANXESS chemical manufacturing operation has an established network of groundwater monitoring including wells on the Project Facility site. LANXESS groundwater monitoring wells are completed in the uppermost saturated zone less than 200 feet below ground surface. On November 28, 2022, two new permanent groundwater monitoring wells were installed by Standard Lithium on the Project Facility site. Well MGW-1 is located on the northern boundary of the subject property, east of the LANXESS South Plant entrance parking lot. Ground water monitoring well MWG-2 is located centrally on the site. Both groundwater wells were completed in the uppermost saturated zone equivalent in depth to the nearby LANXESS monitoring wells

From January 26 to February 2, 2023, 12 existing wells and the two newly installed wells were sampled using low-flow purging and sampling procedures. Water collected from the individual wells was sealed in appropriate sample containers and transported to the analytical laboratory. Samples were analyzed for sulfate, ammonia-nitrogen, nitrate-nitrogen, nitrite-nitrogen, hexavalent chromium, mercury, lead, zinc, barium, dioxins, non-pesticide organic compounds, RCRA characteristic hazardous waste parameters, adsorbable organic fluorine, halogens, major cations and other substances of potential interest. Three metals (mercury, barium, and manganese) and one halogen (chloride) were observed above health risk-based concentrations or primary drinking water maximum contaminant levels in some of the LANXESS monitoring wells.

In addition to the sampling performed January-February 2023, LANXESS provided historical groundwater information for the existing wells on the Property including analytical results of previous monitoring. As a result of historical operations at the LANXESS South facility, there is known subsurface contamination of chemical manufacturing-related constituents (e.g., chlorides, bromoform, methylene chloride, 1-2-Dichloroethane [EDC]). Groundwater collected during the baseline study further confirmed that there are contaminants in shallow groundwater at the proposed Project Facility. This pre-existing contamination is associated with documented historical releases from the LANXESS South Plant and is routinely monitored by LANXESS as the responsible party. Construction and operation of the Project Facility will not expose or impact the contaminated shallow groundwater thus no preventive or remedial action is required by Standard Lithium.

20.6.2 SUBSURFACE – SOIL

Soil core sampling was conducted during the installation of MWG-1 and MWG-2, consisting of two borings at three different depths for a total of six core samples. Core sampling was conducted at surface level (0 to 4 ft) and at or directly above the saturated zone. Soil core samples submitted for laboratory analysis for MWG-1 included those taken at depths of 0 to 2 ft, 2 to 4 ft, and 55 ft. Samples of borings at 0 to 2 ft, 2 to 4 ft, and 40 to 42 ft were selected at MWG-2. Samples were analyzed for Total Recoverable Metals, VOCs, SVOCs, and halogens,.

Arsenic was detected at concentrations greater than health risk-based screening levels in all six soil cores. Selenium was detected from near-surface cores (0 to 4 ft subsurface) at both well locations was greater than health risk-based screening levels. Mercury and methylene chloride were detected from the soil core immediately above the saturated zone (42 to 44 ft subsurface) in MWG-2 exceeded the health risk-based screening levels for those analytes.

Arsenic is a naturally occurring heavy metal with documented background concentrations in the state of Arkansas. The core samples exceeded the EPA screening concentrations for arsenic; however, the arsenic concentration was well below the ambient background concentration of 9.7 mg/kg (Shacklette, 1984). The detection of arsenic can be assumed to be naturally occurring and not the result of industrial activities in the vicinity of the Property. Metals mercury and selenium detected at various depths may be present as a result of adjacent operations or as naturally occurring elements in the soil. However, the organic chemical methylene chloride observed above EPA screening levels in MWG-2 is presumed present because of historical industrial operations as discussed in 20.6.1.

Metals observed in shallow (0-4 feet) soil cores may be disturbed during construction and operation of the Project Facility. Exposure to and transport of soils at the Project Facility will be mitigated by management practices and if necessary, engineering controls and are unlikely to impair the ability to construct and operate the Project; no extraordinary measures are anticipated.

20.6.3 SURFACE – STORMWATER

Twelve individual locations for monitoring stormwater run-on/runoff of the subject property were identified based on topographical features of the site. Locations included five areas where stormwater runs on the property from the adjacent LANXESS South facility and seven monitoring locations where stormwater leaves the subject property.

Stormwater samples were collected during three events (January 24, 2023, February 14, 2023, and March 17, 2023) and analyzed for sulfate, ammonia-nitrogen, nitrate-nitrogen, nitrite-nitrogen, hexavalent chromium, mercury, lead, zinc, barium, dioxins, non-pesticide organic compounds, RCRA characteristic hazardous waste parameters, adsorbable organic fluorine, halogens, and major cations. Stormwater analyses did not exceed any health risk-based screening concentrations at any location sampled.

20.6.4 SURFACE – SEDIMENT

Sediment sampling was conducted at each of the stormwater monitoring locations between a depth of 0 to 6 inches subsurface in the drainage pathway. Samples were analyzed for the Total Recoverable Metals, VOCs, SVOCs, and halogens. Surface sediment exceeded the screening concentration for arsenic at all sampling locations. In addition, mercury was exceeded at multiple locations. Arsenic and mercury exceeded the EPA screening concentrations at the site; however, background concentrations of the two heavy metals are known to be elevated in the region, with concentrations of 9.7 mg/kg and 0.067 mg/kg, respectively (Shacklette, 1984). All of the sample concentrations fell below the background concentrations, suggesting that the detections of heavy metals in the soil are naturally occurring and are not caused by the industrial activity at the subject or adjacent property.

Sediment samples collected at two run-on locations and one runoff location exhibited concentrations of polycyclic aromatic hydrocarbon (PAH) compounds greater than health risk-based screening levels. Detection of PAHs in sediments could be the result of historical oil production, forest management practices, or the adjacent chemical manufacturing operations and at the concentrations observed do not present an elevated worker exposure risk for the Project.

Detections of chemicals of potential concern in sediments and shallow soils do not present an elevated worker exposure risk or likely active remediation potential based on current regulations. Compound concentrations were screened against conservative risk-based concentrations and do not pose an appreciable threat to personnel.

20.6.5 SURFACE – VEGETATION

Vegetation samples were taken to establish baseline conditions and determine if air emissions from adjacent industrial operations may be affecting subject property vegetation. On November 29, 2022, vegetation samples were collected in three separate locations at the Property. One pine tree at each monitoring location was selected for collection of fresh pine needles from canopy height. Trees selected are estimated to have been approximately 40 ft tall and 6 to 8 inches in diameter. Pine needles from the canopy level branches were collected and analyzed for RCRA metals, and halogens. Screening levels for vegetation are not available; therefore, analytical results were compared to soil screening levels. No vegetation sample exceeded a health risk-based screening level for any parameter.

20.7 WILDLIFE

A threatened and endangered species review was conducted for the Project Facility. The basis of the review was information obtained from the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consulting (IPaC). Information provided through the IPaC review included a letter providing a list of threatened and endangered species that may occur in the proposed project area and consistency letters for several of the species. The consistency letters are developed after completion of determination keys in which several questions are answered to facilitate a determination of potential effects the project may have on listed species. The IPaC reports are valid for 90 days as new information obtained by the USFWS may result in changes to the list.

The Project Facility is located in an area within the distribution range of one endangered and one proposed endangered bat, the northern long-eared bat (*Myotis* septentrionalis) and the tricolored bat (*Perrimyotis subflavus*); four threatened/endangered birds—the eastern black rail (*Laterallus jamaicensis spp. Jamaicensis*), the piping plover (*Charadrius melodus*), the red knot (*Calidris cantus rufa*), the red-cockaded woodpecker (*Picoides borealis*); one proposed threatened reptile—the alligator snapping turtle (*Macrochelys temminckii*); one candidate insect—the monarch butterfly (*Danaus plexippus*); and one endangered flowing plant—pondberry (*Lindera melissifolia*).

The northern long-eared bat is primarily distributed in northern and western Arkansas where caves are prevalent for winter hibernation. Their summer ranges extend out but are still primarily confined to the northern and western parts of the state. During summer months northern long-eared bats roost in trees containing suitable cover such as snags or loose/shaggy bark. The tricolored bat is similar in respect to primarily hibernating in caves; however, these bats are known to be less selective in their roosting locations and tend to roost among leaves of deciduous hardwood trees. The eastern black rail prefers a marsh habitat with dense cover. The piping plover is a shore bird that prefers areas devoid of vegetation, typically sandy beach-type areas. The red knot is typically associated with ocean areas and depends heavily on horseshoe crab eggs to sustain their long migration. The red-cockaded woodpecker is strongly tied to old-growth pine forests that burn frequently, leaving the understory mostly clear of younger trees. The alligator snapping turtle prefers to inhabit the deeper beds of large rivers, canals, and lakes. The monarch butterfly utilizes a variety of habitats but depends on milkweed for breeding. Pondberry is associated with wetland habitats such as bottomland and hardwoods.

The IPaC multispecies determination key resulted in a determination of no effect for the eastern black rail, piping plover, pondberry, and red knot. Based on the multispecies key, the project may affect the red-cockaded woodpecker and would require further consultation with the USFWS to determine the effects. The northern long-eared bat determination key resulted in a determination of no effect based on the finding that the project action would not intersect an area where the northern long-eared bat is likely to occur. The determination keys do not cover species proposed for listing as threatened or endangered (alligator snapping turtle, monarch butterfly, and tricolored bat).

The Project Facility lacks large waterbodies or wetlands and would not likely support the alligator snapping turtle. Habitat for the monarch butterfly may exist in the vicinity of the Property, however, milkweed plants were not observed in the project area during site visits. Guidance on distribution for the tricolored bat and implementation of USFWS consultation is currently limited in Arkansas, but based on conversations with USFWS, the distribution and consultation requirements are expected to mimic that for the northern long-eared bat.

The red-cockaded woodpecker preferred habitat is very limited (old-growth pine forests). Union County is included in the known species range with some documented colonies in the county. A desktop review of the Property shows that the area has historically been silvicultural land use, with pine being the dominant tree species. Although pine has been a dominant species on site, it would not likely be classified as old-growth pine forests. The project area also contains dense understory particularly in the areas including the oldest pine stands on the site. Additionally, the USFWS ECOS website does not depict any known species locations within the project area. While impacts are not anticipated, consultation with USFWS is suggested to confirm that the Project would not adversely affect the red-cockaded woodpecker.

The USFWS IPaC report also generated a list of migratory birds of conservation concern. These are species identified by the USFWS that, without conservation efforts, are likely to become candidates for listing under the Endangered Species Act. The only migratory bird listed on the IPaC repot is the chimney swift (*Chaetura pelagica*). Chimney swifts breed in urban and suburban habitats and are most commonly found in areas with vertical structures that provide nest site (e.g., chimneys). They can also nest in hollow trees, tree cavities, and caves. They primarily forage over open areas, but are can be found foraging over forests, ponds, and residential areas. While potentially present, no hollow trees were observed during the site visits nor is there a high likelihood for hollow trees to be present based on the current makeup of the vegetative community. The proposed project will likely not have an adverse effect on the chimney swift.

Development of the Project Facility will result in temporary and permanent disturbance to the existing habitat. However, no adverse impacts to the threatened and endangered species or migratory birds listed are expected as a result of the Project. This assessment is contingent upon further consultation with the USFWS regarding the red-cockaded woodpecker.

20.8 CULTURAL RESOURCES

The Project Facility is located north of US Hwy 167 in Union County, adjacent to the LANXESS South Plant and within Section 32 of T18S R15W and Section 5 of T19S R15W. A desktop cultural review of the Project area was performed by Commonwealth Heritage Group on March 27, 2023. During the cultural review, one archaeological site was found to be within a 0.5-mile radius and two additional sites were within a 8 km [5-mile] radius of the Project Site. The St. Marks Church and Cemetery, located 0.6 km [0.4 mile] southeast of the site, is part of the Union County Historic Site Survey. The Smyrna Church and cemetery, located 3.1 km [1.9 miles] east of the Project Site, is also part of the Union County Historic Site Survey. The Joel Smith Plantation, located 3.5 km [2.2 miles] northeast of the site, is listed on the Arkansas Historic Preservation Program (AHPP) and is a National Register of Historic Places listed property. A further review of the AHPP shows that no historical tracts are within the Project Site. A review of the General Land Office (GLO) plat map dating back to 1845 shows one feature near the Property—the Pine Hill Road that runs north-south between the center of the sections reviewed (T18S R15W and T19N R15W). A review of historical quadrangle maps shows that three or four structures (i.e., houses) were located within the subject property prior to 1927. The structures were no longer present on a quadrangle map from 1951 and they do not exist today.

No previously recorded archaeological sites or historic properties are located within the subject property of the proposed Project . Based on the desktop review the construction of the Project should not result in any threat or loss to historic and cultural resources. This will be confirmed through USACE during the Section 404 permitting process through agency consultation with the Arkansas Historic Preservation Program and Native American Tribal groups with interest in the Project area.

20.9 ENVIRONMENTAL IMPACT

Potential environmental impacts during the construction, operation, and closure stages of the Project have been identified but not quantified in consideration of the global effects of the Project. Those items are summarized as follows:

- Change in local air quality from construction and operation of the facility
- Removal of existing forested areas on the site for construction and operation of the facility
- Altered stormwater runoff hydrology from land development activities and installation of impervious surfaces for the operational facility
- Increased noise levels from the equipment, machinery and vehicles, and process operations
- Increased personal and transport vehicle traffic on county roads and state highways
- Increased light pollution from fixed lighting at the operational site
- Increased withdrawal of fresh water from the Sparta Aquifer via water supply wells drilled for the operational facility
- Increased greenhouse gas (GHG) emissions from hydrocarbon combustion and extraction/processing equipment
- Change in water characteristics in Bayou DeLoutre and Walker Branch from operational stormwater runoff
- Reduction of the usable life span of the Hosston Formation injection zone for waste disposal caused by the addition of new injection wells/wastes
- Reduction of non-renewable natural gas reserves because of its consumption by the facility
- Reduction in GHG emissions as a result of replacement of petroleum fueled vehicles with electric vehicles fueled by lithium batteries manufactured from Lithium Carbonate produced by the Project.
- Increased demand for electricity requiring potential increases in GHG emissions from power generation facilities

The potential direct environmental impacts from construction, operation, and closure of the Project will be mitigated through compliance with rules and permits issued by ADEE-DEQ, ADH, ADEE-AOGC, and other regulatory agencies. The potential indirect environmental impacts will be mitigated or offset by actions of those entities directly responsible, such as public utility providers and government services.

20.10 SOCIAL IMPACT

Standard Lithium is committed to conducting its future Project activities with best management practices and endeavors to maintain a collaborative relationship with the local communities that the Project may impact. Engagement consists of regular community meetings as required; newsletters; and attendance at community and business functions, and industry conferences.

The ADEE-DEQ permit process includes public notices and the opportunity for community input on the regulatory approvals necessary for the Project. This includes oversight for implementation of responsible environmental management; compliance reporting in accordance with approvals/permit conditions; consultation regarding changes or updates to approvals; and compliance audits and inspections.

There is an opportunity for a positive social impact on the surrounding communities. The community will benefit from the construction phase because the project will require skilled labor and many contractors to complete. The community will also benefit with the additional opportunities for a labor market skilled in similar operations once the facility has been constructed. Local businesses that supply goods and services to the Project may also be uplifted by the influx of capital associated with construction and operation of the facility.

The construction phase of the Project is approximately two years and will require an average of 200 workers and will include an overall payroll economic impact estimated at approximately $22M. The workforce staffing for the continuous operation of the facility would begin approximately 6 months before the completion of the construction phase. Standard Lithium estimates the continuous operation will require approximately 90 direct full time employees ranging from high school/GED to MS level education with an average salary of $70,000/yr (Arkansas mean annual wage = $48,570) (Bureau, 2022). The overall base salary economic impact is estimated to be between $6.3M and $7.0M per year. Currently over 80% of the Demonstration Plant full-time team in Arkansas are local workers that live less than 120 kilometers (less than 75 miles) from the facility.

Standard Lithium has partnered with South Arkansas College in El Dorado, Arkansas, for the new Catalyst Program, which is a collaborative effort between employer partners and sponsors to provide free, pre-employment training for individuals interested in the chemical production and services sector (SouthArk,2023). This 16-week program provides a great opportunity for local workers, including high school seniors and GED-level, to learn new skills and advance their careers and ensures there is a short-term workforce development pathway that leads to high-wage careers. Standard Lithium is fully committed to being a strong and supportive partner to the local community in southern Arkansas.

20.11 WASTE MANAGEMENT/DISPOSAL

The Project Facility will generate a small quantity of non-hazardous solid waste from the brine filtration and conditioning steps of the process. The solid waste is mainly filter-aid (diatomaceous earth), insoluble impurities from soda ash and lime, precipitated hydroxides and inorganics from the Feed Brine as well as undissolved calcium carbonate and magnesium hydroxide from the recycled softening sludge.

The waste streams amount to 1,000 to 1,800 tonnes per year and will be collected on site and transported to permitted disposal facilities. All waste container management will be performed on paved or concrete surfaces within the Project Facility. The non-hazardous solid wastes will be moved via transport truck to a land disposal facility licensed and permitted to accept the industrial wastes. The nearest ADEE-DEQ permitted waste disposal facility is the Union County Landfill, approximately 24 km [15 miles] north of the Project Facility.

20.12 ENVIRONMENTAL MANAGEMENT AND CLOSURE PLAN

Environmental Management Plans to guide compliance with the various regulatory programs and requirements will be developed following receipt of applicable construction and/or operating permits from the state agencies. These plans will address the various aspects of the design, construction, commissioning, and operation phases of the Project, identify the key environmental issues from the various Project phases, and provide plans and actions that will be undertaken to manage the phases effectively.

A Closure Plan specific to the two new Class I UIC wells will be submitted to and approved by the ADEE-DEQ through the permit application process. All other operations of the Project are not subject to any state or federal formal Closure Plan requirement. The estimated cost of the closure fund related to the Class I UIC wells is estimated at approximately $650,000. It is currently contemplated that a surety bond will be secured (a condition of the permit) to provide the necessary assurances that the mine closure funding will be available at or prior to the conclusion of operations of the wells.

Standard Lithium is committed to decommissioning and restoring the Project Site when operations cease in the future. Process feedstock, liquids in vessels, reagents, finished products, and ancillary materials will be removed to a proper use, recycling, or disposal facility. Solid residuals and nonhazardous solid wastes will be transported off site to an appropriate permitted recycling or disposal facility. Small quantities of regulated hazardous wastes/universal wastes accumulated during the operation and site termination activities will be transported to an authorized facility. Surface facilities and equipment will be re-purposed or recycled where possible and where not possible, disassembled, scrapped and disposed of off-site in accordance with applicable commercial obligations and relevant regulatory requirements.

21.0 CAPITAL AND OPERATING COSTS

Capital and Operating Costs for the Project were prepared in accordance with the principles set out by the AACE International (Association for Advancement of Cost Engineering International). The estimated costs are based on the engineering design completed for this study, supported by a combination of competitive quotes and engineering estimates compiled using industry standard estimating practices and the experience of the Project team with similar projects.

All dollars in the cost estimates are in 2023 United States of America (USA or US) dollars unless otherwise noted. Major components are presented in tabular form. Numbers stated are rounded such that differences may appear between individual and total values, or between tables.

21.1 CAPITAL COSTS

The total capital cost (CAPEX), including contingency, to construct the Project is estimated at $365 million. Direct project costs represent $259 million and indirect Project Costs represent $56 million of the total cost. A contingency of $50 million is included, which equates to approximately 15% of direct and indirect costs.

The capital cost estimate is considered to have an accuracy range of -15% to +20%. All costs are expressed in 2023 US Dollars. No allowances are included for cost escalation.

The total estimated capital cost for the Project by area is summarized in Table 21-1.

Table 21-1. Project Capital Cost Estimate Summary

Area	$ M
Brine Delivery (Tie-ins)	9.0
Brine Pretreatment	43.3
Direct Lithium Extraction	38.1
Concentration and Purification	53.3
Carbonation	53.4
Drying, Milling, and Packaging	18.9
Effluent Brine Disposal	24.3
Reagent Systems	8.8
Utilities	51.1
Other (First Fills, Membranes, Licensing)	14.7
Subtotal	315.0
Contingency	49.9
Total CAPEX	364.9

Notes:
[1] Any discrepancies in the totals are due to rounding effects.

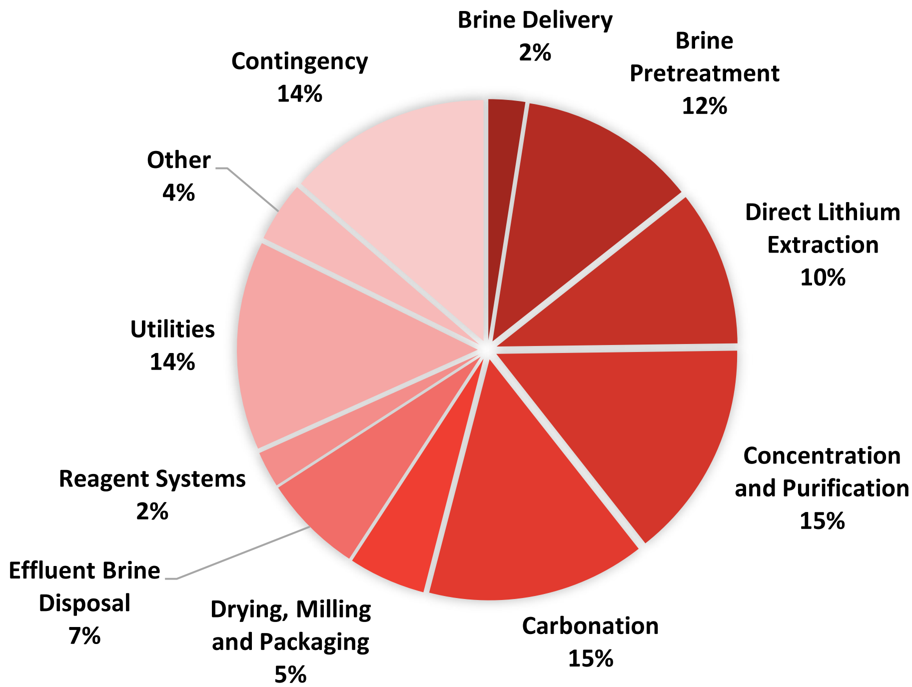


Figure 21-1. Project Capital Estimate Component Breakdown

21.1.1 ESTIMATE METHODOLOGY

The capital cost estimate was assembled based on costs established for each of the Project areas, following the area and cost breakdown structure developed for the Project. The estimate is considered to be reflective of the design completed to date, the proposed EPC contracting strategy and considers the anticipated construction schedule.

Estimated costs were established using industry standard estimating practices and methodologies. The estimate is generally derived from:

- Material and equipment vendor quotes
- Supply and installation quotes from contractors
- Unit pricing received from contractors, vendors and consultants
- Equipment factored cost estimates
- Historical pricing, rates or allowances based on experience with similar recent projects

Quotations were obtained based on loose shipped field erected materials, pre-assembled modules or turnkey design, supply and installation work packages.

Multiple quotations were obtained for the majority of equipment and construction packages which were then tabulated, equalized, assessed, any gaps addressed and escalation applied to adjust price to align with the estimate date. The most appropriate bid, not necessarily the lowest price bid, was selected as the basis for the estimate. Unit pricing estimates were developed with supporting material take-offs based on design drawings.

For reference, equipment-factored estimates are produced by taking the cost of individual process equipment, and multiplying the equipment cost by an installation factor to arrive at a total installed costs. The installation factor, or total installed cost factor, includes subcontracted costs and direct labor costs and materials and indirect costs associated with the installation of the equipment. Where used, project specific installation factors are based on industry norms for US Gulf Coast installation. Where factored estimates were employed, the methodology followed Peters & Timmerhaus 2003 (P&T 2003) methodology.

21.1.2 SCOPE OF ESTIMATE

The capital cost estimate includes all materials, equipment, and labor to construct the commercial scale lithium extraction plant required to produce an average 5400 tonnes per annum of battery-quality lithium carbonate over the 25-year life of the Project.

Capital costs include direct, indirect and associated owners costs associated with the Project which generally includes:

- Site preparation, including temporary access roads.
- Lithium extraction plant, including technology licenses.
- Brine supply and return pipelines (to and from the South Plant).
- Two (2) new Underground Injection Wells.
- Utility tie-ins and upgrades such as electric, gas, and water.
- Offices, shops, laboratory and other site buildings and infrastructure.
- Construction labor and supervision, equipment including mobilization, contractors overhead and profit and other construction expenses.
- Design engineering, permitting and environmental services required during construction.
- Commissioning and startup costs including first fills.
- Owner's costs, insurance, spare parts, sureties and contingencies.

21.1.2.1 DIRECT COSTS

Direct costs include, but are not limited to, the supply and installation of equipment, piping, electrical, instrumentation and controls, buildings, site improvements, service facilities, and non-process equipment as generally described below.

- Site improvements including site development, clearing and grading, roads, stormwater management systems, walkways, fences, parking areas and landscaping.
- Equipment including the supply and installation of all process and mechanical equipment identified on design drawings / equipment lists, such as tanks, pumps, motors, cooling towers, and including equipment foundations, containments, structural supports, insulation, painting, and associated spare parts.
- Piping including process piping with suitable structural supports, pipe hangers, fittings, valves, and insulation where required.
- Electrical systems including power distribution centers, transformers, capacitor banks, switchgear, conduit, wire, fittings, feeders, grounding, instrument and control wiring, lighting, and panels, and associated electrical materials.

- Instrumentation and controls including field instrumentation, control valves and their installation and calibration, and process control, security and communication systems including associated networks, wiring, hardware and software.
- Buildings including process and auxiliary buildings, substructures, superstructures, platforms, supports, stairways, ladders, access ways, cranes, monorails, and hoists and associated building services which include plumbing, heating, ventilation, air conditioning, lighting, painting, and building fire protection.
- Facility wide utility and distribution systems for steam, water, fuel gas, and waste disposal.
- Fire protection systems including fire water storage and distribution, fire detection and suppression systems and fire extinguishers and hose stations.
- Non-process equipment including building furniture and equipment, safety and medical equipment, shop equipment, material-handling equipment, laboratory equipment, storage systems and other equipment required for the safe operation of the facility.

21.1.2.2 INDIRECT COSTS

Indirect costs include, but are not limited to, temporary facilities, contractor management, engineering, supervision expenses, overhead and profit as generally described below:

- Temporary facilities, including construction offices, temporary roads and access, contractor parking, temporary power, utilities, communications, and construction fencing.
- Construction tools and equipment.
- Construction supervisors, accounting, timekeeping, purchasing, expediting, and warehouse personnel, security guards and safety personnel, and all associated travel and living expenses, medical and fringe benefits.
- Construction-related permits, field tests, special licenses, taxes, insurance, and interest.
- Engineering, including detailed discipline engineering design and consulting, cost engineering, engineering field supervision and reviews, environmental monitoring and testing, field and shop inspections and associated reporting.
- Procurement including purchasing, expediting, receiving, testing and inspection and vendor field support during startup and commissioning.
- Owner's costs.

21.1.3 SCHEDULE

The capital cost estimate is based on construction and commissioning of the facility in accordance with the Project contracting strategy and Project schedule as outlined in Figure 21-1. The Company expects to make a Final Investment Decision in the first half of 2024 which would result in first production of lithium carbonate in 2026.

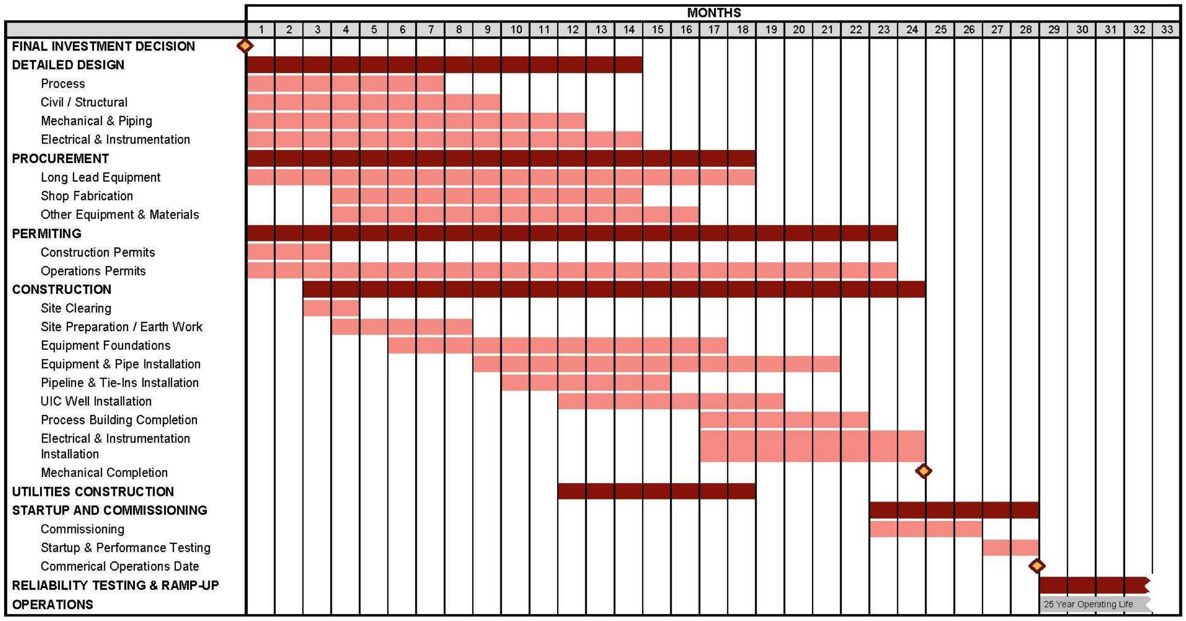


Figure 21-2. Project Schedule

21.1.4 CONTRACTING APPROACH

The construction of the Project is proposed to be contracted on a Lump-Sum-Turn-Key (LSTK) basis to a single EPCC (Engineering, Procurement and Construction and Commissioning) contractor who will be responsible for all remaining engineering, procurement, construction and commissioning activities required, except as may be otherwise provided directly by the Project Company. This approach provides the Project Company, and its financing partners, with execution certainty, primarily through the provision of certain performance and schedule guarantees included in the EPCC agreement. The cost of the proposed contracting approach is considered in the preparation of the cost estimate.

21.1.5 ALLOWANCES

An allowance of 12% is applied to the equipment purchase cost to cover freight, insurances, duties, and sales taxes associated with shipping to the Project Site which is included based on benchmarking and industry norms.

An allowance of 2.5% is applied to major equipment purchased cost, excluding buildings and tanks, for construction, commissioning, and startup spares.

21.1.6 CONTINGENCY

A contingency of $50 million is included, which equates to approximately 15% of the direct and indirect capital costs.

Contingency is included as a separate line item to address items, conditions or events which their state, occurrence, or effect is uncertain and that experience shows will likely result in additional costs. Contingency does not cover changes in scope, cost fluctuations or currency fluctuations, nor does contingency account for project event risks such as labor unrest, blockades, adverse market conditions, force majeure, but instead is included to allow for unknowns that arise during construction.

21.1.7 EXCLUSIONS

The following items are not included within the capital cost estimate:

- Historical or sunk costs including Pre-Feasibility and Feasibility study costs
- Interest and financing costs
- Improvements to LANXESS owned facilities and equipment
- Improvements to the Entergy electrical substation which is assumed to be addressed through electrical tariff
- Sustaining capital and capital spares
- Escalation

It should be noted that the Project is based on receiving brine at current brine wellfield production rates and as such the existing brine field infrastructure can support the Project without new wells or additional capital improvements to existing wellfield infrastructure.

21.1.8 ESTIMATE CONFIDENCE

The cost estimate was developed following the principles set out by AACE International (Association for Advancement of Cost Engineering International) and has a stated accuracy range of -15% to +20%. This accuracy range is supported by over 95% of equipment items pricing based on vendor quotes, which range from an accuracy level of firm to +/- 15%. The estimate accuracy range is supported by engineering design maturity that meets the requirements for this classification of estimate.

21.2 OPERATING COST ESTIMATE

The operating cost (OPEX) of the Project is estimated to be $6,810 per tonne of lithium carbonate produced. The unit cost of operation is based on production of an average of 5,400 tonnes of lithium carbonate for sale per year over the 25-year life of the Project.

Operating costs are categorized as variable or fixed costs. Variable operating costs are those which are production rate dependent. Fixed operating costs do not vary with production and generally remain constant on an annualized basis. Variable costs include reagents, power, fuels, consumable operating supplies and production-based fees and royalties and were derived based on the steady state mass balance and considering vendor recommendations. Fixed costs include maintenance materials, rent and leases, insurance, labor and administrative costs.

The sustaining capital allowance included, specifically for those capital improvements required to maintain the Project over its economic life, are expected to be approximately $79M over the life of the project or approximately $580 per tonne of lithium carbonate produced. The all-in operating cost including OPEX and sustaining capital is estimated at $7,390 per tonne.

The total estimated all-in operating cost for the Project is summarized in Table 21-2.

Table 21-2. Project Operating Cost Summary

Category	Type	Average Annual Cost ($/t)[1]

Electric Power and Infrastructure	Variable	950
Reagents and Consumables	Variable	2,880
Maintenance Materials and External Services[2]	Variable	610
Workforce[3]	Variable	1,930
Insurance	Fixed	340
Miscellaneous Costs[4]	Fixed	100
Total OPEX		6,810
Sustaining Capital Cost		580
All-in Operating Cost [5][6]		7,390

Notes:
[1] Operating costs are calculated based on an average annual production of 5,400 tonnes of lithium carbonate.
[2] Includes contract maintenance, solid waste disposal, and external lab services.
[3] Approximately 89 full time equivalent positions.
[4] Includes general and administrative expenses.
[5] Does not include future royalties or brine lease-fees-in-lieu-of-royalties which are still to be determined and subject to regulatory approval (lease-fees-in-lieu-of-royalties have been determined for bromine and certain other minerals in the State of Arkansas but have not yet been determined for lithium extraction).
[6] Does not include brine fees which may be due to LANXESS as a result of finalization of the commercial arrangements between LANXESS and Company.

21.2.1 ELECTRIC POWER AND INFRASTRUCTURE

Electrical power and infrastructure related costs are estimated to average $5.1M/year or $950 per tonne of lithium carbonate produced on an average over the life of the Project. The major utility demand for the Project is electricity. The Project will utilize new dedicated infrastructure for the supply of electricity, natural gas and water.

The cost of power required to operate the Project Facility is estimated at $4.4M per year, based on an average annual consumption of 67 million kWh and a unit rate of $0.0655 per kWh. Electrical substation upgrades by Entergy in support of the Project are estimated at $3.0M. It is anticipated that the capital cost recovery will be distributed over the first five years through the electrical tariff by Entergy. Capital recovery charges are reflected in the annualized average power cost for the Project.

Natural gas will be delivered to the Project by Energy Transfer. Natural gas infrastructure improvements, including a new gas meter station, are assumed to be recovered through a component of the delivery charge. Natural gas delivery charges are estimated at $390,000 per year for the first five years to account for capital recovery and $270,000 per year thereafter. The project is expected to consume an average of 260 GJ per day. Annualized average natural gas costs are estimated at $380,000 per year based on unit cost of natural gas of $4.00 per GJ ($4.25 per MMBtu).

An allowance is included for the small quantity of chlorinated water supplied by LANXESS for domestic uses which will be charged to the project on a cost plus basis.

21.2.2 REAGENTS AND CONSUMABLES

Reagent and consumables costs are estimated to average $15.6M or $2,880 per tonne of lithium carbonate produced on an average over the life of the Project. A variety of reagents and consumables are necessary to support multiple steps throughout the lithium recovery process. Reagent costs are the single largest component of variable costs. Reagent consumption rates are estimate based on average steady state production of the Project Facility. Reagent costs are based on vendor pricing received from regional chemical suppliers generally located in the gulf coast region. Unit costs are based on expected long-term pricing forecasts supported by historical average pricing.

Table 21-3. Reagent Cost Estimate

Category	Units	Units/year	$/Unit	$ M/year
Caustic Soda (NaOH)	$/t	6,250	542	3.4
Soda Ash (Na2CO3)	$/t	11,500	485	5.6
Hydrochloric Acid (HCl)	$/t	15,600	221	3.4
Hydrated Lime ($Ca(OH)_2$)	$/t	740	766	0.6
Citric Acid	$/t	140	1296	0.2
Other	$	-	-	1.7
Total				14.9

Notes:
[1] Any discrepancies in the totals are due to rounding effects.
[2] Other Reagents includes allowances for small quantities of surfactants, flocculants, coagulants and other reagents associated with the operation of the Project Facility.

Consumables required for the Plant are shown in Table 21-4.

Table 21-4. Consumable Costs

Category	$/year
Filter clothes	250,000
Packaging materials	175,000
Membranes, filters	130,000
Fuel, diesel	50,000
Safety	25,000
Other	100,000
Total	730,000

21.2.3 MAINTENANCE MATERIALS AND EXTERNAL SERVICES

Maintenance materials and external services costs are estimated to average $3.3M or $610 per tonne of lithium carbonate produced on an average over the life of the Project.

Maintenance materials include allowances for parts, equipment and other materials required to maintain the facility but excludes sustaining capital costs. Maintenance materials are estimated at $0.5M per year.

External services include laboratory support, third party chemical analysis, IT services, professional consultants, training services, contract maintenance, vendor support, boiler and cooling tower service, UIC well maintenance and waste management. External services are estimated at $2.8M per year.

21.2.4 WORKFORCE

Workforce costs are estimated to average $10.4M or $1,930 per tonne of lithium carbonate produced on an average over the life of the Project. Personnel is the seconded largest operating cost for Standard Lithium. Workforce positions are estimated based on the requirement for operation of the Project Facility on a 24 hours per day, seven days per week basis.

Table 21-5. Workforce Positions

Area	Position	Workforce per Shift	Shifts	Total
Operations	Operations Manager	1	1	1
	Shift Foreman Pre-treatment	1	4	4
	Shift Foreman Lithium Carbonate	1	4	4
	Control Room Operator	2	4	8
	Production Operator	4	4	16
	Product Handling Operators	3	2	6
			Operations Subtotal	39
Maintenance	Maintenance Manager	1	1	1
	Supervisor	2	1	2
	Planner	2	1	2
	Mech/Welder/Pipe Fitter	4	1	4
	Electrical/Instrument	2	1	2
	Shift Maintenance (Mech, Elect.)	3	4	12
	Electrical/Controls Engineers	1	1	1
	Maintenance/Reliability Engineer	1	1	1
			Maintenance Subtotal	25
Technical Services	Technical Manager	1	1	1
	Plant Engineers	2	1	2
	QA/QC Supervisor	1	1	1
	Dayshift Technicians	2	1	2
	Lab Supervisor	1	1	1
	Chemists	1	4	4
			Technical Subtotal	11
General and Administration	Plant Manager	1	1	1
	Controller	1	1	1
	Purchasing Supervisor	1	1	1
	Human Resources Supervisor	1	1	1
	Health Safety Enviro. Manager	1	1	1
	Purchasing Clerks	1	1	1
	Accounting / Payroll	1	1	1
	Administration Clerks	1	1	1
	Gatehouse (Shift)	1	4	4
	Warehouse Clerks	1	2	2
			General and Administration Subtotal	14
			Workforce Total	89

The average base salary for professional and hourly workers is approximately $83,000 per year. Workforce costs also include burdens estimated at an average of 45% of base salary and a 15% allowance for overtime.

Table 21-6. Workforce Costs

Category	Annual Cost ($M/year)
Operations	4.3
Maintenance	3.1
Technical Services	1.4
General and Administration	1.6
Total	10.4

21.2.5 INSURANCE

Insurance costs are estimated to average $1.8M or $340 per tonne of lithium carbonate produced on an average annualized basis and are assumed to cover risks including property damage, general liability, and business interruption.

21.2.6 MISCELLANEOUS COSTS

Miscellaneous operating costs are estimated to average $0.5M or $100 per tonne of lithium carbonate produced on an average annualized basis. Miscellaneous costs include general and administrative expenses including mobile equipment leases, office and IT costs, telephone and fax, computer equipment, software, licenses, subscriptions, office supplies, and travel.

21.2.7 SUSTAINING CAPITAL

Sustaining capital costs are estimated at $79M over the life of the Project which on an annualized average basis equates to approximately US$580 per tonne of lithium carbonate produced.

Sustaining capital costs include repair or replacement of equipment or materials during the 25-year life of the Project. The frequency of repair or replacement of infrastructure considered ranges or replacement intervals between 1 and 10 years. The cost and frequency of sustaining capital expenditures are based on recommendations from vendors and equipment manufacturers, quotations, previous project experience, and industry standards.

Major equipment replacements and activities considered as sustaining capital expenditures and which are reflected in the sustaining capital cost estimate include, but are not limited to, the following:

- LSS DLE Resin replacement;
- IX resin replacement;
- Ultrafiltration membrane replacement;
- BWRO/OARO membrane replacement;
- Carbonate preheater plate replacement;
- Filter press plate replacement;
- Agitator seal replacement;
- Rubber lining replacement;
- Lithium carbonate centrifuge refurbishment;

- Bicarbonate reactor cooler refurbishment;
- Dryer refurbishment;
- Tank coating refurbishment;
- Structure steel coating refurbishment;
- Low pH service pump replacements; and
- UIC well refurbishments including bullhead acidizing and radioactive tracer survey.

21.2.8 EXCLUSIONS

The following items are not included within the operating cost estimate:

- Future royalties or brine lease-fees-in-lieu-of-royalties which are still to be determined and subject to regulatory approval. Lease-fees-in-lieu-of-royalties have been determined for bromine and certain other minerals in the State of Arkansas but have not yet been determined for lithium extraction.
- Brine fees which may be due to LANXESS as a result of finalization of the commercial arrangements between LANXESS and Company.
- Taxes, other than sales taxes which may be due on the purchase of materials and equipment.
- Escalation.

21.3 QP OPINION

It is the QP's opinion that the estimated capital and operating costs accurately reflect the level of project understanding and are appropriate for a Feasibility Study.

22.0 ECONOMIC ANALYSIS

The objective of the economic analysis is to determine if the Project is financially viable. The economic analysis was prepared using a Discounted Cash Flow (DCF) economic model, showing both pre-tax and post-tax results, to evaluate the Project. CAPEX and OPEX expenditures presented in Section 21 have been used in this analysis. The model includes taxes but excludes any government and commercial royalties/payments. The results include net present value (NPV) for an 8% discount rate, internal rate of return (IRR), and sensitivity analysis of key inputs.

22.1 INPUTS AND ASSUMPTIONS

The key inputs and assumptions are listed in Table 22-1. These assumptions represent the base case for the commercial operation.

Table 22-1. Project Economic Model Key Input Parameters

Key Parameters	Units	Assumption
South Unit Brine Production (LANXESS)	m^3/yr	5.21
Plant Availability (Plant + Utilities) [1, 2]	%	94%
Effective Extraction Efficiency (Plant) [2]	%	93.1
Attrition (Lithium Carbonate Losses) [2]	%	0.5
Initial Annual Production of Li_2CO_3	tpa[3]	5,730[3,4,5]
Average Annual Production of Li_2CO_3	tpa	5,400[4]
Plant Operating Life	years	25[6]
CAPEX – Confidence		P85
Total Capital Expenditures	$ millions	365[7,8]
Average Annual Operating Cost	$/t	6,810
Average Annual All-in Operating Cost	$/t	7,390[9,10]
Selling Price	$/t	30,000[11]
Financing		Unlevered IRR
Discount Rate	%	8
Federal Tax Rate	%	21
Arkansas State Tax	%	5.1
Inflation Reduction Act Manufacturing Tax Credit	-	10 (45X)

Notes:

[1] Plant Availability excludes LANXESS South Plant availability which is already considered in South Unit Feed Brine Rate.

[2] Refer to Section 15 for modifying factors considered.

[3] Tonnes (1,000 kg) per annum.

[4] Commercial production is based on the production plan. Refer to Section 16.

[5] Initial annual production figure represents Year 2 production, following a ramp-up period in Year 1.

[6] Plant design and financial modelling based on 25-year economic life. Proven and Probable Reserves support a 40-year operating life.

[7] Capital Expenditures include 15% contingency.

[8] No inflation or escalation has been carried for the economic modelling.

[9] Includes operating expenditures and sustaining capital.

[10] Brine lease-fees-in-lieu-of-royalties (to be approved by AOGC) have not been defined and are not currently included in the economic modelling.

[11] Selling price of battery-quality lithium carbonate based on a flatline price of $30,000/t over total project lifetime. Refer to Section 19.

[12] Any discrepancies in the totals are due to rounding effects.

22.1.1 CAPEX

Capital investment for the average annual production of 5,400 tonnes per year of battery-quality lithium carbonate, including equipment, materials, indirect costs, and contingency at 15% of direct and indirect costs, is estimated to be US$365 Million. This total excludes interest expenses that might be capitalized during the same period.

22.1.2 OPEX

The average annual operating cost for the Project is estimated at US $37 Million. As the cash flow model accounts for decreasing Lithium Carbonate production over the lifetime of the project, the annual operating costs correspondingly decreases each production year. The annual operating cost includes process reagents, utilities, process consumables, natural gas, maintenance materials, external services, labor, and miscellaneous general and administration (G&A) costs. Approximately 86% of the OPEX costs are derived from three (3) of OPEX cost categories as shown below.

- Process Reagents – 44%
- Labor – 29%
- Utilities – 13%

The remaining components of the operating costs have a significantly lower impact on the overall economics. Insurance is added on top of the above-mentioned operating costs at 0.5% of CAPEX per year. A total of $2.98M of electrical infrastructure cost is distributed evenly over the first 5 years of production to account for capital costs related to the required Entergy Substation upgrades which are recovered by Entergy during the initial operating period.

22.1.3 SUSTAINING CAPITAL

Major repairs or replacements of critical processing plant items are included in sustaining capital. Sustaining capital is capitalized and depreciated over their useful lives. A provision of $78.8M for sustaining capital over the life of the Project was included in the economic model.

22.1.4 CASH FLOW

Cash flow will reach 100% after a production ramp-up period of twelve months. During the ramp-up period, it is assumed the facility will produce and monetize 75% of expected steady-state production of saleable lithium carbonate. Similarly, it is assumed that operating costs associated with process reagents and variable utilities will be at 85% of steady-state consumption (all other operating costs are assumed at 100% of steady-state consumption).

22.1.5 CONSTRUCTION

The economic model assumes a construction period of 27 months.

22.1.6 OPERATING LIFE

The Project is modelled with a 25-year economic life from the start of production. No allowances are included in the model for extension of the project life beyond 25 years. As described in Section 15, the Project's Proven and Probable Reserves support a 40-year operating life.

22.1.7 COMMODITY PRICING

As described in Section 19, the selling pricing assumption for battery-quality Lithium Carbonate is US $30,000/tonne in 2023. Since the economics are calculated without any escalation, the price remains constant in the model over the 25 years of operation.

22.1.8 DISCOUNTED CASH FLOW (DCF)

A discount rate of 8% yearly has been assumed for the calculation of the NPV.

22.1.9 PRE-CONSTRUCTION EXPENSES

Pre-construction expenses are treated as sunk costs and are not included in the DCF analysis.

22.2 TAXES & ROYALTIES

The following royalties and taxes have been applied to the economic analysis of the Project.

22.2.1 FEES AND ROYALTIES

The cash flow model does not consider any royalty payments (also referred to as Lease-fees-in-lieu-of-royalties) which may be due to mineral owners in relation to the profitable extraction of lithium from brine as to date the AOGC has not approved a lease payment related to lithium extraction from brine.

No allowances are included for brine fees which may be due to LANXESS as a result of finalization of definitive commercial arrangements between LANXESS and the Project Company.

22.2.2 DEPRECIATION

A yearly depreciation of 5% (facility evenly depreciated over 20 years of operating life) is used for this analysis.

22.2.3 CORPORATE TAXES

The US Federal Corporate Income Tax (CIT) rate of 21% and the State of Arkansas Corporate Income Tax rate of 5.1% are used for this analysis.

22.2.4 45X MPTC TAX CREDIT

The cash flow model considers the Advanced Manufacturing Production Tax Credit (45X MPTC) for the business case. The Advanced Manufacturing Production Credit provides a tax credit for each "eligible component" which is produced in the U.S. The credit is 10% of costs incurred with respect to the production of critical minerals (of which lithium is one). For modeling purposes, a 10% credit is applied annually (with a 1-year lag) on the total operating cost, sustaining capital, and depreciation.

22.3 CAPEX SPENDING SCHEDULE

The economic model assumes that capital investments disbursements will be spread over 27 months.

22.4 PRODUCTION REVENUES

Production revenues have been estimated based on the price scenario for a Lithium Carbonate product, as identified in Section 19 and the production plan set out in Section 16.

22.5 CASH-FLOW PROJECTION

Table 22-2 summarizes the DCF for the assumed for the Project for the purposes of this Technical Report.

Table 22-2. Project Discounted Cashflow Model

YEAR		2023	2024	2025	2026	2027	2028	2029-33	2034-38	2039-43	2044-48	2049-51
Production (Tonnes per Year)												
Capacity % of Total												
Lithium Carbonate					2,160	5,014	5,718	5,638	5,549	5,424	5,246	4,248
Sale Price (US$ per Tonne)												
Lithium Carbonate					30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
Revenues (US$)												
Lithium Carbonate		-	-	-	64,809,000	150,425,512	171,544,610	845,694,096	832,347,318	813,594,631	786,840,200	382,287,451
Gross Revenue (US$)		**0**	**0**	**0**	**64,809,000**	**150,425,512**	**171,544,610**	**845,694,096**	**832,347,318**	**813,594,631**	**786,840,200**	**382,287,451**
Operating Expenses (US$)												
Royalties & Lease Fees (*See Note 1)		-	-	-	-	-	-	-	-	-	-	-
Operating & Maintenance Costs				-	**18,109,552**	**36,674,078**	**38,432,216**	**188,920,120**	**185,520,476**	**183,262,383**	**180,040,765**	**88,679,852**
Variable O&M					**9,586,662**	**19,628,299**	**21,386,436**	**105,483,721**	**103,876,578**	**101,618,485**	**98,396,867**	**47,857,902**
Fixed O&M				-	**8,522,890**	**17,045,780**	**17,045,780**	**83,436,399**	**81,643,899**	**81,643,899**	**81,643,899**	**40,821,949**
Operating Expenses				-	**18,109,552**	**36,674,078**	**38,432,216**	**188,920,120**	**185,520,476**	**183,262,383**	**180,040,765**	**88,679,852**
Operating EBITDA (US$)		-	-	-	**46,699,448**	**113,751,434**	**133,112,394**	**656,773,976**	**646,826,842**	**630,332,248**	**606,799,435**	**293,607,599**
Taxable Expenses / Income (US$)												
Development Capital Expenditure	(364,947,942)	-	**(66,395,669)**	**(199,034,849)**	**(99,517,424)**	-	-	-	-	-	-	-
Sustaining Capital Cost	-78,763,210					-	*(1,838,675)*	*(16,968,377)*	*(17,698,377)*	*(14,368,377)*	*(17,498,377)*	*(10,391,026)*
Total Capital Expenditure	(443,711,153)	-	**(66,395,669)**	**(199,034,849)**	**(99,517,424)**	-	**(1,838,675)**	**(16,968,377)**	**(17,698,377)**	**(14,368,377)**	**(17,498,377)**	**(10,391,026)**
Depreciation	5.00%				(18,247,397)	(18,247,397)	(18,247,397)	(91,236,986)	(91,236,986)	(91,236,986)	(36,494,794)	-
Sustaining Capital Cost depreciation						-	(1,838,675)	(15,321,711)	(16,170,711)	(16,216,711)	(16,216,711)	(9,730,026)
Taxable Expenses		-	-	-	**(18,247,397)**	**(18,247,397)**	**(20,086,073)**	**(106,558,696)**	**(107,407,696)**	**(107,453,696)**	**(52,711,505)**	**(9,730,026)**
Net Taxable Income		-	-	-	**28,452,051**	**95,504,037**	**113,026,321**	**550,215,280**	**539,419,146**	**522,878,552**	**554,087,930**	**283,877,573**
US Federal Corp. Income Tax	21.0%	-	-	-	(5,974,931)	(20,055,848)	(23,735,527)	(115,545,209)	(113,278,021)	(109,804,496)	(116,358,465)	(59,614,290)
State Arkansas Corp. Income Tax	5.1%	-	-	-	(1,451,055)	(4,870,706)	(5,764,342)	(28,060,979)	(27,510,376)	(26,666,806)	(28,258,484)	(14,477,756)
Property Tax				(518,417)	(2,072,481)	(2,849,514)	(2,849,514)	(14,247,568)	(14,247,568)	(14,247,568)	(14,247,568)	(8,548,541)
Tax credit						3,635,695	5,492,148	29,812,904	29,168,209	29,251,989	25,292,000	11,584,784
Profit after Taxes and Royalties and Tax Credit		-	-	**(518,417)**	**18,953,584**	**71,363,664**	**86,169,085**	**422,174,428**	**413,551,391**	**401,411,671**	**420,515,412**	**212,821,769**
								-	-	-	-	-
Net Cash Flow		-	**(66,395,669)**	**(199,553,266)**	**(62,316,443)**	**89,611,061**	**104,416,483**	**511,764,747**	**503,260,709**	**494,496,990**	**455,728,540**	**212,160,769**
Net Cash Flow - Pre-Tax		-	(66,395,669)	(199,034,849)	(52,817,977)	113,751,434	131,273,718	639,805,599	629,128,465	615,963,871	589,301,058	283,216,573
Net Cash Flow - Post-Tax		-	(66,395,669)	(199,553,266)	(62,316,443)	89,611,061	104,416,483	511,764,747	503,260,709	494,496,990	455,728,540	212,160,769
Discounted Cash Flow (DCF) - Pre-Tax	8.00%	-	(61,477,471)	(170,640,303)	(41,928,613)	83,610,700	89,342,687	347,718,110	232,920,552	155,239,726	101,059,057	36,359,651
Discounted Cash Flow (DCF) - Post-Tax	8.00%	-	(61,477,471)	(171,084,762)	(49,468,802)	65,866,805	71,064,104	278,080,375	186,325,334	124,623,171	78,396,620	27,235,229
Cummulated Post-Tax DCF		-	(61,477,471)	(232,562,233)	(282,031,035)	(216,164,230)	(145,100,126)	150,769,649	1,254,780,931	1,991,439,957	2,471,013,160	1,628,201,808

Internal Rate of Return (IRR)		**Net Present Value (NPV)**	
Pre-Tax	29.529%	**NPV - Pre-Tax**	**$772,204,000**
Post-Tax	24.043%	**NPV - Post-Tax**	**$549,561,000**

22.6 ECONOMIC EVALUATION RESULTS

The project economics resulting from the assumed price scenario at full production, which was used in the economic model, are presented in Table 22-3. The NPV values were also calculated for a discount rate of 8%.

Table 22-3. Project Economic Evaluation

Internal Rate of Return (IRR)		Net Present Value (NPV)	
Pre-Tax	29.53%	NPV – Pre-Tax	$772,204,000
Post-Tax	24.04%	NPV – Post-Tax	$549,561,000

Notes:
[1] All model outputs are expressed on a 100% project ownership basis with no adjustments for project financing assumptions.
[2] Assumes a U.S. Federal tax rate of 21% and State of Arkansas Tax rate of 5.1%, as well as variable property taxes.
[3] Any discrepancies in the totals are due to rounding effects.

22.7 SENSITIVITY ANALYSIS

A sensitivity analysis methodology, using one-factor-at-a-time (OAT), involves changing one input variable, keeping others at their baseline (nominal) values, and then returning the variable to its nominal value. This is repeated for each of the other inputs in the same way.

OAT sensitivity analysis of the project key variables CAPEX, OPEX, Selling Price changing +/- 20%, and Production +/- 5% was conducted to illustrate the impact of changes on the corresponding values of NPV and IRR. The results of the sensitivity analysis, at an 8% discount rate, are presented in Tables 22-4 to Table 22-7, and Figures 22-1 to 22-4.

Table 22-4 shows the sensitivity of NPV and IRR to a 20% CAPEX increase and decrease from the base case. It must be noted that some of the OPEX items are percentages of the CAPEX.

Table 22-4. Sensitivity Analysis to CAPEX Variation

Overview	-20%	Base Case ($M)	+20% ($M)
Capital Cost (CAPEX)	292.0	364.9	437.9
NPV Pre-Tax	837.6	772.2	706.8
NPV Post-Tax	608.3	549.6	490.8
IRR Pre-Tax	35.9%	29.5%	25.0%
IRR Post-Tax	29.2%	24.0%	20.4%

Table 22-5 shows the sensitivity of NPV and IRR to a 20% OPEX increase and decrease from the base case.

Table 22-5. Sensitivity Analysis to OPEX Variation

Overview	-20%	Base Case ($M)	+20% ($M)
Operating Cost (OPEX)	30.7	38.4	46.1
NPV Pre-Tax	837.6	772.2	706.8
NPV Post-Tax	608.3	549.6	490.8
IRR Pre-Tax	31.1%	29.5%	27.9%
IRR Post-Tax	25.1%	24.0%	22.9%

Table 22-6 shows the sensitivity of NPV and IRR to a 20% Product Price increase and decrease from the base case.

Table 22-6. Sensitivity Analysis to Product Price Variation

Overview	-20%	Base Case ($M)	+20% ($M)
LCE Price	24,000	30,000	36,000
NPV Pre-Tax	485.1	772.2	1,059.3
NPV Post-Tax	337.3	549.6	761.7
IRR Pre-Tax	22.4%	29.5%	36.2%
IRR Post-Tax	18.4%	24.0%	29.3%

Table 22-7 shows the sensitivity of NPV and IRR to a 5% Production Volume increase and decrease from the base case.

Table 22-7. Sensitivity Analysis to Production Volume Variation

Overview	-20%	Base Case ($M)	+20% ($M)
Production first year (Mt)	5,473	5,761	6,049
NPV Pre-Tax	708.9	772.2	835.5
NPV Post-Tax	502.0	54.9.6	597.1
IRR Pre-Tax	28.0%	29.5%	31.1%
IRR Post-Tax	22.8%	24.0%	25.2%

Sensitivity of Pre-Tax IRR to the changes in the CAPEX, OPEX, Selling Price, and Production Output is illustrated in the tornado chart in Figure 22-1.

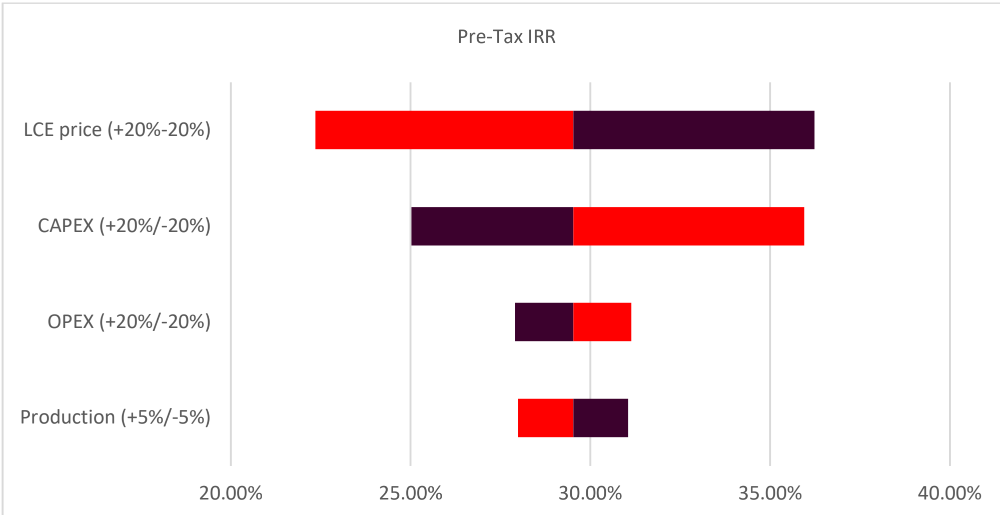


Figure 22-1. Pre-Tax IRR Sensitivity

Sensitivity of Post-Tax IRR to the changes in the CAPEX, OPEX, Selling Price, and Production Output is illustrated in the tornado chart in Figure 22-2.

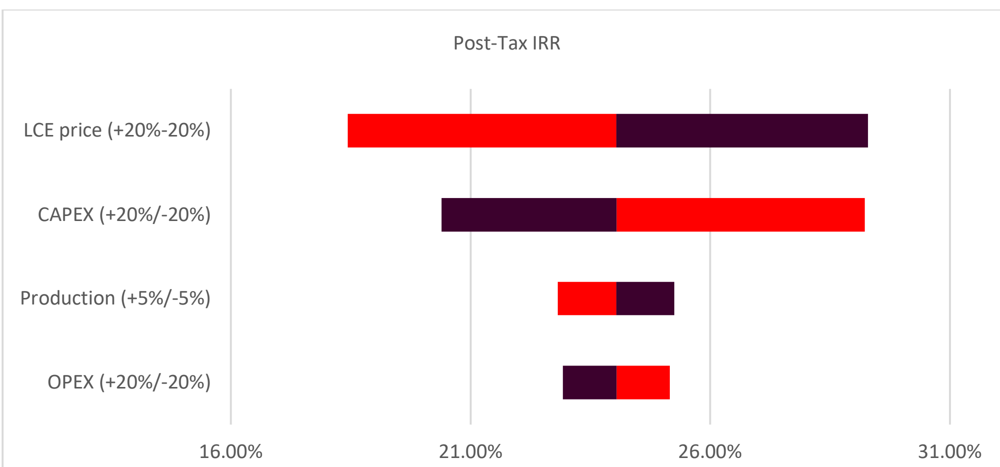


Figure 22-2. Post-Tax IRR Sensitivity

Sensitivity of Pre-Tax NPV at an 8% discount rate to the changes in the CAPEX, OPEX, Selling Price, and Production Output is illustrated in the tornado chart in Figure 22-3.

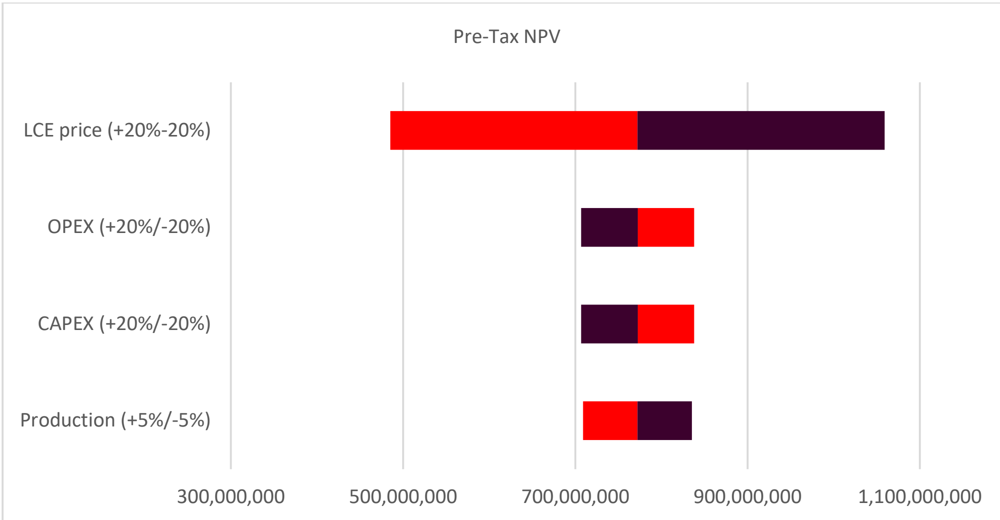


Figure 22-3. Pre-Tax NPV Sensitivity

Sensitivity of Post-Tax NPV at an 8% discount rate to the changes in the CAPEX, OPEX, Selling Price, and Production Output is illustrated in the tornado chart in Figure 22-4.

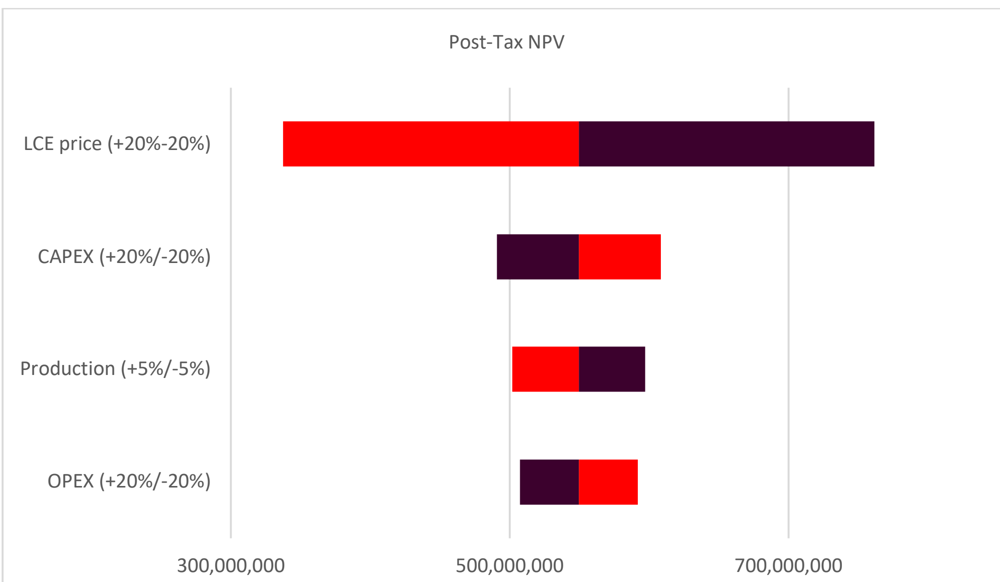


Figure 22-4. Post-Tax NPV Sensitivity

The OAT sensitivity analysis indicates that the project is as follows:

- IRR and NPV are most sensitive to the product Selling Price variation.
- IRR and NPV are least sensitive to OPEX variation.
- IRR and NPV are moderately sensitive to CAPEX and Production.

22.8 CONCLUSIONS AND SENSITIVITY ANALYSIS

The Project's economics resulting from the assumed price scenario used in the economic model is presented in Table 22-1. A sensitivity analysis was conducted to illustrate the impact of +/-20% changes in CAPEX, OPEX, and Selling Price, and +/-5% changes in Production Output on the project's NPV and IRR (Table 22-3 and 22-5).

The Sensitivity analysis of the project economics indicates that the project is economically viable under the base case conditions as well as under the condition of the isolated cases of a 20% increased CAPEX, a 20% reduced product Selling Price, a 5% reduced Production Output, and a 20% increased OPEX.

23.0 ADJACENT PROPERTIES

This section discusses mineral-brine properties that occur outside of the Property. In some cases, the Authors have not been able to verify information pertaining to mineralization on the adjacent properties, and therefore, the Authors and Standard Lithium advocate that the information is not necessarily indicative of the mineralization on the Property that is subject to this report.

There are two major bromine producers in Arkansas: LANXESS and Albemarle Corporation (see Figure 23-1). LANXESS has its Arkansas headquarters in El Dorado, Arkansas. Albemarle's Arkansas headquarters are at the center of its property in Magnolia, Arkansas. Albemarle's property is situated approximately 3 km from the western boundary of the LANXESS Property. In addition, Saltwerx has developed a property package approximately 15km from the western boundary of the LANXESS Property. To date, there is no lithium production from adjacent properties but lithium leases have been established by Saltwerx and Tetra Technologies. The Standard Lithium Project stands to be the first commercial lithium production from the Smackover Formation.

23.1 LANXESS CORPORATION

LANXESS operates three brine-based bromine extraction plants near El Dorado, AR (U.S.). The well-field that supports the LANXESS El Dorado Plants is sub-divided into three contiguous 'units' based on the three unitized areas of bromine operation: South, Central, and West unit areas.

During 2021, LANXESS processed approximately 13.3 million cubic meters [83.7MM U.S. Barrels] of brine to support their South Arkansas Bromine Operations. In addition to bromine, LANXESS entered the battery chemistry business with electrolyte production for lithium-ion batteries in Leverkusen, Germany (LANXESS, 2021) and is actively supporting operation of Standard Lithium's Demonstration Scale Lithium Pilot Plant which is located at the LANXESS South Plant.

23.2 ALBEMARLE CORPORATION

Albemarle Corporation is one of the largest producers of bromine and lithium related resources and products world-wide with bromine operations in Arkansas (U.S.) and Jordan and lithium operations in Chile, Australia, Germany and Clayton Valley, Nevada (U.S.). Albemarle exclusively operates using conventional lithium extraction technologies at their commercial facilities but have previously invested in DLE research. To QP's knowledge, no lithium has been commercially produced to date by Albemarle at either of their facilities in South Arkansas.

Albemarle Corporation operates two (2) brine-based bromine extraction plants near Magnolia, AR. Albemarle's Magnolia North and South plants are fed by a network of brine production wells in Columbia County. During 2021, Albemarle Corporation processed approximately 20 million cubic meters (125.4MM U.S. Barrels) of brine to produce approximately 74,000 tons of bromine at its Magnolia facilities (Albemarle Corporation, 2021). In 2021, Albemarle announced the company will double capacity for brine extraction by 2025 at a cost of $30 miillion to $50 million (Albemarle Corporation, 2021c). The well field that supports Albemarle's Magnolia operations directly abuts sections of the properties associated with Standard Lithium's South West Arkansas project on the field's northern and eastern boundaries.

23.3 SALTWERX (SUBSIDIARY TO GALVANIC, LLC)

Saltwerx, LLC (Subsidiary to Galvanic Energy) has ownership of 120,000 gross acres of resource claims in the Smackover Formation. Saltwerx has completed well testing, reservoir modeling, and inferred mineral resource estimations on their lithium-brine prospect in southern Arkansas. They estimate that this acreage could contain 4 million tons of lithium carbonate equivalent (Saltwerx, 2021). Saltwerx's property is located approximately 15km west of the Property and directly south of the TETRA Property.

23.4 TETRA TECHNOLOGIES

Tetra Technologies and Standard Lithium entered into a 2017 option agreement that grants Standard Lithium an option to acquire the rights to produce and extract lithium form a portion of Tetra's total brine leasehold. The option period is valid for a period of 10 years subject to Standard Lithium's annual payments. Standard Lithium has not yet exercised its option to acquire the rights to produce and extract lithium.

In September 2022, TETRA completed a maiden inferred bromine and lithium brine resource estimation report for its leased acreage in the Smackover Formation. The brine resource underlying the approximately 5,000 gross acres where TETRA holds lithium mineral rights that is not subject to the lithium option agreement with Standard Lithium is estimated to contain an inferred resource of 212,000 tonnes of lithium carbonate equivalent (Tetra, 2022). In June 2023, TETRA filed an application to establish a unitized brine unit on this property and indicated an increase in the acreage to approximately 6,000 acres (Tetra, 2023). No further information was published on an increase to the inferred resource estimate.

23.5 SOUTH WEST ARKANSAS PROJECT

Standard Lithium acquired brine production rights to lithium for the South West Arkansas (SWA) project directly from TETRA through an option agreement. The SWA project has conducted a five-well exploration program, well testing, reservoir modeling, and inferred mineral resource estimations at a Preliminary Feasibility Study (PFS) level study for this greenfield project with an Indicated and Inferred Mineral Resource of 1.4 Mt and 0.4 Mt lithium carbonate equivalent, respectively. The PFS study demonstrates robust economics, assuming production of at least 30,000 tonnes per year of battery-quality lithium hydroxide beginning in 2027 over a 20-plus year operating life. Standard Lithium anticipates completing a FEED and DFS for the SWA project in 2024 and beginning construction in 2025. Commercial production is expected in 2027, subject to continuing project definition, due diligence, project financing and receipt of future feasibility studies.

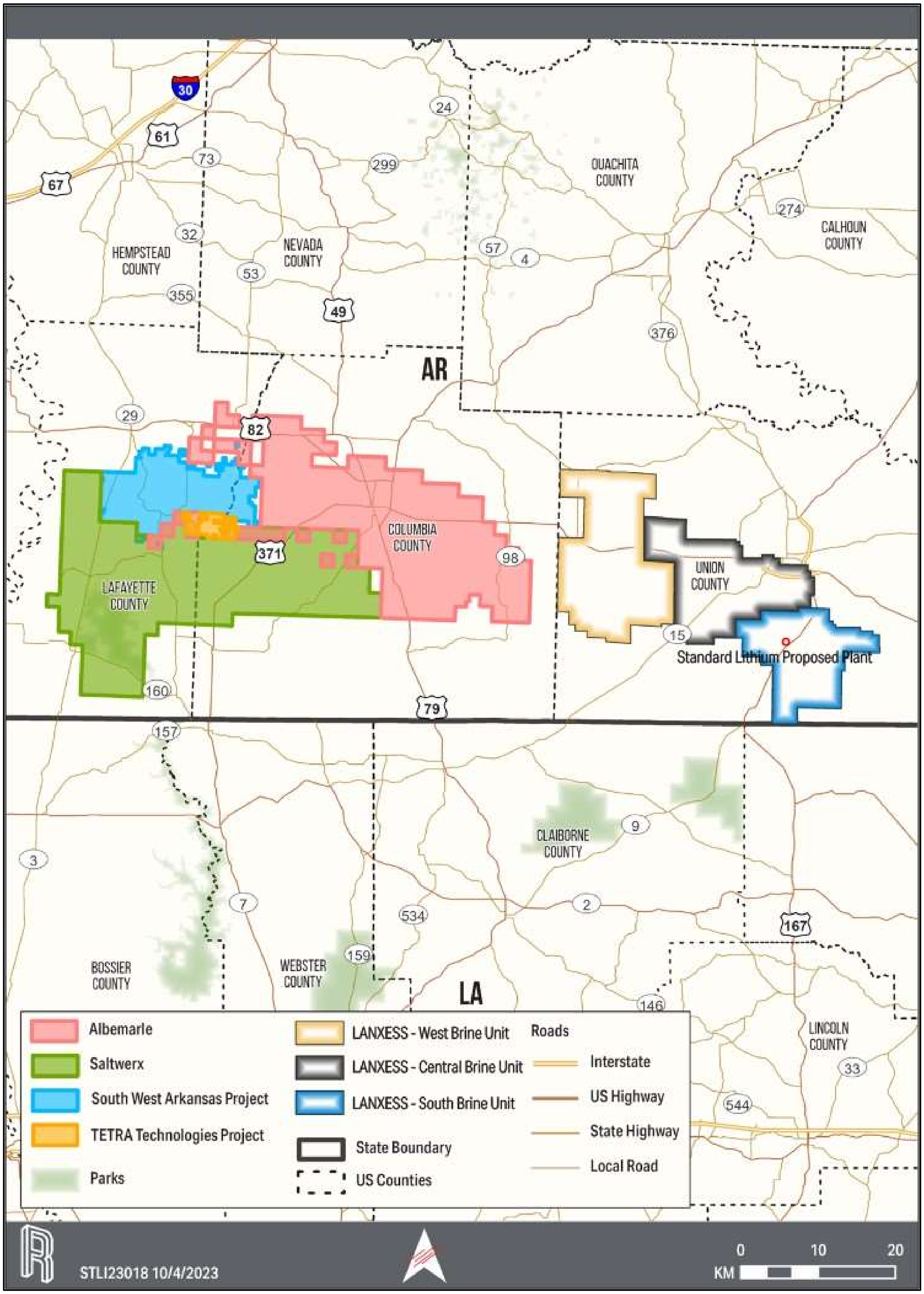


Figure 23-1. Location of Active and Potential Brine Producers in Southern Arkansas

24.0 OTHER RELEVANT DATA AND INFORMATION

There is no other data and information relevant to this report.

25.0 INTERPRETATIONS AND CONCLUSIONS

The Project has been independently evaluated, leading to the following conclusions and interpretations regarding the suitability of the proposed site and the viability of the Project. It is determined that a clear path is established to reach a positive Final Investment Decision subject to concluding remaining commercial agreements and obtaining the required financing.

- The Proven and Probable Reserves confirm the viability of the Project over its 25 year economic life at an average annual production rate of 5400 tonne per annum of lithium carbonate.
- The Proven and Probable Reserves support an operating life of up to 40 years.
- The development and testing completed at the Demonstration Plant provides a robust basis for the commercial design which is based on Direct Lithium Extraction technology.
- Work to date completed at the Demonstration Plant illustrates that lithium can be economically extracted from the lithium rich brine produced from the Smackover Formation.
- The Project Site secured is considered well suited for development and is situated near all necessary utilities.
- Environmental studies have concluded the Project Site is suitable for development with limited adverse environmental and social impacts, generally limited to the boundaries of the Project Site.
- There is a clear pathway for the Project to obtain the state permits required for development.
- The economic analysis yielded positive results in a timeline for development and first production that is considered realistic based on timely funding and is typical of projects of similar magnitude within industry.
- Overall, the result of this Feasibility Study demonstrates that lithium can be economically extracted from the lithium rich brine within the Smackover Formation.

The opinions of the Qualified Persons are further stated in the following sections.

25.1 GEOLOGY, RESOURCES AND RESERVE ESTIMATE

Significant confidence within the geologic modeling was developed by utilizing decades of available bromine production data and ongoing lithium sampling from within the Property. Based on the geologic modeling the following Resource and Reserve conclusions have been reached:

- The Property has the Resources and Reserves required to support the Project.
- The total in-situ Measured and Indicated Brine Resources for the combined LANXESS South, Central and West Brine Units are estimated at 2.8 Mt LCE or 529,000 tonnes of elemental lithium at an average concentration of 148 mg/L.
- The total Proven and Probable Brine Reserves for Phase 1A are estimated at 208,000 tonnes of LCE or 45,200 tonnes of elemental lithium at an average lithium concentration of 217 mg/L.

- Resource Estimate is upgraded from the 2019 PEA from Indicated to Measured for the LANXESS Project. This upgrade is supported by numerical modelling and verified by correlating over 60 years of operating data, supported by a robust well sampling program, and 3.5 years of Demonstration Plant testing with extensive monitoring of brine characteristics and LANXESS operating performance.
- The Project is based on a 25-year economic life. The Proven and Probable Reserves of 208 Kt lithium carbonate equivalent ("LCE") at an average concentration of 217 mg/L can support up to 40 years of operations.
- The Project is planned to produce 135,000 tonnes LCE from the LANXESS South Brine Unit over the 25-year life of the Project which represents production of approximately 5% of the in-situ Measured and Indicated Resources.
- All LANXESS supply and disposal wells proposed to support the Project are currently in operation, with the latest wells commissioned in 2019.
- The large underlying resource, existing operating brine field, experienced operator, coupled with sampling, testing and Demonstration Plant operations results in a Project which is substantially de-risked from a resource perspective when compared to other greenfield lithium projects.
- The size of the broader Resource could support additional lithium extraction developments subject to additional feasibility studies.

25.2 PROCESS INFORMATION AND DESIGN

Standard Lithium has successfully brought a new DLE technology to an established bromine producing region. Through multiple design iterations and testing, the studied processing approach is optimized for the Project's Resource. The following conclusions can be reached regarding process information and design:

- The Project is based on processing a well understood feed stock, specifically brine which has been successfully produced from the Smackover Formation for more than 60 years, from existing infrastructure that supports the Project's design capacity.
- All unit operations have been demonstrated either by Standard Lithium or in vendor facilities using real brine from the Smackover. Numerous production options have been evaluated. The current design concept appears to be near optimal and poses minimal commercial risk.
- The ongoing operation of the Demonstration Plant located at the South Plant and Project Site has provided invaluable information for the design of the commercial facility.
- Long term Demonstration Plant testing has led to a thorough understanding of the brines and has provided key data which have been incorporated into the design of the commercial facility.
- Two DLE technologies have been tested and evaluated. The current KTS LSS technology is considered to be the best technology for the Project, based upon lithium recovery, impurity rejection, operating cost and effluent dilution (i.e. lowest water use).

25.3 INFRASTRUCTURE

The Project location in Union County offers a pool of skilled labor and services. The plant has modest water, power, and thermal energy requirements. All necessary utilities are within close proximity to the Project Site including power and natural gas with brine and water. High-capacity transportation routes are readily accessible within the region and locally in the area of the Project. The site requires little grading and has ample area for equipment layout and construction lay down areas. Space has been allocated in the plot plan to accommodate future expansion.

25.4 ENVIRONMENTAL STUDIES

The Project Site has been investigated for potential risk to development from pre-existing conditions and the presence of waters of the United States. Based on the investigations conducted the conclusions are:

- The site has been subject to historical timber harvesting/production and possibly oil and gas exploration/production operations. The possible oil well locations were investigated during the environmental study and no evidence of their existence was observed. The site is currently undeveloped and has minimal infrastructure associated with the adjoining LANXESS operations. There is no known risk from historical operations.
- Jurisdictional waters of the United States have been identified at the margin of the Project Site. Those areas will be minimally impacted by site development and will be eligible for a Nationwide Permit from the U. S. Army Corps of Engineers. The Project Site development is not expected to cause significant adverse effects to waters of the United States.
- The presence of commercial chemical products was documented in surface and subsurface media at the Project Site. Those materials do not present a risk to construction or operation of the Project Facility based on concentration levels and/or potential exposure pathways.
- In consideration of site characteristics and proximity to existing utility and transportation infrastructure, resource supply and disposal facilities, the Project Site is suitable for construction and operation of the lithium extraction facility.
- Documented pre-existing conditions from historical operations are unlikely to have a material impact on the development and operation of the Project.

25.5 ENVIRONMENTAL REGULATORY PERMITTING

The Project has been examined to establish specific environmental regulatory permits necessary for construction and operation of the Project Facility and its supporting infrastructure. Based on the examination the conclusions are:

- Standard Lithium has been proactive in assessing potential environmental and regulatory risks to improve the Project development certainty, including a comprehensive review of permit applicability, a preliminary review of site cultural resources, and performance of a multimedia baseline investigation of the Project Site.
- The Project is designed in consideration of applicable environmental regulatory standards and does not present a risk of construction or operational permit denial or significant delay in issuance.

- The Project is not subject to review, delay or denial under the NEPA thus there is no risk associated with NEPA applicability based on the current development program.
- Construction and operation of the Project Facility are regulated through Federal and State agencies through established permit procedures. Project Facility emissions to air, surface waters and subsurface waters will require permit authorizations including restrictions to protect the environment while responsibly developing the lithium resources. There is no risk associated with permit(s) issuance on the basis the prescriptive requirements for receipt of the permits are met.
- Minimization of emissions and wastes from construction and operation and avoidance of adverse environmental impact were significant factors in the engineering design of the Project, resulting in permit tiers that are not at risk of denial or delay by the regulatory agencies.
- The Project Site plan factored the presence of waters of the United States in the development and as proposed avoids significant impacts to those waters. There is no risk associated with receiving Nationwide Permits requested from the U. S. Army Corps of Engineers.
- The Arkansas Department of Energy and Environment is proficient in regulating the extraction of resources from brine reservoirs. The adjacent LANXESS bromine production facility has been in operation for decades as have multiple bromine production facilities in Union and Columbia Counties. The LANXESS facility is currently permitted for discharges similar to those proposed for the Project Facility including air emissions, wastewater surface discharges and underground injection of waste brine via Class I injection wells.
- The brine Resource for the Project is currently permitted and the supply well field is operational. Underground injection wells for management of waste brine following extraction of lithium are likewise permitted and operating.
- Regulatory permit application documents are being prepared by Standard Lithium with priority for submission placed on those permits with longer agency review periods to maintain the project construction timeline.
- The Project is viable and as proposed will perform within the boundaries of established environmental standards, noting that the regulatory programs that authorize construction and operation of the Project facility are based on protection of the environment and hence the sustainability of the site and the local community.

25.6 SOCIAL AND COMMUNITY IMPACT

The Project is situated in a region significantly supported by natural resource production and refining for over one hundred years. Bromine production and associated chemical manufacturing operations have been a principal contributor to the local community for decades. In that context, the following opinions are presented regarding local, regional, and national impacts from the Project:

- South Arkansas is a regional hub for natural resource/brine production and processing industries. The Project is comparable to established mineral extraction operations and natural resource production/refining. The local community is generally supportive of those industries and recognizes the value of their existence and their positive impact on the regional economy.
- The region will benefit from the infusion of capital via employment of skilled labor and contractors and acquisition of materials during the construction of the Project facility. The

economic benefit will extend to the operation phase through staffing payrolls and ongoing supporting purchases.

- Lithium is a critical mineral with national self-sufficiency implications for military/defense needs and for the transition away from fossil fueled transportation. The Project supports the goal of domestic lithium production.
- Continuing engagement with the local/regional community is recommended as the Project proceeds through the investment decision and construction phases.
- The Demonstration Plant and public disclosures regarding the Project have been met with positive regional support. The Project is generally well supported by the regional citizens and there is no legitimate basis for organized opposition to the Project.

25.7 CAPITAL AND OPERATING COSTS

Project capital and operating cost estimates were developed utilizing industry standard approaches and benchmarked against related projects, as summarized below:

- The total capital estimate is $365 million and includes a contingency of $50M based on approximately 15% of direct and indirect costs.
- The capital cost estimate is based on approximately 95% of equipment and packages being quoted. Embedded budgetary vendor quotations have a stated accuracy of +15%.
- Reagent and utility consumptions have been developed from the integrated mass balance and vendor recommendations. Power costs are based upon vendor motor selections.
- Labor and management costs, maintenance materials, sustaining capital and contract labor costs were developed with input from the Project's operations team.
- The operating cost for the life of the Project is estimated to be $6,810/t of lithium carbonate. Labor, reagents, consumables, and energy account for over 70% of the operating costs. All-in operating cost, including sustaining capital expenditures is $7,390/t.
- The operating costs exclude any potential brine fees and future royalties (or brine lease-fees-in-lieu-of-royalties) yet to be established.
- The timeline for development and first production appears realistic based on timely funding and is typical of projects of similar magnitude within industry.
- In the QPs opinion the estimated capital cost at $365 million reasonably reflects the level of project understanding. The operating cost estimate is well supported and is considered to reasonably represent the expected Project OPEX. Both the CAPEX and OPEX are considered appropriate for the Definitive Feasibility Study level.

25.8 ECONOMIC ANALYSIS

Project economics were derived from inputs based on the annual production schedule, capital expense estimate, and operating expense estimate as set forth in the DFS. The positive results from the economic analysis are summarized within the following conclusions:

- An after-tax NPV of $550M and IRR of 24% assuming discount rate of 8% and a long-term price of $30,000/t for battery-quality lithium carbonate and capital expenditure of $365 Million.

- First production of battery-quality lithium carbonate is to occur in 2026 with an average annual production of 5,400 tpa over the operating life and a peak annual production of 5,700 tpa.
- The Sensitivity analysis of the Project economics indicates that the Project is economically viable under the base case conditions as well as under the condition of the isolated case. The isolated cases included modeling a 20% increased CAPEX, a 20% reduced product Selling Price, a 5% reduced Production Output, and a 20% increased OPEX.
- Running sensitivity analysis on DCF parameters resulted in the following rank of sensitivity listed from the most to least sensitive, respectfully: +/-20% change in lithium carbonate price, +/- 20% change in capital costs, +/-5% change in production rate, and +/- change in operating costs.

Table 25-1. Project Economic Analysis Conclusions

Project Parameters	Units	Values
Initial Annual Production of Li_2CO_3	tpa [1]	5,730 [2]
Average Annual Production of Li_2CO_3	tpa	5400
Plant Operating Life	years	25 [3]
Total Capital Expenditures	$ millions	365 [4,5]
Average Annual Operating Cost	$/t	6810
Average Annual All-in Operating Cost	$/t	7,390 [6,7]
Selling Price	$/t	30,000 [8]
Discount Rate	%	8
Net Present Value (NPV) Pre-Tax	$ millions	772
Net Present Value (NPV) After-Tax	$ millions	550[9]
Internal Rate of Return (IRR) Pre-Tax	%	29.5
Internal Rate of Return (IRR) After-Tax	%	24.0

Notes:
All model outputs are expressed on a 100% project ownership basis with no adjustments for project financing assumptions.
[1] Tonnes (1,000 kg) per annum.
[2] Initial annual production figure represents Year 2 production, following a ramp-up period in Year 1.
[3] Plant design and financial modelling based on 25-year economic life. Proven and Probable Reserves support a 40-year operating life.
[4] Capital Expenditures include 15% contingency.
[5] No inflation or escalation has been carried for the economic modelling.
[6] Includes operating expenditures, assumed brine supply fees, and sustaining capital.
[7] Brine lease-fees-in-lieu-of-royalties (to be approved by AOGC) have not been defined and are not currently included in the economic modelling.
[8] Selling price of battery-quality lithium carbonate based on a flatline price of $30,000/t over total project lifetime.
[9] Assumes a U.S. Federal tax rate of 21% and State of Arkansas Tax rate of 5.1%, as well as variable property taxes.
[10] Any discrepancies in the totals are due to rounding effects.

25.9 PROJECT RISKS

As with any development project, there exists potential risks and uncertainties. There are no known significant encumbrances on the Property. Standard Lithium will attempt to reduce risk/uncertainty through effective project management, utilization of technical experts, continued Demonstration Plant testing, community engagement, and development of contingency plans. The Project development and contracting approach to-date has incorporated risk mitigation clauses that support Project development certainty (i.e., term sheets, mechanical and performance guarantees, and delivery schedules). The risks to developing the Project on the Property include, but are not limited to, the following:

- Variations in production rate resulting from unanticipated well production issues.
- Variations in produced lithium concentrations resulting from unanticipated reservoir heterogeneity.
- Operational variances within the LANXESS South Plant that adversely impact the quality of the Feed Brine beyond those conditions that have already been experienced during Demonstration Plant operations.
- Scalability from the Demonstration Plant to the commercial scale production.
- Obtaining all the necessary permits and authorizations on acceptable terms, in a timely manner.
- Variations in pricing of capital.
- Variations in lithium carbonate product price.
- Lithium brine royalty assessment by the AOGC is not completed in a timely manner and/or the royalty rates have a significant impact on project economics.
- Finalization of the definitive commercial agreements.
- Changes in laws and their implementation impacting activities on the Property.

26.0 RECOMMENDATIONS

The Qualified Persons involved in the Report make the following recommendations:

- Obtain and review any new log and core data collected in the West, Central, and South Brine Units which may become available in the future. Continue to monitor and analyze brine data from production wells in the South, Central and West Brine Units, in particular in relation to lithium concentration.
- Continue to monitor the LANXESS South Unit brine production performance. If field performance deviates materially from forecasts, make necessary adjustments to geologic and simulation models and revise forecasts.
- Continue test work at the Demonstration Plant with the objectives of:
  - obtaining further understanding of long-term process performance, in particular for the selected DLE technology and associated unit operations;
  - supporting detailed engineering, including alternative equipment evaluations, process optimizations and other cost saving opportunities; and,
  - increasing operating knowledge of the lithium extraction process and associated brine field operations in support of operator development and the future commercial operation of the Project (and subsequent developments).
- Continue to advance key permits and authorizations required for construction and operation of the Project, to ensure permits and authorizations remain off the critical path to commercial operation.
- Address the responsibility for pre-existing environmental conditions in commercial agreements.
- Continue the process of establishing project-specific lithium royalties (lease-fees-in-lieu-of-royalties) with the AOGC, in accordance with Arkansas Statute, to facilitate the commercial extraction of lithium.
- Evaluate and pursue additional federal and state incentive programs including sales tax credits, state and federal income tax reductions, government grants, and other Critical Mineral incentive programs which may be available to improve overall Project economics.
- Given the sensitivity of the Project economics to the product price, consider offtake pricing mechanisms to mitigate the commercial risk associated with short-term lithium price fluctuations.
- Finalize definitive commercial agreements with LANXESS and other parties which are required to support a positive Final Investment Decision.

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