

ORAL ARGUMENT NOT YET SCHEDULED

No. 22-1031

**IN THE UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT**

STATE OF TEXAS, STATE OF ALABAMA, STATE OF ALASKA, STATE OF
ARKANSAS, STATE OF INDIANA, STATE OF KENTUCKY, STATE OF
LOUISIANA, STATE OF MISSISSIPPI, STATE OF MISSOURI, STATE OF
MONTANA, STATE OF NEBRASKA, STATE OF OHIO, STATE OF
OKLAHOMA, STATE OF SOUTH CAROLINA, and STATE OF UTAH,
Petitioners,

v.

U.S. ENVIRONMENTAL PROTECTION AGENCY and
MICHAEL S. REGAN, in his official capacity as Administrator of the
U.S. Environmental Protection Agency,
Respondents,

ADVANCED ENERGY ECONOMY, ET AL.,
Intervenors.

On Petition for Review of a Final Agency Action of
the U.S. Environmental Protection Agency

**BRIEF OF AMICUS CURIAE THE SULPHUR INSTITUTE
IN SUPPORT OF PETITIONERS STATE OF TEXAS, ET AL.**

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DISCLOSURE STATEMENT PURUSANT TO CIRCUIT RULE 26.1

The Sulphur Institute is a non-profit trade association representing the interests of member companies associated with the sulphur industry. The Sulphur Institute has no parent companies. No publicly traded corporation has a 10% or greater ownership interest in The Sulphur Institute.

/s/ Eric P. Gotting
Eric P. Gotting

CERTIFICATE AS TO PARTIES, RULINGS, AND RELATED CASES**A. Parties, Intervenors, and Amici**

All parties, intervenors, and amici are listed in Petitioners' opening brief (Doc. #1972073).

B. Ruling Under Review

Revised 2023 and Later Model Year Light Duty Vehicle Greenhouse Gas Emissions Standards, 86 Fed. Reg. 74,434 (Dec. 20, 2021).

C. Related Cases

The only related cases of which counsel are aware are identified in Petitioners' opening brief (Doc. #1972073).

/s/ Eric P. Gotting
Eric P. Gotting

CERTIFICATE REGARDING SEPARATE AMICUS BRIEF

Pursuant to Circuit Rule 29(d), amicus certifies that a separate brief is necessary to provide the unique perspective of the sulphur industry and the impact that the U.S. Environmental Protection Agency's ("EPA") Clean Air Act ("CAA") revised greenhouse gas emissions standards for light-duty vehicles will have on the refining industry and sulphur supplies in this country.

/s/ Eric P. Gotting
Eric P. Gotting

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GLOSSARY

CAA – Clean Air Act

EPA – U.S. Environmental Protection Agency

USGS – United States Geological Service

INTEREST OF AMICUS CURIAE¹

The Sulphur Institute is a non-profit trade organization representing sixty (60) global member companies involved with producing, consuming, marketing, transporting, or otherwise adding value to elemental sulphur, sulphuric acid, and sulphur-related agricultural products. Founded in 1960, The Sulphur Institute currently focuses on: (i) sharing and promoting within the group's membership excellence in supply chain operations, including the safe and efficient handling, storage, and logistics practices for sulphur; (ii) providing information to governmental authorities in the U.S. and abroad as they contemplate and develop regulatory frameworks for sulphur and its value-added applications; and (iii) expanding the public's knowledge regarding the benefits of sulphur and sulphur-related issues.

Sulphur is a valuable commodity and integral component of the U.S. and world economies. It is used to manufacture numerous products, including fertilizers, chemicals, paints, rubber products, medicines, fibers, sugar, detergents, plastics, paper, and many other products. Sulphur also is a vital nutrient for crops making up much of our nation's food chain. The sulphur industry reaches far into countless sectors of this country's economy, and without adequate sulphur

¹ This brief was not authored in whole or in part by counsel for any of the parties; no party or party's counsel contributed money for preparing or submitting this brief; and no one other than amicus curiae and its counsel have contributed money for preparing or submitting this brief.

supplies, stakeholders in supply and distribution chains in these other industries, including the consuming public, will be significantly impacted.

The Biden Administration, however, has recently taken regulatory actions aimed at the motor vehicle industry and the use of internal combustion engines that will substantially limit the availability of sulphur in the U.S. Our main source of sulphur is not from mining and extraction, but rather from oil refining and natural gas processing, from which refiners recover sulphur to limit emissions of the chemical into the environment. But the Biden Administration has recently issued three federal rules that will force the motor vehicle industry to make a significant shift from internal combustion engines to electric vehicles. Thus, as fuel consumption plummets, so will sulphur supplies.

In the instant case, Petitioners challenge one of those rules – the U.S. Environmental Protection Agency’s (“EPA”) revised and more stringent greenhouse gas emissions standards for light-duty vehicles for 2023 and later model years under the Clean Air Act (“CAA”). *See* 86 Fed. Reg. 74,434 (Dec. 30, 2021). These emissions standards revise standards previously set under the Trump Administration in April 2020.²

The Sulphur Institute, as the global advocate for sulphur and related products, has a strong interest in the outcome of this litigation and is well-

² The two other rulemakings involve EPA granting a CAA pre-emption waiver to California, 87 Fed. Reg. 14,332 (March 14, 2022), and Corporate Average Fuel Economy standards established by the National Highway Traffic Safety Administration, 87 Fed. Reg. 25,710 (May 2, 2022).

positioned to provide the Court with insights into the industrial and social benefits of this chemical, as well as the adverse consequences of limiting sulphur supplies available to other industrial sectors, all factors that were not adequately considered by EPA in the instant rulemaking. Indeed, The Sulphur Institute is concerned that the Biden Administration's efforts to pursue a fundamental shift from internal combustion engines to electric vehicles without explicit authorization to do so from Congress is contrary to settled Supreme Court precedent, including *West Virginia v. EPA*, 597 U.S. ___, slip op. (2022), <https://tinyurl.com/mrx7cccx>, in which the Supreme Court established the "major questions" doctrine. Accordingly, The Sulphur Institute offers this *amicus* brief in support of Petitioners' challenge to EPA's greenhouse gas emissions standards for light-duty vehicles.

ARGUMENT

I. Throughout History Sulphur Has Played An Essential Role In Various Cultures And, More Recently, In Manufacturing Economies

Sulphur is a non-metallic chemical element that occurs naturally in the environment and has been known since Antiquity. As early as 2000 B.C., sulphur was used for bleaching linens, with the Egyptians also using the pigment from the bright yellow element in paintings circa 1600 B.C. The Romans used sulphur or fumes from its combustion as an insecticide and to purify sick rooms and cleanse

their air of evil.³ The same uses were reported by Homer in the Odyssey.⁴

Gunpowder was invented by Chinese alchemists in the 9th century by mixing elemental sulphur, charcoal, and saltpeter. The Greeks called the chemical the ion, Anglo-Saxons brimstone, and the Romans sulphur. Sitting at number sixteen on the periodic chart, sulphur is one of the world's most important elements.

In modern times, the varied suite of industrial products derived from sulphur is so fundamental and diverse that no comprehensive "value to mankind" estimates exist. Industries and product groups enabled by sulphur and sulphuric acid cut a large swath through the U.S. economy: construction materials, traditional batteries, rubber (vulcanization), pharmaceuticals, paper bleaching, water treatment, cosmetics/skin care, detergents, nylon, pigments, leather tanning, explosives and, most importantly, fertilizers. Indeed, sulphur is essential to everyday life.⁵

II. The Main Sources Of Sulphur In the United States Are The Same Refiners Who Produce Our Nation's Gasoline and Natural Gas

Until the last two decades, sulphur in this country was primarily mined from native sources in Texas and Louisiana through the Frasch Process. However, this technique of extracting sulphur from underground deposits required extensive energy to melt the sulphur and then pump the molten product to the earth's surface.

³ DONALD W. DAVIS AND RANDALL A. DETRO, FIRE AND BRIMSTONE: THE HISTORY OF MELTING LOUISIANA'S SULPHUR (1992).

⁴ HOMER, ODYSSEY 22.465 (A.T. Murray trans., Harvard Univ. Press 1919), <https://tinyurl.com/23ahszty>.

⁵ *Glossary*, THE SULPHUR INST., <https://tinyurl.com/bdz26v7c> (last visited Oct. 29, 2022).

U.S. Frasch production ceased in 2000, after nearly one century of operation.

Although native sulphur resources remain in place at Main Pass (Louisiana) and other U.S. locations, reopening of previously closed operations or development of new Frasch mines is highly unlikely.⁶ In fact, this type of sulphur extraction has declined over the last decade to less than 2% of world production.⁷ Thus, this country's manufacturing base requires another continuous source of sulphur.

Enter the Clean Air Act of 1970, in which Congress prioritized reducing the amount of pollution (or "criteria pollutants") emitted from motor vehicles and internal combustion engines.⁸ One of those criteria pollutants at the time was sulphur dioxide (SO₂) created from burning-off naturally occurring sulphur contained in oil.⁹ To prevent SO₂ from entering the atmosphere and to comply with the CAA, the energy industry began recovering sulphur from the oil refining process using the Claus Recovery Method. This technique, implemented through a

⁶ U.S. GEOLOGICAL SURVEY, MATERIALS FLOW OF SULPHUR 12-15 (2002), available at <https://tinyurl.com/368km5um>.

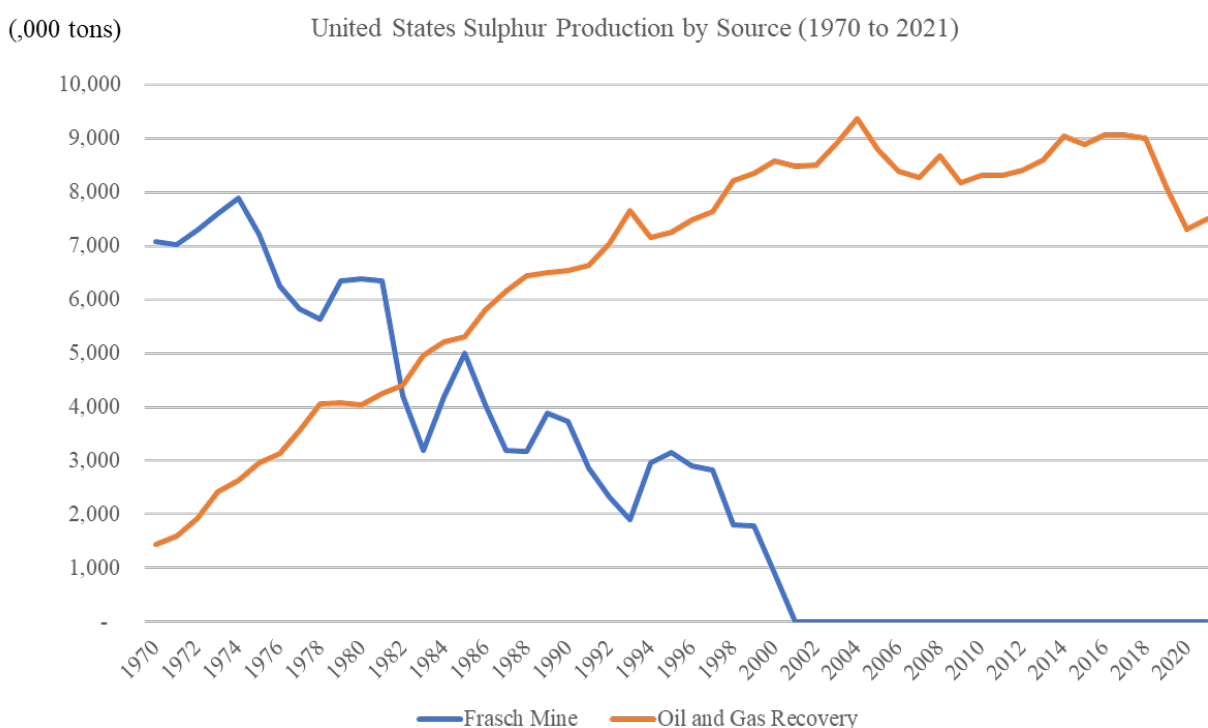
⁷ FAQ, THE SULPHUR INST., <https://www.sulphurinstitute.org/about-sulphur/faq/> (last visited Oct. 29, 2022).

⁸ See Clean Air Act of 1970, 42 U.S.C. §7521 (1970) (granting authority to EPA to regulate emissions of criteria pollutants from motor vehicles).

⁹ U.S. ENVTL. PROTECTION AGENCY, THE PLAIN ENGLISH GUIDE TO THE CLEAN AIR ACT (2015), available at <https://tinyurl.com/2fbajhpe>.

Sulphur Recovery Unit, extracts naturally occurring liquid sulphur from oil and gas streams to produce low-sulphur fuel used for internal combustion engines.¹⁰

The amount of sulphur produced by refiners is substantial. According to the United States Geological Service (“USGS”), since Frasch mining ceased in 2000, recovered sulphur production in the United States from oil refining and gas processing has averaged 8.5 million tons per year.



Source: United States Geological Survey (USGS)

Once extracted, the sulphur, now in molten form, is temporarily stored in a holding area at the refinery and then transported by either railcar or cargo tank truck to industrial facilities that make sulphuric acid. These facilities include

¹⁰ B. Gene Goar, Sulphur Recovery Technology, *Conference abstract* from AMERICAN INSTITUTE OF CHEMICAL ENGINEERS SPRING NATIONAL MEETING (Apr. 1986), available at <https://www.osti.gov/biblio/5599326>.

fertilizer plants, pulp and paper mills, copper smelters, sulphuric acid regeneration plants, and other chemical processing facilities.¹¹ And due to sulphuric acid production, sulphur ranks as one of the more important elements used as an industrial raw material. It is of prime importance to major sectors in the world's industrial and fertilizer complexes. Sulphuric acid production is the leading end use for sulphur, and consumption of sulphuric acid has been regarded as one of the best indexes of a nation's industrial development.¹² In fact, more sulphuric acid is produced in the U.S. every year than any other chemical.¹³

III. Sulphur Derived From The Refining Industry Serves As A Fundamental Crop Nutrient And Is Indispensable To The Success Of The U.S. Agricultural And Fertilizer Sectors

Sulphur is one of the 17 essential plant nutrients and is indispensable when it comes to plant growth and crop development. Among other benefits, sulphur: (i) aids in the formation of chlorophyll that permits photosynthesis through which plants produce starch, sugars, oils, fats, vitamins, and other compounds; (ii) serves as a building block for protein production; (iii) improves the synthesis of oils found

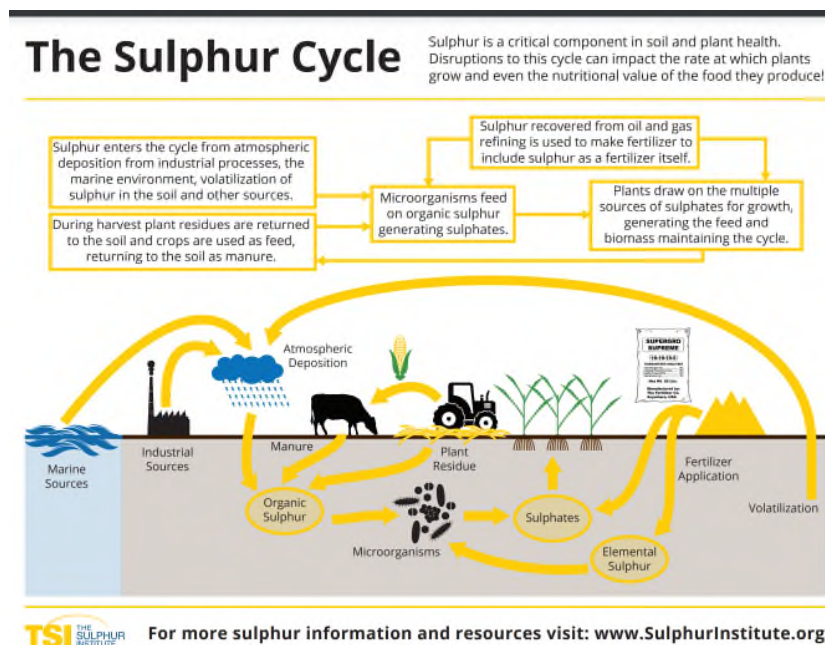
¹¹ *An Introduction to Sulphur*, THE SULPHUR INST., <https://www.sulphurinstitute.org/about-sulphur/introduction-to-sulphur/> (last visited Oct. 29, 2022).

¹² *Sulphur Statistics and Information*, U.S. GEOLOGICAL SURVEY, <https://tinyurl.com/a223krdk> (last visited Oct. 29, 2022).

¹³ *Id.*

in oilseeds; and (iv) increases crop yields and improves produce quality, which of course determine the market price ultimately realized by farmers.¹⁴

Ironically, while the CAA is the reason this country now has ample supplies of sulphur, it also had the unintended effect of reducing the amount of “free sulphur” available to the farmers as a crop nutrient. Sulphur from atmospheric deposition created from internal combustion engine exhaust and other industrial processes no longer fell from the sky onto the farmer’s fields, creating a sulphur deficiency in many crops throughout the U.S., as illustrated by The Sulphur Institute’s Sulphur Cycle infographic below.



Without atmospheric deposition there is not enough sulphur to aid in the growth of crops that feed the world like wheat, conola, beans and corn. Sulphur

¹⁴ *Sulphur – The Fourth Major Plant Nutrient*, THE SULPHUR INST., <https://tinyurl.com/2d777wdw> (last visited Oct. 29, 2022).

deficiencies in crops are apparent through the yellowing of the edges of the leaves, thus producing a plant that appears sick and unnourished.¹⁵



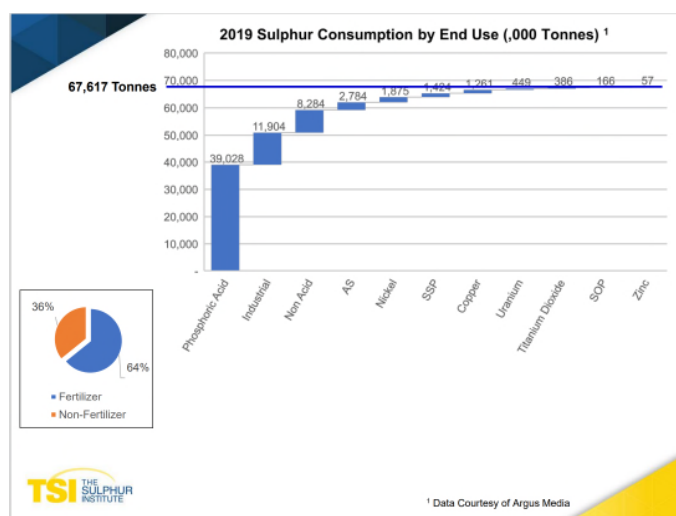
Farmers therefore had to replace these sulphur deficiencies, and The Sulphur Institute, academia, and the fertilizer industry responded accordingly. Throughout the 1980s and 1990s, The Sulphur Institute, in cooperation with many other agricultural research entities conducted studies on sulphur crop nutrition. Time and again, research proved that sulphur is a necessary nutrient, not solely on its own, but also in aiding plant uptake of other nutrients like nitrogen, phosphate, and potassium. The results of many of these studies can be viewed on the publication page of The Sulphur Institute's website.¹⁶ For example, increased yields are evident in several key US crops:

¹⁵ Ronnie W. Heiniger et al., *Sulphur Deficiency Symptoms in Emerging Corn (Updated 2018)*, NC STATE EXTENSION, <https://tinyurl.com/mw686emy> (last visited Oct. 29, 2022).

¹⁶ *Publications*, THE SULPHUR INST., <https://www.sulphurinstitute.org/publications/> (last visited Oct. 29, 2022).

	Increase in Yield (bushel/acre) ¹⁷
<u>Crop</u>	<u>Sulphur enhanced fertilizer compared to phosphate fertilizer</u>
Corn	6.7 bu/ac
Soybeans	2.3 bu/ac
Canola	5.4 bu/ac
Wheat	2.0 bu/ac with improved nutritional value

It is no surprise, then, that one of the major applications of sulphur-based sulphuric acid is in the production of phosphate fertilizers. In 2019, 64% of all sulphur produced globally was used in the production of phosphate and other fertilizers, as illustrated below:



Indeed, there are over two dozen fertilizers on the market that contain sulphur or sulphate as an active ingredient. The Sulphur Institute lists these in

¹⁷ *There Is Only One MicroEssentials*, CROP NUTRITION FROM THE MOSAIC COMPANY, <https://www.cropnutrition.com/microessentials/performance> (last visited Oct. 29, 2022).

generic terms,¹⁸ however key fertilizer industry stakeholders each have branded trade names that benefit farmers and improve crop yields. These benefits can be found on individual company websites like Mosaic’s MicroEssentials®,¹⁹ Nutrien’s Smart Nutrition,²⁰ and Simplot’s Agropell product lines.²¹ For instance, Simplot identifies sulphur’s advantages as “mak[ing] soils more friable, improv[ing] moisture penetration, aid[ing] in crop residue breakdown, increase[ing] the availability of other nutrients and help[ing] reclaim alkaline soils.”²²

As a result, all of this has a sizable impact on the U.S. economy. According to The Fertilizer Institute, there are 487,330 fertilizer industry related jobs in the U.S. with wage earnings of \$34.31 billion. Additionally, there is an economic impact of \$130 billion to the US economy.²³ Likewise, major crops such as corn, wheat, and soybeans all benefit from a healthy sulphur supply chain, which in turn generates thousands of jobs and billions of dollars in economic output for the U.S.

¹⁸ *Sulphur – a Dynamic Nutrient in Chinese Agriculture*, THE SULPHUR INST. (2015), <https://tinyurl.com/yj4fxzkn>.

¹⁹ *MicroEssentials Phosphate Fertilizer*, CROP NUTRITION FROM THE MOSAIC COMPANY, <https://www.cropnutrition.com/microessentials> (last visited Oct. 29, 2022).

²⁰ *The Most Efficient Sulphur and Phosphate for Crops*, Smart Nutrition, <https://smartrnutritionmst.com/> (last visited Oct. 29, 2022).

²¹ J.R. SIMPLOT COMPANY, AGROPELL PRODUCT DATA SHEET (2014), *available at* <https://tinyurl.com/kutryrc7>.

²² *Id.*

²³ *Fertilizer Grows Jobs: Feeding Crops While Growing the U.S. Economy*, THE FERTILIZER INST. (2020), <http://economicimpact.tfi.org/>.

According to the United Soybean Board, the total economic impact from the soybean sector is \$115.8 billion annually, with this sector supporting an average of 357,000 people, comprising 280,000 paid, full-time equivalent jobs, as well as an additional 78,000 family members, beyond growers themselves, who support and are supported by soybean farming operations. The total wage impact of the sector averaged \$11.6 billion.²⁴ Similar economic benefits are seen with corn and wheat. The National Corn Growers Association reports that, in 2021, the total U.S. corn crop value was \$82.38 billion, with total revenue per acre reaching \$965/acre.²⁵ In 2020-2021, wheat had a total production value of \$11.9 billion.²⁶

Yet, without adequate sulphur stocks generated by the petroleum and natural gas refining sector, such economic benefits will be placed in jeopardy.

IV. Paradoxically, The Biden Administration's Goals For Enhanced Electric Vehicle Production And Use Will Require Increased Sulphur Supplies While At The Same Time Reducing Domestic Sulphur Production From Refiners And Natural Gas Processors

Sulphur is also in high demand for the extraction of metals necessary for electric vehicle batteries, primarily copper and lithium, which will only increase as the Biden Administration seeks a market shift from internal combustion engines to electric vehicles. The U.S. copper industry is anticipated to grow by 3.0% in 2022

²⁴ *Homepage*, UNITED SOYBEAN BOARD, <https://www.unitedsoybean.org/> (last visited Oct. 29, 2022).

²⁵ *World of Corn*, NAT'L CORN GROWERS ASS'N, <https://www.ncga.com/world-of-corn> (last visited Oct. 29, 2022).

²⁶ M. Shahbandeh, *Total U.S. Wheat Production Value from 2000 to 2021*, STATISTA (May 6, 2021), <https://tinyurl.com/4mm5be8c>.

and continue to grow annually by 3.3% by 2026.²⁷ Sulphur is consumed by U.S. copper manufacturers who burn sulphur to produce sulphuric acid for use in copper smelters. Approximately 1.4 million tons of sulphur is required for U.S. copper production. This number is based on confidential data reported from The Sulphur Institute's member companies. The increase in copper production just in 2022 and 2023 will increase U.S. sulphur consumption for copper by 85,000 tons, in part to make electric vehicle batteries.

Moreover, lithium is extracted from ore through the leaching process. This technique uses a series of vats where crushed ore is leached for several days with diluted sulphuric acid. On October 19, 2022, the White House launched the “*American Battery Materials Initiative*” to Strengthen Critical Mineral Supply Chains, with a goal of developing enough battery-grade lithium to supply approximately 2 million electric vehicles annually.²⁸ As one of the key stakeholders for the President's initiative, the U.S. Department of Energy has set forth a “Vision for the Lithium-Battery Supply Chain by 2030,” in which:

the United States and its partners will establish a secure battery materials and technology supply chain that supports long-term U.S. economic competitiveness and equitable job creation, enables

²⁷ GlobalData, *US Copper Output to Grow by 3% in 2022, Backed by Output from Freeport-McMoRan*, MINING TECHNOLOGY (July 29, 2022), <https://tinyurl.com/nhc6y48x>.

²⁸ THE WHITE HOUSE, FACT SHEET: BIDEN-HARRIS ADMINISTRATION DRIVING U.S. BATTERY MANUFACTURING AND GOOD-PAYING JOBS (Oct. 19, 2022), *available at* <https://tinyurl.com/4e6dhvs2>.

*decarbonization, advances social justice, and meets national security requirements.*²⁹

Already, the lithium industry is expanding to meet this goal. Today, there is one active lithium mine in the U.S. and two more mines in the advanced permitting phase with production likely to start in the 2023 timeframe. The Sulphur Institute has had discussions with key executives at these sites and it is estimated 250,000 tons of sulphur annually is needed for the vat leaching process. With one mine operational, two mines near operational and three more sites under exploration, it is estimated that the sulphur demand for lithium mining will exceed 1.5 million tons of sulphur annually, or 21% of current sulphur production in the U.S.

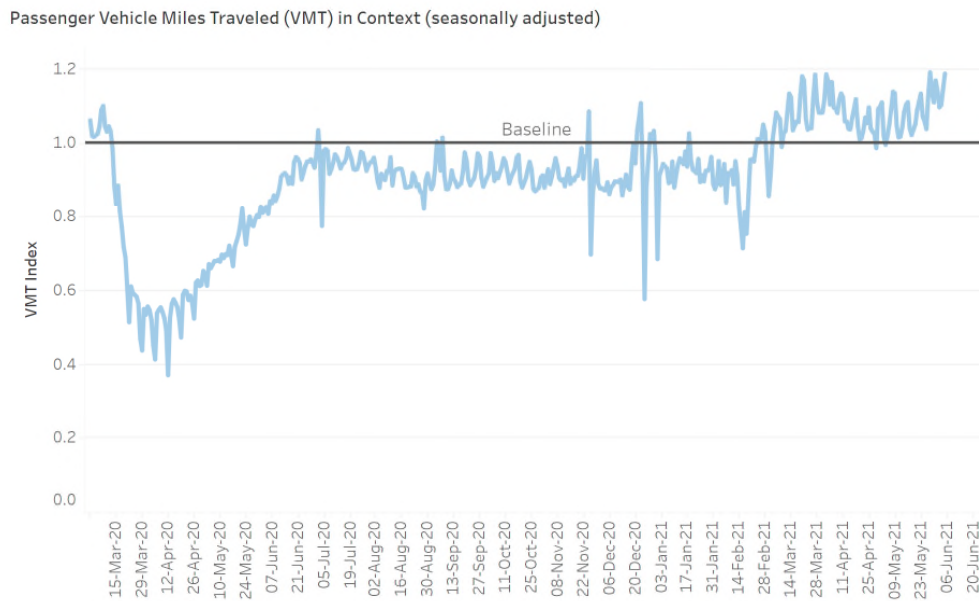
The irony of all this is that sulphur, recovered from the oil refining process for use in internal combustion engines, is required for extraction of lithium,³⁰ increasing future demand for sulphur in an ever-decreasing supply environment in the U.S.³¹ Indeed, the direct impact of a decrease in gasoline consumption on sulphur supplies is readily apparent. According to the Bureau of Transportation Statistics, during the COVID-19 pandemic, there was a significant decrease in

²⁹ *National Blueprint for Lithium Batteries*, DEP'T. OF ENERGY, VEHICLE TECHNOLOGIES OFFICE (June 7, 2021), <https://tinyurl.com/3kr9sne8>.

³⁰ Jie Guan et al., *Extracting Lithium from the H₂SO₄ Leaching Solution of Bauxitic Claystone via Co-Precipitation Methods Without Addition of Al Source*, CHEMICAL ENGINEERS J. ADVANCES, Mar. 2022.

³¹ U.S. GEOLOGICAL SURVEY, MINERAL COMMODITY SUMMARIES: SULPHUR (Jan. 2022) available at <https://tinyurl.com/2unjkt5>.

passenger travel.³²



With reduced demand for gasoline, there was also a direct correlation between refinery output and sulphur supply necessary for the dozens of industries that require the chemical as an industrial raw material. According to the USGS, U.S. sulphur production during 2020 dropped by 1.7 million tons annually from previous years due to scaled back refining during the pandemic.³³

It is easy to see, then, that the mandating of electric vehicles will further reduce refining of fossil fuel and the production of domestic sulphur, making the U.S. reliant on international supply chains for sulphur. In fact, importing sulphur is in direct conflict with the Biden Administration's National Blueprint for Lithium Batteries 2021-2030, which states that "a domestic supply chain for lithium-based

³² *Daily Vehicle Travel During the COVID-19 Public Health Emergency*, U.S. DEP'T. OF TRANSP., BUREAU OF TRANSP. STATISTICS (July 21, 2020), <https://www.bts.gov/covid-19/daily-vehicle-travel>.

³³ U.S. GEOLOGICAL SURVEY, *supra* note 31.

batteries requires a national commitment to both solving breakthrough scientific challenges for new materials and developing a manufacturing base that meets the demands of the growing electric vehicle (EV) and stationary grid storage markets.”³⁴

Yet again, by forcing a marketplace switch from internal combustion engines to electric vehicles, numerous industrial and manufacturing sectors, and even the battery industry at the heart of electric vehicles, will be adversely impacted.

CONCLUSION

Sulphur is just one of the many supply chains that would be substantially affected by reduced gas production as a result of mandated electric vehicle production. The reduction of sulphur will not only affect agricultural production in the U.S. but also extraction of key minerals like lithium having profound implications for the nation’s economy, many industries, and society, all in apparent contradiction of the Supreme Court’s “major questions” doctrine as set forth in decisions like *West Virginia v. EPA*. The Sulphur Institute therefore asks this Court to set aside EPA’s revised emissions standards for light-duty vehicles.

Dated: November 10, 2022

³⁴ U.S. DEP’T. OF ENERGY, NO. EE-2348, NATIONAL BLUEPRINT FOR LITHIUM BATTERIES 2021-2030: EXECUTIVE SUMMARY (June 2021), *available at* <https://tinyurl.com/mv8dwvwp>.

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CERTIFICATE OF COMPLIANCE

This brief complies with the type-volume limitation of Fed. R. App. P. 29(a)(5) because it contains 3191 words, excluding the parts of the brief exempted by Fed. R. App. P. 32(f).

This brief complies with the typeface requirements of Fed. R. App. P. 32(a)(5)(A) because it has been prepared in a proportionally spaced typeface using Microsoft Word in Times New Roman (14-point).

/s/ Eric P. Gotting
Eric P. Gotting

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I hereby certify that on November 10, 2022, I electronically filed the foregoing with the Clerk of the Court for the U.S. Court of Appeals for the District of Columbia Circuit by using the CM/ECF system. All participants in this case are registered CM/ECF users and will be served by the CM/ECF system.

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